Superfund Proposed Plan

THE OPEN BURNING (OB) GROUNDS at the SENECA ARMY DEPOT ACTIVITY (SEDA)
Romulus New York

November 1997

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for cleaning up contamination at the former Open Burning (OB) Grounds at the Seneca Army Depot Activity (SEDA) Superfund site and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by representatives of the U. S. Army, with support from the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC). The U.S. Army is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contingency Plan (NCP). The alternatives summarized here are described in the remedial investigation and feasibility study (RI/FS) report which should be consulted for a more detailed description of all the alternatives. The RI/FS is contained in the Administrative Record which is available for public review at the information repository located at the Seneca Army Depot Activity, Building 116.

The Proposed Plan is being provided as a supplement to the RI/FS report to inform the public of the U.S. Army's, EPA's, and NYSDEC's preferred remedy. This document has been provided to solicit public comments pertaining to all the remedial alternatives evaluated, as well as comments regarding the preferred alternative.

The remedy described in this Proposed Plan is the preferred remedy for the site. Changes to the preferred remedy or a change from the preferred remedy to another remedy may be made, if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA, NYSDEC, and the U.S. Army have taken into consideration all public comments.

COMMUNITY ROLE IN SELECTION PROCESS

EPA, NYSDEC and the U.S. Army rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI/FS report, Proposed Plan, and supporting documentation has been made available to the public for a public comment period which begins on December 1, 1997 and concludes on January 10, 1998.

A public meeting will be held during the public comment period at the Seneca County Office Building Board of Supervisors Room on December 17, 1997 at 7:00 P.M. to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred remedial alternative, and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

All written comments should be addressed to:

Mr. Stephen Absolom
BRAC Environmental Coordinator
Building 123
Seneca Army Depot Activity
Romulus, NY 14541-5001

Dates to remember:
MARK YOUR CALENDAR

December 1, 1997 - January 10, 1998
Public comment period on RI/FS report, Pro posed Plan, and remedies considered.

December 17, 1997 Public meeting at the Seneca County Office Building Board of Supervisors Room at 7:00 P.M.

Copies of the RI/FS report, Proposed Plan, and supporting documentation are available at the following repository:

Seneca Army Depot Activity
5786 State Route 96, Building 116
Romulus, New York 14541-5001
(607) 869-1353

Business Hours are: Monday thru Thursday (7:00 AM - 4:30 PM) and every other Friday (7:00 AM-4:30 PM)

SITE BACKGROUND

SEDA is a 10,587-acre active military facility located in Seneca County, Romulus, New York, that has been owned by the United States Government and operated by the Department of the Army since 1941.

The facility is located in an uplands area, that forms a divide separating two of the New York Finger Lakes, Cayuga Lake on the east and Seneca Lake on the west.

The munitions destruction area, which includes the Open Burning (OB) Grounds and the Open Detonation (OD) Area, is situated in the northwest corner of the facility. **Figure 1** is a depot map that identifies the location of the OB Grounds within the depot. **Figure 2** is a site map identifies the main features at the OB Grounds. Surface water drainage eventually discharges into Reeder Creek. Shallow groundwater flow at this site is also directed northeast to Reeder Creek. The open detonation mound is located to the north of the OB Grounds site.

Demilitarization of munitions has been conducted for more than forty years at the OB Grounds, which is 30 acres in area. Originally, demilitarization of munitions via open burning was conducted directly upon the ground surface. Subsequently individual burn pads were built up with crushed shale and soils to provide a drier environment in which to perform the burning of munitions. The burning of munitions has been performed at nine burning pads labeled A through H and J. The berms around the burn pads were formed by bulldozing the surrounding soils, including those soils containing residues of the burning process. The base material of the pads is composed largely of crushed shale which was quarried from a nearby area within the SEDA facility and placed over the till soils to provide a solid base with good drainage. An elongated, low hill is located in the southern portion of the open burning area. The hill was formed during the clearing activities early in the history of the OB grounds.

Final closure of the OB Grounds under RCRA guidelines was deferred when SEDA was proposed for the National Priority List (NPL) in July 1989. In August 1990, SEDA was finalized and listed in Group 14 on the Federal Section of the National Priority List (NPL). The EPA, NYSDEC and the Army entered into an agreement, called the Federal Facility Agreement (FFA), also known as the Interagency Agreement (IAG). Any required future investigations were to be based on CERCLA guidelines and RCRA was considered to be an Applicable or Relevant and Appropriate Requirement (ARAR) pursuant to Section 121 of CERCLA. SEDA was listed on the final Base Closure List on September 28, 1995 and is scheduled to close in July 2001.

To address employment and economic impacts associated with the closure of the Depot, the Seneca County Board of Supervisors established in October 1995 the Seneca Army Depot Local Redevelopment Authority (LRA). The primary responsibility assigned to the LRA was the preparation of a plan for the redevelopment of the Depot. After a comprehensive planning process, a Reuse Plan and Implementation Strategy for Seneca Army Depot Activity was completed and adopted by the LRA on October 8, 1996. The Reuse Plan was subsequently approved by the Seneca County Board of Supervisors on October 22, 1996. Under this plan, the future intended use of the OB Grounds site is designated as Conservation/Recreation.

REMEDIAL INVESTIGATION SUMMARY

Parsons Engineering Science (Parsons ES), originally known as the Parsons subsidiary C.T. Main (MAIN), was retained to provide environmental support services in 1990. Under this contract, Parsons ES, as MAIN, prepared an RI workplan and conducted a first phase of fieldwork which commenced on October 9, 1991 and was completed in January 1992. The RI report was prepared in two phases. Following the completion of the first phase of fieldwork, the first document provided was the Preliminary Site Characterization Summary Report (PSCR) that was submitted on April 27, 1992. The PSCR constituted the first four chapters of the RI and was intended to provide a description of the site conditions.

The Phase 2 fieldwork was completed under a Parsons ES contract with the Corps of Engineers (COE), Huntsville Division. Phase 2 fieldwork commenced on November 30, 1992 and was completed in April, 1993. The RI report was completed in September 1994.

The nature and extent of the constituents of concern at the OB grounds were evaluated through the comprehensive RI program described above. The primary media investigated at the OB grounds included soil, surface water and sediment (from Reeder Creek, on-site areas and drainage swales), and groundwater. The primary constituents of concern are explosive compounds, metals and semivolatile organics, mainly polycyclic aromatic hydrocarbons (PAHs) and phthalates. These constituents of concern are believed to have been released to the environment during former open burning activities.

Soil cleanup objectives are presented in the NYSDEC TAGM HWR-94-4046. The analyses that exceed these guidance values are the semi-volatiles benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene and the metals barium, copper, lead, mercury, and zinc. However, the site specific risk assessment identified lead and copper as the only compounds that significantly contributed to the overall site risk.

Concentrations of explosives, metals and semivolatiles are generally highest in the soil in the surface of the burn pads and the berms when compared to the concentrations in the areas around the burn pads. Generally, only the upper two feet of the burn pads are affected with constituents while the berms are believed to be affected throughout. The most significantly affected area off the pads is between Pads B and C. Lead was found at a maximum concentration of 56,700 mg/Kg. The highest concentrations of the constituents of concern in surface water and sediments are present in the topographic lows (i.e. the drainage swales and wetlands) which drain major portions of the site encompassing the burn pads. To address the protection of aquatic life in contact with sediments, NYSDEC Sediment Guidelines were compared to analytical data. The most significant exceedances of this guideline were for the metals copper and lead. The maximum concentration of lead was 332 mg/Kg and the NYSDEC Sediment guideline is 31 mg/Kg; the maximum concentration of copper was found to be 2,380 mg/Kg and the NYSDEC sediment guideline is 16 mg/Kg. For surface water, the concentrations of aluminum and iron exceeded the NYSDEC Class C water quality criteria standards. The maximum concentration of aluminum was 300 ug/L which is above the NYSDEC standard of 100 ug/L. Iron was detected at a maximum concentration of 737 ug/L; the NYSDEC standard is 300 ug/L.

Groundwater was found to be only minimally affected by metals. The higher concentrations of metals in the groundwater do not correlate with the location of the most significantly affected burn pads or the areas beyond the burn pads which have also been affected. Low concentrations, i.e. <1.0 ug/L, of the explosives RDX, Trinitrotoluene (TNT), and Dinitrotoluene (DNT) were detected in 4 of 39 monitoring wells on-site. During the Phase II portion of the RI program, lead was detected in two monitoring wells at concentrations exceeding the promulgated New York State (NYS), Class GA groundwater standard (25 ug/L) and the EPA recognized Federal Action Level (15 ug/L) for protection of groundwater that is a source of potable water. The concentrations of lead in these two wells were found to be 36 ug/L at MW-19 and 86 ug/L at MW-14. Groundwater samples from both of these monitoring wells had turbidity values that were above the sampling target turbidity value. The Army believes that elevated turbidities are likely to have contributed to the observed exceedences.

