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August 1, 2002

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Division of Hazardous Waste Remediation
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SUBJECT: **Seneca Army Depot Activity, Final Action Memorandum and Final Decision Document for Time-Critical Removal Actions, Three VOC Sites (SWMUs SEAD-38, SEAD-39, and SEAD-40) at Seneca Army Depot Activity, Romulus, New York.**

Dear Mr. Vazquez / Ms. Thorne:

Parsons Engineering Science, Inc. (Parsons) is pleased to submit copies of the Final Action Memorandum and Final Decision Document for Time-Critical Removal Actions, Three VOC Sites (i.e., SWMUs SEADs 38, 39, and 40) at the Seneca Army Depot Activity in Romulus, New York.

Should you have any questions, please do not hesitate to call me at (781) 401-2229 to discuss them.

Sincerely,

PARSONS

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U.S. ARMY ENGINEER DIVISION
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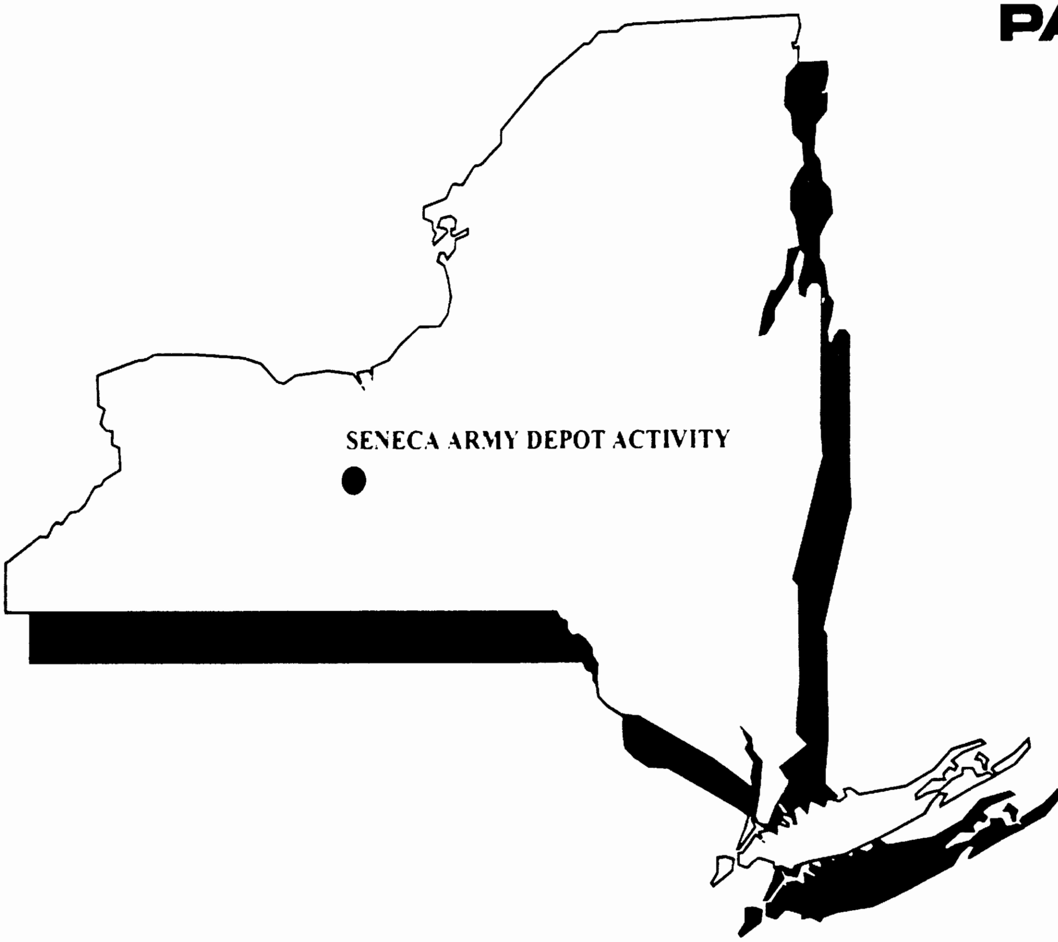

FINAL

ACTION MEMORANDUM and DECISION DOCUMENT TIME-CRITICAL REMOVAL ACTIONS, THREE VOC SITES (SEADs 38, 39, & 40)

CONTRACT NO. DACA87-95-D-0031
DELIVERY ORDER NO. 14

AUGUST 2002

FINAL
ACTION MEMORANDUM
TIME-CRITICAL REMOVAL ACTIONS, THREE VOC SITES

SWMUs SEAD-38, SEAD-39, and SEAD-40
SENECA ARMY DEPOT ACTIVITY

Prepared for:

Seneca Army Depot Activity
Romulus, New York

and

US Army Corp of Engineers
Huntsville Center

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Contract No. DACA87-95-D-0031
Delivery Order 14
734505

AUGUST 2002

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1 PURPOSE

The purpose of this Action Memorandum is to request and document approval of proposed time-critical removal actions at three solid waste management units (SWMUs) that are located at the Seneca Army Depot Activity (SEDA) in Romulus, Seneca County, New York. The three SWMUs, designated as SEADs 38, 39, and 40, are historic boiler blowdown sites where limited sets of available data (typically less than 10 samples per site) suggest that soils have been contaminated with total petroleum hydrocarbon (TPH) materials. If soil is contaminated with TPH type materials, the US Army (Army) believes that there is a possibility that volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals may also be present, and exist at levels that might pose a continuing risk to surrounding populations and the environment.

Due to the limited data available, it is the Army's intention to conduct initial, focused time-critical removal actions that are limited to those areas where it believes there is the greatest likelihood that boiler blowdown liquids were previously discharged. The initial extent of the proposed actions will be based on mapping derived from the preliminary site investigations completed for each site, subsequently on field observations and screening, and finally on the collection and assessment of data through confirmational sampling and analysis. Once the initial limited removal actions are completed at each site, confirmational samples of soils remaining at the base and perimeter of the excavation will be obtained, analyzed, and compared to New York State Department of Environmental Conservation's (NYSDEC's) recommended soil cleanup objective values for VOCs, SVOCs, and metals. If additional excavation is warranted based on the review of confirmational sample results, it will be performed and verified by a subsequent verification sampling and analysis sequence.

The SEDA is closed as a result of the Department of Defense's (DoD's) Base Realignment and Closure (BRAC) process, and the land encompassing and surrounding these SWMUs is in the process of being returned to the community for beneficial reuse purposes. Since the termination of the military presence at the SEDA in July 2000, security at the depot has decreased while the presence of personnel has increased due to reuse. Although an informational program has disclosed the presence of various sites within the reuse areas, the potential threat of contaminants in these areas to human health and the environment remains of concern to the Army. Since 1992, the SEDA has been listed as a CERCLA federal facility. A Federal Facilities Agreement (FFA) describes the process that has been used to perform investigations and remediation of sites located at the depot. Section 11 of the FFA describes removal actions as a viable option for eliminating possible threats. The Army intends to implement focused time-critical removal actions at these three sites to expedite the closure process and lessen, and perhaps eliminate, any possible threats, current or future, that these sites may pose to human health and the environment. These sites are comparatively small, with localized impacts that can be effectively addressed via the removal process. Completion of the time-critical removal actions will facilitate transfer of these properties in the future for beneficial reuse. If approved, the proposed time-critical removal actions will be initiated and completed by contractors working under contract to the Army.

2 SITE CONDITIONS AND BACKGROUND

2.1 SITE DESCRIPTIONS

SEAD-38 is a historic blowdown leaching area that was located north-northwest of Building 2079, which currently is an abandoned boiler plant located in the southwestern portion of SEDA. SEAD-39 is a historic blowdown leaching area that was located exterior and north of Building 121 that is an active boiler plant located in the administrative area of SEDA. SEAD-40 is a historic blowdown leaching area that was located north of Building 319 that is an active boiler plant located on First Street at the SEDA. SEAD-38 is located in a portion of the SEDA where the future land use is designated as conservation/recreational, while SEADs 39 and 40 are both located in that portion of the Depot where the future land use is designated as planned industrial development. The locations of the three SEADs are presented on **Figure 1**.

2.2 HISTORY OF SITES

Between the time when the boilers were installed and 1979 – 1980, when all blowdown points were connected to the Depot's sanitary sewer system, each of the boilers discharged a total of 400 to 800 gallons per day of blowdown liquids. The discharged liquid was allowed to flow into nearby drainage ditches where it either infiltrated into the ground or mixed with other storm or snowmelt flow. It is presumed that the released boiler blowdown liquid contained water, tannins, caustic soda (sodium hydroxide), and sodium phosphate.

2.3 PREVIOUS INVESTIGATIONS AT SITES

Limited sampling programs were conducted within each of the three SWMUs during 1993 – 1994. Each investigation consisted of the advancement and sampling of one soil boring and the collection of a limited number of surface soil samples. Typically, each soil boring was terminated at the weathered bedrock's surface and one soil sample was recovered from each boring and sent to the laboratory for analyses. The sample of soil recovered from each boring was selected either from the horizon where staining or volatile organic compounds were detected using field screening equipment, from the horizon immediately above the water table, or from the deepest depth from which sufficient volume of sample was obtained for analytical purposes. All collected soil samples were sent to a laboratory where analyses for total petroleum hydrocarbons [i.e., TPH by Environmental Protection Agency (EPA) Method 418.1], pH (EPA SW-846 Method 9045) and percent solids were performed.

2.4 INVESTIGATION RESULTS

Total petroleum hydrocarbons (TPH) were detected in all of the soil samples collected from SEADs 38, 39 and 40. Generally, the highest concentrations of TPH were found in the shallow soils at each of the SEADs. The detection of TPH in the samples suggests that releases of organic constituents may have occurred at each of the sites, and the continued presence of TPH at each of these sites after more that 15 years suggests that natural degradation processes and volatilization may not have completely eliminated the volatile and semivolatile organic compounds that may have been associated with the boiler blowdown.

Currently, the existing data is sufficient to define where preliminary removal actions may be implemented. Supplemental data, collected during the actual excavation and the subsequent rounds of confirmational sampling and analysis, will be used to confirm the full extent of the necessary removal actions.

2.5 BASIS OF THE PROPOSED REMOVAL ACTIONS

The Army's intent, initially, is to conduct limited time-critical removal actions at locations where it believes there is greatest likelihood that boiler blowdown liquids were historically discharged. Once the initial, focused removal actions are completed, confirmational samples will be collected from the perimeter and base of the excavation and these samples will be analyzed for selected VOCs (i.e., benzene, toluene, ethyl benzene, and xylene - BTEX), selected SVOCs (i.e., polynuclear aromatic hydrocarbons – PAHs) and selected metals (i.e., the eight "RCRA" metals, arsenic, barium, cadmium, chromium, lead, mercury, nickel, and selenium). Data obtained from the confirmational sampling and analysis process will be compared to NYSDEC's soil cleanup objective levels identified in Technical and Administrative Guidance Memorandum (TAGM) # 4046.

At SEAD-38, the initial focus of the proposed removal action will be centered on a portion of the drainage ditch that is located north-northwest of Building 2079. Available information indicates that a buried pipe extended from Building 2079 to this area, and that it was used to convey blowdown liquids to the ditch when released. Two samples were collected from this drainage ditch during the limited site investigation, one at location SB38-1, near the mouth of the discharge pipe, at a depth of 2-4 feet below grade surface (bgs) and the second at location SS38-1, at a depth of 0-0.2 feet (0 to 2 or 3 inches) bgs. Results from the soil boring sample indicate that TPH was present at a level of 85 parts per million (ppm), while the results of the shallow soil sample indicates that TPH was found at a level of 1,840 ppm. Based on the data, it appears, initially, that TPH contamination is not significant at depth, but available data does suggest that TPH contamination has moved downgradient over the top of the soil in drainage ditch. Based on these data, an excavation measuring roughly 100 feet long (i.e., 50 feet on either side of the shallow soil sample) by 3 feet wide by 1 foot deep is recommended. This portion of the action focuses on the removal of TPH contaminated soil that may also contain residual concentrations of VOCs and SVOCs.

A second area is also of potential concern at SEAD-38. This area is located in the vicinity of where sample SS38-3 was collected during the limited site investigation. Resulting data for this sampling indicates that a TPH concentration in excess of 1,900 ppm was detected. However, no information has been found to suggest that boiler blowdown was discharged at, or near, this point. Therefore, a "hot spot" removal operation in an area measuring 10 feet by 10 feet by 1 foot deep is recommended. Once the initial excavations are completed at both areas in SEAD-38, field observations and screening, and confirmational sampling and analyses will be used to define the full extent of the needed excavations.

At SEAD-40, available information indicates that a buried pipe carried blowdown liquids from Building 319 to the drainage ditch that is located to the north of the building. Therefore, the primary focus of the proposed, limited removal action at SEAD-40 is on the drainage ditch where the blowdown liquids may have been released. Review of the available data from the drainage ditch (i.e., locations SS40-1, SS40-3, SS40-4, and SB40-1) shows that there are concentrations of TPH in excess of 1,000 ppm at location SB40-1 (4-6 feet bgs) and at location SS40-4 (0-0.2 feet bgs). These results provide the basis for the excavation that is planned by the Army to remove TPH, and potentially, volatile and semivolatile organic and metal constituent-contaminated soil from this area. An area measuring 10 feet long by 2 feet wide by 6 feet deep will be advanced as the first part of the excavation to address the elevated concentrations of TPH found in the deep sample (i.e., SB40-1). Subsequently, an extended excavation measuring 110 feet long by 2 feet wide by 1 foot deep is proposed to address the TPH impacts identified in the drainage ditch soils based on the results collected for SS40-4.

A "hot spot" removal will also be conducted in the vicinity of former sampling location SS40-2 where historic data indicates that a concentration of 420 ppm of TPH was found. This excavation will initially be limited to an area of 10 feet by 10 feet by 1 foot deep.

Once the three initial excavations are completed, the completion of the removal action at SEAD-40 will be confirmed by field observation and screening, and by the collection and analysis of confirmational samples for volatile organic, semivolatile organic and metals content. Resulting data will be compared to NYSDEC's recommended soil cleanup objectives identified in TAGM # 4046.

At SEAD-39, insufficient information is available to describe where the boiler blowdown was historically discharged and how it was subsequently conveyed to and through the former leaching area. Thus, the extent of the initial proposed excavation encompasses the full area where the suspected blowdown liquid may have been discharged, which was investigated during the limited sampling program. All of the soil in the top foot will be removed, with two piles being created: one containing the top six inches of soil which is believed to be new fill and loam applied to the area after the blowdown process was connected to the sewer, while the second will contain the six inches of soil that underlies the top six inches of soil and which is believed to have been resident when the historic blowdown process was performed. Each six inch layer of soil represents approximately 18.5 cubic yards (yd^3) of soil. Once the area is opened, field observations, screening and confirmational sampling and analyses will be used to determine the full extent of the excavation needed to address TPH and other potential contamination (volatile and semivolatile organic and metals) that may exist at SEAD-39.

At least five confirmational samples, including one from the base and either one each from the four perimeter walls or one each from the surface surrounding the individual excavations, will be collected at each trench or pit that is opened at the individual SWMUs. Confirmational samples will be collected from the sidewalls of the excavation if the depth of the excavation is greater than 12 inches; confirmational samples will be collected from the soil surrounding the excavation opening if the excavation is less than or equal to 12 inches deep. Due to the limited size of the planned excavations, additional confirmational samples will be collected at a rate of:

- one sample per each 900 square foot (e.g., 30 foot by 30 foot surface) area or fraction thereof, of exposed excavation surface present on any individual excavation face, or for narrow, extended length excavations (e.g., drainage ditches), one sample for each 50 foot or less length of excavation; and
- one sample per each 30 linear feet of excavation perimeter present on any excavation that measures 12

inches or less deep.

Based on the proposed sampling frequency described above, 17 confirmational samples, plus associated quality assurance/quality control (QA/QC) samples, will be collected and analyzed from the two excavations planned at SEAD-38. Twenty-two samples, plus associated QA/QC samples, will initially be collected from the three excavations proposed at SEAD-40; and eight samples, plus associated QA/QC samples, will be collected from the proposed excavation at SEAD-39. All confirmational samples will be collected as discrete, grab samples, and these will be biased towards locations suspected to be contaminated based on the results of field screening, field observations, or professional judgment. Additional confirmational samples will be collected from any area observed to be visibly stained or exhibiting organic compound odors. Each of the collected samples will be analyzed for BTEX VOCs via EPA SW-846 Method 8021, for PAHs via EPA SW-846 Method 8270B, and for the eight "RCRA" metals via EPA Method 6010B et al. Confirmational samples will be analyzed by a NYSDEC certified laboratory according to NYSDEC and EPA approved procedures. Additional details of the proposed confirmational sampling are provided in Appendix B of this document.

Samples of excavated soil that is stockpiled at the site, pending off-site disposal, will also be collected and analyzed for disposal determination purposes. One sample will be collected for each 150 yd^3 or less of soil that is staged in a pile awaiting disposal. Soils with concentration of VOCs, SVOCs, or metals exceeding NYSDEC's recommended cleanup goals (i.e., TAGM # 4046 concentrations) will be disposed at an offsite facility. These soils will also be analyzed for the characteristic of toxicity via the Toxicity Characteristic Leaching Procedure (TCLP) (every 150 yd^3) which is required for landfill disposal.

3 THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

VOC, SVOC and metal residues associated with identified residual TPH concentrations measured in site soil at each of the three boiler blowdown sites may be mobilized and move away from the identified sites via stormwater run-off or via infiltration into the underlying soil and groundwater. Additionally, the pending release of land within the SEDA back to the community for beneficial reuse will provide greater access to any level of residual contamination that is present at each site. Greater access to each of the sites may provide increased levels of human exposure to residual concentrations of TPH remaining in the soil.

Numerous private drinking water wells are located in proximity (less than 1 mile) to each of the three suspected release areas. Thus, should VOCs, SVOCs, or metal constituents exist in the identified TPH releases, they could enter the groundwater via infiltration and subsequently impact water supplies used by human and neighboring populations of livestock.

The identified release points for two of the three boiler operations were into man-made drainage ditches that are located upgradient of receiving streams that flow through the Depot. Although the man-made drainage ditches are designed to function as infiltration galleries in which captured storm water is channeled away from high-traffic or active areas and transported to locations where they may pond and infiltrate, there is a chance that contaminated soil could also spread to receiving waters (i.e., streams, creeks, or lakes) that are downstream of the man-made ditches and possibly result in adverse impacts to the water quality and the resident ecosystem.

The increased access by human to these three sites may also result in incidental contact with soils containing residual levels of petroleum hydrocarbon-type contaminants at each of these sites. Contact with the impacted soil may result in staining of skin or clothes or exposure to nuisance odors.

4 ENDANGERMENT DETERMINATION

Actual or threatened releases of pollutants and contaminants from these three sites, if not addressed by implementing the time-critical removal actions selected in this Action Memorandum, present a potential endangerment to public health, or welfare, or the environment.

5 PROPOSED ACTIONS AND ESTIMATED COSTS

The proposed time-critical removal action for TPH-contaminated soil found at each of the three SEADs is to excavate the contaminated soil, and to transport and dispose of it to an off-site, state-approved landfill for disposal. It is possible that the excavated soil could qualify to be used as cover material at the landfill, which would lessen the overall costs for disposal. The estimated amount of soil requiring excavation from each of the three SEADs is as follows: a) SEAD-38 – 15 cubic yards; b) SEAD-39 – 18.5 cubic yards; and c) SEAD-40 – 16.2 cubic yards or a combined total of approximately 50 cubic yards. The cost for excavation, transportation, disposal, and backfill and compaction is estimated to be $100 per ton. Additional project costs include mobilization, project oversight and management, monitoring, sampling and analysis and reporting. The total project cost, inclusive of all expected costs is estimated not to exceed $70,000. A more complete description of the proposed actions is provided in the Decision Documents: Time-Critical Removal Actions, Three VOC Sites (i.e., SWMUs SEAD-38, SEAD-39 and SEAD-40), which are attached as appendices to this Action Memorandum. The time-critical removal actions are proposed to eliminate other costs associated with future studies that may be needed to document site conditions and eliminate risk.

The completion and effectiveness of the time-critical removal actions will be assessed by conducting verification sampling and analyses at the location of each excavation. Confirmational samples will be collected from the base and either the sidewalls or the perimeter of each excavation, and the resulting samples will be analyzed to determine the concentration of VOCs, SVOCs, and metals that remain in the soil. The collected data will be compared to NYSDEC's recommended soil cleanup objective values as presented in the TAGM # 4046, dated January 1994. If data from the confirmational sampling and analysis indicate that soil that contains concentrations of VOCs, SVOCs, or metals exceeding permissible levels remains at the excavation site, the excavation will be expanded. Once confirmational sampling and analysis results indicate that soil surrounding and underlying the individual excavations is consistent with recommended soil cleanup objectives, the individual excavations will be backfilled with fill approved by the NYSDEC, compacted, re-graded and re-seeded to return the areas to their pre-action state.

The proposed excavation, transport, and disposal of the TPH-contaminated soils at state-approved landfills where they may be beneficially used as daily cover will place the contaminated soil into a more controlled environment. Placement of the contaminated soil into controlled environments will lessen the likelihood that contaminants contained can inadvertently enter the underlying groundwater supply via infiltration or migrate away from the site via storm water run-off.

A variety of other treatment and disposal alternatives/technologies were also considered for the remediation of the TPH-contaminated soils. These include: 1) bioventing; 2) vapor extraction; 3) solidification/stabilization; 4) land treatment or land farming; 5) biopiles; 6) soil washing; and 7) low temperature thermal desorption. Projected costs associated with these other alternatives and technologies were found to be higher than costs associated with the recommended excavation and disposal actions.

Treatment via biological means (e.g., biopiles, bioventing, land treatment or landfarming, etc.) were eliminated due to the following: 1) ancillary costs associated with performing treatment studies; 2) comparable costs associated with treatment technologies; and, 3) the fact that the continued presence of the petroleum hydrocarbons in the soil after more than 15 years indicates that the soil is not highly amenable to biodegradation. Comparably, treatment via vapor extraction requires pilot testing and the continued presence of the identified contaminants at the site suggests that the materials are not very volatile. Costs associated with thermal treatment are also expected to be high, especially given the limited quantity that would probably necessitate that the soil be transported off-site. Soil washing and solidification are considered to be more expensive per ton and involve additional analytical costs.

6 EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase the likelihood that populations entering the confines of the former SEDA facility as a result of the release of of surrounding properties under the BRAC process will have incidental contact with the residual petroleum hydrocarbons and any associated volatile organic, semivolatile organic, or metallic compounds that are present in the shallow soils. While severe or chronic health impacts are not anticipated, contact with the impacted soil may result in staining of skin or clothes, or exposure to nuisance odors.

7 OUTSTANDING POLICY ISSUES

None.

8 ENFORCEMENT

The Army conducted historic military mission related operations and activities in each of the three identified SWMUs (i.e., SEAD-38, -39 and -40) at SEDA that may have resulted in the release of petroleum hydrocarbon constituents (e.g., volatile and semivolatile organic compounds and metals) to the shallow and deeper soils in former blowdown leach pits. The Army is prepared to implement and complete the identified time-critical removal actions to remove residual contamination that may be present at the sites and to dispose of contaminated soil at a state-approved and monitored facility.

9 COORDINATION

This Action has been coordinated with the EPA Region II, NYSDEC, USACHPPM, and USAEC. The public was briefed during the 16 May 2001 Restoration Advisory Board Meeting.

10 RECOMMENDATION

This Action Memorandum defines and summarizes the Army's recommended time-critical removal action for excavating TPH contaminated soil at three former boiler blowdown leach pits (i.e., SEAD-38, -39, and –40) located at the SEDA in town of Romulus, Seneca County, New York. This Action Memorandum was developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based on the administrative record for the site. Conditions at the sites meet the NCP section 300.415(b)(2) criteria for a removal and the Army recommends your approval of the proposed removal actions. The total project ceiling if approved will be approximately $70,000, inclusive of mobilizations, oversight and management, monitoring, confirmatory sampling and analysis, and reporting.

