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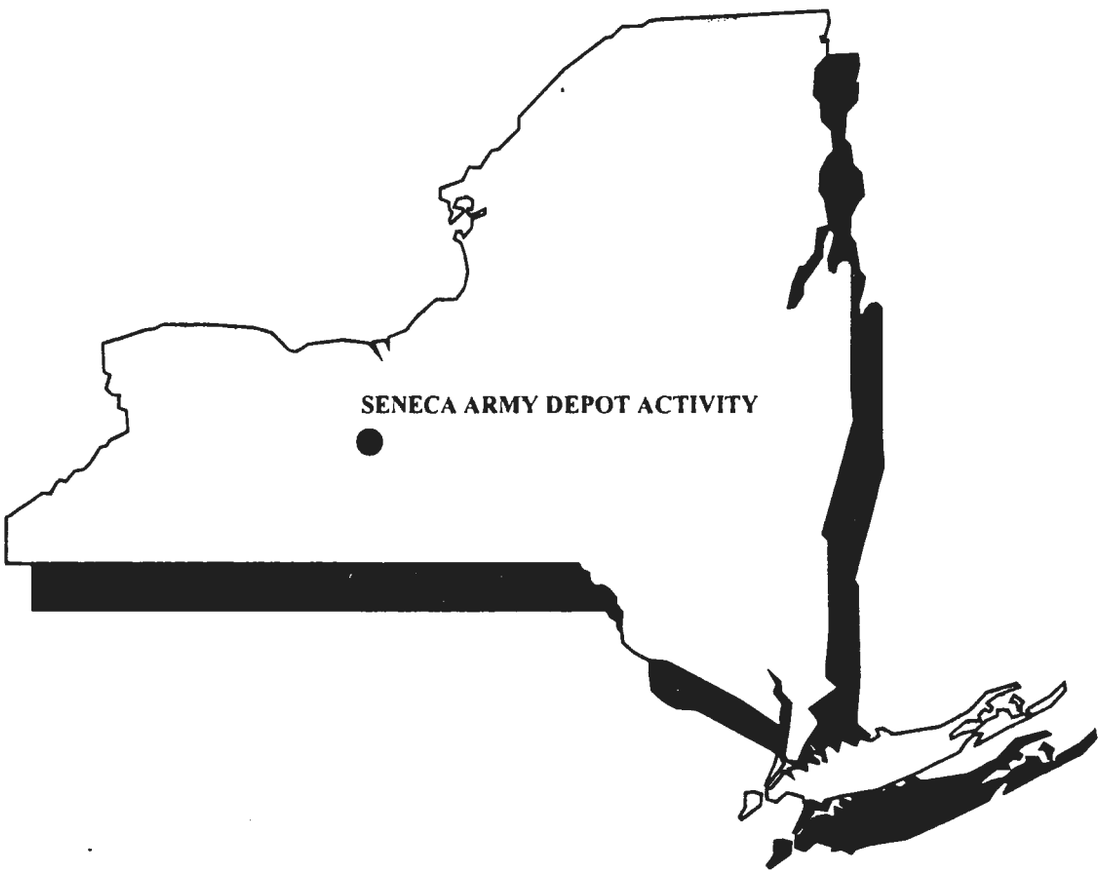

FINAL

WORKPLAN FOR THE ENVIRONMENTAL BASELINE SURVEY (EBS) AT THE FORMER SMALL ARMS RANGE AT THE LAKE HOUSING SITE , SENECA ARMY DEPOT ACTIVITY

CONTRACT NO. DACA87-95-D-0031
DELIVERY ORDER NO. 27

NOVEMBER 2001

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1 INTRODUCTION

The purpose of this work plan is to describe an investigation that will be conducted at the Former Small Arms Range at the Lake Housing Area near Scorpion Road. Results and findings of the proposed investigation will be used to prepare a Decision Document to justify the future disposition of the site. The work will include an historical information review, a site visit, geophysical surveys, and sampling of soil and groundwater.

The proposed work at the Former Small Arms Range at the Lake Housing Area will be performed according to requirements and guidance of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as set forth in the Interim Final "Guidance for Conducting Remedial Investigations and Feasiblity Studies under CERCLA" (EPA, 1988). Work will also comply with the latest guidance from the Environmental Protection Agency (EPA), New York State Department of Environmental Conservation (NYSDEC), and the Department of Defense's (DoD's) Base Realignment and Closure (BRAC) Office. All field work will be conducted in accordance with the Generic Installation Remedial Investigation/Feasibility Study (RI\FS) Work Plan for Seneca Army Depot Activity (Parsons, 1995). The Generic Work Plan describes in detail how the fieldwork will be performed.

2 SCOPING OF THE INVESTIGATION

2.1 CONCEPTUAL SITE MODEL

2.1.1 Historical Usage

Seneca Army Depot Activity (SEDA) was constructed in 1941 and has been owned by the United States Government and operated by the Department of the Army since this time. Prior to construction of the Depot, the site was used for farming. The property that once included Sampson Air Force Base was transferred to Seneca Army Depot Activity in 1975. Included in this transfer were the Lake Housing Area and the Airfield. The Lake Housing Area is located on the shore of Seneca Lake to the north of what is now Sampson State Park. The Lake Housing Area of the Depot once housed depot staff including the base commander and support staff.

The Environmental Baseline Survey (EBS) Report (Woodward-Clyde, 1996) did not identify the Former Small Arms Range at the Lake Housing Area. The EBS Report states that the Lake Housing Area, with the exclusion of the housing area itself, is an uncontaminated Category 1 parcel. This would include the Former Small Arms Range.