Iron and manganese were also detected in groundwater above the NYS, GA classification for protection of groundwater as a source of drinking water. Aluminum and magnesium were detected above the NYS guidance values. Iron, maganese and aluminum were also evaluated according to secondary federal standards intended to establish reasonable goals for aesthetic quality for drinking water such as odor, taste, and color.

SUMMARY OF SITE RISK

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment estimates the human health and ecological risk resulting from the contamination at a site if no remedial action were taken.

Human Health Risk Assessment

The reasonable maximum human exposure has been evaluated. A four-step process is used for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification*--identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment*--estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed. *Toxicity Assessment*--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization*-- summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of site-related risks.

The constituents of concern include: heavy metals such as lead, barium, copper and zinc, explosives (nitrocompounds) and, PAHs. Several of the contaminants, including the PAH compounds benzo(a)pyrene and dibenz(a,h)anthracene, are known to cause cancer in laboratory animals and are suspected to be human carcinogens.

Based upon the current and future land use scenarios, the baseline risk assessment evaluated the human health effects that may result from exposure for the following three receptor groups:

1. Current on-site OB grounds workers;
2. Current off-site residents; and
3. Future on-site residents.

The following exposure pathways were considered :

1. Incidental ingestion and dermal contact to on-site soils (Current and Future Land Use Scenarios)
2. Inhalation of fugitive dust (Current and Future Land Use Scenarios)
3. Dermal contact to surface water and sediment while wading in on-site wetlands (Current and Future Land Use Scenarios).
4. Ingestion of and dermal contact with surface water and sediments while swimming or wading in Reeder Creek (Current and Future Land Use Scenarios)
5. Ingestion of groundwater (Future Land use Scenario only).
6. Dermal contact to groundwater while showering/bathing (Future Land Use Scenario only)

Under current EPA guidelines, the likelihood of carcinogenic and non-carcinogenic effects due to exposure to site-related chemicals are considered separately. Non-carcinogenic risks were assessed by calculation of a Hazard Index (HI), which is an expression of the chronic daily intake of a chemical divided by its safe or Reference Dose (RfD). An HI that exceeds 1.0 indicates the potential for non-carcinogenic effects to occur. Carcinogenic risks were evaluated using a cancer Slope Factor (SF), which is a measure of the cancer-causing potential of a chemical. Slope Factors are multiplied by daily intake estimates to generate an upper-bound estimate of excess lifetime cancer risk. For known or suspected carcinogens, EPA has established an acceptable cancer risk range of 10^{-4} - 10^{-6} (one-in-ten thousand to one-in-one million).

EPA has not generated a toxicity factor (i.e., RfD) for lead due to the absence of a measurable threshold of effect. Rather, EPA has used a well established biomarker (i.e., blood lead) of exposure/effect to develop a biokinetic lead model that estimates blood lead levels based on multimedia lead exposure. Results of EPA's Uptake/Biokinetic (UBK) Lead Model indicates that soil-borne lead exposure in a residential setting would result in unacceptably high (i.e., greater than 5% of a childhood population exceeding 10 ug/dl) blood lead levels.

The results of the baseline risk assessment indicate that no media at the site pose an unacceptable risk to human health. The worst case exposure scenario involves the potential future residents at the site and resulted in an excess cancer risk of 1.0×10^{-5}. This risk number means that 1 additional person out of 100,000 are at risk of developing cancer if the site is not remediated. The maximum HI was estimated to be 0.33. The exposure pathways for this scenario include all the pathways listed above.

The current on-site workers do not exhibit cancer or noncarcinogenic risk above the established EPA target risk ranges either. The carcinogenic risk level for this exposure group is 6.3×10^{-6}. This risk number means that 6 additional persons out of 1,000,000 are at risk of developing cancer if the site is not remediated. The HI is 0.25 and is therefore below the EPA maximum value of 1.0. The exposure pathways for current on-site workers include items 1 through 4 in the list above.

Current off-site residents do not exhibit risk of cancer or noncarcinogenic health risks in excess of the EPA target risk ranges or adverse noncarcinogenic health threats. Carcinogenic risk is 3.9×10^{-7} which means that 4 additional persons out of 10,000,000 are at risk of developing cancer if the site is not remediated. The noncarcinogenic hazard index is 0.007 and is less than the EPA target level of 1.0. The exposure pathway for off-site residents is ingestion of and dermal contact with surface water and sediments while swimming or wading in off-site sections of Reeder Creek.

Ecological Risk Assessment

The reasonable maximum environmental exposure was also evaluated. A four-step process was used for assessing site-related ecological risks for a reasonable maximum exposure scenario: *Problem Formulation*--a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study. *Exposure Assessment*--a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations. *Ecological Effects Assessment*--literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. *Risk Characterization*--measurement or estimation of both current and future adverse effects.

Phase I and Phase II field evaluations included fish trapping and counting, benthic macroinvertibrate sampling and counting and small mammal species sampling and counting. In addition, a vegetation survey was performed, identifying major vegetation and understory types. The conclusions determined from these field efforts indicated a diverse and healthy aquatic and terrestrial environment. No overt acute toxic impacts were evidenced during the field evaluation.

The quantitative evaluation, which involved comparison of the 95th Upper Confidence Limit (UCL) of the site mean with the media specific criteria, suggested potential chronic risk from heavy metals, specifically lead and copper. The acute effects from these metals were not observed during fieldwork, i.e. the ecological community appeared diverse and normal, however long term chronic impacts are more subtle. For example, the NYSDEC guideline to protect benthic aquatic life in contact with copper containing sediments is 16 mg/kg. The 95th UCL of the mean for copper in sediments at the OB Grounds is 401 mg/kg. For lead the NYSDEC sediment guideline is 31 mg/kg, and the 95th UCL of the site mean is 652 mg/kg at the OB Grounds.

For surface water in Reeder Creek, the 95th UCLs of the mean exceed the NYSDEC Class C water quality criteria standards for aluminum, iron, selenium, vanadium, and cyanide. The aluminum concentration (139.4 ug/l) exceeded the standard (100 ug/l) by approximately 40 percent and the iron concentration (545.5 ug/l) exceeded the standard (300 ug/l). Small exceedences were noted for selenium, vanadium and cyanide.

SCOPE AND ROLE OF ACTION

The scope of this action is to provide adequate protection for current and future human and ecological receptors at the OB Grounds at SEDA. The OB Grounds is one of the 25 areas subject to remedial investigation at SEDA. The other areas will be addressed separately.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives have been developed that consist of medium-specific objectives for the protection of human health and the environment. These objectives are based on standards such as ARARs and levels established in the risk assessment. The following sections describe how these remedial objectives were determined. The remedial action objectives and site-specific clean-up goals are summarized at the end of the discussion.

Remedial action objectives are specific goals to protect human health and the environment; they specify the contaminant(s) of concern, the exposure route(s), receptor(s), and acceptable contaminant level(s) for each exposure route.

Site-specific remedial action objectives were established between NYSDEC, the USEPA (Region II), and the Army for the OB Grounds. These objectives are listed below:

- Remediate on-site soils with concentrations of lead greater than 500 mg/kg to protect human health;
- Remediate sediment in Reeder Creek until the remaining sediment is below 31 mg/kg for lead and 16 mg/kg for copper, which is protective of the aquatic community in Reeder Creek;

- Conduct appropriate post-remediation groundwater monitoring to assure continued protection of groundwater;
- Prevent surface water runoff that may contain lead from the OB Grounds from contaminating sediments in Reeder Creek;
- As an initial step in the remediation process, remove all UXOs from the areas of the site that will undergo remediation;
- Cover the areas of the OB Grounds with soils containing lead concentrations above 60 mg/kg with at least 9 inches of clean fill. The cover will be protective of terrestrial wildlife by preventing direct contact and incidental soil ingestion. This value was supported by the U.S. Fish and Wildlife Service publication, *Evaluating Soil Contamination, Biological Report 90,(2), July, 1990*;
- Develop vegetative stabilization of the remaining soil at the OB Grounds to minimize erosion and
- Conduct periodic monitoring of the sediments in Reeder Creek to ensure that they are not being recontaminated by the lead left in the soils at the site.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with other statutory laws, use permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The FS report evaluates in detail four remedial alternatives for addressing the contamination associated with the OB grounds. These alternatives are:

Alternative 1: The No Action Alternative
Alternative 2: The On-site Containment Alternative
Alternative 3: The In-situ Treatment Alternative
Alternative 4: The Off-Site Disposal Alternative
Alternative 5: The On-Site Disposal Alternative
Alternative 6: The Innovative Treatment Alternative

Alternatives 2 and 3 were eliminated in the preliminary screening, which evaluated the alternatives in terms of the criteria presented in the Evaluation of Alternatives section. The remaining four alternatives underwent a detailed evaluation and are described below.

Alternative 1: The No-Action Alternative

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. There are no costs associated with the no action alternative. The no action alternative means that no remedial activities would be undertaken at the site. No monitoring or security measures would be undertaken. Any attenuation of the threats posed by the site to human health and the environment would be the result of natural processes. Current security measures would be eliminated or modified depending upon if the property is transferred or leased. Open burning would not be performed.