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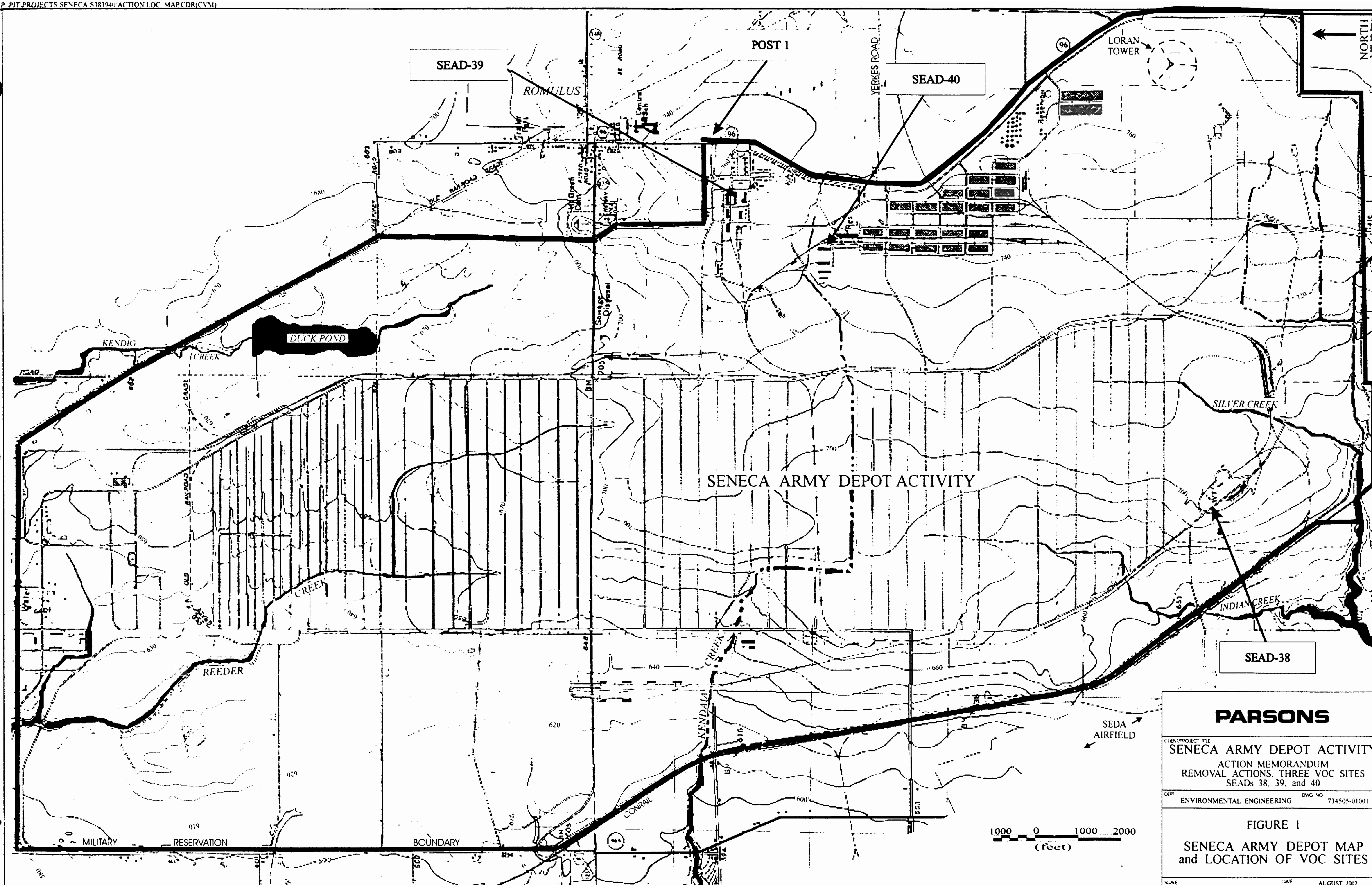

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SENECA ARMY DEPOT ACTIVITY

ACTION MEMORANDUM
REMOVAL ACTIONS, THREE VOC SITES
SEADs 38, 39, and 40

ENVIRONMENTAL ENGINEERING — DWG NO 734505-01001

FIGURE 1

SENECA ARMY DEPOT MAP and LOCATION OF VOC SITES

DATE AUGUST 2002

FINAL

DECISION DOCUMENT FOR TIME-CRITICAL REMOVAL ACTIONS, THREE VOC SITES SWMUs SEAD-38, SEAD-39, and SEAD-40 SENECA ARMY DEPOT ACTIVITY

Prepared for:

Seneca Army Depot Activity
Romulus, New York

and

US Army Corps of Engineers
Huntsville Center

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Delivery Order 14
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AUGUST 2002

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1 DECISION DOCUMENT FOR REMEDIAL ACTION AT SEAD-38

1.1 EXECUTIVE SUMMARY

A limited sampling program performed at SEAD-38, the Building 2079 Boiler Blowdown Leach Pit, at Seneca Army Depot Activity (SEDA) in Romulus, NY suggests that total petroleum hydrocarbon (TPH) compounds may have been released due to historic operations conducted in the area. This Decision Document presents and summarizes available data and the proposed plan for conducting a time-critical removal action at SEAD-38 to eliminate soil that may be contaminated with TPH or TPH-associated chemicals such as volatile and semivolatile organic compounds (i.e., VOCs and SVOCs, respectively) as well as metals. The objective of this removal action is to remove a potential threat to the environment and neighboring populations that may exist in the area due to the past release of TPH and associated compounds during boiler blowdown. This removal action is considered time-critical because the historic military mission of the Depot is now terminated and the Depot is officially closed. In accordance with provisions of the Department of Defense's (DoD's) Base Realignment and Closure (BRAC) process, the land and the facilities of the former Depot have been surveyed and evaluated, and prospective beneficial uses of the facility have been identified. Portions of the Depot have been released to the public and private sectors for reuse under the BRAC process, and additional areas will be released as other forms of beneficial reuse are identified. As more portions of the former Depot are released to public and private concerns for alternative uses, increased access will be afforded to all portions of the Depot, resulting in an equivalent increase in the potential for the exposure of populations to any residual chemicals that may be present at solid waste management units (SWMUs) remaining at the Depot pending clean-up. Therefore, the goal of the proposed time-critical removal action at SEAD-38 is to eliminate an identified source of petroleum hydrocarbon contamination, and other associated contaminants that may also be present, to remove or at least lessen, the magnitude of any potential threat may remain due to the historic discharge.

This Decision Document presents the removal action that was developed in accordance with the Federal Facility Agreement (FFA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Contingency Plan (NCP). Based upon the results of the limited sampling program, limited quantities of surface soil located in two roadside Man-made drainage ditches to the north-northwest and to the west of Building 2079 are currently known to contain concentrations of TPH. Based on these data, the US Army (Army) recommends that approximately 15 cubic yards (yd^3) of soil be removed from the ditches where blowdown liquids were discharged and that the excavated soil be transported to, and disposed at, a state-approved, off-site facility. Once the initial soil volume is removed, field observations (visual and olfactory) and screening and, confirmational sampling and analyses will be used to provide additional data regarding whether additional soil has been impacted by TPH-related compounds and thus, needs to be removed. Determination of whether additional soil needs to be removed will be based on the evaluation of the resulting data versus soil cleanup levels recommended by the New York State Department of Environmental Conservation (NYSDEC). If appropriate, additional soil will be excavated at each site, and the excavated soil will be disposed at off-site, state-approved facilities. Once the full extent of each excavation is confirmed and contaminated soil has been removed and disposed, the excavations will be backfilled with approved clean fill, re-contoured to match the pre-excavation terrain, and re-seeded to promote vegetation.

1.2 SITE BACKGROUND

1.2.1 Site Description

SEAD-38 is the blowdown leaching area that once was located to the north-northwest of Building 2079 (**Figure 1-1**). Building 2079 is an abandoned boiler plant located in the southwestern portion of SEDA, in a portion of the SEDA where the future land use is designated as conservation/recreational. The area encompassed by SEAD-38 is situated approximately 1,800 feet away from the nearest fence line that marks the Depot's boundary with neighboring properties.

Evidence of the historic leach pit is currently not visible. A drainage pipe that originates in Building 2079 is suspected to have once carried boiler blowdown liquids from the boiler plant to the roadside drainage ditch that is located approximately 100 feet to the north-northwest of Building 2079, which subsequently drains to the west. A second, smaller drainage ditch originates approximately 50 feet to the west of Building 2079 and drains to the northwest until it intercepts the larger roadside drainage ditch discussed above. The area between the Building 2079 and the two drainage ditches is a relatively flat and level, grassy field.

1.2.2 Site History

Between the time when the boilers were initially installed and 1979 – 1980, when all blowdown points were connected to the Depot's sanitary sewer system, the boilers discharged a total of 400 to 800 gallons of liquid per day. The discharge flow drained partly into nearby drainage ditches and partly into the ground. It is presumed that the boiler blowdown contained water, tannins, caustic soda (sodium hydroxide), and sodium phosphate.

1.3 PREVIOUS INVESTIGATIONS

1.3.1 Description of Sampling Program

A limited sampling program was performed in 1993 and 1994 to provide potential evidence of a release. One soil boring (i.e., SB38-1) was advanced in the roadside drainage ditch north-northwest of the northeast corner of Building 2079. The soil boring was located near the discharge end of the drainage pipe that originated in Building 2079 and is suspected to have historically transmitted blowdown liquids from the boilers to the ditch. The boring was terminated in weathered bedrock at a depth of 6.3 feet below grade surface (bgs) due to spoon refusal. The groundwater table was not encountered during the advancement and sampling of the boring. Volatile organic compounds were not detected with the field screening instrument, and no staining of the soil was observed in the samples recovered. The deepest soil sample recovered containing sufficient sample volume (i.e., 2-4 ft bgs) was submitted to the laboratory for chemical analysis.

One surface soil sample (SS38-1, 0-2 inch bgs) was collected from the base of the roadside drainage ditch downstream of the soil boring location and three surface soil samples (i.e., SS38-2 through 38-4, all 0-2 inch bgs) were collected from the grassy field between Building 2079 and the roadside drainage ditches. Chemical analyses completed on the recovered samples consisted of soil pH by Environmental Protection Agency (EPA) SW-846[1] Method 9045 and TPH by EPA Method 418.1[2]. The sample locations are shown in **Figure 1-1**.

1.3.2 Results of Sampling Program

The results of the limited soil sampling program are presented in **Table 1-1**. Total petroleum hydrocarbons were detected in the subsurface soil sample and in each of the surface soil samples. Surface soil samples SS38-2 and SS38-4 contained 104 and 110 parts per million (ppm) of TPH, respectively, and surface soil samples SS38-1 and SS38-3 contained significantly higher concentrations of 1,840 and 1,940 ppm, respectively. The subsurface soil sample SB38-1 contained 85 ppm of TPH. The pH of the soil samples ranged from 7.35 to 7.47 in the surface soil samples and was 8.93 in the subsurface soil sample.

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[1] US EPA Publication SW-846, "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.*"

[2] EPA 600/4-79-020, "*Methods for Chemical Analysis of Water and Wastes.*"

The detection of TPH in all of the samples suggests that a TPH release did occur. The low concentration of TPH found in the subsurface sample (i.e., 85 parts per million at SB38-1, 2-4 feet bgs) suggests that the TPH impacts diminish with depth. The absence of detailed analytical data from SEAD-38 limits the Army's ability to determine whether other contaminants may be present in the area of the observed levels of TPH detected in SEAD-38 soils.

1.4 REMEDIAL ACTION OBJECTIVES

The objective of the proposed remedial action at SEAD-38 is to remove soil located in two drainage ditches where existing data suggests that a release of TPH has occurred and where residual contamination may still reside and pose a continuing, potential threat to human health and the environment. The Army is proposing to perform a time-critical removal action to eliminate, or at least lessen, the magnitude of any potential threat that may still exist at SEAD-38 due to the release of historic blowdown liquids. The extent of the final excavation will be verified by field observation and screening, and by collecting and analyzing samples of the soil from the base and perimeter of the excavations conducted. Data resulting from the analysis of verification samples will be compared to NYSDEC's recommended soil cleanup objectives identified in the Technical and Administrative Guidance Memorandum (TAGM) # 4046 for VOCs, SVOCs and metals. Final determinations regarding the extent of the excavations advanced and the volume of soil removed under the proposed action will be based on the results of the aforementioned field observation/screening and comparison of data to soil cleanup objective levels. Once completed, all excavations will be backfill with approved, clean fill, re-graded to match surrounding terrain features, and re-seeded to reestablish vegetative cover.

This Decision Document identifies and presents alternatives that have been considered to eliminate or at least lessen, the magnitude of any potential threat that may exist at SEAD-38 due to the historic release of TPH and associated contaminants. Due to the Depot's change in status, and the current release of portions of the former Depot for beneficial reuses by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to reduce, and possibly eliminate, any potential threat that may still exist a the site due to the historic boiler blowdown operations.

It is currently anticipated that a limited amount of soil from the man-made drainage ditches located to the north-northwest and to the west of Building 2079 will be excavated and disposed as a result of the proposed action. The quantity of soil requiring excavation and disposal in the north-northwestern situated drainage ditch is currently estimated to encompass an area that measures 100 feet long by 3 feet wide by 1 foot deep or approximately 11.1 yd^3, while the extent of the soil requiring excavation and disposal in the western drainage ditch encompasses an area measuring roughly 10 feet long by 10 feet wide by 1 foot deep, or approximately 3.7 yd^3. Combined, the estimated volume of soil requiring excavation and disposal is approximately 15 yd^3. The extent of the planned areas requiring treatment is displayed on **Figure 1-1**.

Confirmation of the acceptability of the surrounding soil quality will be demonstrated by collecting and analyzing soil samples that will be analyzed for selected VOCs (i.e., benzene, toluene, ethyl benzene and xylene – BTEX), selected SVOCs (i.e., polynuclear aromatic hydrocarbons – PAHs), and the "RCRA" eight metals (i.e., arsenic, barium, cadmium, chromium, lead, mercury, nickel, and selenium) via NYSDEC and EPA accepted procedures. Data resulting from the confirmational sampling and analysis will be compared to soil cleanup objective levels identified and described in the New York State Department of Environmental Conservation's (NYSDEC's) Technical and Administrative Guidance Memorandum (TAGM) # 4046, dated January 1994.

If the results from the confirmatory sampling and analysis indicate that identified contaminant concentrations, if any are found to exist, are consistent with recommended cleanup objective levels or background concentrations found in the area, the removal operations will be terminated. The open excavation will be backfilled with approved, clean fill and re-contoured, once NYSDEC's approval is obtained. However, if the resulting data indicate that the surrounding or underlying soil contains contaminant concentrations in excess of cleanup objectives or background levels, the area of excavation will be expanded.

Samples of excavated soil that is stockpiled at the site, pending off-site disposal, will also be collected and analyzed for disposal determination purposes. One sample will be collected for each 150 yd^3 or less of soil that is staged in a pile awaiting disposal. Soils with concentration of VOCs, SVOCs, or metals exceeding NYSDEC's recommended cleanup goals (i.e., TAGM # 4046 concentrations) will be disposed at an offsite facility. These soils will also be analyzed for the characteristic of toxicity via the Toxicity Characteristic Leaching Procedure (TCLP) (every 150 yd^3) which is required for landfill disposal.

1.5 TREATMENT/DISPOSAL ALTERNATIVES FOR EXCAVATED SOIL

A variety of treatment and disposal alternatives/technologies are available for the treatment of the excavated petroleum-impacted soils from SEAD-38. These include:

- bioventing
- vapor extraction
- solidification/stabilization
- land treatment or land farming
- biopiles

- soil washing
- low temperature thermal desorption and
- off-site disposal

A brief overview of these alternatives is provided below.

Bioventing

Bioventing is an in-situ treatment technology that promotes biodegradation of the identified volatile and semivolatile organic contaminants by the providing oxygen to the microorganisms that are resident in the affected soil. If the treatment is successful, the contaminants are reduced to carbon dioxide and water, and the soil can be left in-place.

A typical bioventing system contains one or more air injection points that are manifold to a low-flow blower. A properly sized bioventing system provides only enough oxygen flow to sustain microbial activity. Optimal air flow rates maximize biodegradation as the vapors move slowly through biologically active soil while minimizing volatilization and release of the contaminants to the atmosphere.

Advantages of a bioventing system include factors such as:

1. in-situ treatment greatly reduces the expense and destruction associated with traditional combined excavation and treatment/disposal processes;
2. in-situ treatment often eliminates expensive off-gas treatment requirements that are typical of many soil vapor vacuum extraction procedures;
3. bioventing processes are mechanically simple, require minimal levels of maintenance, can be operated and maintained by relatively few people, and can be left unattended for extended periods of time; and,
4. biodegradation of volatile organic compounds can be achieved in periods of 1 to 5 years, while treatment times for semivolatile organic constituents can be achieved in 2 to 10 years.

Potential limitations of a bioventing system include:

1. bioventing is most practical for implementation at sites where large volumes of soil at depth are contaminated with degradable volatile and semivolatile organic compounds;
2. saturated soil lenses are difficult to aerate;
3. low-permeability soils are difficult to aerate;

4. soils with low moisture content tend to dry out during aeration, and thereby reduce the rate of biodegradation achieved;
5. water tables in close proximity to the ground's surface limits the vent well's radius of influence;
6. low nutrient levels (i.e., nitrogen and phosphorous) may affect and retard biodegradation; and,
7. low soil and ambient temperatures retard biodegradation.

Soil Vapor Extraction

Soil vapor extraction wells are drilled in and around the area where the soil contamination exists. A vacuum is then applied through the extraction well(s) that induces gas-phase volatiles to be removed from the soil and captured in the well(s). If contaminants are shallow, geomembrane covers are typically included to prevent short-circuiting of airflow and to increase the radius of influence of the extraction wells. Ground water depression pumps may be needed to reduce upwelling that may result due to the application of the vacuum on the area of contamination. These wells may also be used to lower the local water table elevation, thereby thickening the vadose where this technology works best.

Principal advantages of this technology include:

1. it is an in-situ technology that thereby eliminates the need for excavation.
2. It is best applied to sites where large amounts of volatile and semivolatile organic contamination exists; and
3. relatively simple and inexpensive equipment is used in the system.

Potential limitations of this technology include:

1. soil that contains a high degree of fines and/or a high degree of saturation require higher vacuums which will increase the cost of the system or hamper the operational efficiency of the unit;
2. soil exhibiting highly variable stratigraphy or high permeability may be susceptible to uneven gas flow and therefore, contaminant removal;
3. soil containing high organic content or that is extremely dry has a high sorption capacity for VOCs which may result in reduced removal rates;
4. exhaust gases from the SVE system may require additional treatment prior to discharge to the atmosphere; and
5. entrained liquids resulting from the off-gas treatment system may require capture and treatment/disposal in ancillary systems.

Solidification/Stabilization

Solidification/stabilization technologies may be implemented in-situ or ex-situ. In either case, the objective of solidification technology is to physically bound or encapsulate the contamination within a stabilized mass, while stabilization technologies induce chemical reactions between stabilizing agents and the contaminants to reduce their mobility within the environment. The efficacy of the solidification/stabilization process is typically demonstrated by performing leachability tests to measure and document the immobilization of contaminants. Numerous forms of solidification and stabilization technologies have been demonstrated and include:

- bituminization
- emulsified asphalt
- modified sulfur cement
- polyethylene extrusion
- pozzolan/Portland cement
- radioactive waste solidification
- sludge stabilization soluble phosphates and
- vitrification/molten glass.

Key limitations or drawbacks of these technologies include:

1. Depth of contaminants may limit the application of some in-situ processes;
2. Environmental conditions may affect the long-term immobilization of the contaminants;
3. Certain types of wastes are incompatible with different processes and treatability studies are generally required to predict the efficacy of the treatment process;
4. Organic contaminants are frequently not encapsulated and immobilized by the processes;
5. Reagent/additive mixing are relatively difficult when applied in-situ;
6. Significant volume increases (e.g., up to double the original volume) may result from the process;
7. Confirmatory sampling for in-situ application is generally more difficult and costly that for ex-situ applications;
8. Cohesive soil and soil containing a large portion of coarse gravel and cobbles are unsuitable for this type of treatment; and
9. Solidified materials, if left in place, may hinder future site uses and conditions encountered.

Land Treatment or Land Farming

Land Treatment or Land Farming are generally comparable treatment technologies, the significant difference being Land Treatment is performed in-situ whereas Land Farming is performed ex-situ. In both cases, the contaminated soil is periodically tilled or turned over to aerate the waste and to promote degradation. During treatment, key conditions (e.g., moisture content, degree of aeration, pH and nutrient/additive levels, etc.) of the contaminated media are closely monitored and controlled to enhance the biodegradation process. Land Treatment or Land Farming technologies are both generally applied to enhance the degradation of heavier hydrocarbons, and are less likely to be used for the treatment of organic contamination containing volatile organic compounds. Volatile organic compound contamination is typically more effectively and quickly treated using technologies that take advantage of the lighter hydrocarbon species' volatility (e.g., soil vapor extraction, bioventing, etc.). Both technologies are considered to be medium to long-term approaches to remediating contaminated soils.

Land Treatment sites must be properly designed and managed to ensure that problems that could result in the ground water, surface water, sediment, air, and food chain contamination do not occur. Land Farming technologies, on the other hand, control these potential problems by moving the contaminated soil to a controlled test cell. During Land Farming the contaminated media is excavated and placed into lined beds or other systems that are designed to control and capture leaching or volatile contaminants. During placement of the contaminated media in the bed, lifts of up to 18 inches in height are constructed and these are maintained during the treatment process. Once the desired degree of biodegradation is achieved, the affected media is removed and replaced by other contaminated material. Frequently, fresh contaminated media is mixed with partially remediated material to inoculate the freshly added material with an actively degrading microbial culture, thereby enhancing degradation and shortening treatment times.

Contaminants that have been successfully treated in Land Treatment and Land Farming applications include diesel fuels, number 2 and 6 fuel oils, aviation fuels, oily sludges, wood preserving wastes, coke wastes and certain pesticides.

Key limitations to these treatment technologies include:

1. a large amount of space is required;
2. soil that is contaminated to extensive depths (e.g., greater than 1 to 2 feet) must be excavated and placed into land farming cells or spread out over extended areas;
3. conditions affecting the biological degradation of contaminants (e.g., temperature and rain fall) are largely uncontrolled which can lead to increased treatment times;
4. if volatile contaminants are present in the contaminated media, they must be pretreated because they would volatilize and cause releases to the atmosphere;
5. dust control provisions must be considered, especially during media tilling and handling operations;
6. runoff collection facilities must be constructed and monitored to control leachate release; and,

7. some waste constituents may be subject to land ban regulations and thus be prohibit from treatment via this technique.

Biopiles

Biopile treatment is a full-scale technology where excavated soils are mixed with soil additives, stockpiled in a fabricated treatment area, and remediated using forced aeration to promote natural biodegradation of the organic contaminants. If the treatment is successful, the contaminants are reduced to carbon dioxide and water, and the soil can be recycled and placed back into the excavation.

A basic biopile system includes a treatment bed, which is typically comprised of a 60-mil high-density polyethylene (HDPE) base liner that sits atop a base of clean soil, an aeration system, an irrigation/nutrient addition system, a leachate collection system, and an over liner (20-mil HDPE). Moisture, heat, nutrients, oxygen, and pH are controlled to promote biodegradation. The irrigation/nutrient addition system is buried beneath the contaminated soil to facilitate the addition of air and if necessary, nutrients (e.g., water, phosphorous, nitrogen). The contaminated pile is typically covered to minimize run-off, evaporation and volatilization, and to promote solar heating. Volatile organic compounds liberated during the biodegradation may be captured in an optional air collection system where they are treated (e.g., passed through an activated carbon canister) prior to discharge to the atmosphere.