According to the ordnance and explosives (OE) Archive Search Report (ASR) (USACE, St. Louis, 1998), the Former Small Arms Range at the Lake Housing Area first appears on site plans in 27 February 1955 as part of the Sampson Air Force Base. The other documented location of the Former Small Arms Range at the Lake Housing Area was shown on the Seneca Ordnance Depot Layout Map No. 1 produced on 12 March 1956 (USACE, St. Louis, 1998). The OE ASR briefly reported the results of a site visit to the Former Small Arms Range at the Lake Housing Area: "We found a tower and a small shack, but there is no target berm or evidence of ordnance in the area". A photograph included in the OE ASR shows the tower overgrown with brush and small trees, perhaps 10 to 15 feet in height. The OE Archive Search Report recommends no further action/investigation for the Former Small Arms Range at the Lake Housing Area.

2.1.2 Physical Site Characterization

The Former Small Arms Range at the Lake Housing Area is located approximately 5,000 feet west of the main area of SEDA (Figure 2-1). The elevation of the site is 560 to 580 feet (NGVD 1929). The land slopes gently towards Seneca Lake (elevation 445 feet), which is located 4,000 feet further to the west. The site is bounded on the north by the gorge of the Kendaia Creek, which is 80 to 100 feet deep in this area, and by Scorpion Road on the south. Figure 2-1 shows a map of the area based on a USGS topographic sheet. Examination of aerial photographs from 1959 and 1968 did not show the small shack and tower as reported in the OE ASR, perhaps due to the small footprint

of these structures. Recent photographs indicate that the Former Small Arms Range at the Lake Housing Area is currently overgrown with thick brush and small trees.

A thin, clay-rich layer of glacial till overlies the shale bedrock at the Former Small Arms Range at the Lake Housing Area. The nature of the groundwater flow at this site is uncertain. The groundwater flow in the overburden may follow the general trend of the land towards the west and Seneca Lake. The groundwater flow in the overburden may also be locally influenced by the gorge of Kendaia Creek to the north. It is assumed that the groundwater flow in the overburden and shale will be locally directed to the creek, but the extent of this influence is not known.

2.1.3 Environmental Fate of Constituents

2.1.3.1 Overview

The primary explosive component of small arms ammunition is smokeless powder (nitrocellulose), which burns completely on firing of the small arms cartridge. Elevated levels of certain metals may be associated with small arms ammunition scrap metal (bullets and casings) as well as with chemical compounds comprising primers, ignitors, and tracers. The metals of concern may include lead, cadmium, copper, zinc, antimony, selenium, strontium, and magnesium. Due to the uncertainty of former use of this site, explosive compounds, in addition to metals, will be considered as potential constituents of concern.

2.1.3.2 Metals

In general, metals tend to be persistent and relatively insoluble in the environment. Leaching of metals from soil is controlled by numerous factors. The most important consideration for leaching of metals is the chemical form of the metal (base metal or cation) present in the soil. The leaching of metals from soil is substantial if the metal exists as a soluble salt. Metallic salts have been identified as a component of such items as tracer ammunition, ignitor compositions, incendiary ammunition, flares, colored smoke and primer explosive compositions. In particular, barium nitrate, lead stearate, lead carbonate, and mercury fulminate are potential metal salts or complexes which are components of ammunition that may have been tested or disposed of at the SEDA. During the burning of these materials, a portion of these salts oxidize to their metallic oxide forms. In general, metal oxides are considered less likely to leach metallic ions than metallic salts. Upon contact with surface water or precipitation, the metal salts may be dissolved, increasing their mobility and increasing the potential for leaching to the groundwater.

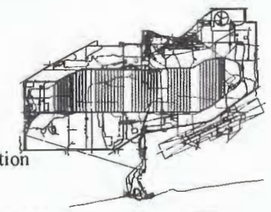
LEGEND

- RAILROAD TRACK
- EDGE OF WATER
- PROPERTY LINE
- ROAD
- FENCE
- 580 CONTOUR ELEVATION
- TREELINE

Source of Basemap

USGS Dresden Quadrangle, 1: 24000 scale, 1943, Photorevised 1978.

KEY PLAN



Former Small Arms Range Location

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SENECA ARMY DEPOT ACTIVITY

LAKE HOUSING AREA FORMER SMALL ARMS RANGE WORKPLAN

FIGURE 2-1

LOCATION OF FORMER SMALL ARMS RANGE AT THE LAKE HOUSING AREA

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Metals may also exist in the base metallic form as a component of the projectiles tested or disposed of at the SEDA. Bullets are composed mainly of lead, which may contain trace amounts of cadmium and selenium. Metals which exist in base metallic form, bullet or projectile casings for example, will tend to dissolve much more slowly than the metallic salts.

Soil pH is often correlated with potential metal migration. If the soil pH is greater than 6.5, most metals are fairly immobile, particularly those normally present as cations. This is because at higher pH values, metals form insoluble carbonate and hydroxide complexes. Metals would be most mobile in highly acidic soil (pH of less than 5).

A remedial investigation (RI) was performed at the Open Burning (OB) Grounds at the SEDA in 1992 during which more than 50 surface soil samples and over 300 subsurface soil samples were collected. The pH values of the surface soil samples ranged from 5 to 8.4, and the subsurface soil samples had values ranging from 7 to 9 (Parsons ES, 1994). The soil at the OB Grounds is probably similar to the soil at the Lake Housing area; therefore, metals in the soil at the Lake Housing area are expected to be present primarily in insoluble forms.

Lead is extremely persistent in both water and soil. Environmental fate processes may transform one lead compound to another; however, lead is generally present in the +2 oxidation state, and will form lead oxides. It is largely associated with suspended solids and sediment in aquatic systems, and it occurs in relatively immobile forms in soil. Lead which has been released to soil may become airborne as a result of fugitive dust generation.