Alternatives 4 through 6: Common Components

All of the remaining alternatives have five components in common. These components, that were developed to meet the remedial action objectives required by the Army, NYSDEC, and the USEPA, include groundwater monitoring, runoff control, site revegetation, protection of ecological receptors, ordnance clearance and periodic monitoring of the sediments in Reeder Creek. Each component is provided below:

- An appropriate site groundwater monitoring program will be developed.
- A 9 inch soil cover will be placed over areas of the OB Grounds with soils containing lead concentrations above 60 mg/kg. The area to be covered is estimated to be most of the OB Grounds. Slope stabilization will also be provided near Reeder Creek, as necessary, to control soil runoff from migrating to the creek and prevent exposure from lead to terrestrial ecological receptors.
- A cover of native vegetation will be established as an additional erosion control measure.
- Sediment sampling in Reeder Creek will be conducted on an annual basis at locations within the reach affected by the OB grounds. This reach includes the section of Reeder Creek adjacent to and downstream of OB Grounds. The purpose of the sampling is to ensure that Reeder Creek is not being recontaminated by lead left in the soil at the site.
- Unexploded Ordnance (UXO) in the area of the action will be cleared by a qualified UXO contractor.

Remediation of Ordnance and Explosives (OE) will be required for Alternatives 2 through 6, above. This will involve two different efforts. The initial effort will involve removal of OE from soils that will require treatment or disposal as part of the remedial program. Trained UXO technicians, working for a qualified UXO contractor, will be responsible for removing OE, OE-related scrap and scrap from those soils to be processed and treated/disposed. This will be necessary in order to protect any soil remediation contractor/landfill operator from harm during subsequent treatment/disposal operations. The second effort will require OE remediation over the remainder of the site after lead-contaminated soils have undergone treatment/disposal. This effort will involve the removal of OE, OE-related scrap and scrap from the surface and to a given depth. For both efforts, any UXO found will be detonated on SEDA property and the resulting scrap will be disposed of as appropriate.

All OE efforts will be designed, carried out, reported and presented for public review and approval prior to initiation. All work involving OE will be performed in compliance with the regulations of the Department of Defense Explosives Safety Board (DDESB).

Because these alternatives would result in hazardous substances, pollutants or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, CERCLA requires that the lead agency review the remedial action no less than every five years after its initiation. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 4: The Off-Site Disposal Alternative

Capital Cost: $3.6 to $5.2 million
O & M Cost: $45,300/yr
Present Worth Cost: $4.1 to $5.7 million
Construction Time: Treatability testing for the solidification process will take two to three months. Remediation will take one to two months depending on the time needed for the solidified soil to cure.

The off-site disposal alternative involves excavation of soils that are expected to exceed the Toxicity Characteristic Leaching Procedure (TCLP) limits and processing the soils through a mechanical mixing operation where a solidifying agent, either pozzolan/portland cement or pozzolan/lime/fly ash, is added in sufficient quantity to completely solidify the soils that exceeded the TCLP limit in order to reduce the potential for leaching of lead so that the soils will not be characteristic hazardous waste. The solidified soils and the remainder of the contaminated soils, i.e. those soils that exceed the 500 mg/kg Remedial Action Objective for lead in soil, in addition to any sediments in Reeder Creek exceeding the 31 mg/kg limit for lead and the 16 mg/kg limit for copper, would then be transported to an off-site, Subtitle D, solid waste industrial landfill for disposal. Removal and loading would consist of excavation using standard construction equipment. A Subtitle D landfill refers to a solid waste landfill that meets the NYSDEC and USEPA Subtitle D landfill construction requirements.

In general, the materials to be excavated are: soils exceeding the TCLP regulatory limits, (The TCLP limits are not cleanup levels but are used to determine if soils are a RCRA "characteristic" waste. If soils exceed the RCRA limit for TCLP, the waste is a "characteristic" waste for toxicity and will require removal of the characteristic, by stabilization, prior to disposal in an off-site landfill); sediments from Reeder Creek with concentrations of copper and lead above the NYSDEC criteria; and soils from the low hill, berms, pads and hotspots between the pads (grid boring locations) with lead concentrations above 500 mg/kg. The cumulative total volume is approximately 17,900 CY. The volume that will be treated prior to disposal is approximately 3,800 CY.

The site would be regraded and clean fill would be backfilled wherever soil was removed. The topsoil cover would be vegetated with indigenous grasses as an erosion control measure.

Remaining areas of the OB Grounds with soils containing lead concentrations above 60 mg/kg will be covered with 9 inches of clean fill. The fill will be vegetated to prevent erosion and to prevent direct contact and incidental soil ingestion by terrestrial wildlife. Slope stabilization will be provided near Reeder Creek as necessary to prevent surface water runoff from migrating to the creek. The area to be covered is estimated to be approximately 43.8 acres, which encompasses most of the OB Grounds. The total cost of the 9" cover is $1.19 million.

The solidification/stabilization treatment step can be accomplished either on or off-site. If treatment is conducted on-site, the cost is lower. Solidification/stabilization is a process in which a setting agent is added to the soil to form a mixture which entraps the constituents. Solidification refers to the techniques used to encapsulate hazardous waste into a solid material, and stabilization generally refers to the techniques that treat hazardous waste by converting them into a less soluble, mobile, or toxic state.

The reason for stabilizing the soil is to immobilize the lead and other heavy metals in the soils that have concentrations of constituents in excess of the TCLP regulatory limits. Once this is accomplished the material can be disposed of as a solid waste.

The final step in this remedial action is disposal of all the soils and sediments including the treated material. The solidified soils and remaining excavated soils and sediments would be disposed of as a solid waste, subject to RCRA Subtitle D and New York State solid waste regulations.

Two landfills, which may be used for this remedial action, have been identified. The first is the Seneca Meadows landfill located in Waterloo, New York, approximately 10 to 15 miles from the site. The other landfill is the Waste Management of New York High Acres landfill in Fairport, Monroe County, approximately 40 to 50 miles from the site.

The total capital cost for Alternative 4 is estimated to be between $3.6 million and $5.2 million. If solidification is performed on-site, the cost is lower than if the solidification is performed off-site.

Alternative 5: The On-Site Disposal Alternative

Capital Cost: $5.2 million
O & M Cost: $49,100/yr
Present Worth Cost: $5.7 million
Construction Time: Treatability testing for the solidification process will take two to three months. Remediation will take one to three months, depending on the time for the solidified soil to cure. Closure of the landfill will take an additional two to three months.

The On-Site Disposal Alternative involves excavation of soils that are expected to exceed the TCLP limits and processing the soils through a mechanical mixing operation where a solidifying agent is added to solidify the soils that exceeded the TCLP limit. The solidification/stabilization process is described in detail in the description of Alternative 4. The solidified soils and the remainder of the contaminated soils above the 500 mg/kg Remedial Action Objective for lead in soil would then be disposed of in an on-site landfill.

The on-site landfill would be constructed at the OB Grounds and would be sized to accept similar types of contaminated soil from this site and other SEDA sites. The landfill would meet the requirements of a Subtitle D landfill for the USEPA and the requirements of NYSDEC identified in 6 NYCCR Part 360 for landfill construction. The landfill would be located based on geological requirements and reuse impacts. The regulations require that post-closure care and monitoring be conducted for a minimum of thirty years. In general, the maintenance required is for erosion control, pest control, and maintenance of the vegetative cover. Monitoring wells in the vicinity of the landfill would be sampled quarterly. Any releases from the landfill would be addressed accordingly.

In general, the materials to be excavated are described in Alternative 4. The cumulative total volume for these soils is approximately 17,900 CY. Approximately 3,800 CY would be solidified prior to landfilling. Excavation would be accomplished with standard construction equipment.

After the excavation, the site would be regraded. Clean fill would be brought in to make up for the waste removed. The topsoil cover would be vegetated with indigenous grasses as an erosion control measure.

Alternative 6: The Innovative Treatment Alternative

Capital Cost: $10.6 million
O & M Cost: $45,300/yr
Present Worth Cost: $11.1 million
Construction Time: Remediation will take three to six months.

The innovative treatment alternative involves soil washing. For this alternative, the sediments and soils would be excavated and "washed" to separate the coarse fraction of soil from the fine fraction. The soils and sediment to be removed for this remedial action are described in detail in Alternative 4. The coarse fraction would be backfilled as clean fill providing the requirements of the Remedial Action Objective are met. The fine fraction is expected to contain the majority of the target constituents of concern, i.e. lead and copper, and would be treated, either via solidification or acid leaching, to reduce the potential for leaching of lead so that they will not be characteristic hazardous waste. Following this treatment, the fine fraction would be disposed of off-site. If the fine fraction undergoes an acid extraction process and the process is successful at reducing the concentration of lead to below the 500 mg/Kg goal, it may be possible to minimize the volume of soils that would require off-site disposal. This would be accomplished by backfilling the remediated fine fraction with the clean coarse fraction or reusing it as daily landfill cover. The fine fraction which contains concentrations of lead above 500 mg/Kg would be further treated via technologies such as acid extraction or solidification.