The advantages of soil treatment via biopiles include factors such as:

1. it is applicable to all types of petroleum, oil and lubricants;
2. final reaction products are relatively innocuous;
3. short treatment times (i.e., typically range from 3 to 6 months) are achievable; and,
4. treatment rate can be enhanced by the addition of simple, low-cost nutrients (i.e., water, nitrogen, phosphorous).

Limitations of treatment in biopiles include:

1. small size excavations (i.e., less than 250 yd^3) may be more economically handled via off-site disposal;
2. a large amount of flat space is required for construction of the biopile; and,
3. increased content of clay and silt in the soil may retard or limit the extent of biodegradation.

Soil Washing

Soil washing is a treatment option applicable to soil contaminated with metals and semivolatile organic compounds (SVOCs). In the process, soil is slurried with water and subjected to intense scrubbings. To improve the efficiency of soil washing, the process may include the use of surfactants, detergents, chelating agents or pH adjustment. After contaminants are removed from the soil, the washing solutions can be treated in a wastewater treatment system. The washing fluid can then be recycled, continuing the soil washing process.

Certain site factors can limit the success of soil washing:

1. highly variable soil conditions;
2. high silt or clay content which will reduce percolation and leaching, and inhibit the solid-liquid separations following the soil washing;
3. chemical reactions with soil cation exchange and pH effects may decrease contaminant mobility; and,
4. if performed in-situ, the groundwater flow must be well defined in order to recapture washing solutions.

Low Temperature Thermal Desorption

Thermal desorption is a physical separation process that is intended to volatilize water and organic contaminants from the waste feedstock. A carrier gas transports the volatilized water and organic compounds into a gas treatment system where subsequent contaminant destruction or containment is accomplished. In low temperature thermal desorption (LTTD) processes, the contaminated media is heated to a temperature between 90 and 300 degrees Celsius (^{o} C; or approximately 200 to 600 degrees Fahrenheit, ^{o} F) using either direct-fired, indirect-fired, or indirect heated systems. In the direct-fired systems, fire is applied directly upon the surface of the contaminated media, and frequently some degree of thermal oxidation may result among the organic constituents. In the indirect-fired system, the flame heats the air stream that is then passed over and through the contaminated media to volatilize water and organic constituents. In an indirect-heated system, the waste is placed into an externally heated vessel where it is typically tumbled while the surrounding headspace is continuously swept with an inert carrier gas. If the LTTD system is operated at the lower end of its temperature range, the naturally occurring organic constituents of the soil are not damaged which enables the treated soil to support future biological activity.

Advantages of LTTD processes include:

1. it is effective at separating organic from complex waste streams (e.g., refinery wastes, coal tar wastes, paint wastes, etc.);
2. it can separate solvents, PCBs, pesticides, lubricants and fuels from soil;
3. equipment capable of handling 10 or more tons per hour is commercially available and it can be brought to the site;
4. LTTD processes require less fuel than other forms of treatment technologies; and,
5. treated soils can be used as backfill at the original excavation site or at other sites, if subsequent analyses indicate that organics are removed to permissible levels and metals enhancement does not occur.

Limitations of the LTTD technology include:

1. clay or silty soil that agglomerates and that has a high humic content typically increase reaction time or temperature requirements due to the binding of the organic contaminants within the soil matrix;
2. preprocessing of soil (e.g., dewatering, grinding or crushing) may be needed to achieve acceptable levels of moisture or particle size in the feed stock.;
3. soils containing heavy metals content may yield a treated soil residue that requires subsequent stabilization or treatment; and,
4. all thermal desorption systems require treatment of the off-gases to control particulates and emissions prior to discharge to the atmosphere.

Off-Site Disposal at a Landfill

Excavation of hazardous materials is performed extensively for site remediation. Excavation is usually accompanied by off-site treatment (several discussed above) or disposal in an off-site secured landfill. Excavation employs the use of earth moving equipment to physically remove soil and buried materials. There are no limitations to the types of waste that can be excavated and removed. Factors that must be considered include the mobility of the wastes, the feasibility of on-site containment, and the cost of disposing the waste or rendering it non-hazardous once it has been excavated. A frequent practice at hazardous waste sites is to excavate and remove contaminant "hot spots" and to use other remedial measures for less contaminated soil.

Advantages of excavation and off-site disposal include:

1. excavation and off-site disposal can be used to eliminate the source of contamination at a site;
2. excavation and off-site disposal reduces or eliminates the need for long-term monitoring at the original waste site; and,

3. time to achieve beneficial results at the original site is short relative to other remedial alternatives.

Potential limitations of excavation and off-site disposal in a landfill include:

1. costs associated with off-site disposal are be high if the excavated material is classified as hazardous according to 40 CFR 261 Subpart C;
2. institutional aspects (e.g., barriers or fencing, dust suppression, etc.) can add significant delays to program implementation; and,
3. inappropriate post-excavation disposal can result in subsequent environmental liabilities at the off-site disposal site.

1.6 REMEDIAL ACTION COSTS

Bioventing

Bioventing does not require expensive equipment and can be completed by relatively few personnel who are responsible for the operation and continuing maintenance of the system. Factors that affect costs include the type of contaminant and its concentration, the permeability of the soil, well spacing and number, pumping rate and off-gas treatment requirements.

Based on data developed by the US Air Force Center for Environmental Excellence (AFCEE)[3], the estimated total costs of in-situ soil remediation via the application of bioventing technology is $10 to $60 per ton. At sites where more than 10,000 yd^3 of contaminated soil require treatment, costs of less than $10 per yd^3 have been achieved. At site where less than 500 cubic yards require treatment, costs of greater than $60 per yd^3 have been recorded.

Soil Vapor Extraction

The actual cost of in-situ soil vapor extraction is site-specific, highly dependent on the size of the contaminated site, the type of contaminant species that are present and their concentration, and the geologic and hydrogeologic setting of the site. Independently, these factors affect the number of extraction wells that may be required at the site, the level of vacuum that must be applied and the capacity of the extraction device needed, and the length of time that is necessary to achieve the desired clean-up goal. Additionally, off-gas treatment systems and systems that treat recovered liquid streams

[3] Air Force Center of Environmental Excellence, Technology Transfer Division, "*Bioventing Performance and Cost Results from Multiple Air Force Test Sites*," Technology Demonstration, Final Technical Memorandum, Jun 1996, Hill AFB, Texas.

may also be needed to control releases to the air or receiving water bodies or sewer systems. Both of these ancillary systems will add to the ultimate cost of the soil vacuum extraction system.

Based on information reported by the Federal Remediation Technologies Roundtable[4], costs to treat contaminated soil via in-situ soil vapor extraction are estimated to be on the order of $10 to $40 per yd^3 of contaminated soil. An additional cost of between $10,000 and $100,000 may be required if pilot testing is required to demonstrate the efficacy of the technology for the contaminant.

In-Situ Solidification/Stabilization

Solidification/stabilization treatment is grouped into different categories according to the types of additives and processes used, and the cost of this treatment is ultimately dependent upon which process is utilized. Ex-situ processes are among the most mature of remediation technologies and data provided by Federal Remediation Technologies Roundtable[4] indicates that all forms of this technology can be applied for under $100 per ton of soil. In-situ treatment costs range from $40 to $60 per yd^3 for shallow applications of auger/caisson or reagent/injector head system processes, to $150 to $250 per yd^3 for deeper applications of the same technologies. Costs associated with the application of in-situ vitrification processes include $25,000 to $30,000 for treatability tests exclusive of analytical costs, plus equipment mobilization (i.e., $200,000 to $300,000 per event) fees, plus utilities (e.g., cost of electricity, water, etc.).

Land Treatment or Land Farming

Based on information provided by the Federal Remediation Technologies Roundtable[4], costs to treat contaminated soil via land treatment are estimated to be on the order of $25 to $50 per yd^3 of contaminated soil. Comparable treatment costs via land farming procedures are estimated to be closer to $75 per yd^3 of soil treated. Additional costs associated that may be required for both technologies include laboratory study costs ($25,000 to $50,000 per event) and costs associated pilot tests or field demonstration (e.g., $100,000 to $500,000) if the efficacy of the technology for the contaminant is unknown.

[4] Federal Remediation Technologies Roundtable, U.S. EPA, Chair, (5102G) 401 M Street, S.W., Washington, D.C. 20460, URL http://www.frtr.gov

Biopiles

Treatment costs using biopiles is dependent on the nature of the contaminant, the procedure to be used, the need for additional pre- or post-treatment, and the need for air emission control equipment. Information provided by the Federal Remediation Technologies Roundtable[4] indicates that typical treatment costs using a prepared bed and a liner range from \$100 to \$200 per yd^3 of contaminated soil.

Soil Washing

A large number of vendors provide soil washing services. The treatment processes used vary according to the scale of the operation, particle size being treated, and extraction agent used. Because the operation is unique for each site, it is difficult to arrive at a cost estimate. However, in an evaluation of fourteen companies offering soil washing treatment services, a general price range of \$50 to \$205 per ton was noted in EPA Engineering Bulletin EPA/540/2-90/017, September 1990. The average cost for use of this technology reported by the Federal Remediation Technologies Roundtable[4], including excavation costs, is \$170 per ton.

Low Temperature Thermal Desorption

The Federal Remediation Technologies Roundtable[4] reports that costs associated with the remediation of petroleum hydrocarbon contaminated soil via low temperature thermal desorption systems range from \$40 to \$300 per ton of soil. Of the total cost, approximately \$15 to \$30 per ton is associated with direct operating costs, while unit transportation and set-up costs are estimated at \$3.50 to \$5.50 per ton (not typically exceeding a total of \$200,000 per event). Costs associated with excavation of the contaminated soil and backfill of the treated soil is estimated in the range of \$5 to \$10 per ton.

Off-Site Disposal at a Landfill

The Federal Remediation Technologies Roundtable[4] estimates that costs associated with the excavation and disposal of soil range from \$270 to \$460 per ton of soil, depending on the nature of the hazardous materials and the methods of excavation. If the soil is not classified as hazardous, the cost to excavate and dispose of it in a landfill will more typically range between \$50 and \$100 per ton. If the soil can be classified as clean enough to serve for beneficial use as daily cover, the cost to excavate and dispose of it will drop and range between \$25 and \$50 per ton.

1.7 RECOMMENDATION

Remediation of soil impacted by TPH is recommended for SEAD-38. Specifically, a 100 foot long by 3 foot wide by 1 foot deep area in the north-northwestern roadside drainage ditch and a 10 foot long by 10 foot wide by 1 foot deep area at the end of the second drainage ditch that is located to the west of Building 2079 will be the subjects of limited excavations that are proposed. The total estimated quantity of the two initial excavations is approximately 15 yd^3 of soil. The locations of the areas to be remediated are shown in **Figure 1-1**.

It is currently believed that a majority of the blowdown liquids were discharged into the north-northwestern drainage ditch; therefore, it is presumed that soil located in the bottom of this ditch will require the most attention. The subsurface soil sample collected at the upstream end of the north-northwestern trending drainage ditch shows that there is little vertical extent to the petroleum hydrocarbon impacted soil.

The soil from excavations completed in the man-made drainage ditch area and around shallow soil sample SS38-3 can be easily excavated with a backhoe and transported by truck to an off-site, state-approved and permitted disposal area. Because of the limited volume of soil that apparently requires remediation, approved clean fill from SEDA can be used to backfill the excavated area.

1.8 JUSTIFICATION

The volume of TPH contaminated soil recommended for removal from SEAD-38 is approximately 15 yd^3 for both areas. Using a conservative estimated unit cost of $100 for the excavation and disposal of the contaminated soil, the total cost of the proposed removal action is approximately $1,500, exclusive of other costs such as confirmational sampling, monitoring, mobilization, oversight and management. Because the lateral and vertical extent of the petroleum hydrocarbon-impacted soil can be sufficiently removed by this method of remediation, and the cost is not prohibitive, excavation and off-site disposal are an effective and immediate way to remediate the soil at SEAD-38.

1.9 VERIFICATION SAMPLING AND ANALYSIS

Confirmatory Sampling and Analysis

Confirmational sampling will be conducted at both excavation sites (i.e., north-northwestern drainage ditch and from the area of SS38-3) to verify that both "hot spots" of TPH contaminated soil have been adequately removed. As is shown on **Figure 1-1**, both of the planned excavations within SEAD-38 are expected to be 1 foot deep or less. Therefore, a minimum of five discrete grab samples will be collected from each of the proposed excavation areas, with no fewer than one being collected from the base of the excavation, while at least four others will be collected from each perimeter edge of the excavation. Additional confirmational samples will be collected from the base of the excavation at a rate of at least one per every additional 900 square feet or less of surface area exposed, or for excavations of limited base area but of extended length (e.g., drainage ditch excavations), at least one additional sample will be collected from the base of the excavation for each additional 50-foot length or fraction thereof. Based on these specifications, it is currently anticipated that a minimum of five confirmational samples will be collected from the smaller of the two excavations (i.e., 10 ft. by 10 ft. by 1 ft.), while a minimum of 12 discrete samples will be collected from the longer (i.e., 100 ft. by 3 ft. by 1 ft.) trench.

The locations selected for collection of confirmational samples will be biased towards sites that are suspected to be contaminated. Each of the confirmational samples will be analyzed for aromatic VOCs (i.e., BTEX), PAHs, and the "RCRA" eight metals by EPA Methods SW-846[1] 8021B, SW-846[1] 8270C, and SW-846[1] 6010B et al., respectively. Additional confirmational samples will be collected and analyzed if results of field screening or observations or the professional judgment of site personnel suggests that they are warranted. Additional details of the proposed confirmational sampling are provided in Appendix B.

If the results of the confirmational sample analyses demonstrate that the concentrations of the target analytes (i.e., BTEX, PAHs, or RCRA metals) are consistent with the NYSDEC TAGM # 4046 guidelines, the proposed removal action will be considered complete.

Disposal or Characterization Sampling and Analysis

Samples of excavated soil that is stockpiled at the site, pending off-site disposal, will also be collected and analyzed for disposal determination purposes. One sample will be collected for each 150 yd^3 or less of soil that is staged in a pile awaiting disposal. Soils with concentration of VOCs, SVOCs, or metals exceeding NYSDEC's recommended cleanup goals (i.e., TAGM # 4046 concentrations) will be disposed at an offsite facility. These soils will also be analyzed for the characteristic of toxicity via the Toxicity Characteristic Leaching Procedure (TCLP) (every 150 yd^3) which is required for landfill disposal.

TABLE 1-1

SURFACE AND SUBSURFACE SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT ACTIVITY
SEAD-38 LIMITED SAMPLING PROGRAM

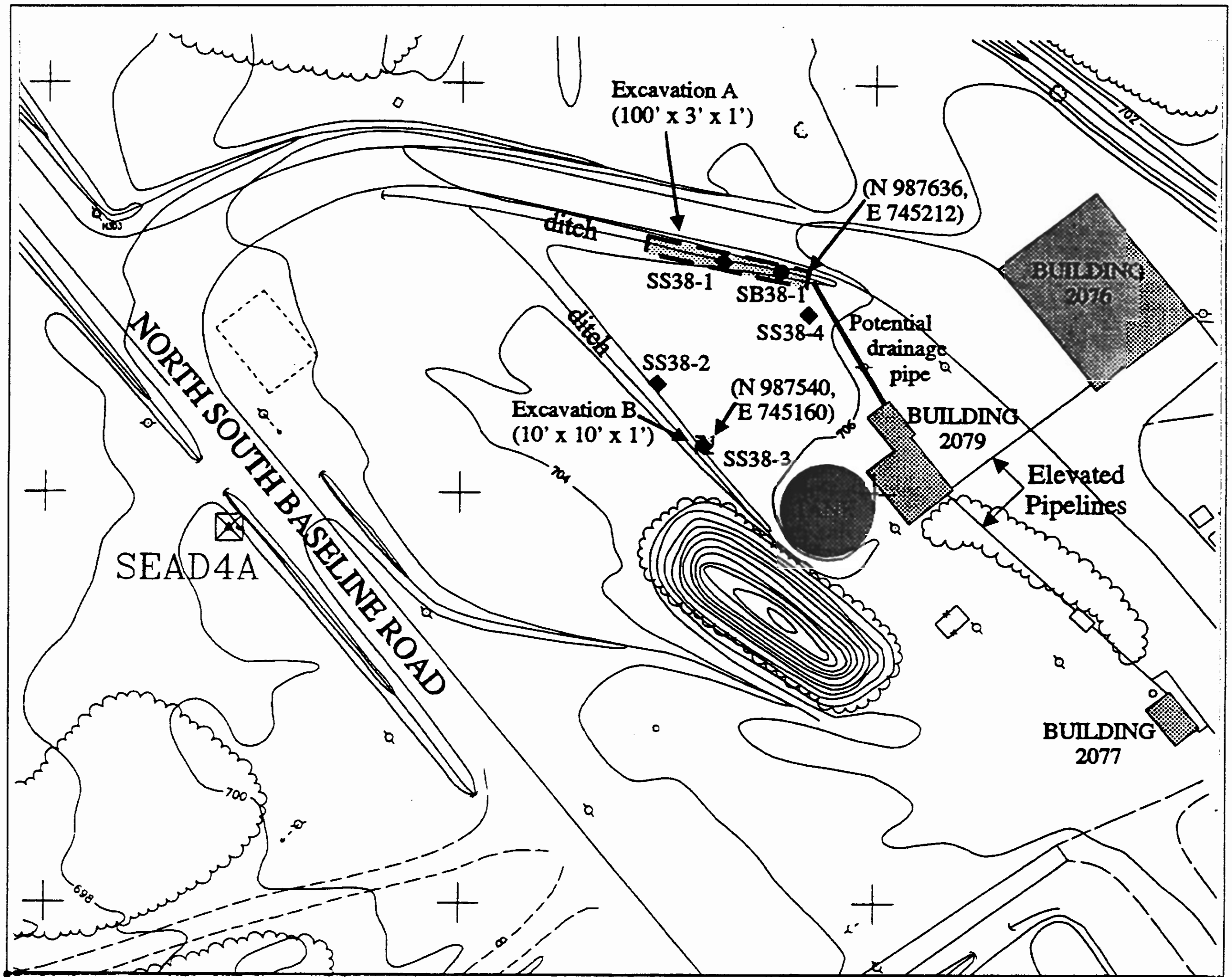
Compounds	Matrix Location Depth (ft) Date ES ID Lab ID (1) Units	Maximum Result	NYSDEC TAGM #4046 Value (2)	Number Above TAGM #4046 Value	Soil SEAD-38 0-0.2 12/17/93 SS38-1 207135	Soil SEAD-38 0-0.2 12/17/93 SS38-2 207136	Soil SEAD-38 0-0.2 12/17/93 SS38-3 207137	Soil SEAD-38 0-0.2 12/17/93 SS38-4 207138	Soil SEAD-38 2-4 1/9/94 SB38-1 208176
Total Petroleum Hydrocarbons	mg/Kg	1940	NA	NA	1840	104	1940	110	85
pH	standard units	8.93	NA	NA	7.36	7.46	7.47	7.4	8.93
Total Solids	% W/W	88.8	NA	NA	60.2	79.8	80.1	86	88.8

Notes:

(1) Laboratory results are from Sample Deivery Group (SDG) 41726.

(2) The New York State Department of Environmental Conservation's Technical and Administrative Guidance Memorandum HWR-94-4046 (or TAGM #4046) does not contain guidance values for these analyses.

NA = Not Applicable



LEGEND

- ● SOIL BORING LOCATION
- ◆ SURFACE SOIL SAMPLE
- (N 987636, E 745212) NEW YORK STATE PLANE N/E COORDINATES
- ⊠ SURVEY MONUMENT
- TELEPHONE POLE

N

PARSONS

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT

DECISION DOCUMENT FOR REMOVAL ACTION

SEAD-38

DEPT ENVIRONMENTAL ENGINEERING | DWG NO 727023-01001

FIGURE 1-1

SAMPLE LOCATIONS AND APPROXIMATE AREA TO BE REMEDIATED

SCALE | DATE AUGUST 2002

P:\PIT\PROJECTS\SENECA\DECISION\SEAD38.CDR

2 DECISION DOCUMENT FOR REMOVAL ACTION AT SEAD-39

2.1 EXECUTIVE SUMMARY

A limited sampling program performed at SEAD-39, Building 121's Boiler Blowdown Leach Pit, at the Seneca Army Depot Activity (SEDA) in Romulus NY, suggests that total petroleum hydrocarbon (TPH) compounds may have been released due to historic activities conducted in the area. This Decision Document presents and summarizes available data and the proposed plan for conducting a time-critical removal action at SEAD-39 to eliminate soil that may be contaminated with TPH or TPH-associated chemicals such as volatile and semivolatile organic compounds (VOCs and SVOCs, respectively) as well as metals. The objective of the time-critical removal action is to remove a potential threat to the environment and neighboring populations that may exist in the area due to the past release of TPH and associated compounds during boiler blowdown. This removal action is considered time-critical because the historic military mission of the Depot is now terminated and the Depot is officially closed. In accordance with provisions of the Department of Defense's (DoD's) Base Realignment and Closure (BRAC) process, the land and the facilities of the former Depot have been surveyed and evaluated, and prospective beneficial uses of the facility have been identified. Portions of the Depot have been released to the public and private sectors for reuse under the BRAC process, and additional areas will be released as other forms of beneficial reuse are identified. As more portions of the former Depot are released to public and private concerns for alternative uses, increased access will be afforded to all portions of the Depot, resulting in an equivalent increase in the potential for the exposure of populations to any residual chemicals that may be present at solid waste management units (SWMUs) remaining at the Depot pending clean-up. Therefore, the goal of the proposed time-critical removal action at SEAD-39 is to eliminate a potential source of petroleum hydrocarbon contamination, and other associated contaminants that may also be present, to remove or at least lessen, the magnitude of any potential threat may remain due to the historic discharge.

This Decision Document presents the removal action that was developed in accordance with the Federal Facility Agreement (FFA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Contingency Plan (NCP). Based upon the results of the limited sampling program, limited quantities of soils located in a 20 foot by 50 foot area to the north and to the east of Building 121 will be removed to a depth of twelve inches in two steps to facilitate the isolation and separation of the top six inches from the lower six inches of soil found in this area. Each six-inch layer of soil is estimated to represent approximately 18.5 cubic yards (yd^3) of soil. Each separate layer of excavated soil will be staged and contained, sampled and analyzed, and the resulting data will be evaluated to determine whether soil contaminated by VOCs and SVOCs is present. The Army expects that 18.5 yd^3 of soil (i.e., the quantity of the lower six inch layer of soil) will be removed from the area where the blowdown liquids were previously discharged and that the contaminated soil will be transported to, and disposed at, a state-approved and permitted, off-site facility.

The anticipated 18.5 yd^3 of soil excavated from the top six inch layer of soil present in the area is not expected to be contaminated because it was placed as a landscaping cover after the historic blowdown operation was terminated in 1980. The extent of the area finally excavated will be confirmed via field observation and screening, and sampling and analysis, and once completed, the excavation will be backfilled with approved, clean fill and re-graded and contoured to match the existing terrain characteristics.

2.2 SITE BACKGROUND

2.2.1 Site Description

SEAD-39 is the historic blowdown leaching area that was located exterior to, and immediately north of, Building 121 (**Figure 2-1**). Building 121 is an active boiler plant located in the administrative area (i.e., halfway along the eastern border) of the Seneca Army Depot Activity (SEDA), in a portion of the Depot where the future designated land use is Planned Industrial Development. The historic blowdown area associated with Building 121 is located north of the building, approximately 500 feet south of the nearest Depot fence line. This area is located approximately 500 feet south of the nearest Depot perimeter fence. The local groundwater flow direction at SEAD-39 is expected to be generally consistent with the facility-wide southwest to west-southwest groundwater flow trend, although this has not been field verified.

Use of the leaching area was terminated in approximately 1979 or 1980, when all boiler blowdown points were connected to the sanitary sewer. There is no depression or visible indication of where the historic leaching area was previously located. Center Street, which runs in an east-west direction, is located 50 feet to the north of Building 121 and the suspected location of the former leach pit. The land surface to the north of Building 121 is grass covered and is slightly mounded between the building and the street.