2.1.3.3 Explosive Compounds

According to the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), the major high-explosive compounds used by the Army are HMX, RDX, TNT, and Tetryl. By association with SEDA, these compounds along with their breakdown products are potential constituents of concern at the Former Small Arms Range at the Lake Housing Area.

Explosive compounds are semivolatile organic compounds (SVOCs). The most volatile of the five explosive compounds considered at this site is 2,6-dinitrotoluene (2,6-DNT), with a vapor pressure of 0.018 millimeters mercury (mm Hg). Compared to benzene, a volatile compound, which has a vapor pressure of 95.2 mm Hg, it is apparent that volatilization of this compound is expected to be low, especially in soil that has a high clay content. Soil with a high clay content generally has a high ratio of water-filled to air-filled porosity; therefore, there is a small amount of air space through which vapor can migrate. Compounds such as RDX and HMX have extremely low vapor pressures and would not volatilize through the soil. Consequently, volatilization of RDX and HMX are not expected to represent a significant environmental pathway.

The potential for explosive compounds to leach to the groundwater is influenced by many factors including solubility, cation exchange capacity, clay content and percolation rate. For this evaluation, solubility has been considered as the most representative parameter for leaching potential. The most soluble of the explosive compounds considered are the dinitrotoluenes and trinitrotoluene (DNTs and TNT). Their solubilities range from approximately 130 mg/L to 270 mg/L. This range of solubility is considered to represent a moderate degree of leaching potential. The solubilities of HMX and RDX are approximately four times less than that for the di- and trinitrotoluenes and therefore represent a smaller potential for leaching.

The tendency of explosive compounds to adsorb to the soil will also affect the potential for explosives to leach into the groundwater. The compounds considered in this evaluation show values of the organic carbon partition coefficient (K_{OC}) ranging from approximately 100 to 500 ml/g and would be considered intermediately mobile. The SEDA site soil has been shown to possess a high percentage of fines including clay, thereby increasing the sorption potential of these compounds to the soil.

Environmental degradation of these parent organic compounds has been shown to occur by various investigators. A summary of the identified breakdown products resulting from environmental degradation of TNT, 2,4-DNT, and RDX is provided in the Generic Installation RI/FS Workplan.

2.2 PRELIMINARY IDENTIFICATION OF POTENTIAL RECEPTORS AND EXPOSURE SCENARIOS

2.2.1 Introduction

This section identifies the source areas, release mechanisms, potential exposure pathways, and the likely human and environmental receptors at the Former Small Arms Range based upon the results of the conceptual site model, which was described in the previous section. The intended land use of the Former Small Arms Range, as well as the entire Lake Housing Site, is residential housing.

2.2.2 Potential Source Areas and Release Mechanisms

The primary source of potential contaminants at the Former Small Arms Range at the Lake Housing Site is the former earthen firing berm, which served as a backstop for small arms bullets. It is likely that the berm was subsequently bulldozed, and the potential source is the surface or near-surface soils containing small arms projectiles. A second potential source is anticipated concentrations of cartridge casings in surface soil at or near the former firing point(s).

Potential release mechanisms from these source areas include (1) infiltration to groundwater and (2) dust and volatile emissions. Surficial runoff of precipitation and soil erosion to surface water and sediment are not expected to constitute a significant release mechanism, since there are no streams on the site and the site is relatively flat and heavily vegetated. However, if this investigation indicates significant risks from surface soils on site, then this potential release mechanism will be further evaluated.

2.2.3 Potential Exposure Pathways and Receptors

The potential exposure pathways from sources to receptors are shown in Figure 2-2. There are three primary receptor populations for potential releases of contaminants from Former Small Arms Range at the Lake Housing Site:

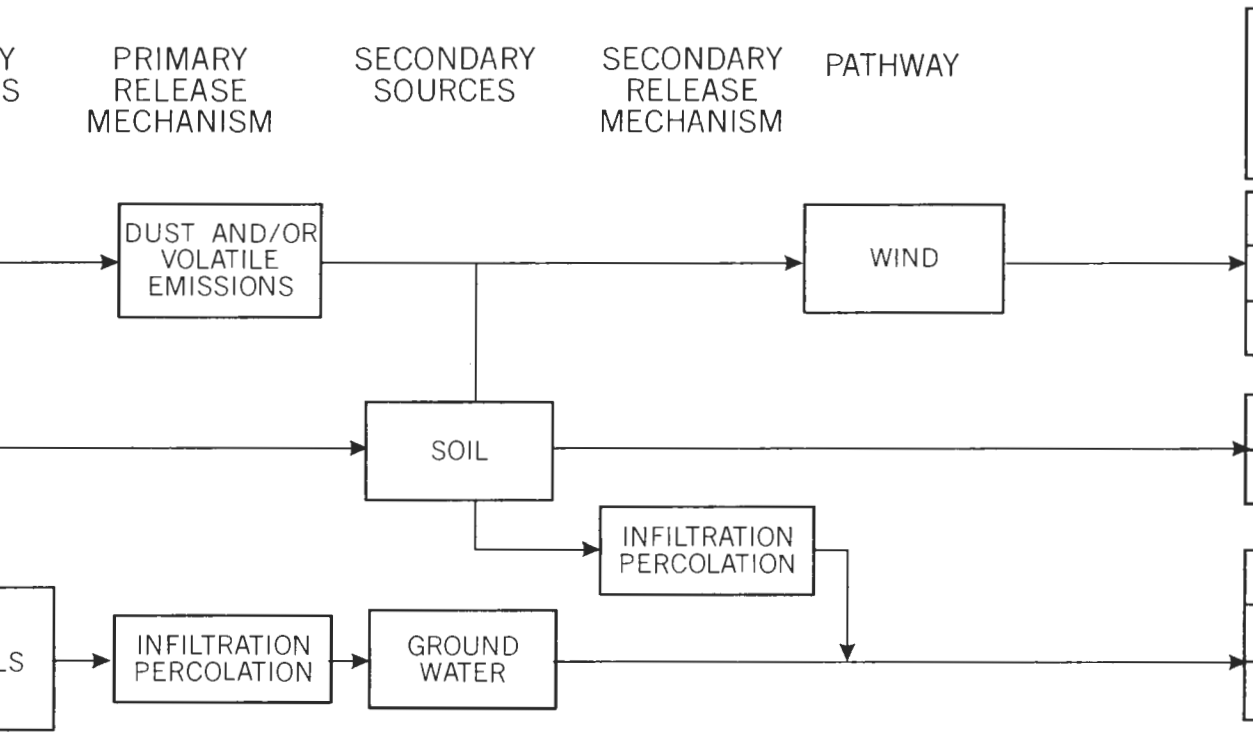
- Current or future resident;
- Current site workers; and
- Terrestrial biota in contact with the soil.