Soil washing has been identified as an effective technology for soil treatment at the OB Grounds because soils that comprise the pads and the berms are made-up of a large quantity of coarse particles, i.e. crushed shale imported from a SEDA borrow pit. The inorganic and organic constituents that are of interest tend to bind chemically or physically to the smaller quantity of fine-grained silt and clay particles. Soil washing separates the fine clay and silt particles from the larger fraction of coarse sand and gravel soil particles. This process concentrates chemical constituents into a smaller volume that can be further treated or disposed. The clean, larger fraction of coarse material can be returned to the site. Soil washing is expected to be done at a rate of 25 tons/hour or about 17 cubic yards/hr. Treatability studies would be conducted prior to implementation of the technology to estimate the actual volume reduction achieved by the process.

Further treatment to remove the inorganic components can involve the use of acids. A combination of fluosilicic acid (H_2SiF_6), nitric acid (H_2NO_3) and hydrochloric acid (HCl) have been used as effective agents for solubilizing metal contaminants in various soil washing processes. In general, acid is slowly added to a water and soil slurry to achieve and maintain a pH of 2. Precautions are taken to avoid lowering the pH below 2 and disrupting the soil matrix. When extraction is complete, the soil is rinsed, neutralized, and dewatered. The extraction solution and rinsewater are regenerated. The regeneration process removes entrained soil, organics, and heavy metals from the extraction fluid. Heavy metals are concentrated in a form potentially suitable for recovery. Recovered acid is recycled to the extraction unit. Following treatment, soil could be re-used as daily cover in a Subtitle D landfill or backfilled on-site.

The U.S. Bureau of Mines has developed an acid leaching process that recovers lead from the acid leaching solution using electrochemical techniques. The outcome is an ingot of lead that can be recycled as scrap lead. This option will require treatability testing to determine the proper acid type and quantities.

The final step in the remedial action is site restoration. After backfilling the clean fraction, the site would be regraded. If necessary, clean fill would be brought in to make up for the waste removed. The topsoil cover would be vegetated with indigenous grasses as an erosion control measure.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume, short-term effectiveness, implementability, cost, and state and community acceptance.

The evaluation criteria are described below.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance costs, and net present worth costs. The cost of OE remediation for areas not addressed by the remedial actions is not included in the capital cost of each alternative because it will be funded under a separate program.

- State acceptance indicates whether, based on its review of the RI/FS reports and Proposed Plan, the state concurs, opposes, or has no comment on the preferred alternative at the present time.

- Community acceptance will be assessed in the Record of Decision (ROD) following a review of the public comments received on the RI/FS reports and the Proposed Plan.

A comparative analysis of these alternatives will be based upon the evaluation criteria noted above.

- Overall Protection of Human Health and the Environment

The No Action Alternative is currently within the EPA target risk range for carcinogenic risk and below the target value for non-carcinogenic risk for the future on-site residential exposure scenario. The total site non-carcinogenic risk, HI, for this scenario was determined to be 0.33, which is below the EPA target value of 1.0. The total site carcinogenic risk for this scenario was calculated to be 1.0 x 10^{-5} which is within the EPA target range of 1 x 10^{-4} to 1 x 10^{-6}. Therefore, this alternative is considered to be protective of human health based on the estimated carcinogenic and noncarcinogenic risks.

Lead is not considered in these estimations and, based on the results of the UBK Blood Lead Model, this alternative does not protect against ingestion of and direct contact with soils having concentrations of lead above 500 mg/kg. All of the constituents of concern remain in-place. Since the SEDA security measures prevent public access to the site, there is currently little or no risk to the public because there is no exposure. Since the depot is scheduled to be closed under BRAC95, these security measures will eventually be eliminated.

The no action alternative does not provide long-term protection to aquatic receptors in Reeder Creek because the sediments with concentrations of lead and copper above the NYSDEC criteria would remain. While no adverse effects were observed during the RI, there is a potential for long-term chronic effects. Further contamination of the creek by runoff from the site would not be prevented.

Terrestrial ecological receptors also require protection due to exposure from lead in surficial soils. A value of 60 mg/kg for lead in soil was established for protection of terrestrial ecological receptors. This value was adopted from the U.S. Fish and Wildlife Service publication, *Evaluating Soil Contamination, Biological Report 90 (2), July 1990*. Using information from this document as guidance, the OB Grounds cover value of 60 mg/kg for lead in soil, proposed by the regulators and agreed to by the Army, was considered to be protective of terrestrial ecological receptors.

Alternatives 4, 5, and 6 would protect human health and the environment from lead exposure. These alternatives protect against ingestion of and direct contact with soils having concentrations of lead above 500 mg/kg by removing subsurface soils with concentrations of lead above 500 mg/kg. Removal of soils having concentrations of lead above 500 mg/kg would reduce the HI from 0.33 to 0.11 and the total site carcinogenic risk would be reduced from 1 x 10^{-5} to 9 x 10^{-6}. These alternatives would also protect terrestrial wildlife against ingestion of and direct contact with soils having concentrations of lead above 60 mg/kg by covering those areas of the OB Grounds with 9 inches of clean fill.

These alternatives also meet the soil clean-up criteria established for lead in on-site soils and the sediment clean-up criteria for copper and lead in Reeder Creek. The entire 17,900 CY of soil and sediment would be removed and disposed of in an on-site or off-site Subtitle D landfill or treated by soil washing, depending on the alternative.

• Compliance with ARARs

The evaluation of compliance with ARARs involves review of the chemical-specific, action-specific and location specific ARARs to determine if the implementation of the alternative would result in compliance with all appropriate ARARs. Alternative 1, the No Action Alternative, was ranked the lowest since there would be no provisions to assure that leaching to groundwater was eliminated. The remaining alternatives were ranked equally high for this criterion. Leaching could cause exceedences of the NYSDEC Class GA groundwater standard (25 ug/L) and the EPA recognized Federal Action Level (15 ug/L) for lead. All alternatives except the No Action Alternative include remediation of soils which are a potential source for groundwater contamination. To address this potential, on-going groundwater monitoring will be performed regardless of the remedy selected.

• Long-Term Effectiveness and Permanence

The assessment of the long-term effectiveness is an evaluation of the adequacy and reliability of the implemented solution to maintain protection of human health and the environment. For each landfill alternative, some waste materials will be solidified prior to disposal. The innovative alternative will also involve solidification of waste materials but only after the soil washing process. Permanence is enhanced by the use of solidifying agents, such as lime and cement. These agents react with the heavy metals to form insoluble carbonates and hydroxides, increasing the long term effectiveness and permanence of the solution. The solidified mass is less soluble than the unsolidified mass, and formation of a monolithic mass increases the resistance to weathering. As each alternative involves the use of solidifying agents this benefit is constant for each alternative.

Alternative 1, the No Action Alternative, does not provide a permanent solution since no engineering or institutional solution is part of this alternative.

Alternative 6 is considered the best alternative for long term effectiveness and permanence because the amount of contaminated materials in the coarse soil is reduced through soil washing and the contaminated fines that were separated out are treated, either via acid extraction or solidification and disposed of off-site. Treatment is considered a permanent solution and therefore this alternative was ranked highest.

Alternatives 4 and 5 were ranked the next highest. A landfill would be considered permanent providing the landfill does not leak. As releases from landfills are always a potential, these alternatives were ranked lower than Alternative 6 because they involved landfilling a larger volume than Alternative 6, with less treatment, thereby increasing the potential for future releases.

• Reduction in Toxicity, Mobility, or Volume

For Alternative 1, there would be little or no reduction in the toxicity, mobility, and volume of the wastes. Some natural attenuation would be expected, through chemical and physical changes of the heavy metals.

Alternative 6 was considered the most effective in reducing the toxicity, mobility, and volume of the hazardous constituents present at the site. The primary goal of soil washing is volume reduction, and the process is expected to reduce the volume of contaminated soil to approximately 30 to 50 percent of the original volume. Solidification and landfilling of the washed material represents an additional reduction in mobility.

Alternatives 4 and 5 would also be effective in reducing the toxicity and mobility of the hazardous constituents by removing and isolating these items in a landfill. Although solidification would increase the volume of the waste that will be landfilled, the negative aspects associated with this increase is outweighed by the reduction in mobility and toxicity. Alternatives 4 and 5 are similar in nature and were ranked similarly for this factor.

• Short-Term Effectiveness

Alternative 1, the No-Action alternative, has the least short-term effects because there are no risks to the community or workers. Any remedial solution involving excavation and transportation will decrease the short term protectiveness to human health by increasing the potential exposure to dust and physical accidents from heavy equipment traffic through adjacent neighborhoods. No remedial solutions will be conducted for this alternative.