2.2.2 Site History

Between the time when the boilers were first installed and 1979 – 1980 when all blowdown points were connected to the sanitary sewer system, the boilers discharged between 400 and 800 gallons of blowdown liquids per day. Blowdown was released three times a day, and the discharged liquid was allowed to flow into the drainage system in the street and partly into the ground. The boiler blowdown is suspected to have contained water, tannins, caustic soda (sodium hydroxide), and sodium phosphate.

2.3 PREVIOUS INVESTIGATIONS

2.3.1 Description of Sampling Program

A limited sampling program was performed in 1993 and 1994 to obtain evidence of a release. One soil boring (i.e., SB39-1) was advanced north of the northeast corner of Building 121, part way between the building and the Center Street. The boring was terminated in weathered bedrock at split-spoon refusal, 5.7 feet below grade surface (bgs). The water table was encountered at a depth of 5.2 feet bgs. Volatile organic compounds were not detected with the field-screening instrument, and no stained soil was observed in the soils recovered from the soil boring. One sample, collected from a depth of 3-5 feet bgs, immediately above the local water table, was submitted to the lab for chemical analysis.

Physical characterization of the split-spoon samples collected from soil boring SB39-1 indicated that the top six inches of the ground is filled topsoil. This accounts for the mounding of the ground surface that exists between Building 121 and Center Street. As this mounding makes the ground surface higher in elevation than the historic discharge point of the blowdown liquid, surface soil samples were not considered to be representative of the impacts caused by the release of the blowdown liquids. Therefore, four soil samples (SS39-1 through SS39-4) were collected by driving a split-spoon to a depth of 0-2 feet bgs at four corner locations surrounding the soil boring. One sample was collected from each sampling location and submitted for chemical analyses. Analytical determinations consisted of soil pH, analyzed by Environmental Protection Agency (EPA) SW-846[5] Method 9045 and TPH by EPA Method 418.1[6]. The sample locations are shown in **Figure 2-1**.

2.3.2 Results of Sampling Program

The results of the limited soil sampling program are presented in **Table 2-1**. Total petroleum hydrocarbons were detected in all of the soil samples collected from SEAD-39. All of the soil samples, with the exception of SS39-1 contained TPH concentrations of less than 100 parts per million (ppm). SS39-1 contained 118 ppm TPH. The pH of the soil samples ranged from 7.9 to 8.9.

[5] US EPA Publication SW-846, "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.*"

[6] EPA 600/4-79-020, "*Methods for Chemical Analysis of Water and Wastes.*"

Insufficient analytical data exists to definitively determine whether a release of boiler blowdown liquids occurred in the area of SEAD-39. The detection of TPH at low levels in all of the samples could be indicative of naturally occurring or anthropologically deposited organic materials in the environment. However, information originally contained in the Depot's Part A and Part B RCRA permit applications indicates that a 20 foot by 50 foot area to the north of Building 121 was used for this purpose. This area suspected to have received blowdown liquids is outlined in **Figure 2-1**.

2.4 REMEDIAL ACTION OBJECTIVES

The objective of the proposed action at SEAD-39 is to remove soil located at and near the historic blowdown liquid discharge point that may have been contaminated by the release of TPH and where residual contamination may still exist and pose a potential threat to human health and the environment. No information exists to describe precisely where the boiler blowdown liquid was discharged at SEAD-39, or how it was conveyed to and through the area that is located north of the Building 121; thus, the proposed extent of the excavation encompasses the entire area that was investigated as part of the limited sampling program in 1993 – 1994. All soil found in the top foot of the overburden will be excavated, with two piles being created; one containing the top six inches of soil which is believed to contain only fill and loam applied to the area outside of Building 121 after the historic blowdown process was connected to the sewer in 1979 - 1980, while the second will contain the underlying six inches of soil that is believed to have been resident when the historic blowdown activities were conducted in the area. Once the area is opened, field observations and screening, and confirmational sampling and analyses will be used to verify that residual contamination does not remain in the area.

This Decision Document identifies and presents alternatives that have been considered to eliminate or at least lessen, the magnitude of any potential threat that may exist at SEAD-39 due to the possible historic release of TPH contaminants. Due to the Depot's change in status, and the current release of portions of the former Depot for beneficial reuses by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to reduce, and possibly eliminate, any potential threat that may still exist a the site due to the historic boiler blowdown operations.

It is currently anticipated that a limited amount of soil from the grassy area that is located to the north of Building 121 will need to be remediated during the planned action. The estimated quantity of soil that will be excavated covers an area that measures 50 feet long by 20 feet wide by 1 foot deep. This area extends from the edge of the building to the edge of Center Street. Combined, the estimated volume of soil that will be excavated is approximately 37 cubic yards. The extent of the area requiring treatment is displayed on **Figure 2-1**. During excavation, the soil will be divided and placed into two piles; one containing soil from the top six inches of the area, while the second will contain soil excavated from the six to twelve inch deep horizon. This segregation is proposed to isolate soil that the Army believes may be uncontaminated by TPH and other organic constituents, because it was placed as a landscaping cover after the blowdown discharge was terminated, from soil that the Army believes is more likely to potentially contain increased concentrations of VOCs and SVOCs.

Confirmation of the acceptability of the surrounding soil quality will be demonstrated by collecting and analyzing soil samples that will be analyzed for selected VOCs (i.e., benzene, toluene, ethyl benzene and xylene – BTEX), selected SVOCs (i.e., polynuclear aromatic hydrocarbons – PAHs) and selected metals (i.e., the "RCRA" metals, arsenic, barium, cadmium, chromium, lead, mercury, nickel, and selenium) in accordance with US EPA and NYSDEC's accepted procedures. Data resulting from the confirmational sampling and analysis will be compared to soil cleanup objective levels identified and described in the New York State Department of Environmental Conservation's (NYSDEC's) Technical and Administrative Guidance Memorandum (TAGM) # 4046, dated January 1994.

If the results from the confirmatory sampling and analysis indicate that VOCs, SVOCs, or RCRA metals metallic compounds concentrations, if they are found to exist, are consistent with recommended cleanup objective levels or background concentrations found in the area, the removal operations will be terminated. Once NYSDEC approves the selected fill, the affected area will be backfilled (as needed if contaminated soil is excavated) and re-contoured. However, if the resulting data indicate that the surrounding or underlying soil contains contaminants in excess of recommended cleanup objective or background levels, the area of excavation will be expanded to remove additional soil.

Samples of excavated soil that is stockpiled at the site, pending off-site disposal, will also be collected and analyzed for disposal determination purposes. One sample will be collected for each 150 yd^3 or less of soil that is staged in a pile awaiting disposal. Soils with concentration of VOCs, SVOCs, or metals exceeding NYSDEC's recommended cleanup goals (i.e., TAGM # 4046 concentrations) will be disposed at an offsite facility. These soils will also be analyzed for the characteristic of toxicity via the Toxicity Characteristic Leaching Procedure (TCLP) (every 150 yd^3) which is required for landfill disposal.

2.5 TREATMENT/DISPOSAL ALTERNATIVES FOR CONTAMINATED SOIL

A variety of treatment and disposal alternatives/technologies are available for the petroleum-impacted soils from SEAD-39. These include:

1. bioventing
2. vapor extraction

3. solidification/stabilization
4. land treatment or land farming
5. biopiles
6. soil washing
7. low temperature thermal desorption and
8. off-site disposal

A brief overview of each of these alternatives is provided below.

Bioventing

Bioventing is an in-situ treatment technology that promotes biodegradation of the identified volatile and semivolatile organic contaminants by the providing oxygen to the microorganisms that are resident in the affected soil. If the treatment is successful, the contaminants are reduced to carbon dioxide and water, and the soil can be left in-place.

A typical bioventing system contains one or more air injection points that are manifold to a low-flow blower. A properly sized bioventing system provides only enough oxygen flow to sustain microbial activity. Optimal airflow rates maximize biodegradation as the vapors move slowly through biologically active soil while minimizing volatilization and release of the contaminants to the atmosphere.

Advantages of a bioventing system include factors such as:

1. in-situ treatment greatly reduces the expense and destruction associated with traditional combined excavation and treatment/disposal processes;
2. in-situ treatment often eliminates expensive off-gas treatment requirements that are typical of many soil vapor vacuum extraction procedures;
3. bioventing processes are mechanically simple, require minimal levels of maintenance, can be operated and maintained by relatively few people, and can be left unattended for extended periods of time; and,
4. biodegradation of volatile organic compounds can be achieved in periods of 1 to 5 years, while treatment times for semivolatile organic constituents can be achieved in 2 to 10 years.

Potential limitations of a bioventing system include:

1. bioventing is most practical for implementation at sites where large volumes of soil at depth are contaminated with degradable volatile and semivolatile organic compounds;

2. saturated soil lenses are difficult to aerate;
3. low-permeability soils are difficult to aerate;
4. soils with low moisture content tend to dry out during aeration, and thereby reduce the rate of biodegradation achieved;
5. water tables in close proximity to the ground's surface limits the vent well's radius of influence;
6. low nutrient levels (i.e., nitrogen and phosphorous) may affect and retard biodegradation; and,
7. low soil and ambient temperatures retard biodegradation.

Soil Vapor Extraction

Soil vapor extraction wells are drilled in and around the area where the soil contamination exists. A vacuum is then applied through the extraction well(s) that induces gas-phase volatiles to be removed from the soil and captured in the well(s). If contaminants are shallow, geomembrane covers are typically included to prevent short-circuiting of airflow and to increase the radius of influence of the extraction wells. Ground water depression pumps may be needed to reduce upwelling that may result due to the application of the vacuum on the area of contamination. These wells may also be used to lower the local water table elevation, thereby thickening the vadose where this technology works best.

Principal advantages of this technology include:

1. it is an in-situ technology that thereby eliminates the need for excavation.
2. it is best applied to sites where large amounts of volatile and semivolatile organic contamination exists; and
3. relatively simple and inexpensive equipment is used in the system.

Potential limitations of this technology include:

1. soil that contains a high degree of fines and/or a high degree of saturation require higher vacuums which will increase the cost of the system or hamper the operational efficiency of the unit;
2. soil exhibiting highly variable stratigraphy or high permeability may be susceptible to uneven gas flow and therefore, contaminant removal;
3. soil containing high organic content or that is extremely dry has a high sorption capacity for VOCs which may result in reduced removal rates;
4. exhaust gases from the SVE system may require additional treatment prior to discharge to the atmosphere; and

5. entrained liquids resulting from the off-gas treatment system may require capture and treatment/disposal in ancillary systems.

Solidification/Stabilization

Solidification/stabilization technologies may be implemented in-situ or ex-situ. In either case, the objective of solidification technology is to physically bound or encapsulate the contamination within a stabilized mass, while stabilization technologies induce chemical reactions between stabilizing agents and the contaminants to reduce their mobility within the environment. The efficacy of the solidification/stabilization process is typically demonstrated by performing leachability tests to measure and document the immobilization of contaminants. Numerous forms of solidification and stabilization technologies have been demonstrated and include:

- bituminization
- emulsified asphalt
- modified sulfur cement
- polyethylene extrusion
- pozzolan/Portland cement
- radioactive waste solidification
- sludge stabilization soluble phosphates and
- vitrification/molten glass.

Key limitations or drawbacks of these technologies include:

1. depth of contaminants may limit the application of some in-situ processes;
2. environmental conditions may affect the long-term immobilization of the contaminants;
3. certain types of wastes are incompatible with different processes and treatability studies are generally required to predict the efficacy of the treatment process;
4. organic contaminants are frequently not encapsulated and immobilized by the processes;
5. reagent/additive mixing are relatively difficult when applied in-situ;
6. significant volume increases (e.g., up to double the original volume) may result from the process;
7. confirmatory sampling for in-situ application is generally more difficult and costly that for ex-situ applications;
8. cohesive soil and soil containing a large portion of coarse gravel and cobbles are unsuitable for this type of treatment; and
9. solidified materials, if left in place, may hinder future site uses and conditions encountered.

Land Treatment or Land Farming

Land Treatment or Land Farming are generally comparable treatment technologies, the significant difference being Land Treatment is performed in-situ whereas Land Farming is performed ex-situ. In both cases, the contaminated soil is periodically tilled or turned over to aerate the waste and to promote degradation. During treatment, key conditions (e.g., moisture content, degree of aeration, pH and nutrient/additive levels, etc.) of the contaminated media are closely monitored and controlled to enhance the biodegradation process. Land Treatment or Land Farming technologies are both generally applied to enhance the degradation of heavier hydrocarbons, and are less likely to be used for the treatment of organic contamination containing volatile organic compounds. Volatile organic compound contamination is typically more effectively and quickly treated using technologies that take advantage of the lighter hydrocarbon species' volatility (e.g., soil vapor extraction, bioventing, etc.). Both technologies are considered to be medium to long-term approaches to remediating contaminated soils.

Land Treatment sites must be properly designed and managed to ensure that problems that could result in the ground water, surface water, sediment, air, and food chain contamination do not occur. Land Farming technologies, on the other hand, control these potential problems by moving the contaminated soil to a controlled test cell. During Land Farming the contaminated media is excavated and placed into lined beds or other systems that are designed to control and capture leaching or volatile contaminants. During placement of the contaminated media in the bed, lifts of up to 18 inches in height are constructed and these are maintained during the treatment process. Once the desired degree of biodegradation is achieved, the affected media is removed and replaced by other contaminated material. Frequently, fresh contaminated media is mixed with partially remediated material to inoculate the freshly added material with an actively degrading microbial culture, thereby enhancing degradation and shortening treatment times.

Contaminants that have been successfully treated in Land Treatment and Land Farming applications include diesel fuels, number 2 and 6 fuel oils, aviation fuels, oily sludges, wood preserving wastes, coke wastes and certain pesticides.

Limitations to these treatment technologies include:

1. a large amount of space is required;
2. soil that is contaminated to extensive depths (e.g., greater than 1 to 2 feet) must be excavated and placed into land farming cells or spread out over extended areas;
3. conditions affecting the biological degradation of contaminants (e.g., temperature and rain fall) are largely uncontrolled which can lead to increased treatment times;

4. if volatile contaminants are present in the contaminated media, they must be pretreated because they would volatilize and cause releases to the atmosphere;
5. dust control provisions must be considered, especially during media tilling and handling operations;
6. runoff collection facilities must be constructed and monitored to control leachate release; and,
7. some waste constituents may be subject to land ban regulations and thus be prohibit from treatment via this technique.

Biopiles

Biopile treatment is a full-scale technology where excavated soils are mixed with soil additives, stockpiled in a fabricated treatment area, and remediated using forced aeration to promote natural biodegradation of the organic contaminants. If the treatment is successful, the contaminants are reduced to carbon dioxide and water, and the soil can be recycled and placed back into the excavation.

A basic biopile system includes a treatment bed, which is typically comprised of a 60-mil high-density polyethylene (HDPE) base liner that sits atop a base of clean soil, an aeration system, an irrigation/nutrient addition system, a leachate collection system, and an over liner (20-mil HDPE). Moisture, heat, nutrients, oxygen, and pH are controlled to promote biodegradation. The irrigation/nutrient addition system is buried beneath the contaminated soil to facilitate the addition of air and if necessary, nutrients (e.g., water, phosphorous, nitrogen). The contaminated pile is typically covered to minimize run-off, evaporation and volatilization, and to promote solar heating. Volatile organic compounds liberated during the biodegradation may be captured in an optional air collection system where they are treated (e.g., passed through an activated carbon canister) prior to discharge to the atmosphere.

The advantages of soil treatment via biopiles include factors such as:

1. it is applicable to all types of petroleum, oil and lubricants;
2. final reaction products are relatively innocuous;
3. short treatment times (i.e., typically range from 3 to 6 months) are achievable; and,
4. treatment rate can be enhanced by the addition of simple, low-cost nutrients (i.e., water, nitrogen, phosphorous).

Limitations of treatment in biopiles include:

1. small size excavations (i.e., less than 250 cubic yards) may be more economically handled via off-site disposal;

2. a large amount of flat space is required for construction of the biopile; and,
3. increased content of clay and silt in the soil may retard or limit the extent of biodegradation.

Soil Washing

Soil washing is a treatment option applicable to soil contaminated with metals and semivolatile organic compounds. In the process, soil is slurried with water and subjected to intense scrubbings. To improve the efficiency of soil washing, the process may include the use of surfactants, detergents, chelating agents or pH adjustment. After contaminants are removed from the soil, the washing solutions can be treated in a wastewater treatment system. The washing fluid can then be recycled, continuing the soil washing process.

Certain site factors can limit the success of soil washing:

1. highly variable soil conditions;
2. high silt or clay content which will reduce percolation and leaching, and inhibit the solid-liquid separations following the soil washing;
3. chemical reactions with soil cation exchange and pH effects may decrease contaminant mobility; and,
4. if performed in-situ, the groundwater flow must be well defined in order to recapture washing solutions.

Low Temperature Thermal Desorption

Thermal desorption is a physical separation process that is intended to volatilize water and organic contaminants from the waste feedstock. A carrier gas transports the volatilized water and organic compounds into a gas treatment system where subsequent contaminant destruction or containment is accomplished. In low temperature thermal desorption (LTTD) processes, the contaminated media is heated to a temperature between 90 and 300 degrees Celsius (^{o}C; or approximately 200 to 600 degrees Fahrenheit, ^{o}F) using either direct-fired, indirect-fired, or indirect heated systems. In the direct-fired systems, fire is applied directly upon the surface of the contaminated media, and frequently some degree of thermal oxidation may result among the organic constituents. In the indirect-fired system, the flame heats the air stream that is then passed over and through the contaminated media to volatilize water and organic constituents. In an indirect-heated system, the waste is placed into an externally heated vessel where it is typically tumbled while the surrounding headspace is continuously swept with an inert carrier gas. If the LTTD system is operated at the lower end of its temperature range, the naturally occurring organic constituents of the soil are not damaged which enables the treated soil to support future biological activity.

Advantages of LTTD processes include:

1. it is effective at separating organic from complex waste streams (e.g., refinery wastes, coal tar wastes, paint wastes, etc.);
2. it can separate solvents, PCBs, pesticides, lubricants and fuels from soil;
3. equipment capable of handling 10 or more tons per hour is commercially available and it can be brought to the site;
4. LTTD processes require less fuel than other forms of treatment technologies; and,
5. treated soils can be used as backfill at the original excavation site or at other sites, if subsequent analyses indicate that organics are removed to permissible levels and metals enhancement does not occur.

Limitations of the LTTD technology include:

1. clay or silty soil that agglomerates and that has a high humic content typically increase reaction time or temperature requirements due to the binding of the organic contaminants within the soil matrix;
2. preprocessing of soil (e.g., dewatering, grinding or crushing) may be needed to achieve acceptable levels of moisture or particle size in the feed stock.;
3. soils containing heavy metals content may yield a treated soil residue that requires subsequent stabilization or treatment; and,
4. all thermal desorption systems require treatment of the off-gases to control particulates and emissions prior to discharge to the atmosphere.

<u>Off-Site Disposal at a Landfill</u>

Excavation of hazardous materials is performed extensively for site remediation. Excavation is usually accompanied by off-site treatment (several discussed above) or disposal in an off-site secured landfill. Excavation employs the use of earth moving equipment to physically remove soil and buried materials. There are no limitations to the types of waste that can be excavated and removed. Factors that must be considered include the mobility of the wastes, the feasibility of on-site containment, and the cost of disposing the waste or rendering it non-hazardous once it has been excavated. A frequent practice at hazardous waste sites is to excavate and remove contaminant "hot spots" and to use other remedial measures for less contaminated soil.

Advantages of excavation and off-site disposal include:

1. excavation and off-site disposal can be used to eliminate the source of contamination at a site;
2. excavation and off-site disposal reduces or eliminates the need for long-term monitoring at the original waste site; and,
3. time to achieve beneficial results at the original site is short relative to other remedial alternatives.

Potential limitations of excavation and off-site disposal in a landfill include:

1. costs associated with off-site disposal are be high if the excavated material is classified as hazardous according to 40 CFR 261 Subpart C;
2. institutional aspects (e.g., barriers or fencing, dust suppression, etc.) can add significant delays to program implementation; and,
3. inappropriate post-excavation disposal can result in subsequent environmental liabilities at the off-site disposal site.

2.6 REMEDIAL ACTION COSTS

Bioventing

Bioventing does not require expensive equipment and can be completed by relatively few personnel who are responsible for the operation and continuing maintenance of the system. Factors that affect costs include the type of contaminant and its concentration, the permeability of the soil, well spacing and number, pumping rate and off-gas treatment requirements.

Based on data developed by the US Air Force Center for Environmental Excellence (AFCEE)[7], the estimated total costs of in-situ soil remediation via the application of bioventing technology is $10 to $60 per ton. At sites where more than 10,000 cubic yards of contaminated require treatment, costs of less than $10 per cubic yard have been achieved. At site where less than 500 cubic yards require treatment, costs of greater than $60 per cubic yard have been recorded.

Soil Vapor Extraction

The actual cost of in-situ soil vapor extraction is site-specific, highly dependent on the size of the contaminated site, the type of contaminant species that are present and their concentration, and the geologic and hydrogeologic setting of the site. Independently, these factors affect the number of extraction wells that may be required at the site, the level of vacuum that must be applied and the capacity of the extraction device needed, and the length of time that is necessary to achieve the desired clean-up goal. Additionally, off-gas treatment systems and systems that treat recovered liquid streams may also be needed to control releases to the air or receiving water bodies or sewer systems. Both of these ancillary systems will add to the ultimate cost of the soil vacuum extraction system.

Based on information reported by the Federal Remediation Technologies Roundtable[8], costs to treat contaminated soil via in-situ soil vapor extraction are estimated to be on the order of $10 to $40 per cubic yard of contaminated soil. An additional cost of between $10,000 and $100,000 may be required if pilot testing is required to demonstrate the efficacy of the technology for the contaminant.

In-Situ Solidification/Stabilization

Solidification/stabilization treatment is grouped into different categories according to the types of additives and processes used, and the cost of this treatment is ultimately dependent upon which process is utilized. Ex-situ processes are among the most mature of remediation technologies and data provided by Federal Remediation Technologies Roundtable[8] indicates that all forms of this technology can be applied for under $100 per ton of soil. In-situ treatment costs range from $40 to $60 per cubic yard for shallow applications of auger/caisson or reagent/injector head system processes, to $150 to $250 per cubic yard for deeper applications of the same technologies. Costs associated with the application of in-situ vitrification processes include $25,000 to $30,000 for treatability tests exclusive of analytical costs, plus equipment mobilization (i.e., $200-000 to $300,000 per event) fees, plus utilities (e.g., cost of electricity, water, etc.).

Land Treatment or Land Farming

Based on information provided by the Federal Remediation Technologies Roundtable[8], costs to treat contaminated soil via land treatment are estimated to be on the order of $25 to $50 per cubic yard of contaminated soil. Comparable treatment costs via land farming procedures are estimated to be closer to $75 per cubic yard of soil treated. Additional costs associated that may be required for both technologies include laboratory study costs ($25,000 to $50,000 per event) and costs associated pilot

[7] Air Force Center of Environmental Excellence, Technology Transfer Division, "*Bioventing Performance and Cost Results from Multiple Air Force Test Sites*," Technology Demonstration, Final Technical Memorandum, Jun 1996, Hill AFB, Texas.

[8] Federal Remediation Technologies Roundtable, U.S. EPA, Chair, (5102G) 401 M Street, S.W., Washington, D.C. 20460, URL http://www.frtr.gov

tests or field demonstration (e.g., $100,000 to $500,000) if the efficacy of the technology for the contaminant is unknown.

Biopiles

Treatment costs using biopiles is dependent on the nature of the contaminant, the procedure to be used, the need for additional pre- or post-treatment, and the need for air emission control equipment. Information provided by the Federal Remediation Technologies Roundtable[8] indicates that typical treatment costs using a prepared bed and a liner range from $100 to $200 per cubic yard of contaminated soil.