The exposure pathways and media of exposure are described below as they may affect the various receptors.

Dust Inhalation and Dermal Contact. Contaminated fugitive dust may be released from the Former Small Arms Range at the Lake Housing Site due to high winds, vehicle traffic through the area, or disturbance of the soil during site use. The receptors of fugitive dust releases by way of inhalation and dermal contact are residents, site workers, and terrestrial biota. Because the former berm is now level with the surrounding land and vegetated, the amount of fugitive dust is not expected to be significant.

Incidental Soil Ingestion and Dermal Contact. Dermal contact and incidental ingestion of soil is a potential exposure pathway for residents, site workers, and terrestrial biota.

Ingestion of Groundwater. The groundwater at Former Small Arms Range at the Lake Housing Site may be used as a drinking water source in the future. As such, residents would potentially be exposed to groundwater through ingestion. In addition, bathing and showers would expose residents to groundwater by dermal contact and inhalation.



EXPOSURE ROUTE	RECEPTO		
	HUMAN		BIO
	CURRENT OR FUTURE RESIDENT	CURRENT SITE WORKERS	TERR
INHALATION	●	●	X
INGESTION	X	X	X
DERMAL CONTACT	X	X	X
INGESTION	●	●	●
DERMAL CONTACT	●	●	●
INGESTION	●	X	X
INHALATION	●	X	X
DERMAL CONTACT	●	X	X

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

X PATHWAY NOT APPLICABLE TO RECEPTOR

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WORK PLAN FOR THE EBS AT
FORMER SMALL ARMS RAN
AT THE LAKE HOUSING SIT

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FIGURE 2-2

EXPOSURE PATHWAY SUM

SCALE NA | DATE OCTOBER

F:\SMALL ARMS RANGE, LAKE HOUSING\WORKPLAN\FIG 2 2 CDR

2.3 PRELIMINARY IDENTIFICATION OF ARARs AND TBC CRITERIA

2.3.1 Introduction

Section 121(d)(1) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), requires that remedial actions must attain a degree of cleanup that assures the safety of human health and protection of the environment. Moreover, all potential applicable or relevant and appropriate requirements (ARARs) must be outlined. ARARs include federal standards, requirements, and criteria, and limitations under state environmental or facility siting regulations that are more stringent than federal standards. Although the requirements of CERCLA Section 121 generally apply as a matter of law only to remedial actions, USACE's policy for response actions is that ARARs will be identified and complied with to the maximum extent practicable.

Non-promulgated advisories or guidance documents issued by federal or state governments do not have the status of potential ARARs. However, these "to be considered" (TBC) criteria may be used in determining the necessary level of cleanup for human safety and protection of the environment. Potential ARARs and TBCs for the Former Small Arms Range at the Lake Housing Area are listed in the following sections.

2.3.2 Sources of Chemical-Specific ARARs

Federal:

- Resource Conservation and Recovery Act (RCRA), Groundwater Protection Standards and Maximum Concentration Limits (40 CFR 264, Subpart F).
- Clean Water Act, Water Quality Criteria (Section 304) (May 1, 1987 - Gold Book).
- Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16).
- Safe Drinking Water Act National Primary Drinking Water Regulations, Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50-141.51).

New York State:

- New York State Codes, Rules and Regulations (NYCRR) Title 6, Chapter X.
- New York Groundwater Quality Standards (6 NYCRR 703).

- New York Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) (10 NYCRR 5).
- New York Surface Water Quality Standards (6 NYCRR 702).
- New York State Raw Water Quality Standards (10 NYCRR 170.4).
- New York RCRA Groundwater Protection Standards (6 NYCRR 373-2.6 (e)).
- New York State Department of Environmental Conservation, Division of Water, Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values, November 15, 1990.
- Surface Water and Groundwater Classifications and Standards (6 NYCRR 700-705).
- Declaration of Policy, Article 1 Environmental Conservation Law (ECL), Department of Environmental Conservation.
- General Functions, Powers, Duties and Jurisdiction, Article 3 Environmental Conservation Law, Department of Environmental Conservation.
- ECL, Protection of Water, Article 15, Title 5, Department of Environmental Conservation.
- Use and Protection of Waters, (6 NYCRR, Part 608).

2.3.3 Sources of Location-Specific ARARs

Federal:

- Executive Orders on Floodplain Management and Wetlands Protection (CERCLA Floodplain and Wetlands Assessments) #11988 and 11990.
- National Historic Preservation Act (16 USC 470) Section 106 et seq. (36 CFR 800) (Requires Federal agencies to identify all affected properties on or eligible for the National Register of Historic Places and consult with the State Historic Preservation Office and Advisory Council on Historic Presentation).
- RCRA Location Requirements for 100-year Floodplains (40 CFR 264.18(b)).
- Clean Water Act, Section 404, and Rivers and Harbor Act, Section 10, Requirements for Dredge and Fill Activities (40 CFR 230).