The time to implement the remedial action solutions are similar and therefore, ranked equally. Of the alternatives, Alternative 5 would most likely require the greatest period of time to complete due to the permit equivalencies and approvals required for construction of an on-site landfill. However, once permitted, the actual remedial action (excavation and stabilization) should be completed within seven months. The initial treatability testing and vendor selection should take two to three months. Mobilization should be less than one month, since all of the equipment required is standard construction equipment. The remedial action is expected to take one to three months. Since there would be no off-site transportation of materials the short term impacts to the local community would be small and therefore this alternative was ranked favorably over the off-site landfilling alternative and the innovative treatment alternative.

Alternative 6 is expected to be completed in three to six months. Mobilization and prove-out testing would require approximately one to two months. Once the unit is fully operational at 25 tons per hour, it would take one to three months to complete the soil washing step. Backfilling, transportation of wastes off-site, and demobilization would be expected to take another month. This alternative was ranked higher than the off-site landfilling alternative as there is less off-site disposal required to complete this solution and therefore there would be fewer short term impacts to nearby residences.

Alternative 4 can be completed within five to six months. Treatability testing should require approximately two to three months. Mobilization would be less than one month. The remedial action should be accomplished in one to two months. However, since it may also involve the off-site transport of hazardous waste to a treatment facility, this alternative was ranked the lowest for short term protectiveness.

- Implementability

A discussion of implementability can be divided into three sections, technical feasibility, administrative feasibility, and availability of services and materials. Technical feasibility describes items such as construction and operation, technology reliability, and monitoring considerations. Administrative feasibility addresses issues such as permitting, interaction with NYSDEC and EPA, and community relations. Availability of services and materials describes the ease of obtaining vendors and equipment, and the availability of offsite disposal capacity.

The criterion of implementability is applicable to Alternative 1, the no action alternative, in that there are no implementation obstacles.

Technical Feasibility

Alternative 4, Off-Site Landfilling

Alternative 4 was ranked the highest for technical feasibility. Solidification/stabilization is considered to be technically feasible since the materials and equipment used are all standard construction equipment. A treatability study is required to establish the optimal admixture ratios. The excavation process is also considered technically feasible. As the waste materials are in shallow soils, excavation will be easy.

Another aspect of technical feasibility is the ease with which additional work may be conducted. If additional work is required in the future, this remedial action is not expected to interfere. No equipment or modifications to the site will remain once the remedial action is complete. Therefore, there will be nothing preventing further actions.

Alternative 5, On-site Disposal Landfilling

The technical feasibility of Alternative 5 was ranked the next highest. As with Alternative 4, solidification/stabilization will be used to treat waste that exhibits the characteristic of toxicity. This does not factor into the evaluation as it is constant for each alternative. The excavation process would also be identical to Alternative 4 and does not pose a technical feasibility problem.

Unlike Alternative 4, there are a number of institutional issues that affect the technical feasibility of this alternative. Although landfill construction is technically feasible, the issues associated with landfill siting and permitting requirements of NYCCR 360 complicate the feasibility of Alternative 5 more than Alternative 4.

In order to meet the NYSDEC requirement that the landfill be at least five feet above the seasonal high water table, the landfill would need to be located on high ground, on several feet of clean fill, and would need to have runoff to Reeder Creek controlled.

This alternative could hamper any additional remedial efforts at the OB Grounds as the landfill would be in an area of the site that may overlap the original contaminated area, thereby restricting future remedial actions in the area where the landfill is located.

Alternative 6, Soil Washing

Alternative 6 was ranked the lowest for technical feasibility. Although soil washing has been used and has been demonstrated to be effective at sites with similar contamination, each is considered unique. Treatability studies would be necessary to confirm that the technology will be effective at the OB Grounds. The technical advantage of soil washing is to decrease the quantity of material that would require solidification and off-site landfilling.

Like the other alternatives, the excavation portion of the soil washing remedial action is technically feasible and readily implementable. The areas demonstrating elevated concentrations of heavy metals have been delineated, and the excavation plan will ensure that all areas are removed.

This remedial action would not preclude any additional remedial efforts. There will be nothing permanently left on the site so there will be nothing preventing further actions.

Administrative Feasibility

Administrative feasibility refers to the likelihood that an alternative would be accepted by local residences and the regulatory agencies.

Alternative 4, Off-Site Landfilling

Since several permitted landfills, many of which are involved with expansion plans, are available in the area this alternative is attractive since there is no need to construct and permit an additional landfill.

Alternative 5. On-site Disposal Landfilling

The administrative feasibility would depend on the ability of site conditions to meet the requirements of the New York code of regulations for landfill construction and permitting. The unit to be constructed would be a Subtitle D solid waste landfill, requiring a NYSDEC permit equivalency. The regulatory requirements, described in 6 NYCRR Part 360 are broad, and include issues such as siting, design, closure, post closure, and monitoring. It would be necessary to obtain NYSDEC concurrence on the acceptability of a single composite liner system. Obtaining the necessary permit and concurrence could take six months to a year, or more, and would require engineering design and procurement.

Alternative 6. Soil Washing

The administrative feasibility of this alternative is the best of the alternatives. This option provides the most permanent solution via treatment. The treatment would be performed on-site and would reduce the volume of material that would be transported off-site for landfilling.

Availability of Services and Materials

Alternative 4. Off-Site Landfilling

This alternative involves standard equipment, readily available in the Romulus area. The excavation would be accomplished with backhoes and scrapers, and the material would be transported in standard dumptrucks. The on-site stabilization unit would consist of a standard pug mill, which is considered readily available construction equipment.

Several Subtitle D landfills are available to accept the excavated and solidified soils. Both the Seneca Meadows and High Acres landfills indicated that they had sufficient capacity to accept the waste, and would be willing to accept the waste if the proper analytical results were provided.

Alternative 5. On-site Disposal Landfilling

This alternative was ranked lower than Alternative 4 because of the special materials that would be required to construct an on-site landfill. The construction materials include clay which would require that a source be identified, tested for quality and quantity prior to being brought to the site. It is anticipated that a local source would be available but it is possible that an acceptable source may not be found. Clean fill is readily available and could be obtained on the Depot. The geomembrane and geosynthetic drainage layer are available from a limited number of vendors. While all these materials are available, some are not readily available. Because of this restriction, Alternative 5 would rank lower in terms of availability of materials. This alternative would also require standard equipment, which is readily available in the Romulus area. The excavation would be accomplished with backhoes and scrapers, and the material would be transported in standard size dumptrucks. The stabilization unit would consist of a standard pug mill, or the stabilization could be conducted in a cement truck.

Alternative 6. Soil Washing

This alternative was ranked the lowest for availability, since this technology is specialized and available from a select number of companies. The number of specialized companies that have experience in implementing soil washing are limited.

Implementability

All of the alternatives score well on implementability. Alternative 4, which relies on off- site disposal of soils scored the highest of the remedial actions. Alternative 4 requires primarily standard earth moving equipment and would be easy to implement. Landfill space is readily available and would not limit the ability to implement this alternative. Alternative 4 ranks higher than Alternative 5 because it is easier to dispose of wastes off-site than to construct an on-site Subtitle D landfill. Alternative 6 is the most difficult to implement because of the need for specialized soil washing equipment.

- Cost

There are no costs associated with Alternative 1, the No Action Alternative, so it rated highest. Alternatives 4 and 5 ranked fairly equal for 30 year Present Worth Cost. Alternative 6, soil washing, ranked lowest for 30 year Present Worth Cost, as it is approximately twice as expensive as Alternative 4 and 5.

Capital Costs

The total capital cost for Alternative 4 is estimated to be between $3.6 million and $5.2 million. If solidification is performed on-site, the cost is lower than if the solidification is performed off-site. The disposal costs are based upon estimates obtained from the Ontario County Landfill and the Seneca Meadows Landfill. The determination of on-site or off-site solidification will occur after selection of the preferred alternative.

The capital cost for Alternative 5 is approximately $5.2 million.

There are four major cost items for Alternative 6, excavation, soil washing, solidification, and offsite disposal. Soil washing costs are estimated to be $200 per CY. Offsite disposal costs (including transportation and treatment) would be $450 per CY. The total cost including engineering, oversight, and site restoration for remediation of 17,900 cubic yards is $10.6 million.

O & M Costs

O & M costs associated with Alternative 4 include costs for quarterly groundwater sampling and yearly sediment sampling of Reeder Creek. The quarterly groundwater monitoring would cost $40,000. The yearly sampling of sediments in Reeder Creek would cost approximately $5,300 per year. The O & M cost is estimated to be $45,300 annually.

The O & M costs associated with Alternative 5 are estimated to be approximately $50,000 per year. Quarterly groundwater monitoring would cost $40,000 per year. There are also general maintenance costs for the vegetative cover, erosion control, equipment upkeep, and annual sediment sampling in Reeder Creek. These costs are estimated to be $10,000 per year.

The O & M costs associated with Alternative 6 are similar to Alternative 4 and are estimated to be approximately $45,300 per year.