Soil Washing

A large number of vendors provide soil washing services. The treatment processes used vary according to the scale of the operation, particle size being treated, and extraction agent used. Because the operation is unique for each site, it is difficult to arrive at a cost estimate. However, in an evaluation of fourteen companies offering soil washing treatment services, a general price range of $50 to $205 per ton was noted in EPA Engineering Bulletin EPA/540/2-90/017, September 1990. The average cost for use of this technology reported by the Federal Remediation Technologies Roundtable[8], including excavation costs, is $170 per ton.

Low Temperature Thermal Desorption

The Federal Remediation Technologies Roundtable[8] reports that costs associated with the remediation of petroleum hydrocarbon contaminated soil via low temperature thermal desorption systems range from $40 to $300 per ton of soil. Of the total cost, approximately $15 to $30 per ton is associated with direct operating costs, while unit transportation and set-up costs are estimated at $3.50 to $5.50 per ton (not typically exceeding a total of $200,000 per event). Costs associated with excavation of the contaminated soil and backfill of the treated soil is estimated in the range of $5 to $10 per ton.

Off-Site Disposal at a Landfill

The Federal Remediation Technologies Roundtable[8] estimates that costs associated with the excavation and disposal of soil range from $270 to $460 per ton of soil, depending on the nature of the hazardous materials and the methods of excavation. If the soil is not classified as hazardous, the cost to excavate and dispose of it in a landfill will more typically range between $50 and $100 per ton. If the soil can be classified as clean enough to serve for beneficial use as daily cover, the cost to excavate and dispose of it will drop and range between $25 and $50 per ton.

2.7 RECOMMENDATION

Remediation of any soil impacted by TPH is recommended for SEAD-39. Specifically, a 50 foot long by 20 foot wide by 1 foot deep area located to the north of Building 121 will be the subject of a limited excavation. It is presumed that the top six inches of soil need not be remediated because it appears that this material was added during landscaping activities after the blowdown process was connected to the sanitary sewer and because it appears that this material lies above the elevation of the former blowdown leach pit; thus it is unlikely to be contaminated. The total estimated quantity of the initial excavation is approximately 37 yd^3 of soil, of which half (i.e., the bottom six inches) or approximately 18.5 yd^3 is expected to be found to contain contaminants. The location of the areas to be remediated is shown in **Figure 2-1**.

The soil can be excavated with a backhoe or bulldozer with the top six inches and the bottom six inches being segregated into two, separate piles. Soil recovered from the six-inch to one-foot horizon can be loaded into trucks and transported off-site for disposal at a state-approved, permitted landfill. Once confirmational samples and results have been obtained and shown to be consistent with the NYSDEC recommended levels, clean fill will be brought in and used as a base for the reclaimed upper soil. The existing grade will then be re-established using the untreated topsoil and sod.

2.8 JUSTIFICATION

The total volume of soil that is being recommended for remediation from SEAD-39 is approximately 18.5 cubic yards. Using a conservative estimated unit cost of $100 per cubic yard for the treatment of the soil, the total cost of remediating the soil is estimated as $1,850, exclusive of costs associated with monitoring, sampling and analysis, mobilization to the site, and oversight and management. Because the lateral and vertical extent of the petroleum-impacted soil can be sufficiently removed by this method of remediation, and the cost is not prohibitive, excavation and off-site disposal appears to be the most effective and immediate way to remediate the soil at SEAD-39.

2.9 VERIFICATION SAMPLING AND ANALYSIS

Confirmatory Sampling and Analysis

Confirmational sampling will be conducted at excavation site in SEAD-39 to verify that the area where boiler blowdown is suspected to have been discharged no longer contains levels of selected VOCs, SVOCs or metals at concentrations above recommended cleanup objective levels. As is shown on **Figure 2-1**, the extent of the proposed excavation at SEAD-39 is 20 ft. by 50 ft. by 6 inches. Therefore, it is expected that a minimum of eight discrete grab samples will be collected from the proposed excavation area, with no fewer than two being collected from the base of the excavation, while at least six others (i.e., 2 each on the 50 foot edges, and 1 each on the 20 foot edges) will be collected from the four perimeter edges of the excavation. Additional confirmational samples will also be collected from the base of the excavation at a rate of at least one per every additional 900 square feet or less of surface area exposed, while additional confirmational samples will also be collected for the edges of the excavation for each incremental length of 30 feet or less.

The locations selected for collection of confirmational samples will be biased towards sites that are suspected to be contaminated. Each of the confirmational samples will be analyzed for aromatic VOCs (i.e., BTEX), PAHs, and the "RCRA" eight metals by EPA Methods SW-846[5] 8021B, SW-846[5] 8270C, and SW-846[5] 6010B et al., respectively. Additional confirmational samples will be collected and analyzed if results of field screening or observations or the professional judgment of site personnel suggests that they are warranted. Additional details of the proposed confirmational sampling are provided in Appendix B.

If the results of the confirmational sample analyses demonstrate that the concentrations of the target analytes (i.e., BTEX, PAHs, or RCRA metals) are consistent with the NYSDEC TAGM # 4046 guidelines, the proposed removal action will be considered complete.

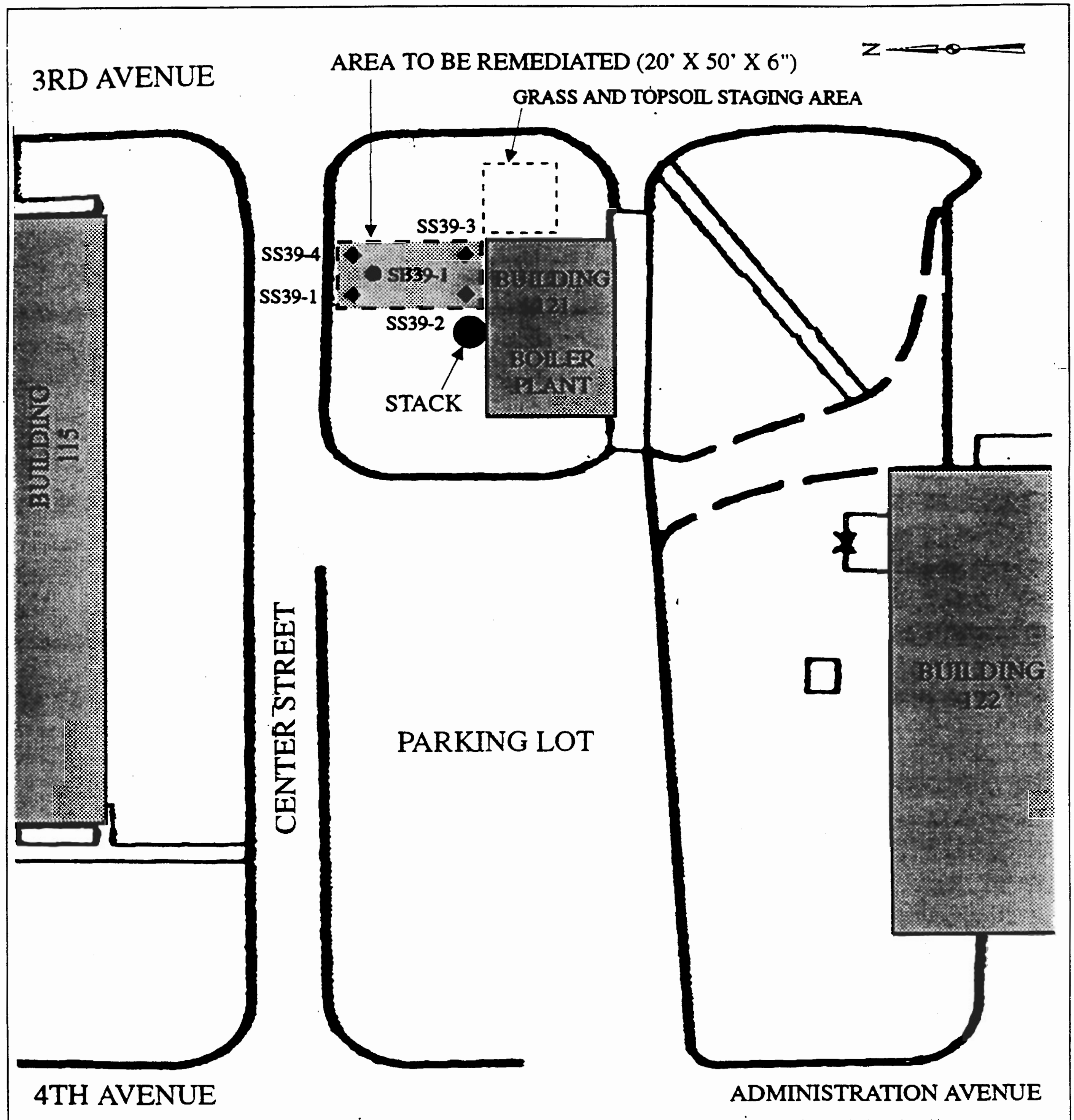
Disposal or Characterization Sampling and Analysis

Samples of excavated soil that is stockpiled at the site, pending off-site disposal, will also be collected and analyzed for disposal determination purposes. One sample will be collected for each 150 yd^3 or less of soil that is staged in a pile awaiting disposal. Soils with concentration of VOCs, SVOCs, or metals exceeding NYSDEC's recommended cleanup goals (i.e., TAGM # 4046 concentrations) will be disposed at an offsite facility. These soils will also be analyzed for the characteristic of toxicity via the Toxicity Characteristic Leaching Procedure (TCLP) (every 150 yd^3) which is required for landfill disposal.

TABLE 2-1

SURFACE AND SUBSURFACE SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT ACTIVITY
SEAD-39 LIMITED SAMPLING PROGRAM

Compounds	Matrix Location Depth (ft) Date ES ID Lab ID Units	Soil SEAD-39 0-0.2 1/12/94 SS39-1 208403	Soil SEAD-39 0-0.2 1/12/94 SS39-1 209343	Soil SEAD-39 0-0.2 1/12/94 SS39-2 208404	Soil SEAD-39 0-0.2 1/12/94 SS39-3 208405	Soil SEAD-39 0-0.2 1/12/94 SS39-4 208406	Soil SEAD-39 3-5 12/16/93 SB39-1.1 207131	Soil SEAD-39 0-0.2 1/24/94 SS39-5 209345 (SS39-1 dup)	Soil SEAD-39 3-5 12/16/93 SB39-1.2 207133 (SB39-1.1 dup)
Total Petroleum Hydrocarbons	mg/Kg	98	118	71	63	65	89	90	72
pH	standard units	7.9	7.91	8.9	8.34	8.03	7.2	8.18	7.39
Total Solids	% W/W	83.2	82.1	79.8	84.6	83.9	85.8	82.5	84.7



LEGEND

◆ SURFACE SOIL SAMPLE

● SOIL BORING LOCATION

PARSONS

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT

DECISION DOCUMENT FOR REMOVAL ACTION
SEAD-39

DEPT: ENVIRONMENTAL ENGINEERING

DWG NO: 727023-01001

FIGURE 2-1

SAMPLE LOCATIONS AND APPROXIMATE AREA TO BE REMEDIATED

SCALE

DATE: AUGUST 2002

P:\PIT\PROJECTS\SENECA\S383940\DECISION\SEAD39.CDR

3 DECISION DOCUMENT FOR REMOVAL ACTION AT SEAD-40

3.1 EXECUTIVE SUMMARY

A limited sampling program performed at SEAD-40, Building 319's Boiler Blowdown Leach Pit, at the Seneca Army Depot Activity (SEDA) in Romulus, NY suggests that total petroleum hydrocarbon (TPH) compounds may have been released due to historic operations conducted in the area. This Decision Document presents and summarizes available data and the proposed plan for conducting a time-critical removal action at SEAD-40 to eliminate soil that may be contaminated with TPH or TPH-associated chemicals such as volatile and semivolatile organic compounds (VOCs and SVOCs, respectively) as well as metals. The objective of this removal action is to remove a potential threat to the environment and neighboring populations that may exist in the area due to the past release of petroleum hydrocarbons during boiler blowdown. This removal action is considered time-critical because the historic military mission of the Depot is now terminated and the Depot is officially closed. In accordance with provisions of the Department of Defense's (DoD's) Base Realignment and Closure (BRAC) process, the land and the facilities of the former Depot have been surveyed and evaluated, and prospective beneficial uses of the facility have been identified. Portions of the Depot have been released to the public and private sectors for reuse under the BRAC process, and additional areas will be released as other forms of beneficial reuse are identified. As more portions of the former Depot are released to public and private concerns for alternative uses, increased access will be afforded to all portions of the Depot, resulting in an equivalent increase in the potential for the exposure of populations to any residual chemicals that may be present at solid waste management units (SWMUs) remaining at the Depot pending clean-up. Therefore, the goal of the proposed time-critical removal action at SEAD-40 is to eliminate an identified source of petroleum hydrocarbon contamination, and other associated contaminants that may also be present, to remove or at least lessen, the magnitude of any potential threat may remain due to the historic discharge.

This Decision Document presents the removal action that was developed in accordance with the Federal Facility Agreement (FFA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Contingency Plan (NCP). Based upon the results of the limited sampling program, it is recommended that 12.5 cubic yards (yd^3) of soil be removed from the drainage ditch where the blowdown liquids were discharged. Additionally, a limited "hot spot" removal (i.e., excavate a 10 foot by 10 foot by 1 foot area or approximately 3.7 yd^3) is also proposed for the site of SS40-2 where elevated levels of TPH were also detected during historic sampling. The excavated soil (i.e., approximately 16.2 yd^3) will be transported to, and disposed at, a state-approved, off-site facility. The extent of the area requiring excavation will be confirmed via field observation and screening, and sampling and analysis, and once completed, the excavation will be backfilled with clean fill and re-graded and contoured to match the existing terrain characteristics.

3.2 SITE BACKGROUND

3.2.1 Site Description

The historic blowdown leach pit that constitutes SEAD-40 was located in a drainage ditch that was next to the railroad tracks that are located north of Building 319 (**Figure 3-1**). Building 319 is an active boiler plant located on First Street at the SEDA, in a portion of the Depot where the future land use is designated as planned industrial development. The area encompassed by SEAD-40 is located approximately 2,000 feet west of the nearest Depot fence line. Currently, evidence of the historic leach pit is not visible. A drainage pipe originating in Building 319 is suspected to have carried blowdown liquids to the man-made drainage ditch, where they were released. The drainage ditch originates at the mouth of the drainage pipe approximately thirty feet northeast of Building 319. The drainage ditch continues for approximately 400 feet to the north where it eventually levels into a grassy field. The ground surface to the north of Building 319 and to the south of the drainage ditch is covered with asphalt.

3.2.2 Site History

Between the time when the boilers were first installed and 1979 – 1980, when all blowdown points were connected to the sanitary sewer system, the boilers discharged blowdown three times every 24 hours. It is estimated that the average blowdown flow totaled 400 to 800 gallons of liquids per day. The blowdown flow drained partly into drainage ditch and partly into the ground. It is presumed that the boiler blowdown contained water, tannins, caustic soda (sodium hydroxide), and sodium phosphate.

3.3 PREVIOUS INVESTIGATION

3.3.1 Description of Sampling Program

A limited sampling program was performed in 1993 and 1994 to provide potential evidence of a release. One soil boring (i.e., SB40-1) was advanced in the ditch near the discharge end of the drainage pipe. The boring was terminated in weathered bedrock at spoon-spoon refusal, 5.8 feet below grade surface (bgs). The water table was not encountered during the advancement and sampling of the soil boring. Volatile organic compounds were not detected with the field-screening instrument, and no stained soil was observed. One soil sample, collected from a depth of 4-6 feet below ground surface (bgs) was submitted to the lab for chemical analysis.

Four surface samples (0-2 inches bgs) were also collected and submitted to the laboratory for analyses. One of the surface samples was collected at the mouth of the drainage pipe near location SB40-1, another was collected between Building 319 and the drainage ditch, and the remaining two were collected in the drainage ditch approximately 50 and 100 feet downstream of the mouth of the discharge pipe. Chemical analyses consisted of pH analyzed by Environmental Protection Agency (EPA) SW-846[9] Method 9045 and total petroleum hydrocarbons (TPH) by EPA Method 418.1[10]. The sample locations are shown in **Figure 3-1**.

3.3.2 Results of Sampling Program

The results of the soil sampling program are presented in **Table 3-1**. Total petroleum hydrocarbons were detected in all of the soil samples collected from SEAD-40. The subsurface sample SB40-1.1 and the surface soil sample SS40-3 contained 1270 and 1640 parts per million (ppm) of TPH, respectively. The surface soil samples SS40-1, SS40-2, and SS40-4 contained 300, 420 and 680 ppm of TPH, respectively. The pH of the soil samples ranged from 7.29 to 7.86.

The detection of TPH in all of the samples suggests that a petroleum hydrocarbon release did occur. The subsurface soil sample suggests that TPH impacts have penetrated to a depth of six feet bgs near the mouth of the discharge pipe. The surface soil samples collected show that the TPH impacts persist downstream of the point at which the blowdown liquids were discharged.

3.4 REMEDIAL ACTION OBJECTIVES

The objective of the proposed remedial action at SEAD-40 is to remove soil located in a man-made drainage ditch and soil in the vicinity of an identified "hot spot" (i.e., near SS40-2) where existing data suggests that TPH is present and where residual contamination may still reside and pose a continuing, potential threat to human health and the environment. The Army is proposing to perform a time-critical removal action to eliminate, or at least lessen, the magnitude of any potential threat that may still exist at SEAD-40 due to the release of historic blowdown liquids. The final extent of the excavations will be verified by collecting and analyzing samples of the soil from the base and perimeter or sidewalls of the initial excavations conducted. Data resulting from the analysis of verification samples will be compared to New York State Department of Environmental Conservation's (NYSDEC's) recommended soil cleanup objectives for identified compounds. Final determinations regarding the extent of the excavations advanced and the volume of soil removed under the proposed action will be based on the results of the aforementioned field observation/screening and comparison of data to defined soil cleanup objective levels. Once completed, all excavations will be backfill with

[9] US EPA Publication SW-846, "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.*"

[10] US EPA 600/4-79-020, "*Methods for Chemical Analysis of Water and Wastes.*"

State-approved clean fill, re-graded to match surrounding terrain features, and re-seeded to reestablish vegetative cover.

This Decision Document identifies and presents alternatives that have been considered to eliminate or at least lessen, the magnitude of any potential threat that may exist at SEAD-40 due to the historic release of TPH contaminants. Due to the Depot's change in status, and the current release of portions of the former Depot for beneficial reuses by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to reduce, and possibly eliminate, any potential threat that may still exist a the site due to the historic boiler blowdown operations.

It is currently anticipated that a limited amount of soil from the drainage ditch located to the north of Building 319 will need to be excavated and disposed during the planned action. Additionally, a limited "hot spot" removal action near the location of historic sample SS40-2 is also proposed. The quantity of soil requiring treatment is currently estimated to include:

- an area that measures 10 feet long by 2 feet wide by 6 feet deep immediately at the end of the discharge pipe, near the location of SB40-1;
- an area that measures 110 feet long by 2 feet wide by 1 foot deep beyond (i.e., to the north of) the former deep excavation to remove the contamination that extends along the bottom of the drainage ditch; and,
- an area that measures 10 feet long by 10 feet wide by 1 foot deep surrounding the site of historic sample SS40-2.

Combined, the estimated volume of soil requiring treatment from SEAD-40 is approximately 16.2 yd^3. The extent of the planned areas requiring treatment is displayed on **Figure 3-1**.

Confirmation of the acceptability of the surrounding soil quality will be demonstrated by collecting and analyzing soil samples that will be analyzed for selected VOCs (i.e., benzene, toluene, ethyl benzene and xylene – BTEX), selected SVOCs (i.e., polynuclear aromatic hydrocarbons – PAHs), and the eight selected metals (i.e., the "RCRA" metals, arsenic, barium, cadmium, chromium, lead, mercury, nickel, and selenium) in accordance with EPA and NYSDEC's accepted procedures. Data resulting from the confirmational sampling and analysis will be compared to soil cleanup objective levels identified and described in the NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) # 4046, dated January 1994.

If the results from the confirmatory sampling and analysis indicate that identified contaminant concentrations, if any are found to exist, are consistent with recommended cleanup objective levels or background concentrations found in the area, the removal operations will be terminated. The open excavation will be backfilled with approved, clean fill and re-contoured, once NYSDEC's approval is obtained. However, if the resulting data indicate that the surrounding or underlying soil contains contaminant concentrations in excess of cleanup objectives or background levels, the area of excavation will be expanded.

Samples of excavated soil that is stockpiled at the site, pending off-site disposal, will also be collected and analyzed for disposal determination purposes. One sample will be collected for each 150 yd^3 or less of soil that is staged in a pile awaiting disposal. Soils with concentration of VOCs, SVOCs, or metals exceeding NYSDEC's recommended cleanup goals (i.e., TAGM # 4046 concentrations) will be disposed at an offsite facility. These soils will also be analyzed for the characteristic of toxicity via the Toxicity Characteristic Leaching Procedure (TCLP) (every 150 yd^3) which is required for landfill disposal.

3.5 TREATMENT/DISPOSAL ALTERNATIVES FOR CONTAMINATED SOIL

Varieties of treatment and disposal alternatives/technologies are available for the treatment of the excavated petroleum-impacted soils from SEAD-40. These include:

1. bioventing
2. vapor extraction
3. solidification/stabilization
4. land treatment or land farming
5. biopiles
6. soil washing
7. low temperature thermal desorption and
8. off-site disposal

A brief overview of these alternatives is provided below.

<u>Bioventing</u>

Bioventing is an in-situ treatment technology that promotes biodegradation of the identified volatile and semivolatile organic contaminants by the providing oxygen to the microorganisms that are resident in the affected soil. If the treatment is successful, the contaminants are reduced to carbon dioxide and water, and the soil can be left in-place.

A typical bioventing system contains one or more air injection points that are manifold to a low-flow blower. A properly sized bioventing system provides only enough oxygen flow to sustain microbial activity. Optimal airflow rates maximize biodegradation as the vapors move slowly through biologically active soil while minimizing volatilization and release of the contaminants to the atmosphere.

Advantages of a bioventing system include factors such as:

1. in-situ treatment greatly reduces the expense and destruction associated with traditional combined excavation and treatment/disposal processes;
2. in-situ treatment often eliminates expensive off-gas treatment requirements that are typical of many soil vapor vacuum extraction procedures;
3. bioventing processes are mechanically simple, require minimal levels of maintenance, can be operated and maintained by relatively few people, and can be left unattended for extended periods of time; and,
4. biodegradation of volatile organic compounds can be achieved in periods of 1 to 5 years, while treatment times for semivolatile organic constituents can be achieved in 2 to 10 years.

Potential limitations of a bioventing system include:

1. bioventing is most practical for implementation at sites where large volumes of soil at depth are contaminated with degradable volatile and semivolatile organic compounds;
2. saturated soil lenses are difficult to aerate;
3. low-permeability soils are difficult to aerate;
4. soils with low moisture content tend to dry out during aeration, and thereby reduce the rate of biodegradation achieved;
5. water tables in close proximity to the ground's surface limits the vent well's radius of influence;
6. low nutrient levels (i.e., nitrogen and phosphorous) may affect and retard biodegradation; and,
7. low soil and ambient temperatures retard biodegradation.

Soil Vapor Extraction

Soil vapor extraction wells are drilled in and around the area where the soil contamination exists. A vacuum is then applied through the extraction well(s) that induces gas-phase volatiles to be removed from the soil and captured in the well(s). If contaminants are shallow, geomembrane covers are typically included to prevent short-circuiting of airflow and to increase the radius of influence of the extraction wells. Ground water depression pumps may be needed to reduce upwelling that may result due to the application of the vacuum on the area of contamination. These wells may also be used to lower the local water table elevation, thereby thickening the vadose where this technology works best.

Principal advantages of this technology include:

1. it is an in-situ technology that thereby eliminates the need for excavation.
2. It is best applied to sites where large amounts of volatile and semivolatile organic contamination exists; and
3. relatively simple and inexpensive equipment is used in the system.