- National Environmental Policy Act (NEPA), Statement of Procedures on Floodplain Management and Wetlands Protection (40 CFR 6, Appendix A).
- USDA/SCS - Farmland Protection Policy (7 CFR 658).
- USDA Secretary's Memorandum No. 1827, Supplement 1, Statement of Prime Farmland, and Forest Land - June 21, 1976.
- EPA Statement of Policy to Protect Environmentally Significant Agricultural Lands - September 8, 1978.
- Farmland Protection Policy Act of 1981 (FPPA)(7 USC 4201 *et seq*).
- Endangered Species Act (16 USC 1531).
- Wilderness Act (16 USC 1131).
- National Environmental Policy Act (NEPA), Wetlands, Floodplains, Important Farmland, Coastal Zones, Wild and Scenic Rivers, Fish and Wildlife and Endangered Species (40 CFR 6.302).

New York State:

- New York State Freshwater Wetlands Law (ECL Article 24, 71 in Title 23).
- New York State Freshwater Wetlands Permit Requirements and Classification (6 NYCRR 663 and 664).
- New York State Floodplain Management Act and Regulations (ECL Article 36 and 6 NYCRR 500).
- Endangered and Threatened Species of Fish and Wildlife Requirements (6 NYCRR 182).
- New York State Flood Hazard Area Construction Standards.

2.3.4 Sources of Action-Specific ARARs

Federal:

- RCRA Subtitle C Hazardous Waste Treatment Facility Design and Operating Standards for Treatment and Disposal systems, (i.e., landfill, incinerators, tanks, containers, etc.) (40 CFR 264 and 265); Minimum Technology Requirements.
- RCRA, Subtitle C, Closure and Post-Closure Standards (40 CFR 264, Subpart G).
- RCRA Groundwater Monitoring and Protection Standards (40 CFR, Subpart F).
- RCRA Generator Requirements for Manifesting Waste for Offsite Disposal (40 CFR 262).
- RCRA Transporter Requirements for Off-Site Disposal (40 CFR 263).
- RCRA, Subtitle D, Non-Hazardous Waste Management Standards (40 CFR 257).
- Safe Drinking Water Act, Underground Injection Control Requirements (40 CFR 144 and 146).
- RCRA Land Disposal Restrictions (40 CFR 268) (On and off-site disposal of excavated soil).
- Clean Water Act, - NPDES Permitting Requirements for Discharge of Treatment System Effluent (40 CFR 122-125).
- Effluent Guidelines for Organic Chemicals, Plastics and Resins (Discharge Limits) (40 CFR 414).
- Clean Water Act Discharge to Publicly - Owned Treatment Works (POTW) (40 CFR 403).
- DOT Rules for Hazardous Materials Transport (49 CFR 107, 171.1-171.500).
- Occupational Safety and Health Standards for Hazardous Responses and General Construction Activities (29 CFR 1904, 1910, 1926).
- Federal Ambient Water Quality Standards (AWQCs) (33 USC 1314(a), 40 CFR 122.44).
- RCRA Identification and Listing of Hazardous Wastes, Toxicity Characteristic (40 CFR 261.24).

- SARA (42 USC 9601).
- OSHA (29 CFR 1910.120).
- Clean Air Act (40 CFR 50.61).

New York State:

- New York State Pollution Discharge Elimination System (SPDES) Requirements (Standards for Stormwater Runoff, Surfacewater, and Groundwater discharges (6 NYCRR 750-757).
- New York State RCRA Standards for the Design and Operation of Hazardous Waste Treatment Facilities (i.e., landfills, incinerators, tanks, containers, etc.); Minimum Technology Requirements (6 NYCRR 370-373).
- New York State RCRA Closure and Post-Closure Standards (Clean Closure and Waste-in-Place Closures) (6 NYCRR 372).
- New York State Solid Waste Management Requirements and Siting Restrictions (6 NYCRR 360-361), and revisions/enhancements effective October 9, 1993.
- New York State RCRA Generator and Transporter Requirements for Manifesting Waste for Off-Site Disposal (6 NYCRR 364 and 372).

2.3.5 Sources of TBC Criteria

Federal:

- Proposed Maximum Contaminant Levels (50 Federal Register 46936-47022, November 13, 1985).
- Proposed Maximum Contaminant Levels Goals (50 Federal Register 46936-47022, November 13, 1985).
- Proposed Requirements for Hybrid Closures (combined waste-in-place and clean closures) (52 Federal Register 8711).
- USEPA, 1989. Risk Assessment Guidance for Superfund, Volume I. Human Health Evaluation Manual (Part A). EPA/540/1-89/002.
- USEPA, 1997. Exposure Factors Handbook. Volumes 1 – III. Update to Exposure Factors Handbook (EPA/600/8-89/043 – May 1989). EPA/600/P-95/002Fa.

- USEPA, Integrated Risk Information System (IRIS), electronic database.
- USEPA Drinking Water Health Advisories, long-term only.
- USEPA Health Effect Assessment (HEAs).
- TSCA Health Data.
- Toxicological Profiles, Agency for Toxic Substances and Disease Registry, U.S. Public Health Service.
- Policy for the Development of Water-Quality-Based Permit Limitations for Toxic Pollutants (49 Federal Register 9016).
- Cancer Assessment Group (National Academy of Science) Guidance.
- Groundwater Classification Guidelines.
- Groundwater Protection Strategy.
- Waste Load Allocation Procedures.
- Fish and Wildlife Coordination Act Advisories.
- Federal Guidelines for Specification of Disposal Site for Dredged or Fill Material.
- USEPA Interim Guidance for Establishing Soil Lead Clean Up Levels.
- RCRA Clean-Up Criteria for Soils/Groundwater (RFI Guidance), EPA 530-SW-89-031.
- USEPA OSWER Publication 9345.3-03 FS, Management of Investigation-Derived Waste, January 1992.