Present Worth Costs

The present worth costs for each alternative was obtained assuming a 30 year lifespan with a 5% average interest rate and a 3% average inflation rate. The present worth cost was calculated as the sum of the capital cost and the O&M cost adjusted for the conditions described above.

The present worth costs for Alternative 4 are estimated to range from $4.1 to $5.7 million.

The present worth costs for Alternative 5 are estimated to be $5.7 million.

The present worth costs for Alternative 6 are estimated to be $11.1 million.

• State Acceptance

New York State Department of Environmental Conservation accepted this remedy on March 14, 1997.

• Community Acceptance

Community acceptance of the preferred alternative will be assessed in the ROD following review of the public comments received on the RI/FS report and the Proposed Plan.

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, the U.S. Army, EPA, and NYSDEC recommend Alternative 4, the Off-Site Disposal Alternative, as the preliminary choice for the Site remedy. Alternative 4 involves excavation of soils with lead concentrations above 500 mg/kg and sediments from Reeder Creek with concentrations of copper and lead above the NYSDEC criteria of the 16 mg/kg and 31 mg/kg, respectively; processing approximately 3,800 CY of the excavated soil by a solidification /stabilization method to meet TCLP; and disposing of all this material as well as untreated excavated soils in an off-site Subtitle D landfill. The total quantity of soil to be disposed of off-site is 17,900 CY. A drainage swale would also be constructed to prevent surface water runoff from the OB Grounds to Reeder Creek. Site groundwater monitoring would be conducted at an appropriate frequency.

The areas of the OB Grounds with soils remaining on the site with lead concentrations above 60 mg/kg will be covered with 9 inches of clean fill. The fill will be vegetated to prevent erosion and to prevent direct contact and incidental soil ingestion by terrestrial wildlife. Slope stabilization will be provided near Reeder Creek as necessary to control runoff from migrating to the creek. The area to be covered is estimated to encompass most of the area of the OB Grounds.

Alternative 4 is the most cost effective alternative and is effective in eliminating long term threats with permanent remedial actions. Alternative 4 is the easiest to implement and will achieve the remedial action goals the quickest. Although Alternative 4 ranks low for short term protectiveness of human health due to increased dust and heavy equipment traffic these negative components can be controlled through the use of dust suppressants and the construction of temporary haul roads away from congested areas.

Currently, NYSDEC GA standard and Federal Action Level for lead was exceeded in samples from two of the 35 wells at the OB Grounds. To ensure that there will be no further impacts, groundwater monitoring will continue and source materials will be removed. The preferred alternative will assure that ARAR compliance is maintained as well as other alternatives and at a cost lower than the other remedial actions evaluated. Therefore, the preferred alternative will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria.

The Army, EPA, and NYSDEC believe that the preferred alternative will be protective of human health and the environment, will comply with ARARs, will be cost effective, and will use permanent solutions and treatment technologies to the maximum extent practicable. The remedy also will meet the statutory preference for the use of treatment as a principal element through the use of stabilization of wastes.

GLOSSARY
Of Terms Used In the Proposed Plan

This glossary defines the technical terms used in this Proposed Plan. The terms and abbreviations contained in this glossary are often defined in the context of hazardous waste management, and apply to work performed under the Superfund program. Therefore, these terms may have other meanings when used in a different context.

Ambient air: Any unconfined part of the atmosphere. Refers to the air that may be inhaled by workers or residents in the vicinity of contaminated air sources.

Ambient Water Quality Standards (AWQS): Standards proposed by EPA or NYSDEC for establishing allowable concentrations of chemicals in groundwater or surface water.

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces, or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be tapped and used for drinking or other purposes. The water contained in the aquifer is called groundwater.

Applicable Relevant and Appropriate Requirements (ARAR): Requirements used to assure that a remedial action will comply with all other appropriate regulations. ARARs can be location specific or chemical specific. Chemical specific ARARs involve promulgated standards used to establish minimum environmental quality that an action must meet.

Backfill: To refill an excavated area with removed earth; or the material itself that is used to refill an excavated area.

Barium: A heavy metal.

Base Realignment and Closure (BRAC95): The military downsizing program responsible for closing and reusing miliary bases. SEDA has been listed as a base to be closed by the year 2001.

Berm: A ledge, wall, or a mound of earth used to prevent the migration of contaminants.

Benzo(a)pyrene: An organic chemical, considered to be a likely human carcinogen, associated with the PAH chemical class of compounds.

Bioaccumulate: The process by which some contaminants or toxic chemicals gradually collect and increase in concentration in living tissue, such as in plants, animals, or humans as they breathe contaminated air, drink contaminated water, or eat contaminated food.

Biokinetic Uptake Model (UBK): An uptake model, developed by EPA, to evaluate the potential human health effects, particularly to children, from exposure to lead. The output from this model was considered a factor in establishing the allowable clean-up level for lead in soil.

Borehole: A hole drilled into the ground used to sample soil and groundwater.

Borrow pit: An excavated area where soil, sand, or gravel has been dug up for use elsewhere.

C.T. Main (MAIN): The consulting engineering firm responsible for the initial phases of the environmental work at the site. This firm was purchased by the Parsons Corp. and reorganized as Parsons Engineering Science Inc.

Cap: A layer of material, such as clay or a synthetic material, used to prevent rainwater from penetrating and spreading contaminated materials. The surface of the cap is generally mounded or sloped so water will drain off.

Carbon adsorption/carbon treatment: A treatment system in which contaminants are removed from groundwater and surface water by forcing water through tanks containing activated carbon, a specially treated material that attracts and holds or retains contaminants.

Cell: In solid waste disposal, one of a series of holes in a landfill where waste is dumped, compacted, and covered with layers of dirt.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): The Superfund Act responsible for the nationwide clean-up of abandoned hazardous waste sites.

Closure: The process by which a permitted unit stops accepting wastes and is shut down under federal or state guidelines that ensure the public and the environment is protected.

Containment: The process of enclosing or containing hazardous substances in a structure, typically in ponds and lagoons, to prevent the migration of contaminants into the environment.

Copper:A heavy metal found in the soil and sediments of the OB Ground.

Cooperative agreement: A contract between EPA and a state wherein the State agrees to manage or monitor certain site investigation and/or cleanup responsibilities and other activities on a cost-sharing basis.

Cover: A layer of clean soil, such as sandy loam, used to prevent dermal and/or ingestion of contaminated surficial soil.

The cover is not impermeable to rainwater. The surface of the cover is generally vegetated and sloped to control runoff and erosion.

Cubic Yard (CY): A volume measurement commonly used to describe an amount of soil or waste material.

Culvert: A pipe under a road, railroad track, path, or through an embankment used for drainage.

Decommission: To revoke a license to operate and take out of service.

Defense Reutilization and Marketing Office (DRMO): The agency within the Department of Defense responsible for recycling and reusing governmental materials.

Department of Defense (DOD): The federal agency responsible for maintaining the defense of the country. The U.S. Army is part of the DoD.

Department of Defense Explosive Safety Board (DDESB): The agency responsible for assuring that explosive materials are handled in a safe and responsible manner.

Dewater: To remove water from wastes, soils, or chemicals.

Dibenz(a,h)anthracene: An organic chemical, considered to be a likely human carcinogen, associated with the PAH chemical class of compounds.

Downgradient/downslope: A downward hydrologic slope that causes groundwater to move toward lower elevations. Therefore, wells downgradient of a contaminated groundwater source are prone to receiving pollutants.

Dinitrotoluene (DNT): A nitrated organic chemical used in explosives. Is also considered a breakdown product of other explosive compounds such as trinitrotoluene (TNT).

Effluent: Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Ecological Risk Assessment (ERA): An evaluation of the ecological risk posed by site conditions to the environment.

Exposure Assessment: An estimate of the magnitude of the actual and/or potential exposures.

Explosive Ordnance Disposal (EOD): A term referencing a specialized field of expertise that involves identifying and managing unexploded ordnance.

Federal Facilities Agreement (FFA): An agreement between EPA, NYSDEC and the Army that defines the procedures for establishing whether or not a remedial action is required.

Generator: A facility that "generates" hazardous wastes.

Hazard Identification: The portion of a risk assessment that evaluates all site data in order to identify the contaminants of concern.

Hazard Index (HI): The risk criteria used to assess non-carcinogenic risks. The EPA target value for non-carcinogenic risk is 1. An HI greater than 1 indicates unacceptable risk.

Hot Spot: An area or vicinity of a site containing exceptionally high levels of contamination.

Human Health Risk Assessment: An assessment of the risks, both carcinogenic and non-carcinogenic, that site conditions pose to human health.

Hydrogeology: The geology of groundwater, with particular emphasis on the chemistry and movement of water.

Impoundment: A body of water or sludge confined by a dam, dike, floodgate, or other barrier.

Influent: Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant.

Installation Restoration Program (IRP): The specially funded program established in 1978 under which the Department of Defense has been identifying and evaluating its hazardous waste sites and controlling the migration of hazardous contaminants from those sites.