Potential limitations of this technology include:

1. soil that contains a high degree of fines and/or a high degree of saturation require higher vacuums which will increase the cost of the system or hamper the operational efficiency of the unit;
2. soil exhibiting highly variable stratigraphy or high permeability may be susceptible to uneven gas flow and therefore, contaminant removal;
3. soil containing high organic content or that is extremely dry has a high sorption capacity for VOCs which may result in reduced removal rates;
4. exhaust gases from the SVE system may require additional treatment prior to discharge to the atmosphere; and
5. entrained liquids resulting from the off-gas treatment system may require capture and treatment/disposal in ancillary systems.

Solidification/Stabilization

Solidification/stabilization technologies may be implemented in-situ or ex-situ. In either case, the objective of solidification technology is to physically bound or encapsulate the contamination within a stabilized mass, while stabilization technologies induce chemical reactions between stabilizing agents and the contaminants to reduce their mobility within the environment. The efficacy of the solidification/stabilization process is typically demonstrated by performing leachability tests to measure and document the immobilization of contaminants. Numerous forms of solidification and stabilization technologies have been demonstrated and include:

- bituminization
- emulsified asphalt
- modified sulfur cement
- polyethylene extrusion
- pozzolan/Portland cement
- radioactive waste solidification
- sludge stabilization soluble phosphates and
- vitrification/molten glass.

Key limitations or drawbacks of these technologies include:

1. Depth of contaminants may limit the application of some in-situ processes;
2. Environmental conditions may affect the long-term immobilization of the contaminants;
3. Certain types of wastes are incompatible with different processes and treatability studies are generally required to predict the efficacy of the treatment process;
4. Organic contaminants are frequently not encapsulated and immobilized by the processes;
5. Reagent/additive mixing are relatively difficult when applied in-situ;
6. Significant volume increases (e.g., up to double the original volume) may result from the process;
7. Confirmatory sampling for in-situ application is generally more difficult and costly that for ex-situ applications;
8. Cohesive soil and soil containing a large portion of coarse gravel and cobbles are unsuitable for this type of treatment; and
9. Solidified materials, if left in place, may hinder future site uses and conditions encountered.

Land Treatment or Land Farming

Land Treatment or Land Farming are generally comparable treatment technologies, the significant difference being Land Treatment is performed in-situ whereas Land Farming is performed ex-situ. In both cases, the contaminated soil is periodically tilled or turned over to aerate the waste and to promote degradation. During treatment, key conditions (e.g., moisture content, degree of aeration, pH and nutrient/additive levels, etc.) of the contaminated media are closely monitored and controlled to enhance the biodegradation process. Land Treatment or Land Farming technologies are both generally applied to enhance the degradation of heavier hydrocarbons, and are less likely to be used for the treatment of organic contamination containing volatile organic compounds. Volatile organic compound contamination is typically more effectively and quickly treated using technologies that take advantage of the lighter hydrocarbon species' volatility (e.g., soil vapor extraction, bioventing, etc.). Both technologies are considered to be medium to long-term approaches to remediating contaminated soils.

Land Treatment sites must be properly designed and managed to ensure that problems that could result in the ground water, surface water, sediment, air, and food chain contamination do not occur. Land Farming technologies, on the other hand, control these potential problems by moving the contaminated soil to a controlled test cell. During Land Farming the contaminated media is excavated and placed into lined beds or other systems that are designed to control and capture leaching or volatile contaminants. During placement of the contaminated media in the bed, lifts of up to 18 inches in height are constructed and these are maintained during the treatment process. Once the desired degree of biodegradation is achieved, the affected media is removed and replaced by other contaminated material. Frequently, fresh contaminated media is mixed with partially remediated material to inoculate the freshly added material with an actively degrading microbial culture, thereby enhancing degradation and shortening treatment times.

Contaminants that have been successfully treated in Land Treatment and Land Farming applications include diesel fuels, number 2 and 6 fuel oils, aviation fuels, oily sludges, wood preserving wastes, coke wastes and certain pesticides.

Key limitations to these treatment technologies include:

1. a large amount of space is required;
2. soil that is contaminated to extensive depths (e.g., greater than 1 to 2 feet) must be excavated and placed into land farming cells or spread out over extended areas;
3. conditions affecting the biological degradation of contaminants (e.g., temperature and rain fall) are largely uncontrolled which can lead to increased treatment times;
4. if volatile contaminants are present in the contaminated media, they must be pretreated because they would volatilize and cause releases to the atmosphere;
5. dust control provisions must be considered, especially during media tilling and handling operations;
6. runoff collection facilities must be constructed and monitored to control leachate release; and,
7. some waste constituents may be subject to land ban regulations and thus be prohibited from treatment via this technique.

Biopiles

Biopile treatment is a full-scale technology where excavated soils are mixed with soil additives, stockpiled in a fabricated treatment area, and remediated using forced aeration to promote natural biodegradation of the organic contaminants. If the treatment is successful, the contaminants are reduced to carbon dioxide and water, and the soil can be recycled and placed back into the excavation.

A basic biopile system includes a treatment bed, which is typically comprised of a 60-mil high-density polyethylene (HDPE) base liner that sits atop a base of clean soil, an aeration system, an irrigation/nutrient addition system, a leachate collection system, and an over liner (20-mil HDPE). Moisture, heat, nutrients, oxygen, and pH are controlled to promote biodegradation. The irrigation/nutrient addition system is buried beneath the contaminated soil to facilitate the addition of air and if necessary, nutrients (e.g., water, phosphorous, nitrogen). The contaminated pile is typically covered to minimize run-off, evaporation and volatilization, and to promote solar heating. Volatile organic compounds liberated during the biodegradation may be captured in an optional air collection system where they are treated (e.g., passed through an activated carbon canister) prior to discharge to the atmosphere.

The advantages of soil treatment via biopiles include factors such as:

1. it is applicable to all types of petroleum, oil and lubricants;
2. final reaction products are relatively innocuous;
3. short treatment times (i.e., typically range from 3 to 6 months) are achievable; and,
4. treatment rate can be enhanced by the addition of simple, low-cost nutrients (i.e., water, nitrogen, phosphorous).

Limitations of treatment in biopiles include:

1. small size excavations (i.e., less than 250 yd^3) may be more economically handled via off-site disposal;
2. a large amount of flat space is required for construction of the biopile; and,
3. increased content of clay and silt in the soil may retard or limit the extent of biodegradation.

Soil Washing

Soil washing is a treatment option applicable to soil contaminated with metals and semivolatile organic compounds (SVOCs). In the process, soil is slurried with water and subjected to intense scrubbings. To improve the efficiency of soil washing, the process may include the use of surfactants, detergents, chelating agents or pH adjustment. After contaminants are removed from the soil, the washing solutions can be treated in a wastewater treatment system. The washing fluid can then be recycled, continuing the soil washing process.

Certain site factors can limit the success of soil washing:

1. highly variable soil conditions;
2. high silt or clay content which will reduce percolation and leaching, and inhibit the solid-liquid separations following the soil washing;
3. chemical reactions with soil cation exchange and pH effects may decrease contaminant mobility; and,
4. if performed in-situ, the groundwater flow must be well defined in order to recapture washing solutions.

Low Temperature Thermal Desorption

Thermal desorption is a physical separation process that is intended to volatilize water and organic contaminants from the waste feedstock. A carrier gas transports the volatilized water and organic compounds into a gas treatment system where subsequent contaminant destruction or containment is accomplished. In low temperature thermal desorption (LTTD) processes, the contaminated media is heated to a temperature between 90 and 300 degrees Celsius (^{o} C; or approximately 200 to 600 degrees Fahrenheit, ^{o}F) using either direct-fired, indirect-fired, or indirect heated systems. In the direct-fired systems, fire is applied directly upon the surface of the contaminated media, and frequently some degree of thermal oxidation may result among the organic constituents. In the indirect-fired system, the flame heats the air stream that is then passed over and through the contaminated media to volatilize water and organic constituents. In an indirect-heated system, the waste is placed into an externally heated vessel where it is typically tumbled while the surrounding headspace is continuously swept with an inert carrier gas. If the LTTD system is operated at the lower end of its temperature range, the naturally occurring organic constituents of the soil are not damaged which enables the treated soil to support future biological activity.

Advantages of LTTD processes include:

1. it is effective at separating organic from complex waste streams (e.g., refinery wastes, coal tar wastes, paint wastes, etc.);
2. it can separate solvents, PCBs, pesticides, lubricants and fuels from soil;
3. equipment capable of handling 10 or more tons per hour is commercially available and it can be brought to the site;
4. LTTD processes require less fuel than other forms of treatment technologies; and,
5. treated soils can be used as backfill at the original excavation site or at other sites, if subsequent analyses indicate that organics are removed to permissible levels and metals enhancement does not occur.

Limitations of the LTTD technology include:

1. clay or silty soil that agglomerates and that has a high humic content typically increase reaction time or temperature requirements due to the binding of the organic contaminants within the soil matrix;
2. preprocessing of soil (e.g., dewatering, grinding or crushing) may be needed to achieve acceptable levels of moisture or particle size in the feed stock.;
3. soils containing heavy metals content may yield a treated soil residue that requires subsequent stabilization or treatment; and,
4. all thermal desorption systems require treatment of the off-gases to control particulates and emissions prior to discharge to the atmosphere.

Off-Site Disposal at a Landfill

Excavation of hazardous materials is performed extensively for site remediation. Excavation is usually accompanied by off-site treatment (several discussed above) or disposal in an off-site secured landfill. Excavation employs the use of earth moving equipment to physically remove soil and buried materials. There are no limitations to the types of waste that can be excavated and removed. Factors that must be considered include the mobility of the wastes, the feasibility of on-site containment, and the cost of disposing the waste or rendering it non-hazardous once it has been excavated. A frequent practice at hazardous waste sites is to excavate and remove contaminant "hot spots" and to use other remedial measures for less contaminated soil.

Advantages of excavation and off-site disposal include:

1. excavation and off-site disposal can be used to eliminate the source of contamination at a site;
2. excavation and off-site disposal reduces or eliminates the need for long-term monitoring at the original waste site; and,
3. time to achieve beneficial results at the original site is short relative to other remedial alternatives.

Potential limitations of excavation and off-site disposal in a landfill include:

1. costs associated with off-site disposal are be high if the excavated material is classified as hazardous according to 40 CFR 261 Subpart C;
2. institutional aspects (e.g., barriers or fencing, dust suppression, etc.) can add significant delays to program implementation; and,
3. inappropriate post-excavation disposal can result in subsequent environmental liabilities at the off-site disposal site.

3.6 REMEDIAL ACTION COSTS

Bioventing

Bioventing does not require expensive equipment and can be completed by relatively few personnel who are responsible for the operation and continuing maintenance of the system. Factors that affect costs include the type of contaminant and its concentration, the permeability of the soil, well spacing and number, pumping rate and off-gas treatment requirements.

Based on data developed by the US Air Force Center for Environmental Excellence (AFCEE)[11], the estimated total costs of in-situ soil remediation via the application of bioventing technology is $10 to $60 per ton. At sites where more than 10,000 yd^3 of contaminated require treatment, costs of less than $10 per yd^3 have been achieved. At site where less than 500 yd^3 require treatment, costs of greater than $60 per yd^3 have been recorded.

Soil Vapor Extraction

The actual cost of in-situ soil vapor extraction is site-specific, highly dependent on the size of the contaminated site, the type of contaminant species that are present and their concentration, and the geologic and hydrogeologic setting of the site. Independently, these factors affect the number of extraction wells that may be required at the site, the level of vacuum that must be applied and the capacity of the extraction device needed, and the length of time that is necessary to achieve the desired clean-up goal. Additionally, off-gas treatment systems and systems that treat recovered liquid streams may also be needed to control releases to the air or receiving water bodies or sewer systems. Both of these ancillary systems will add to the ultimate cost of the soil vacuum extraction system.

Based on information reported by the Federal Remediation Technologies Roundtable[12], costs to treat contaminated soil via in-situ soil vapor extraction are estimated to be on the order of $10 to $40 per yd^3 of contaminated soil. An additional cost of between $10,000 and $100,000 may be required if pilot testing is required to demonstrate the efficacy of the technology for the contaminant.

In-Situ Solidification/Stabilization

Solidification/stabilization treatment is grouped into different categories according to the types of additives and processes used, and the cost of this treatment is ultimately dependent upon which process is utilized. Ex-situ processes are among the most mature of remediation technologies and data provided by Federal Remediation Technologies Roundtable[12] indicates that all forms of this technology can be applied for under $100 per ton of soil. In-situ treatment costs range from $40 to $60 per yd^3 for shallow applications of auger/caisson or reagent/injector head system processes, to $150 to $250 per yd^3 for deeper applications of the same technologies. Costs associated with the application of in-situ vitrification processes include $25,000 to $30,000 for treatability tests exclusive of analytical costs,

[11] Air Force Center of Environmental Excellence, Technology Transfer Division, "*Bioventing Performance and Cost Results from Multiple Air Force Test Sites*," Technology Demonstration, Final Technical Memorandum, Jun 1996, Hill AFB, Texas.
[12] Federal Remediation Technologies Roundtable, U.S. EPA, Chair, (5102G) 401 M Street, S.W., Washington, D.C. 20460, URL http://www.frtr.gov

plus equipment mobilization (i.e., \$200-000 to \$300,000 per event) fees, plus utilities (e.g., cost of electricity, water, etc.).

Land Treatment or Land Farming

Based on information provided by the Federal Remediation Technologies Roundtable[12], costs to treat contaminated soil via land treatment are estimated to be on the order of \$25 to \$50 per yd^3 of contaminated soil. Comparable treatment costs via land farming procedures are estimated to be closer to \$75 per yd^3 of soil treated. Additional costs associated that may be required for both technologies include laboratory study costs (\$25,000 to \$50,000 per event) and costs associated pilot tests or field demonstration (e.g., \$100,000 to \$500,000) if the efficacy of the technology for the contaminant is unknown.

Biopiles

Treatment costs using biopiles is dependent on the nature of the contaminant, the procedure to be used, the need for additional pre- or post-treatment, and the need for air emission control equipment. Information provided by the Federal Remediation Technologies Roundtable[12] indicates that typical treatment costs using a prepared bed and a liner range from \$100 to \$200 per yd^3 of contaminated soil.

Soil Washing

A large number of vendors provide soil washing services. The treatment processes used vary according to the scale of the operation, particle size being treated, and extraction agent used. Because the operation is unique for each site, it is difficult to arrive at a cost estimate. However, in an evaluation of fourteen companies offering soil washing treatment services, a general price range of \$50 to \$205 per ton was noted in EPA Engineering Bulletin EPA/540/2-90/017, September 1990. The average cost for use of this technology reported by the Federal Remediation Technologies Roundtable[12], including excavation costs, is \$170 per ton.

Low Temperature Thermal Desorption

The Federal Remediation Technologies Roundtable[12] reports that costs associated with the remediation of petroleum hydrocarbon contaminated soil via low temperature thermal desorption systems range from \$40 to \$300 per ton of soil. Of the total cost, approximately \$15 to \$30 per ton is associated with direct operating costs, while unit transportation and set-up costs are estimated at \$3.50 to \$5.50 per ton (not typically exceeding a total of \$200,000 per event). Costs associated with excavation of the contaminated soil and backfill of the treated soil is estimated in the range of \$5 to \$10 per ton.

Off-Site Disposal at a Landfill

The Federal Remediation Technologies Roundtable[12] estimates that costs associated with the excavation and disposal of soil range from $270 to $460 per ton of soil, depending on the nature of the hazardous materials and the methods of excavation. If the soil is not classified as hazardous, the cost to excavate and dispose of it in a landfill will more typically range between $50 and $100 per ton. If the soil can be classified as clean enough to serve for beneficial use as daily cover, the cost to excavate and dispose of it will drop and range between $25 and $50 per ton.

3.7 RECOMMENDATION

Remediation of soil impacted by TPH at SEAD-40 is recommended. Specifically, soil located in the man-made drainage ditch to the north of Building 319 has been impacted by TPH and it is is believed that a majority of the blowdown liquids was discharged into the northern drainage ditch; therefore, it is presumed that the soil in the bottom of this ditch will require the most attention. However, soil around an identified "hot spot" of TPH contamination (i.e., SS40-2) will also be addressed during this action.

The projected amount of soil requiring remediation from this ditch is defined as 12.5 yd^3. This estimate includes an area measuring 2 feet across the ditch and extending 120 feet to the north in the downstream flow direction starting at the point where the underground pipe from Building 319 first appears (at the location of SB40-1). The subsurface soil sample, SB40-1, collected at the discharge of the pipe shows that the petroleum hydrocarbon contamination has penetrated throughout the vadose zone, so all soil located above the weathered bedrock in this area should removed. Downstream of the discharge point, the petroleum hydrocarbon contamination appears to be located in the shallow soil, so it is recommended that the initial removal effort focus on the top one foot (i.e., 12 inches) of the soil. Details of the areas to be remediated are shown in **Figure 3-1**.

The projected amount of soil requiring remediation from the TPH "hot spot" (i.e., vicinity of SS40-2) is defined as approximately 3.7 yd^3. This estimate includes an area measuring 10 feet long by 10 feet wide by 1 foot deep.

The soil from excavations can be easily excavated with a backhoe and transported by truck to an off-site disposal area. Because of the limited volume of soil that apparently requires remediation, state-approved, clean fill from SEDA can be used to backfill the excavated area once the area has been shown to comply with the NYSDEC requirements.

3.8 JUSTIFICATION

The volume of petroleum hydrocarbon contaminated soil recommended for removal from SEAD-40 is approximately 16.2 yd^3. Using a conservative estimated unit cost of $100 for the excavation, backfill, and disposal of the contaminated soil, the total cost of the proposed removal action at SEAD-40 is approximately $1,600 – $1,700, exclusive of costs associated with mobilization, monitoring, sampling and analysis, and oversight and management. Because the lateral and vertical extent of the petroleum hydrocarbon-impacted soil can be sufficiently removed by this method of remediation, and the cost is not prohibitive, excavation and off-site disposal are an effective and immediate way to remediate the soil at SEAD-40.

3.9 VERIFICATION SAMPLING AND ANALYSIS

Confirmatory Sampling and Analysis

Confirmational sampling will be conducted at both excavation sites (i.e., man-made drainage ditch and from the area of SS40-2) to verify that TPH contaminated soil have been adequately removed. A minimum of five confirmational samples will be collected from each area excavated. As is shown on **Figure 3-1**, two of the three planned excavations within SEAD-40 are expected to be 1 foot deep or less, while the third is expected to be 6 feet deep. Based on the size of the proposed excavations, it is currently expected that a total of 22 confirmational samples, plus associated QA/QC samples, will be collected from the three excavations in SEAD-40. At the small excavation surrounding sampling location SS40-2, a minimum of five confirmational samples will be collected (i.e., one from base, and one each from each perimeter edge). Similarly, at the small deep excavation (i.e., 10 ft. by 2 ft. by 6 ft.) that is proposed for the top of the drainage ditch, a minimum of five confirmational samples will also be collected (i.e., one from the base, and one each from each sidewall). Finally, a minimum of 12 confirmational samples will be collected from the longest of the proposed excavations (i.e., 110 ft. by 2 ft. by 1 ft) with one being collected from the narrow (i.e., 2 ft) perimeter end, four being collected from each long perimeter edge (i.e., 110 ft. length), and three being collected from the base of the excavation. No confirmational sample will collected from the perimeter edge of the extended trench that is shared with the deeper excavation, as this sample is already covered under the samples proposed for the deeper trench. Necessary samples will also be collected for QA/QC purposes.

Additional confirmational samples will be collected from the base of the excavation at a rate of at least one per every additional 900 square feet or less of surface area exposed, or for excavations of limited base area but of extended length (e.g., drainage ditch excavations), at least one additional sample will be collected from the base of the excavation for each additional 50-foot length or fraction thereof. Furthermore, additional confirmational samples will be collected for each incremental length extension of 30 feet or less.

The locations selected for collection of confirmational samples will be biased towards sites that are suspected to be contaminated. Each of the confirmational samples will be analyzed for aromatic VOCs (i.e., BTEX), PAHs, and the "RCRA" eight metals by EPA Methods SW-846[9] 8021B, SW-846[9] 8270C, and SW-846[9] 6010B et al., respectively. Additional confirmational samples will be collected and analyzed if results of field screening or observations or the professional judgment of site personnel suggests that they are warranted. Additional details of the proposed confirmational sampling are provided in Appendix B.

If the results of the confirmational sample analyses demonstrate that the concentrations of the target analytes (i.e., BTEX, PAHs, or RCRA metals) are consistent with the NYSDEC TAGM # 4046 guidelines, the proposed removal action will be considered complete.

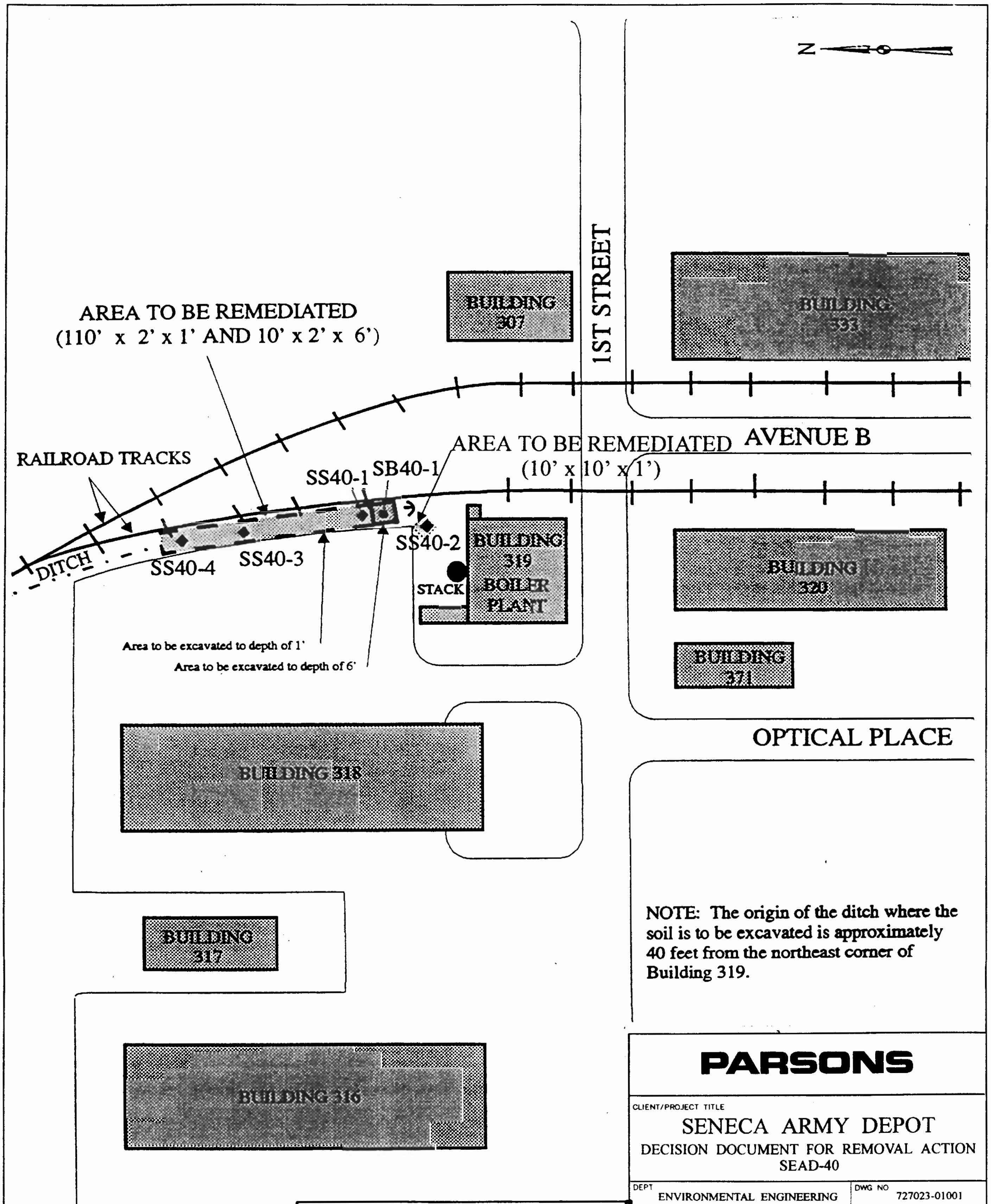
Disposal or Characterization Sampling and Analysis

Samples of excavated soil that is stockpiled at the site, pending off-site disposal, will also be collected and analyzed for disposal determination purposes. One sample will be collected for each 150 yd^3 or less of soil that is staged in a pile awaiting disposal. Soils with concentration of VOCs, SVOCs, or metals exceeding NYSDEC's recommended cleanup goals (i.e., TAGM # 4046 concentrations) will be disposed at an offsite facility. These soils will also be analyzed for the characteristic of toxicity via the Toxicity Characteristic Leaching Procedure (TCLP) (every 150 yd^3) which is required for landfill disposal.