New York State:

- New York State Proposed Safe Drinking Water Standards Maximum Contaminant Levels for VOCs (10 NYCRR 5).
- New York State Underground Injection/Recirculation at Groundwater Remediation Sites (Technical Operating Guidance (TOG) Series 7.1.2).
- New York State Analytical Detectability for Toxic Pollutants (85-W-40 TOG).
- New York State Toxicity Testing for the SPDES Permit Program (TOG 1.3.2).
- New York State Regional Authorization for Temporary Discharges (TOG Series 1.6.1).

- Sediment Criteria - December, 1989 - Used as Guidance by the Bureau of Environmental Protection, Division of Fish and Wildlife, New York State Department of Environmental Conservation.

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites; October 1994.

- New York State Department of Environmental Conservation, Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, TAGM 4046, January 24, 1994 (revised).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Use of Inactive Hazardous Waste Disposal Site Numbers, February 1987, (HWR-4001).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Preparation of Annual "Short List" of Prequalified Consultants, January 1993, (HWR-4002).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Guidelines for Entries to the Quarterly Status Report of Inactive Hazardous Waste Disposal Sites, May 1987, (HWR-4003).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Guidelines for Classifying Inactive Hazardous Waste Disposal Sites, June 1987, (HWR-4004).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Insurance Requirements for Consultant and Construction Contracts and Title 3 Projects, September 1989, (HWR-4005).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Consultant Contract Overhead Rates and Multipliers, April 1988, (HWR-4006).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Phase II Investigation Generic Workplan, May 1988, (HWR-4007).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Phase II Investigation Oversight Guidance, November 1990, (HWR-4008).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Team Submissions in Responding to Requests for Proposals and Title 3 Projects, June 1992, (HWR-4009).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Roles and Responsibilities of the NYSDEC Regional Offices, January 1992, (HWR-4010).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Contractor/Consultant Oversight Guidance - O&D Memo #88-26, July 1988, (HWR-4011).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Inactive Hazardous Waste Disposal Site Registry Petitions - O&D Memo #88-33, August 1988, (HWR-4012).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Emergency Hazardous Waste Drum Removal/Surficial Cleanup Procedures, January 1995, (HWR-4013).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Protocol Between Division of Hazardous Waste Remediation and Division of Environmental Enforcement, September 1988, (HWR-4014).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Policy Regarding Alteration of Groundwater Samples Collected for Metal Analysis, September 1988,

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Health and Safety Training and Equipment, October 1988, (HWR-4016).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Protocol Between DHWR and DHSR for Determining Lead Program for RCRA/CERCLA Title 13 Sites, November 1988, (HWR-4017).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Phase I Investigations, November 1988, (HWR-4018).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Phase II Investigation Oversight Note-Taking, November 1990, (HWR-4019).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Guidelines for Responding to Freedom of Information Law (FOIL) Requests, December 1988, (HWR-4020).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Start/End Definitions for Program Elements Within Funding Sources, March 1991, (HWR-4021).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Records of Decision for Remediation of Class 2 Inactive Hazardous Waste Disposal Sites - O&D Memo #89-05, February 1989, (HWR-4022).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Citizen Participation Plan, February 1989, (HWR-4023).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): NYSDOH Hazardous Waste Site Notification, March 1989, (HWR-4024).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Guidelines for Remedial Investigation/Feasibility Studies, March 1989, (HWR-4025).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Assistance for Contaminated Private and Public Water Supplies, April 1994, (HWR-4027).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Subcontracting under Hazardous Waste Remediation Contracts, April 1989, (HWR-4028).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Roles and Responsibilities of the Technology Section - Site-Specific Projects, April 1990, (HWR-4029).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Selection of Remedial Actions at Inactive Hazardous Waste Sites, May 1990, (HWR-4030).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites, October 1989, (HWR-4031).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Disposal of Drill Cuttings, November 1989, (HWR-4032).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Inactive Sites Interface with Sanitary Landfills, December 1989, (HWR-4033).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Guidelines for Eligibility Determination for Work Performed Under the EQBA Title 3 Provisions, January 1900, (HWR-4034).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Project Manager and Contract Manager Responsibilities Under Standby Contract, March 1990, (HWR-4034).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Landfill Regulatory Responsibility, March 1990, (HWR-4036).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Major Milestone Dates for Tracking Remedial Projects, April 1990, (HWR-4037).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Remediation of Inactive Hazardous Waste Disposal Sites, April 1990, (HWR-4038).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Contract Appeals, October 1990, (HWR-4039).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Permitting Jurisdiction Over Inactive Hazardous Waste Site Remediation - O&D Memo #94-04, March 1994, (HWR-4040).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Releasing Sampling Data, Findings and Recommendations, February 1991, (HWR-4041).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Interim Remedial Measures, June 1992, (HWR-4042).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Procedures for Handling RPP-Funded PSAs, February 1992, (HWR-4043).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Accelerated Remedial Actions at Class 2, Non-RCRA Regulated Landfills, March 1992, (HWR-4044).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Enforcement Referrals, July 1992, (HWR-4045).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels, January 1994, (HWR-4046).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Priority Ranking System for Class 2 Inactive Hazardous Waste Sites, December 1992, (HWR-4047).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Interim Remedial Measures-Procedures, December 1992, (HWR-4048).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Referral of Sites to the Division of Water, December 1992, (HWR-4049).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Payment Review Process, April 1993, (HWR-4050).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Early Design Strategy, August 1993, (HWR-4051).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Administrative Records and Administrative Record File, August 1993, (HWR-4052).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Obtaining Property Access for Investigation, Design, Remediation and Monitoring/Maintenance, September 1993, (HWR-4053).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Contract Conceptual Approval Process, November 1994, (HWR-4054).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Contract Final Approval Process, November 1994, (HWR-4055).