Interagency Agreement (IAG): A written agreement between EPA and a federal agency that has the lead for site cleanup activities (e.g., the Department of Defense), that sets forth the roles and responsibilities of the agencies for performing and overseeing the activities. States are often parties to interagency agreements. Also known as Federal Facilities Agreements (FFA).

Lagoon: A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater. Lagoons are typically used for the storage of wastewaters, sludges or liquid wastes.

Landfill: A disposal facility where waste is placed in or on land.

Leachate: The liquid that trickles through or drains from waste, carrying soluble components from the waste.

Leach/Leaching: The process by which soluble chemical components are dissolved and carried through soil by water or some other percolating liquid.

Lead: A heavy metal found in soil and sediment at the OB Ground site.

Long-term remedial phase: Distinct, often incremental, steps that are taken to solve site pollution problems. Depending on the complexity, site cleanup activities can be separated into a number of these phases.

Lowest Effect Level (LEL): The lowest concentration of a chemical that produces an observable effect. Used to establish allowable clean-up goals.

Migration: The movement of contaminants, water, or other liquids through porous and permeable rock.

Mitigation: Actions taken to improve site conditions by limiting, reducing, or controlling toxicity and contamination sources.

Monitoring Well (MW): A device installed into the groundwater, usually by drilling, that allows for the collection of a representative sample.

New York State (NYS): The State of New York.

New York State Department of Environmental Conservation (NYSDEC): The New York agency responsible for implementing and enforcing the environmental laws and regulations of the State of New York.

NYSDEC Class GA Groundwater Standard: Standards and guidance values for protection of the human health and sources of potable water supplies. Class GA waters are fresh groundwater, which may be used as a source of potable water supply.

New York State Department of Health (NYSDOH): The New York agency responsible for implementing and enforcing public health laws and regulations of the State of New York.

National Contingency Plan (NCP): The federal plan responsible for establishing environmental goals and policy at hazardous waste sites.

National Priorities List (NPL): The list of Superfund sites.

Nephlometeric Turbidity Units (NTU): A standard unit of measurement used to establish the turbidity of a water sample. The target goal for a groundwater sample at the OB Ground is 50 NTU.

Nitroaromatics: Common component of explosive materials, which will explode if activated by very high temperature or pressures; 2,4,6-Trinitrotoluene (TNT) is a nitroaromatic.

OB Grounds (OB Grounds): The area at SEDA where open burning of munitions was performed. This site is the subject of the remedial plan.

Open Burning (OB): The process of demilitarizing munitions by burning. For safety reasons, this process is usually performed in the open due to the energetic nature of the materials being destroyed.

Open Detonation (OD): The process of demilitarizing munitions by detonating. For safety reasons, this process is usually performed in the open due to energetic nature of the materials being destroyed.

Parsons Engineering Science, Inc. (Parsons ES): An engineering consulting firm under contract with the U.S. Army responsible for conducting and preparing the RI/FS.

Outfall: The place where wastewater is discharged into receiving waters.

Ordnance and Explosives (OE): Military munitions and ordnance.

Perched groundwater: Groundwater separated from another underlying body of groundwater by a confining layer, often clay or rock.

Percolation: The downward flow or filtering of water or other liquids through subsurface rock or soil layers, usually continuing downward to groundwater.

Petrochemicals: Chemical substances produced from petroleum in refinery operations and as fuel oil residues. These include fluoranthene, chrysene, mineral spirits, and refined oils. Petrochemicals are the bases from which volatile organic compounds (VOCs), plastics, and many pesticides are made. These chemical substances are often toxic to humans and the environment.

Phenols: Organic compounds that are used in plastics manufacturing and are by-products of petroleum refining, tanning, textile, dye, and resin manufacturing. Phenols are highly poisonous and can make water taste and smell bad.

Plume: A body of contaminated groundwater flowing from a specific source. The movement of the groundwater is influenced by such factors as local groundwater flow patterns, the character of the aquifer in which groundwater is contained, and the density of contaminants.

Polycyclic Aromatic Hydrocarbons or Polyaromatic Hydrocarbons (PAHs): PAHs, such as benzo(a)pyrene, dibenz(a,h)anthracene and pyrene, are a group of highly reactive organic compounds resulting from incomplete combustion of organic compounds. They are common components of smoke, creosote and soot and are suspected to can cause cancer.

Preliminary Site Characterization Report (PSCR): The initial site characterization report prepared following the completion of the Phase 1 fieldwork. Used as the basis for determining an understanding of site conditions.

Royal Demolition Explosive (RDX): A high explosive component of military munitions. The chemical name of RDX is Hexahydro-1,3,5 - Trinitro-1,3,5 - Triazine.

Reference Dose (RfD): A chemical specific, allowable dose used to calculate the non-carcinogenic risk. The RfD is expressed in units of milligram of chemical per kilogram of body weight per day of exposure.

Record of Decision (ROD): The culmination of the CERCLA RI/FS process. A contractual agreement between the regulatory agencies and the PRPs, in this case, the Army, describing the intended remedial plan for protecting human health and the environment.

Reeder Creek: The surface water body adjacent to the OB Grounds that collects surface water runoff from the site. The creek, classified by NYSDEC as a Class C surface water body, eventually discharges to Seneca Lake.

Remedial Action Objectives (RAO): Objectives that serve as the basis for site remedial activities. Alternatives are evaluated in regard as how well they can comply with RAOs.

Remedial Investigation/ Feasibility Study (RI/FS): A course of study combined with actions to correct site contamination problems through identifying the nature and extent of cleanup strategies under the Superfund program.

Resource Conservation and Recovery Act (RCRA): The federal regulations describing procedures used to manage hazardous wastes.

Retention Pond: A pond used to hold water for various reasons prior to discharge. At the OB Grounds, a retention pond will be used to allow suspended solid to settle prior to release.

Risk Characterization: The process of quantifying the risk that a site may pose to human health or the environment.

Runoff: The discharge of water over land into surface water. It can carry pollutants from the air and land into receiving waters.

Sediment: The layer of soil, and minerals at the bottom of surface waters, such as streams, lakes, and rivers that absorb contaminants.

Sediment Criteria: Guidelines established by NYSDEC to establish minimum concentrations of various pollutants for the protection of aquatic life due to exposure from sediment in surface waters, such as streams, lakes, and rivers.

Seeps: Specific points where releases of liquid (usually leachate) form from waste disposal areas, particularly along the lower edges of landfills.

Seneca Army Depot Activity (SEDA): The 10,587 acre Army installation, located in Romulus, New York, where the OB Grounds are located. SEDA is to be closed by the year 2001.

Soil Washing: A soil remediation technology that involves separation and concentration of pollutants into a small fraction of the initial volume, usually in the clay/slit fraction of soil.

Solidification/Stabilization: The process of changing an active substance to inert, harmless material, or physical activities at a site that act to limit the further spread of contamination without actual reduction of toxicity.

Subpart X: The portion of RCRA that applies to miscellaneous units. The OB Grounds is regulated as a miscellaneous unit under RCRA.

Superfund Amendments and Reauthorization Act (SARA): The law that in 1986 reauthorized the Superfund program.

Solid Waste Management Unit (SWMU): Units, required by RCRA to be identified, where hazardous waste, was stored or managed. The OB Grounds was identified as a SWMU in the initial RCRA permit application.

Treatment, Storage and Disposal (TSD) Unit: A RCRA unit where treatment, storage or disposal is performed.

Trinitrotoluene (TNT): An explosive compound.

Toxicity Assessment: The phase of the risk assessment process that determines the types of adverse health effects are determined.

To Be Considered (TBC): Guidelines and criteria that are not promulgated but can be used to influence the establishment of RAO

Toxicity Characteristic Leaching Procedure (TCLP): A standard test procedure used to determine the ability of a waste to leach. Leachate concentrations above the RCRA limits classify the waste as a "characteristic" hazardous waste due to toxicity.

Treatability Testing: An integral aspect of the remedial action involving testing prior to implementation of a remedial action. The information obtained during treatability testing is used for optimal equipment sizing and final design considerations.

United States Army Corps of Engineers (COE): The federal agency responsible for providing engineering support at federal facilities.

United States Environmental Protection Agency (EPA): The federal agency responsible for applying and enforcing federal environmental laws and regulations. EPA, Region II, is the responsible group involved with the OB Grounds project.

Upgradient/Upslope: Upstream; an upward slope. Demarks areas that are higher than contaminated areas and, therefore, are not prone to contamination by the movement of polluted groundwater.

Upper 95th Confidence Limit of the Mean (95th UCL): A calculated probabalistic determination that there is a 95% probability that the actual mean is less than this value. Used in risk assessment to establish a reasonable exposure concentration.

Unexploded Ordnance (UXO): Ordnance that has failed to be completely rendered harmless.