TABLE 3-1

SURFACE AND SUBSURFACE SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT ACTIVITY
SEAD-40 LIMITED SAMPLING PROGRAM

Compounds	Matrix Location Depth (ft) Date ES ID Lab ID Units	Soil SEAD-40 4-6 12/16/93 SB40-1.1 207134	Soil SEAD-40 0-0.2 12/17/93 SS40-1 207139	Soil SEAD-40 0-0.2 12/17/93 SS40-2 207141	Soil SEAD-40 0-0.2 12/17/93 SS40-3 207142	Soil SEAD-40 0-0.2 12/17/93 SS40-4 207143	Soil SEAD-40 0-0.2 12/17/93 SS40-5 207144 (SS40-1 dup)
Total Petroleum Hydrocarbons	mg/Kg	1270	300	420	1640	680	270
pH	standard units	7.37	7.86	7.64	7.54	7.29	8.15
Total Solids	% W/W	85.4	90.8	89.2	81.1	69.9	91.8



LEGEND

◆ SURFACE SOIL SAMPLE

● SOIL BORING LOCATION

PARSONS

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT

DECISION DOCUMENT FOR REMOVAL ACTION SEAD-40

DEPT ENVIRONMENTAL ENGINEERING	DWG NO 727023-01001

FIGURE 3-1

SAMPLE LOCATIONS AND APPROXIMATE AREA TO BE REMEDIATED

SCALE	DATE AUGUST 2002

P:\PIT\PROJECTS\SENECA\S383940\DECISION\SEAD40.CDR

Confirmatory Sampling and Analysis
Time-Critical Removal Actions, Three VOC Sites
(SEADs 38, 39 and 40)

1. Introduction

Confirmatory soil sampling will be conducted at each site where an excavation or pile/berm structure removal is performed. The goals of the confirmatory sampling are to verify that the identified contamination has been removed, and that concentrations of contaminants remaining at the subject site comply with the cleanup objectives. If the results of the confirmatory analysis verify that the cleanup objectives have been achieved, no further excavation will be conducted at the subject site. If the confirmatory results show that the Army's cleanup objectives have not been achieved, further excavation may be conducted until such verification is provided.

2. Equipment and Supplies

The following equipment and supplies will be required to complete the confirmatory sampling.

- Field Book and Project Plans
- Sample Labels
- Shipping Labels
- Sample Records
- Shipping Forms
- Chain-of-Custody Forms
- Camera
- Photo-ionization Detector
- Personal Protective Equipment in accordance with the Health and Safety Plan
- Marker stakes, flagging and paint
- Tape Measures
- Decontamination Supplies
- Inert (e.g., stainless steel or Teflon®) sampling equipment
- Hand Auger
- Mixing Bowls
- Pre-cleaned Sample Bottles
- Plastic Sheeting
- Shipping Tape
- Ice Chests and Ice (for sample transport)

3. Number, Frequency and Location of Confirmatory Sampling

In general, confirmational soil samples will be collected from the base and sidewalls of each excavation. Sidewall samples will not be collected where the depth of the excavation measures 12 inches or less. In situations where the sidewalls of an excavation are 12 inches or less in depth, confirmational samples will be collected outside the perimeter of the excavation. Confirmational samples will also be collected from locations beneath and around the perimeter of every aboveground soil pile or berm structure that is removed.

At least one discrete sample will be collected from each face of an open excavation that is 12 inches in depth or greater. Thus, a minimum of five confirmational samples (i.e., one base, and four sidewall samples) will be collected at each excavation. Additional confirmational samples will be collected from the base of each excavation at a rate of at least one per every 900 square feet (e.g., 30 ft. by 30 ft. area), or fraction thereof, of surface area. Furthermore, additional sidewall samples will be collected for each additional 30-foot length, or fraction thereof, of excavation opened on any sidewall face.

For excavations where the depth of the excavation is less than or equal to 12 inches in depth, confirmational samples will be collected from the perimeter of the excavation at a rate of no less than one sample per every 30 linear feet of length on each edge of the excavation. A minimum of one sample will be collected along each edge of the excavation. Additionally, at least one sample will be collected from the base of the excavation, and additional samples will be collected from the base of the excavation at a rate of at least one per every additional 900 square feet or less of surface area. For excavations of limited base area but of extended length (e.g., drainage ditch excavations), at least one additional sample will be collected from the base of the excavation for each additional 50-foot length or fraction thereof that exists. Additionally, samples will be collected from the perimeter of the excavation at a rate of at least one sample per each incremental length of 30 feet or less.

For aboveground soil piles or berm structures that are removed, at least one sample will be collected from a point that is directly beneath each pile or berm structure, and from at least four other locations (e.g., major compass point locations) that are located around the perimeter of the pile or berm. Additional samples from beneath the pile or berm structure will be collected at a rate of not less than one per every 900 square feet or less of surface area underlying the pile or berm, and at a rate of at least one per every 30 linear feet of the piles or berms perimeter.

Locations of confirmational sampling will be biased towards areas that are most likely to be contaminated. Visual and olfactory sensing and use of portable field monitoring devices (e.g., photo-ionization detectors) should be used, within the bounds of the site-specific health and safety plan and good operating procedures, to assist in the selection of additional confirmational sampling locations.

4. Site-Specific Confirmational Sampling Details

SEAD-38

Confirmational sampling proposed for SEAD-38, Building 2079's Boiler Blowdown Leach Pit, is anticipated to conform to the general specifications provided above for shallow excavations, with samples being collected from the base of the excavation and from the perimeter of the excavation if its completed depth is 12 inches or less. Due to the anticipated small size, depth, and limited length of the two planned excavations in SEAD-38, a minimum of five confirmation samples will be collected from the smaller (i.e., 10 ft. by 10 ft. by 1 ft.) of the two planned excavations, while 12 confirmational samples be collected from the larger (i.e., 100 ft by 2 ft. by 1 ft.) of the two planned excavations. If either of the planned shallow excavations is increased laterally, additional confirmational samples will be collected from the perimeter at a rate of one sample per 30 feet or fraction thereof that is located on each side and at a rate of at least one additional sample per every 50 increment of base length or 900 square feet of excavation base. Additional samples will be collected if field conditions, observations or professional judgment dictate that they should be.

If the planned excavations are extended to a depth of greater than 12 inches or if the length of the excavation is increased, additional conformational samples will be collected. In deeper excavations, additional confirmational samples will be collected at a rate of not less than one sample per every 900 square feet or less of surface area present on each completed excavation face (i.e., base and sidewalls). Furthermore, additional confirmational samples will be collected at a rate of not less than one per every 30 linear feet, or fraction thereof, of sidewall or excavation base length.

At present, a minimum of 17 confirmatory samples, plus associated quality assurance/quality control (QA/QC) samples, will be collected from the area of SEAD-38. Each of the confirmational samples collected will be analyzed for aromatic volatile organic compounds (e.g., benzene, toluene, ethyl benzene, and xylenes (BTEX) by SW-846 Methods 5035/8021B) and polynuclear aromatic hydrocarbon (PAH) compounds (SW-846 Method 8270C) as well as the eight metals (i.e., the "RCRA" metals – arsenic, barium, cadmium, chromium, lead, mercury, nickel, and selenium) by SW-846 Method 6010B et al.

SEAD-39

Confirmational sampling proposed for SEAD-39, Building 121's Boiler Blowdown Leach Pit, is anticipated to conform to the general specifications provided above for shallow excavations, with samples being collected from the base of the excavation and from the perimeter of the excavation if its completed depth is 12 inches or less. Due to the anticipated limited size (i.e., 1,000 square feet with 20 ft. by 50 ft. perimeter) of the planned excavation in SEAD-39, a minimum of eight confirmation samples will be collected from the proposed site; two from the base of the excavation, one each from each of the shorter (i.e., 20 ft.) perimeter edges, and two from the longer (i.e., 50 ft.) perimeter edges. Additional samples will be collected if field conditions, observations or professional judgment dictate that they may be necessary.

If the planned excavation is extended to a depth of greater than 12 inches or if the size of the excavation is increased, additional conformational samples will be collected. In deeper excavations, additional confirmational samples will be collected at a rate of not less than one sample per every 900 square feet or less of surface area present on each completed excavation face (i.e., base and sidewalls). Furthermore, additional confirmational samples will be collected at a rate of not less than one per every 30 linear feet, or fraction thereof, of sidewall or excavation base length.

At present, a minimum of eight confirmatory samples, plus associated QA/QC samples, are expected to be collected from the area of SEAD-39. Each of the confirmational samples collected will be analyzed for aromatic volatile organic compounds (e.g., BTEX by SW-846 Methods 5035/8021B) and PAH compounds (SW-846 Method 8270C) as well as the eight "RCRA" metals (by SW-846 Method 6010B et al.).

SEAD-40

Confirmational sampling proposed for SEAD-40, Building 319's Boiler Blowdown Leach Pit, is anticipated to conform to the general specifications provided above. The proposed removal action includes the excavation of three areas; two of which are shallow (i.e., 12 inches deep or less), while the third will be advanced deeper (i.e., 4-6 feet) into the ground. Therefore, at the two shallow excavations confirmational samples will be collected from the base and along the perimeter of the excavations, while for the deeper excavation, samples will be collected from the base and the sidewalls of the excavation. At present, the deepest excavation and one of the shallower excavations will share one common side; therefore, no confirmational sample will be collected from the perimeter of the shallower excavation along the common side; however, a sidewall confirmational sample will be collected from the deeper excavation along the common side.

The shallow excavation that does not share a common side with the deeper excavation is currently expected to measure 10 feet by 10 feet by 1 foot deep. Five confirmational samples will be collected from this site including one from the base and one from each perimeter edge.

The second shallow excavation is expected to measure 110 feet long by 2 – 3 feet wide by 1 foot deep. Three samples will be collected from the base of this excavation, and nine will be collected from the three perimeter edges that are not common with the deeper excavation discussed below.

Due to the expected length of this excavation (i.e., 110 feet), four samples will be collected along each of the two extended sides, with the last sample being collected from the end of the excavation.

Five confirmational samples will be collected from the deeper excavation (i.e., 10 feet long by 2 – 3 feet wide by 4 – 6 feet deep). One sample will be collected from the base of the excavation, while additional samples will be collected from each of the sidewalls.

Thus, at present, a minimum of 22 confirmatory samples, plus associated QA/QC samples, will be collected from the area of SEAD-40. Each of the confirmational samples collected will be analyzed for aromatic volatile organic compounds (e.g., BTEX by SW-846 Methods 5035/8021B) and PAH compounds (SW-846 Method 8270C) as well as the eight "RCRA" metals (by SW-846 Method 6010B et al.).

In all cases, additional confirmational samples will be collected, as may be needed, based on field observations, screening results, or professional judgment.

5. Sampling Method

Once the excavation is complete, a drawing of the completed excavation will be prepared and necessary measurements shall be recorded in the field notes. Specific measurements will be collected including the length, width, and depth (if subsurface excavation) of the excavation. The depth of the excavation will be reported at each corner, and at intermediate locations that are no further than 100 feet apart. These measurements will be used to document that sufficient samples have been collected from the excavation to reasonably assess whether residual contamination remains in the area of the excavation.

Once the drawing of the excavation is prepared, all proposed sampling locations will be marked and labeled and information describing the location of each proposed sampling location will be transcribed into the field notes and onto site maps. Each sampling location must be uniquely identified with a sample location.

Confirmational samples will be collected from a depth of not less than one-inch below the excavation's surface and not more than six inches below the excavation's surface. The one-inch minimum is recommended to ensure that soils exposed directly to the atmosphere, which could result in the off-gassing of volatile organic or inorganic (e.g., sulfide or cyanide) compounds and a decreased level of volatile content over time, are not collected and used for the volatile compound analyses. The depth from which confirmational samples are obtained will be recorded in the field notes at the time of collection.

At the time of their collection, confirmational soil samples will be visually described for:

1. soil type,
2. color,
3. moisture content,
4. texture,
5. grain size and shape,
6. consistency,
7. visible evidence of staining or discoloration, and
8. any other observations (e.g., odors).

All data collected at the time of sample collection will be transcribed into the field records. The identity of the sampler, the date and time of sample collection, the location of the sample collection (i.e., location id), the identity of the sample (i.e., sample number), a description of the sampling method (e.g., auger, trowel, spade, homogenized, etc.) used, the number of sample containers collected, and the intended analysis that will be completed will be recorded.

All sampling will be completed using decontaminated, inert (e.g., stainless steel, Teflon®, etc.) sampling equipment. Selected sampling equipment may be used for all collection activities conducted at one location (e.g., the sample and its duplicate for all required analyses) during one contiguous time period; however, once the equipment has been used at one location, it can not be used at another location until it has been thoroughly decontaminated per prescribed procedures.

Samples collected for volatile compound analyses (e.g., volatile organic compounds or cyanide) will be collected first and will be transferred directly from the ground to the appropriate sample container (e.g., for VOC analyses either a preserved VOA vial or an EnCore™ sampler). Samples for volatile compound analyses will not be homogenized. Samples collected for non-volatile analyses (e.g., semivolatile organic compounds, pesticides, metals, nitrate, TOC, TPH) should be collected and transferred to an inert mixing bowl and homogenized prior to being placed into their final sample bottles.

6. Recommended Sampling Order

A recommended order for sample collection is provided below:

<u>Collected without homogenization</u>
Aromatic Volatile Organic Compounds (BTEX VOCs)

Collected, homogenized, and split into required bottles
Polynuclear aromatic hydrocarbon (PAH) Semivolatile Organic Compounds (SVOCs)
RCRA Metals

7. Laboratory Analyses

An analytical laboratory that is certified by the State of New York for the identified analysis will perform all confirmational sample analyses. The analytical procedures used for the performance of the proposed analyses will conform to requirements identified by the EPA in its document Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods (EPA, SW-846 3rd edition) as modified by the NYSDEC's Contract Laboratory Program (CLP) Analytical Services Protocol (ASP).

The proposed analytical methods identified for the metal sites discussed above include:

- Aromatic VOCs (i.e., BTEX) by SW-846 Methods 5035 (sample collection) and 8021B (analysis) as modified under NYSDEC's CLP ASP.
- Polynuclear aromatic hydrocarbons SVOCs by SW-846 Method 8270C as modified under NYSDEC's CLP ASP.
- RCRA Metals by SW-846 Method 6010B et al. as modified under NYSDEC's CLP ASP.

8. Quality Assurance/Quality Control Samples

Field quality assurance/quality control (QA/QC) samples will consist of the collection and analysis of one equipment blank, matrix spike, matrix spike duplicate, and duplicate sample for every batch of eighteen field samples or less per analytical matrix (e.g., soil or surface water) that is submitted to the laboratory for analysis. In addition, whenever samples are collected for VOC analyses, at least one trip blank sample will be shipped with each cooler that is used for the transport of VOC samples. A preliminary estimate of the number of QA/QC samples that are expected to be collected during the proposed removal actions at the three sites is provided in Table 1. It is currently anticipated that each analytical sample delivery group will consist of a maximum of 18 field samples, one field duplicate, one field blank, one matrix spike and one matrix spike duplicate (a total of 22 samples in the SDG). Trip blank samples will also be collected for each cooler. Additional QA/QC samples will be collected in the event that particular sample delivery groups (SDGs) need to be closed due to delays in the field sampling program that impact sample extraction and analysis requirements defined by EPA and the NYSDEC.

Field QA/QC samples will be identified using standard sample identifiers, which will provide no indication of their QA/QC role. QA/QC sampling requirements are described in Section 5.4 of

Appendix C of SEDA's Generic Installation RI/FS Work Plan (Parsons, 1995). Required sample containers, preservation techniques, and holding times are also specified in the Generic Installation RI/FS Work Plan, and in EPA's SW-846 document.

9. Data Validation

Validation of analytical data resulting from analytical determinations in soil will be performed in a manner that is generally consistent with procedures defined in the EPA's "National Functional Guidelines for Organic Data Review" and "National Functional Guidelines for Inorganic Data Review" and consistent with EPA Region 2's Standard Operating Procedures. Specific data validation procedures that will be followed include:

HW-6, CLP Organics Data Review and Preliminary Review, Revision 12, March 2001;

HW-22, Validating Semivolatile Organic Compounds by SW-846 Method 8270, Revision 2, June 2001; and

HW-2, Evaluation of Metals Data for CLP Program, Revision 11, January 1992.

The data package submittal requested from the laboratory for the analytical determinations in soil will contain all data generated during the analysis, including mass spectral identification charts, mass spectral tuning data, spike recoveries, laboratory duplicate results, method blank results, instrument calibration, and holding time documentation. All sample data and laboratory quality control results will be requested for analyses completed for VOCs via Method 8021B.

Commensurate levels of data validation will be performed on the results and the data packages reported for the proposed analyses. A *qualitative* review will be completed for the asbestos data. A qualitative review includes an analysis of the following items, as they are applicable to the polarized light microscopy procedure; data completeness, custody documentation, holding times, laboratory and field QC blanks, instrument calibrations, laboratory control sample recoveries, matrix spike/matrix spike duplicate precision and accuracy, laboratory duplicate precision, instrument performance, surrogate recoveries, field duplicate precision, internal standard responses, instrument run logs, and all other QC samples.

Other analyses will be subjected to full data validation. Full data validation is a qualitative and quantitative review of those items evaluated during a qualitative assessment in addition to calculating sample and laboratory QC results with the instrument raw data. This level of data quality provides assurance that all sample results reported by the laboratory were transcribed, calculated, and reported correctly. Therefore, this level of data review requires laboratories to submit all environmental sample results, laboratory QC results, and instrument raw data (i.e., a full data package or "CLP-type" data deliverable).

TABLE 1
ANTICIPATED FIELD AND QA/QC SAMPLE COUNTS
TIME-CRITICAL REMOVAL ACTIONS, THREE VOC SITES (SEADS 38, 39, AND 40)

SWMU IDENTIFICATION	**SEAD-38**		**SEAD-39**		**SEAD-40**	
SAMPLE ANALYSIS	**Anticipated Field Samples**	**QA/QC Samples (dup, fb, ms/msd, tb)(1)**	**Anticipated Field Samples**	**QA/QC Samples (dup, fb, ms/msd, tb)(1)**	**Anticipated Field Samples**	**QA/QC Samples (dup, fb, ms/msd, tb)(1)**
Aromatic Volatile Organic Compounds (BTEX - SW-846 5035/8021B)	17	5(2)	8	5(2)	22	10(2)
Polynuclear Aromatic Hydrocarbon Compounds (SW-846 8270C)	17	4(3)	8	4(3)	22	8(3)
RCRA Metals (SW-846 6010B et al.)	17	4(3)	8	4(3)	22	8(3)

(1) dup = duplicate; fb = field blank; ms = matrix spike; msd = matrix spike duplicate; tb = trip blank.
(2) Trip blanks included.
(3) Trip blanks not included.

Response To Comments
Submitted By
U.S. Environmental Protection Agency (USEPA), Region II
For Draft Final Action Memorandum and Decision Document Removal Actions,
Three VOC Sites
(SEADs 38, 39, 40)

Seneca Army Depot Activity
Romulus, New York

Comments Dated: May 30, 2002
Date of Response: July 31, 2002

This is in reference to the subject referenced document received by this office on April 11, 2002.

I. GENERAL COMMENTS

Comment:

1. There is not adequate documentation of the nature of the boilers and the type of blowdown operations that were once done at these SEADs, and, as a result, the contention that the boiler blowdown contained water, tannins, caustic soda, and sodium phosphate is speculative. In addition to chemical additives that were used, the boiler blowdown may also have contained metals, such as, copper, iron, and nickel. Further, if the leach pits were used for disposal of boiler cleaning wastes, other metals, such as chromium, calcium and magnesium may be present (EPA 1997). It is recommended that the proposed confirmation sampling include analysis for metals.

Response:

Agreed. Confirmational sampling will include the collection of samples for analysis of selected metals (e.g., the "RCRA" eight). which are?

Comment:

2. The argument presented under the groundwater sampling response provides rationale for waiting to evaluate groundwater until after removal of the source of contamination has been completed. However, the response contains one inaccuracy that should be addressed – the statement that relates total petroleum hydrocarbons (TPH) to naturally occurring organic matter. Measurement of TPH would not be expected to include a fraction of naturally occurring organic matter (unless there was a naturally occurring petroleum deposit present, such as a tar sands.) Furthermore, sampling of groundwater should not be dependant on the results of the

confirmatory soil sampling. Regardless of the contaminants level in soil, the groundwater would still need to be sampled. The possibility that contaminants could have leached out from the soil into the groundwater, leaving little or low levels of contamination in soil is a concern that needs to be addressed. Include text from the responses in the Action Memorandum to indicate potential future groundwater evaluations.

Response:

The Army agrees that the text will be modified to indicate that indicate potential future groundwater evaluations may be conducted. Crop

Comment:

3. It appears that much of Section 1-9 (Page 1-16) of the Decision Document for SEAD-38 has been inadvertently omitted. Include this text so that verification sampling plans can be reviewed completely.

Response:

Agreed. Omitted pages and text has been provided.

Comment:

4. The response to U.S. EPA General Comment #1 implies on Page 3 of the responses, second complete paragraph, that each of the collected samples from SEADs-38, -39, and -40 will be analyzed for VOCs as well as SVOCs. However, the same text describes the sampling method to be utilized as being a three point (minimum) composite sample. It should be noted that composite samples are not appropriate for volatile organic soil samples. Revise text and sampling plans as appropriate.

Response:

Agreed. The text has been revised to indicate that discrete samples will be collected for all excavations. Per General Comment Number 1 above, analyses for selected metals have been added to the planned analytical suite.

II SPECIFIC COMMENTS

Comment:

1. SEAD-38 Decision Document, Section 1.2.2, Page 1-2. Review of the text indicates that suspected releases of boiler blowdown contaminants to nearby drainage ditches. As noted above, boiler blowdown typically contains metals contamination. For this reason, metal analysis should be included in the post-removal verification sampling discussed in Section 1.9 on Page 1-16.

Response:

Agreed. Analysis of ~~selected~~ metals has been added to the list of proposed confirmational analyses.

Comment:

2. SEAD-39 Decision Document, Section 2.1, Page 2-1. The revised text (here as well as other portions of the document) provides substantial clarification. However, it is recommended that the text further be revised to state that each 6-inch layer of soil to be removed is estimated to be 18.5 cubic yards, for a total of 37 cubic yards.

Response:

Agreed. The additional text has been added to indicate that the projected volume of each six-inch thickness of soil is approximately 18.5 cubic yards.

Response To Comments
Submitted By
U.S. Environmental Protection Agency (USEPA), Region II
For Draft Action Memorandum and Decision Document Removal Actions
(SEADs 38, 39, 40)

Seneca Army Depot Activity
Romulus, New York

Comments Dated: October 12, 2001
Date of Response: April 9, 2002

The following represent our comments on the subject report dated August 2001.