- New York State, Division Technical and Administrative Guidance Memorandum (TAGM): Remedial Action by PRPs, April 1995, (HWR-4056).

2.4 DATA QUALITY OBJECTIVES (DQOs)

The RI/FS process requires decisions regarding future site remedial actions, including whether or not any actions are required. The RI serves as the mechanism for collecting and assessing data that will be used in the decision making process. During this portion of the overall process, data are collected and assembled to:

- characterize site conditions;
- determine the nature of the waste(s) or contaminant(s) present;
- assess the risk posed to human health and the environment by the identified waste(s) or contaminant(s); and
- perform testing to evaluate the potential performance and cost of treatment technologies that are being considered for use.

The FS provides the mechanism within which the alternative remedial actions are developed and scoped, assessed and evaluated. Ultimately, the output of the combined RI/FS process is a recommended alternative for remedial actions needed at the site that is based on the data that is developed during the RI/FS. Consequently, the collected data must be of sufficient quantity and quality to support defensible decision making.

The U.S. Environmental Protection Agency's (EPA's) Quality Assurance Management Staff (QAMS) developed the Data Quality Objectives (DQO) Process (US EPA, 1996) as a systematic planning tool for developing data collection designs that support defensible decision making in a resource-effective manner. Proper application and use of the EPA's recommended DQO Process can improve the effectiveness, efficiency and defensibility of data collection efforts used in the development and recommendation of potential remedial actions.

The DQO Process is an iterative process that consists of seven steps, as is shown in **Figure 2-3**. The output from each step influences the choices that may be made later in the Process, and may lead to reconsideration of prior decisions due to the development or discovery of new data that does not support prior decisions. The first six steps focus on the development and specification of decision performance criteria or the data quality objectives (DQOs) that will be used to develop the data collection design. Key components of each of these steps are highlighted below:

- State the Problem – Concisely describe the problem to be studied. Review existing information and data to serve as the basis of the problem definition.

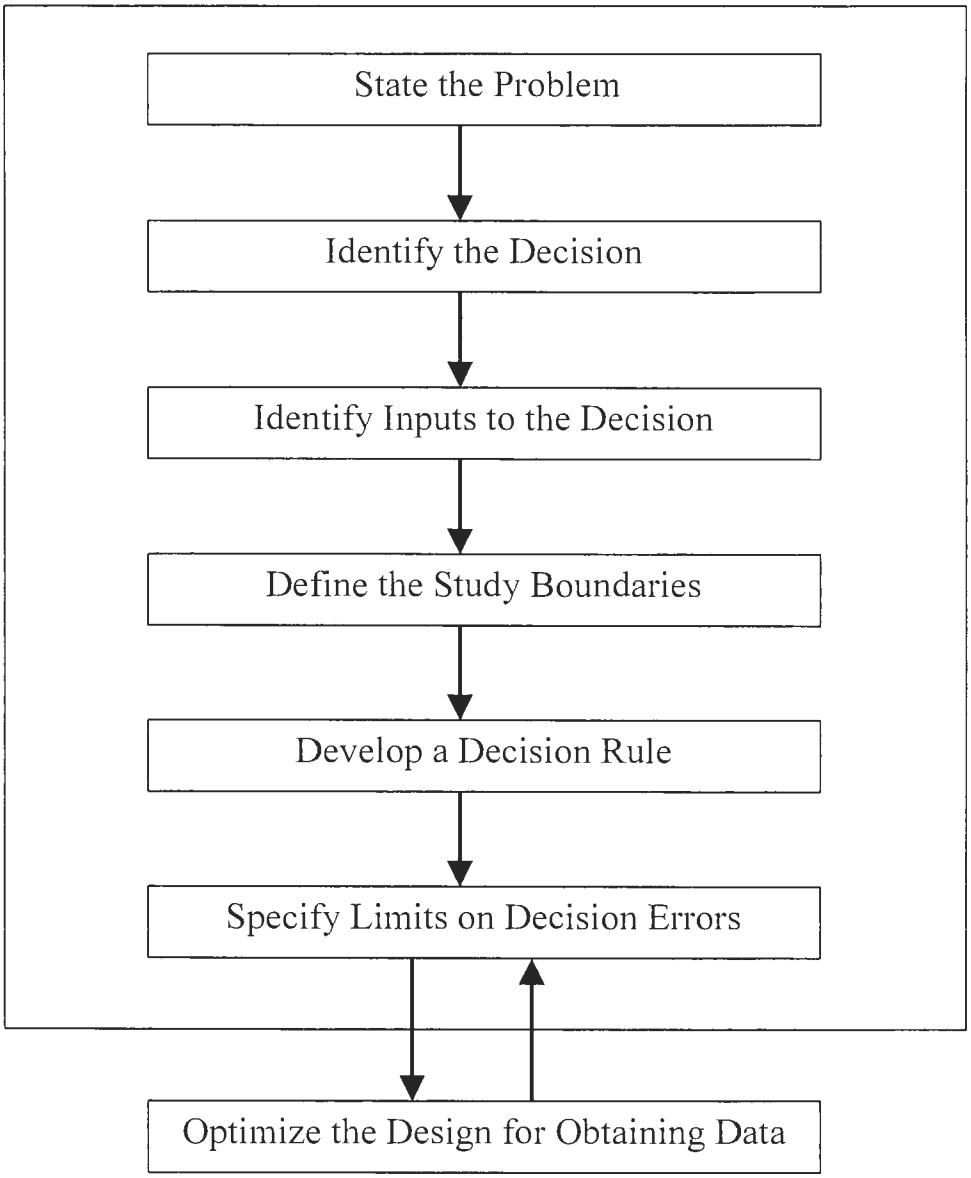


Figure 2-3

US EPA Quality Assurance Management Staff's

Data Quality Objectives Process

(Guidance for the Data Quality Objectives Process, EPA/600/R-96/055, Sept 1994)