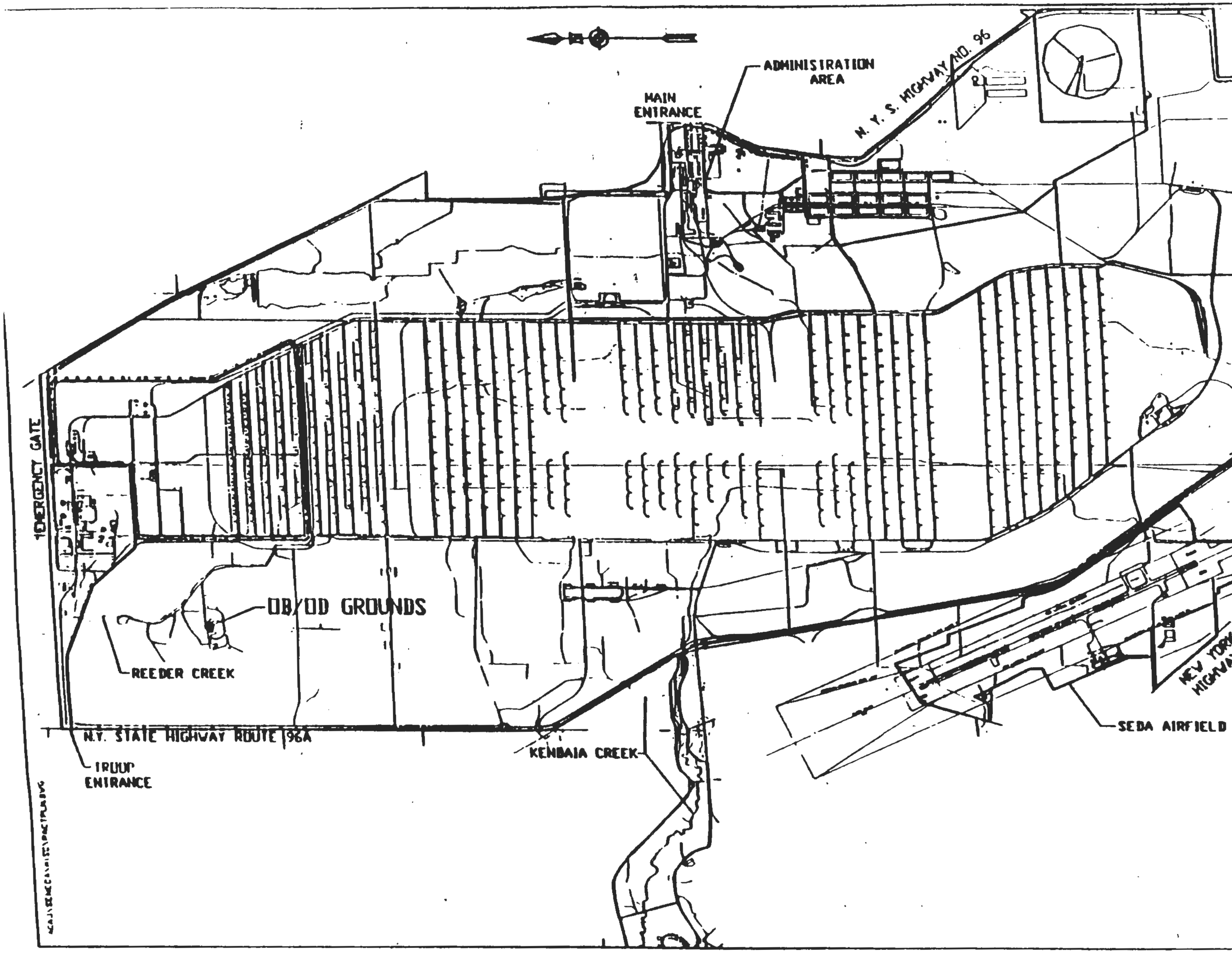
Vegetated Soil Cap: A cap constructed with graded soils and seed for vegetative growth to prevent erosion. (see cap.)

Volatile Organic Compounds (VOCs): VOCs are made as secondary petrochemicals. They include light alcohols, acetone, trichloroethylene, perchloroethylene, dichloroethylene, benzene, vinyl chloride, toluene, and methylene chloride. These potentially toxic chemicals are used as solvents, degreasers, paints, thinners, and fuels. Because of their volatile nature, they readily evaporate into the air, increasing the potential exposure to humans. Due to their low water solubility, environmental persistence, and wide- spread industrial use, they are commonly found in soil and groundwater.

Watershed: The land area that drains into a stream or other water body.

Wetland: An area that is regularly saturated by surface or groundwater and, under normal circumstances, capable of supporting vegetation typically adapted for life in saturated soil conditions. Wetlands are critical to sustaining many species of fish and wildlife. Wetlands generally include swamps, marshes, and bogs. Wetlands may be either coastal or inland. Coastal wetlands have salt or brackish (a mixture of salt and fresh) water, and most have tides, while inland wetlands are non-tidal and freshwater. Coastal wetlands are an integral component of estuaries.

Zinc: A heavy metal found in soils at the OB Ground.



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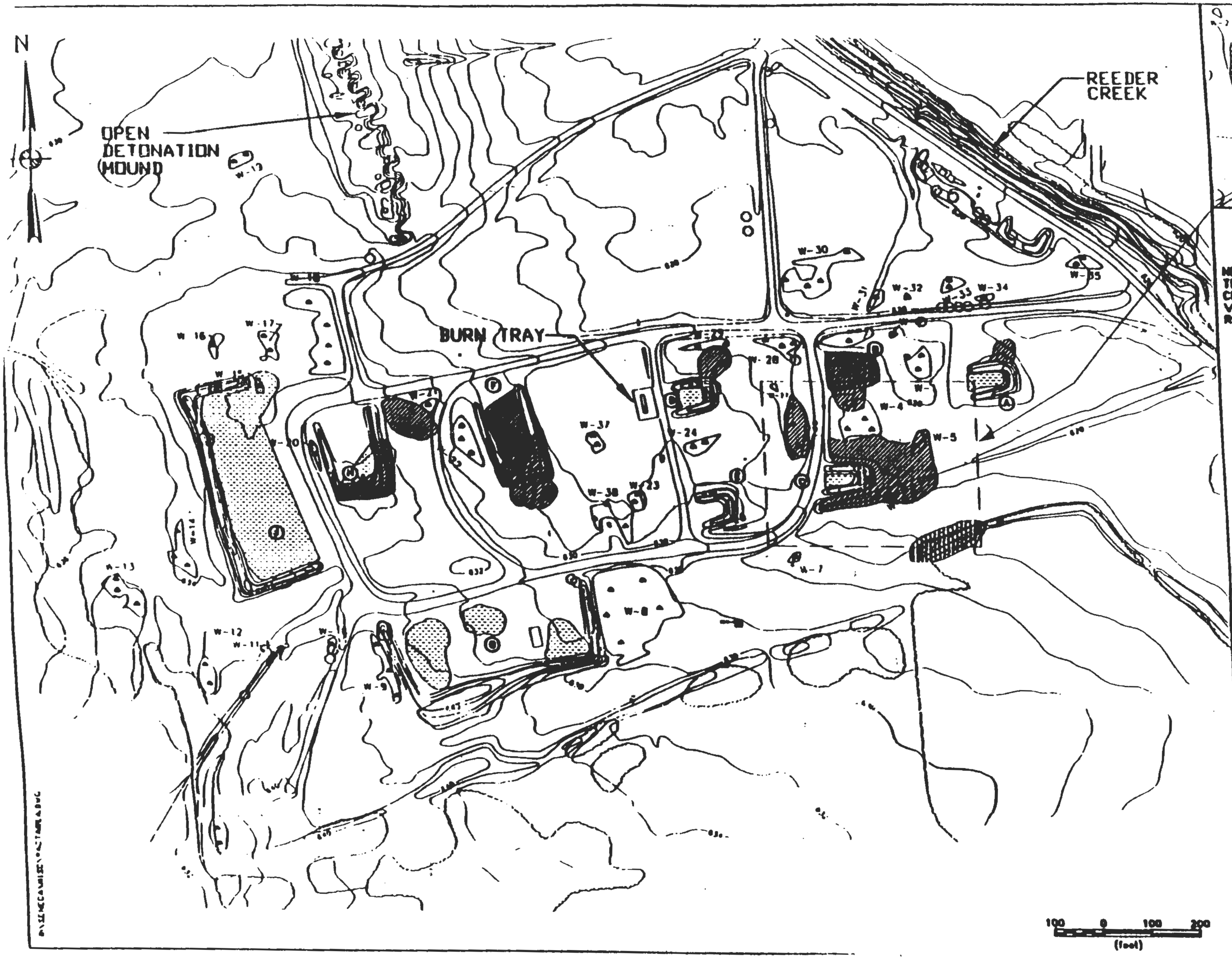

PAD C-NO SCALE

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- BURNING PAD
- GROUND CONTOUR
- WETLAND & ...
- UTILITY POLE
- TREE
- BRUSH
- CASE 1
- CASE 2 AREAS TO ... REEDER CR...
- CASE 3
- CASE 4
- CASE 5

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