I. GENERAL COMMENTS

Comment:

1. The specification of soil excavation areas in the Action Memorandum and the Decision Documents for the three VOC sites appears to be arbitrary. At site SEAD-38, previous surface and subsurface soil testing during the ESI showed TPH levels ranging from 85 to 1,940 mg/kg. At this site, the Army is proposing to excavate an area based on sampling locations that showed TPH levels of 1,840 and 1,940 mg/kg. At site SEAD-39, previous surface and subsurface soil testing during the ESI showed TPH levels ranging from 65 to 118 mg/kg. At this site, the Army is proposing to excavate and sample an area that encompasses all ESI sampling locations. At SEAD-40, previous surface and subsurface soil testing during the ESI showed TPH levels ranging from 270 to 1640 mg/kg. At this site, the Army is proposing to excavate and sample an area that encompasses all ESI sampling locations at SEAD-40, with the exception of one location that showed 420 mg/kg of TPH. Some consistent rationale should be presented and used as a basis for specification of the excavation areas at these three VOC sites.

Response:

Changes to the text have been made in the first paragraph of the Action Memorandum to explain the basis and initial focus of the proposed removal actions at the three VOC sites. Additional summary information is provided in a new Section 2.5 that has been added to the Action Memorandum. Finally, further clarification is also provided within individual sections of the Decision Documents for each of the proposed removal sites. The general content of the highlighted changes is provided below.

The Army's intent is to conduct removal actions at locations where it believes there is a high likelihood that boiler blowdown liquids were historically discharged. At SEAD-38, the focus of the removal action will initially center on the area of the drainage ditch that is located north-northwest of Building 2079, where available information suggests that a buried pipe existed that was used to convey blowdown liquids [Note: See the following language in Section 1.2.1 of the Decision Document "*A drainage pipe that originates in Building 2079 is suspected to have carried boiler blowdown liquids from the boiler plant to a roadside drainage ditch that is located approximately 100 feet to the northwest of Building 2079 and drains to the west.*"]. Two samples were collected from this drainage ditch, one at SB38-1 from a depth of 2-4 feet below grade (bgs) and one at location SS38-1, at a depth of 0-0.2 feet bgs. Results from the soil boring (i.e., SB designation) sample indicate that total petroleum hydrocarbons (TPH) were present at a level of 85 parts per million (ppm), while the results of the shallow soil sample (i.e., SS designation) indicates that TPH was found at a level of 1840 ppm. Based on the data, it does not appear that TPH contamination is significant in the deeper soils; however, the data does suggest that TPH contamination has moved downgradient over the top of the ground's surface as a concentration of over 1800 ppm was found roughly 50 feet downgradient of the suspected historic pipe's discharge. Based on these data, an initial excavation measuring roughly 100 feet long (50 feet on either side of the shallow soil sample) by 3 feet wide by 1 foot deep is recommended to remove potential contamination that may result from the historic discharge of boiler blowdown. Additionally, based on the measurement of another TPH concentration in excess of 1900 ppm at location SS38-3, a hot spot removal operation measuring 10 feet by 10 feet by 1 foot deep is recommended in this area. Once the initial excavations are completed, field observations and screening, and confirmational sampling will be used to define the full extent of both of the proposed excavations.

At SEAD-40, a similar approach has been used. Again, available information indicates that a pipe is suspected to have carried blowdown liquids from Building 319 to the drainage ditch that is located to the north of the building. Therefore, the focus of the proposed excavation is on the drainage ditch and not the surrounding grassy areas that are higher in elevation (e.g., in the vicinity of location SS40-2) than the edge of the drainage ditch and the discharge point of the pipe. Review of the available data (i.e., SS40-1, SS40-3, SS40-4, and SB40-1) from the drainage ditch shows that there are concentrations of TPH in excess of 1000 ppm found at locations SB40-1 (4-6 feet bgs) and at location SS40-4 (0-0.2 feet bgs) and these provide the basis upon which the initial excavations are recommended to remove TPH contaminated soil. An area measuring 10 feet long by 2 feet wide by 6 feet deep is proposed as the first part of the excavation to address the elevated concentration of TPH found in sample SB40-1. An excavation measuring 110 feet long by 2 feet wide by 1 foot deep is proposed to address the TPH impacts suspected to be present in the drainage ditch based on the results obtained for SS40-4. Coincidentally, the extended excavation also covers the area where samples SS40-1, SS40-5 and SS40-3 were collected which showed lesser quantities of TPH; however, in order for the TPH to have been discharged from Building 319 and reached the location of SS40-4, it would have had to flow over the spots where these samples were collected. Once the initial excavations are completed, the full extent of the excavation will be confirmed by field observation and screening, and by the collection and analysis of confirmational samples.

With reference to SEAD-39, no information is available to precisely describe where the boiler blowdown was discharged and how it was conveyed to and through the former leaching area. Thus, in this case, the extent of the proposed excavation encompasses the area that was investigated during the limited sampling program. All of the soil in the top foot will be removed, with two piles being created: one containing the top six inches of soil which is believed to be new fill and loam applied to the area after the blowdown process was connected to the sewer, while the second contains the underlying six inches of soil that is believed to have been resident when the blowdown process was conducted. Once the area is opened, field observations and screening and confirmational sampling will again be used to determine the full extent of the excavation needed.

Five composite confirmational samples, including one from the base and one each from the four perimeter walls of the excavation, will be collected from each trench or area that is excavated at the individual sites. Thus, initially 10 composite confirmation samples will be collected and analyzed from the two excavations planned at SEAD-38; another 10 composite samples will be collected from the excavations proposed at SEAD-40; and five will be collected from proposed excavation at SEAD-39. The composite samples from the sidewalls of the trenches will be comprised of three or more subsamples collected at equally-spaced intervals along the face of the excavation, while the composite sample from the base of the excavation will be comprised of one or more subsamples collected from the base of the trench. The number of subsamples used to prepare composite samples from the base of an excavation will be based on one subsample per 200 square feet of exposed surface. Additional confirmational samples will be collected from any area observed to be visibly stained or exhibiting organic compound odors. Each of the collected samples will be analyzed for volatile organic compounds via US EPA SW-846 Method 8021, and for semivolatile organic compounds via US EPA SW-846 Method 8270B.

Additional composite samples of stockpiled soil will be collected and analyzed for the purpose of evaluating and selecting reuse or disposal alternatives for the excavated soils. The number of composite samples collected from these determinations will be based on guidance provided in the Spills Technology and Remediation Series Guidance Memorandum #1 (e.g., one composite or grab sample collected for volatile and semivolatile organic determinations for each stockpile of 50 cubic yards or less). Reuse or disposal determinations will be based on the comparison of the resulting data to TAGM 4046 guidance values.

Comment:

2. The Action Memorandum and Decision Documents do not address previous groundwater sampling events in the vicinity of SEAD-38, 39 and 40. Numerous private drinking water wells are located within 1 mile of these three sites, and the groundwater table was encountered within a foot of TPH contaminated soil at SEAD-39. The Superfund Removal Procedures Action Memorandum Guidance (USEPA, 1990) states that Action Memorandums should detail any release or threatened release into the environment of a hazardous substance, pollutant or contaminant. Include the results of previous groundwater sampling events for SEAD-38, 39 and 40.

Response:

Groundwater sampling has not been conducted at any of the proposed VOC Removal Action Sites. At present there are no monitoring wells at, or near (i.e., within 200 foot radius), the proposed excavations in either SEAD-39 or SEAD-40. Five monitoring wells associated with SEAD-4 are located within 200 feet of the proposed excavations identified at SEAD-38. Analytical results obtained from sampling these wells (under the SEAD-4 RI/FS) indicate that four organic compounds [i.e., di-n-butyl phthalate (1 time), diethylphthalate (4 times), aldrin (1 time) and heptaclor (1 time)] were detected in the five wells closest to the proposed excavation sites. Of the compounds detected, only aldrin was detected at a concentration (i.e., 0.036 J ug/L) that exceeded its NYSDEC GA groundwater standard, which is "not detected."

Although a few organic chemicals were detected in the groundwater near SEAD-38, the Army believes that it is unlikely that volatile or semivolatile organic chemicals associated with the historic boiler blowdown processes will pose a threat to groundwater that may be used in the future as a potable water source. Several factors contribute to this belief. First, the blowdown operations ceased more than 20 years ago making it probable that the concentrations of any petroleum-type matter released have decreased due to weathering, volatilization, or degradation. This is partially borne out by the fact that most of the observed TPH concentrations reported are low, especially if naturally-occurring organic matter is considered. Second, each of the identified TPH release points is removed and isolated from receptors that are likely to use the shallow groundwater as a potable supply of water. SEAD-38 is located approximately 1800 feet upgradient of the nearest Depot fence line, while SEAD-39 and SEAD-40 are both located in the industrial area and located more than 600 feet away from the nearest Depot perimeter fence line, which are upgradient (i.e., counter to the localized flow of the shallow groundwater aquifer found at the SEDA. Therefore, even if TPH-type contaminants were released to the groundwater, dilution and dispersion within the local aquifer would decrease the expected concentration of organic compounds at the fence line.

Given this information, the Army believes that it is appropriate to conduct the proposed excavations and disposal and confirmational sampling and analysis sequences first, and then use the resulting data to determine whether there is any need for conducting additional groundwater evaluations. In this manner, the area of the any potential continuing source of volatile and semivolatile organic materials would be removed, eliminating the imminent threat of a continuing release. Then, the need for conducting future groundwater evaluations at one or more of the sites would be determined based on the measurement of volatile or semivolatile organic chemicals in the soil at the individual sites at concentrations that exceed NYSDEC recommended soil cleanup objectives.

Comment:

3. Pursuant to STARS Technical Memorandum No. 1, any soil that exhibits petroleum-type odors does not meet the Soil Cleanup Guidelines for protection against objectionable nuisance characteristics (NYSDEC, 1992). Revise text to include this additional soil cleanup requirement.

Response:

Agreed. The text will be modified to include reference to the fact that visual and olfactory observations, and hand-held volatile organic compound monitors will be used to define the extent of excavations completed.

Comment:

4. The Action Memorandum document should include a references section.

Response:

Agreed. A reference section has been added.

II. SPECIFIC COMMENTS

Comment:

1. **Decision Document, Table 1-1:** Revise the depth of sampling in Table 1-1 for all three VOC sites to read 0-2' instead of 0-0.2'.

Response:

The available sample collection information indicates that many of the samples were collected from the top two inches of the soil. The data presented in the varying Decision Documents has been checked against original field collection information and the appropriate depths are annotated in the tables. In many cases, the correct annotation is 0 to 0.2 feet of 0 to 2.5 inches (±).

Comment:

2. **SEAD-38 Decision Document, Table 1-1:** The surface soil samples are labeled "SB" in Table 1-1 and "SS" in the text and Figure 1-1. Revise the ES ID sample designations to be consistent with Figure 1-1 and the text.

Response:

Agreed. The sample designations will be standardized throughout the document. The "SS" designation applies to "surface soil" samples collected from the 0 to 0.2 foot horizon (below vegetative cover material).

Comment:

3. **SEAD-38 Decision Document, Figure 1-1:** The text in Section 1.1 references the location of the Burning Pit boundary in the description of the areas to be excavated. Add the location of the Burning Pit to Figure 1-1 for clarity.

Response:

The sentence referencing the Burning Pit in the second paragraph of Section 1.1 was not properly edited before the draft was issued. The referenced Burning Pit is located at SEAD-24, the Abandoned Powder Burning Pit. The Decision Document for SEAD-24 was in preparation at the same time as the Decision Document for SEAD-38, and the text provided in the identified paragraph for SEAD-38 was apparently cut and pasted from the SEAD-24 document. The second paragraph for the SEAD-38 Decision Document has been revised to read:

> "This Decision Document presents the removal action that was developed in accordance with the Federal Facility Agreement (FFA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Contingency Plan. *Based upon the results of the limited sampling program, limited quantities of surface soil*

located in two roadside drainage ditches to the north-northwest and to the west of Building 2079 are currently known to contain concentrations of TPH. Based on ....."

Note: Italicized text provided to highlight portion of the sentence that has been edited.

Comment:

4. **SEAD-39 Decision Document, Section 2.1, Executive Summary, 2nd Paragraph, Page 2-1:** Section 2.1 recommends that surface soil should be remediated to a depth of 6 inches for a total of 18.5 cubic yards of soil. Section 2.4 recommends that soil should be remediated to a depth of 1 foot for a total of 37 cubic yards of soil. Section 2.7 recommends that the soil from 6 inches to one foot below ground should be remediated for a total of 18.5 cubic yards of soil. Clarify these discrepancies. Note that the same comment also applies to the entire SEAD-39 Decision Document.

Response:

The text in Section 2.1 has been revised to read:

"This Decision Document presents the removal action that was developed in accordance with the Federal Facility Agreement (FFA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Contingency Plan. *Based upon the results of the limited sampling program, limited quantities of soils located to the north and to the east of Building 121 will be removed to a depth of twelve inches in two steps to facilitate the isolation and separation of the top six inches from the lower six inches of soil found in this area. Each separate layer of excavated soil will be staged and contained, sampled and analyzed, and the resulting data will be evaluated to determine whether soil contaminated by volatile and semivolatile organic compounds is present. The Army expects that 18.5 cubic yards (yd^3) of soil (i.e., the quantity of the lower six inch layer of soil) will be removed from the area where the blowdown liquids were previously discharged and that the contaminated soil will be transported to, and disposed at, a state-approved and permitted, off-site facility...*"

Appropriate corrections indicating the two-step removal process have also been added to other sections with in the Decision Document and the Action Memorandum.

Comment:

5. **SEAD-39 Decision Document, Section 2.7, Recommendations, 1st Paragraph, Page 2-17:** The text states that the top 6-inches of topsoil is presumed to lie above the former blowdown leach pit and is unlikely to be contaminated. A confirmatory sample, however, should be taken from this 6-inch topsoil layer to verify this contention because the topsoil layer will presumably be placed back on the surface after temporary excavation.

Response:

Agreed. Additional composite samples of stockpiled soil will be collected and analyzed for the purpose of evaluating and selecting reuse or disposal alternatives for the excavated soils. The number of composite samples collected from these determinations will be based on guidance provided in the Spills Technology and Remediation Series Guidance Memorandum #1 (e.g., one composite or grab sample collected for volatile and semivolatile organic determinations for each stockpile of 50 cubic yards or less). Reuse or disposal determinations will be based on the comparison of the resulting data to NYSDEC's recommended soil cleanup objective levels.

Response To Comments
Submitted By
New York State Department of Environmental Conservation (NYSDEC)
For Draft Action Memorandum and Decision Document Removal Actions
(SEADs 38, 39, 40)
Seneca Army Depot Activity
Romulus, New York

Comments Dated: October 1, 2001
Response to Comments: April 9, 2002

The New York State Department of Environmental Conservation has reviewed the above referenced document. Comments are as follow:

Specific comments on Draft Action Memorandum:

Comment:

1. **Page 3, Section 4, Endangerment Determination:** The last sentence of the previous section states that "although severe and chronic health impacts are not anticipated, contact with the impacted soil may result in staining of skin or clothes or exposure to nuisance odors." The following sentence then states that "actual or threatened releases of pollutants and contaminants...present an imminent and substantial endangerment to public health, or welfare, or the environment." Please reconcile.

Response:

The phrase "although severe and chronic health impacts are not anticipated" has been removed from the last paragraph that is presented in Section 3. Thus, the last paragraph now reads:

> "The increased access to these three sites can result in incidental contact with soils containing residual petroleum hydrocarbons at each of these sites. Contact with the impacted soil may result in staining of skin or clothes or exposure to nuisance odors."

The following Section (i.e., Section 4) has been changed to read:

> "Actual or threatened releases of pollutants and contaminants from these three sites, if not addressed by implementing the response actions selected in this Action Memorandum, present a potential endangerment to public health, or welfare, or the environment."

Specific comments on Draft Decision Documents:

Comment:

1. **Page 1-4, Section 1.4, Remedial Action Objectives:** The third paragraph states that "verification of the acceptability of the surrounding soil quality" will be demonstrated by comparing the analytical results for volatile organic and semivolatile organic compounds to soil cleanup levels that are tabulated in NYSDEC TAGM #4046. On page 1-18, Section 1.9, Post-Removal Verification Sampling, it states that "if these samples demonstrate that the concentrations of contaminants are below the guidance values for ...NYSDEC Petroleum-Contaminated Soil Guidance Policy, then SEAD-38 will be considered to have been acceptably remediated." Clarification is sought. Also in Section 1.4 of Remedial Action Objectives, it states that "if the results from the confirmatory sampling indicate that all species are below allowable limits, the treatment will be terminated." Please define "allowable."

Response:

SEADs-38 (Building 2079), -39 (Building 121), and –40 (Building 319) are each defined as Boiler Plant Blowdown Leaching Pits; thus, it is presumed that all contamination associated with these processes are petroleum-like materials. As such, the proposed removal actions completed for each site will be conducted in accordance with the provisions and methodologies defined in the NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, dated January 1994.

Building 2079 (i.e., SEAD-38) is a component of the former Ammunition Washout Facility (i.e., SEAD-4) at the SEDA. Remedial investigations completed for SEAD-4 indicate that metals, including arsenic, chromium, copper, lead and nickel; polynuclear and benzo-polynuclear aromatic hydrocarbons; and pesticides such as 4,4'-DDD, 4,4'-DDE and 4,4'-DDT have been identified in soils found within, and in the immediate vicinity of, the drainage ditches where the petroleum hydrocarbons were found during the Expanded Site Inspection (ESI) that was performed for SEAD-38. The presence of these compounds in the soils surrounding and within the sampled drainage ditches of SEAD-38 suggests that soil in these ditches need to be analyzed to determine the level of TCLP constituents that may be present in the soil that will be excavated under the proposed action.

Available information for the other two boiler blowdown discharge areas (i.e., SEADs 39 and 40) do not indicate that chemical constituents other than petroleum hydrocarbons are expected to be present in the boiler blowdown liquids that were released from Buildings 121 and 319. Therefore, SEDA proposes that the soil from both of these sites be handled as non-hazardous.

Proposed excavations will be focused, initially, in the areas that are considered most likely to have been impacted by historic release of blowdown liquids. In the case of SEADs 38 and 40, this area is defined by the location and geometry of the drainage ditches where the blowdown liquid discharge pipes are presumed to have terminated. In the case of SEAD-39, this encompasses the 20-foot by 50-foot area that is located north and adjacent to Building 121. The goal of the initial excavations conducted is to remove soil that is most likely to have been impacted by the former discharge of boiler blowdown liquid. Once this soil is removed, field visual or olfactory observations and field screening (i.e., hand-held volatile organic analyzers) will be used to confirm that sufficient soil has been removed and that the excavation is complete. Confirmational sampling and analysis of the excavation's sidewalls and base will also be used to verify that the extent of the excavation is adequate to remove residual volatile and semivolatile organic compound contamination that may result from the historic blowdown processes. Results of the confirmational sampling will initially be compared to NYSDEC's recommended soil cleanup objectives to determine if the detected concentrations exceed state threshold levels. If no obvious risk or threat exists at a site (i.e., all measured concentrations are lower than the NYSDEC recommended cleanup objective levels), the excavation will be terminated. All final excavation decisions will be substantiated by analytical data.

During excavation, all excavated soil at an individual site (i.e., SEAD-38, -39, or –40) will be segregated, stockpiled, sampled, and the collected samples will be analyzed, as necessary, to document toxicity characteristic results (i.e., SEAD-38 only) and concentrations of volatile and semivolatile organic compounds (i.e., SEADs 38, 39, and 40) present. If the results of the toxicity characteristic determination indicate that soil removed from SEAD-38 is non-hazardous, excavated soil from all three sites will be handled as non-hazardous wastes.

The analytical results obtained from samples of the staged and stockpiled soil will be used to determine the ultimate fate of the excavated material. If the analytical results indicate that the excavated soil contains levels lower than defined thresholds for protection of groundwater, protection of human health, and protection against nuisance characteristics, then it can be returned to the original excavation. If resulting data indicates that concentrations of contaminants contained in the stockpile soil exceed any defined regulatory threshold, then the soil will be transported and disposed off-site at approved locations.

Comment:

2. **<u>Page 2-17, Section 2.7, Recommendation:</u>** The Army proposes to segregate the top six inches from the bottom six inches into two piles because "it is presumed that the top six inches of soil need not be remediated." It is unclear as to whether the Army plans on

sampling both piles to confirm that the top six inches are indeed uncontaminated. Clarification is sought. Please note that no backfilling should occur without the prior written notification to the NYSDEC.

Response:

The Army is proposing to excavate 12 inches of soil and to separate the top and bottom six inches (approximate measures) into two piles. The Army believes that the top six inches of soil was added to the area after the discharge of blowdown liquid to the leach pit was terminated in the 1979 – 1980 time period. Thus, this soil may be unaffected, and therefore reusable. This will be confirmed by sampling and analysis of the two piles after they have been excavated and staged at the site. The number of composite samples collected from these determinations will be based on guidance provided in the Spills Technology and Remediation Series Guidance Memorandum #1 (e.g., one composite or grab sample collected for volatile and semivolatile organic determinations for each stockpile of 50 cubic yards or less). Each of the collected samples will be analyzed for volatile organic compounds via US EPA SW-846 Method 8021, and for semivolatile organic compounds via US EPA SW-846 Method 8270B. If the results of the sampling and analysis confirm this belief, the soil will be used as fill at the site with the NYSDEC's approval.

Comment:

3. There are three separate draft decision documents, one for each SEAD, that support the Draft Action Memorandum. Each decision document repeats much of what is stated, section for section, so the above comments are applicable to each draft decision document.

Response:

Appropriate modifications have been incorporated into all three Draft Decision Documents.

Response To Comments
Submitted By
State of New York Department of Health
For Draft Action Memorandum and Decision Document Removal Actions
(SEADs 38, 39, 40)
Site # 805006
Seneca Army Depot Activity
Romulus, Seneca County, New York

Comments Issued: November 26, 2001
Response to Comments: April 9, 2002

I have reviewed the draft Action Memorandum and Decision Document for Removal Actions at Three VOC Sites – SEADs 38, 39 and 40 of the Seneca Army Depot located in Romulus, Seneca County and your October 1, 2001 comment letter on the referenced document. I concur with your assessment of the report and have the following additional comments:

Comment:

SEAD-38

1. *Decision Document – Page* 1-1, *Section 1.1, Executive Summary:* The second paragraph states that "...it is recommended that the surface soil to the north and to the east of the Burning Pit be removed..." whereas in *Section* 1.7, *Recommendation* "Remediation ... is recommended for the area of the north-northwestern roadside drainage ditch and for a small area at the end of the second drainage ditch that is located to the west of Building 2079". Please reconcile this discrepancy. I do not believe there is a Burning Pit on the SEAD-38 site.

Response:

Agreed: There is not a Burning Pit on the SEAD-38 site. This results from an editorial error during the processing of the document. The paragraph has been modified to remove the reference to the Burning Pit.

Comment:

2. The Department is not confident that the justification to excavate a 10' x 10' x 1' area around SS38-3 is valid. How was this contaminated area determined since only one surface soil sample was analyzed from this area? Further site investigation is necessary to determine total horizontal contamination and to determine if subsurface soil is impacted in the area also.

Response:

The excavation is proposed as an initial removal of material that contains an identified "hot spot" of total petroleum hydrocarbons contamination. It is based on field observations and field screening determinations made during the initial sampling event in the 1993/1994 timeframe. Once the initial excavation is completed, samples will be collected from the base and perimeter of the excavation and these samples will be analyzed for volatile and semivolatile organic compounds. The results from the confirmational sampling and analysis will be compared to NYSDEC's recommended soil cleanup objectives and background to determine if additional excavation of the soil is warranted before the excavation is backfilled.

Comment:

3. Based upon comment 2 above, the number and locations of post-excavation samples may need to be altered.

Response:

The Army is prepared to increase the number of confirmational samples collected from any excavation. However, as was stipulated in the Decision Document, five samples are proposed for a hole that measures 10 feet by 10 feet by 1 foot deep. If the excavation is extended/expanded as a result of the discovery of volatile or semivolatile organic constituents in the soil after the initial excavation is completed, additional sampling will be performed to document that the excavation is complete.