- Identify the Decision – Identify what questions the investigation/study will attempt to resolve, and the actions that may result.
- Identify the Inputs to the Decision – What information/data needs to be obtained and collected to resolve the problem identified?
- Define the Study Boundaries – Specify the time periods and spatial area to which the decisions will apply. Determine where and when data should be collected.
- Develop a Decision Rule – Define the statistical parameter of interest, specify the action level, and integrate the previous DQO inputs into a single statement that describes the logical basis for choosing among the alternatives.
- Specify Tolerable Limits on Decision Errors – Define decision error rates based on the consideration of making an incorrect decision.

The last step of the DQO Process is the development and specification of the data collection design based on the DQOs. During this step, all of the data and information developed and collected during the prior steps of the process are evaluated and used to generate alternative data collection designs that could be applied to resolving the identified problem. Once the alternative data collection strategies are identified, the most resource-effective design that meets all the DQOs may be selected and implemented.

Each of the first six steps of the DQO has been incorporated into the development and presentation of this work plan for the proposed environmental baseline survey for the Small Arms Range at the Lake Shore Housing. This work plan presents the Army's recommended approach to conducting an investigation that will be used to prepare a Decision Document that will be used to justify the future disposition of the site.

2.5 DATA NEEDS

2.5.1 Site Visit

After reviewing available historic documents, a site visit will be conducted to locate and define the extent of the Former Small Arms Range at the Lake Housing Site. A metal detector will aid the visual search for evidence of firing points and targets. At this time, an assessment will be made regarding the extent of brush cutting needed prior to performing the geophysical surveys.

2.5.2 Geophysical Data

Digital geophysical mapping will be used to determine areas with elevated levels of metallic debris. If found, such areas will be targeted by the soil sampling program.

2.5.3 Soil Chemistry Data

Soil samples will be collected and analyzed to provide the following information:

- Determine whether soil has been impacted by site activities
- Establish potential for constituents in soil to infiltrate to groundwater
- Assess the adsorptive potential of the soil by performing TOC analyses on soil samples
- Determine compliance with ARARs

2.5.4 Groundwater Chemistry Data

A minimum of three overburden monitoring wells will be installed and screened in the glacial till/weathered shale aquifer. Groundwater from these wells will be sampled and analyzed to determine the following:

- Determine whether groundwater has been impacted by site activities
- Determine aquifer characteristics, such as groundwater flow direction and hydraulic conductivity, to assess potential migration of chemical constituents
- Determine whether site groundwater chemistry complies with ARARs.

3 TASK PLAN FOR THE INVESTIGATION

3.1 HISTORICAL INFORMATION REVIEW AND SITE VISIT

An historical information review will be conducted to determine the location and extent of the Former Small Arms Range at the Lake Housing Area. In particular, the documents of interests include the Sampson AFB Layout Map (1955) and the Seneca Ordnance Depot Layout Map (1956). Additionally, inquiries will be made with persons knowledgeable of the Lake Housing Area, to gather information on the location and former use of this facility.

A site visit will be conducted to validate the findings of the historical information review and to assess the current conditions of the site. Particular attention will be devoted to identifying firing points and target areas with the objective of defining the likely extent of impact. A metal detector will be used to help delineate these areas. Once the area(s) of interest are defined, the boundaries will be marked for clearance of vegetation.

3.2 GEOPHYSICAL INVESTIGATIONS

3.2.1 Rationale

Any significant accumulation of metallic debris, whether brass cartridge casings at a firing point or lead bullets at or behind the target, is detectable with the appropriate geophysical method. Geophysics will be used to locate anomalies that will be targeted by follow-up soil sampling. Since small arms ammunition is non-ferrous, the electromagnetic method, rather than the magnetic method, is the preferred approach. Electromagnetic methods are capable of detecting all types of metals.

3.2.2 Instrumentation

The initial testing of a variety of geophysical instruments at the SEDA was conducted as a geophysical prove-out survey (Parsons, 2000). The results of the geophysical prove-out survey demonstrated that the Geonics EM-61 Time Domain Metal Detector (TDMD) provided the best target resolution and was capable of detecting simulated ordnance and explosives (OE) items with greater reliability than the magnetometer tested. The EM-61 will be used to map and assess bulk metallic content of the ground. Anomalous areas will be targeted for soil sampling.

A hand-held "all metals" detector, such as the White's Spectrum XLT, will be used to support the site visit and field work. The use of such a detector will be for rapid screening of suspect areas and for confirmation and relocation of EM-61 anomalies. Such metal detectors are much more sensitive to smaller near-surface targets than the Geonics EM-61. For example, the hand-held detector will readily detect a single small arms cartridge casing lying just below the ground's surface. Whereas, the EM-61 would pass over the single cartridge without a

measurable response. Unlike the Geonics EM-61, the hand-held metal detector does not provide a digital or other permanent record of the ground's geophysical response.

Accurate tracking of the position of the instrument is essential in producing quality geophysical maps and in relocating anomalous areas and targets. If feasible, a differential Global Positioning System (GPS) in RTK mode will be used to track the instrument with centimeter level accuracy. One such system is the Trimble 4700 GPS Total Station. The practicality of using a GPS at the Former Small Arms Range at the Lake Housing Area depends primarily on the extent of tree cover at the site. GPS requires an unobstructed view of the sky to operate accurately and consistently.

3.2.3 Survey Design

The geophysical survey will be conducted over 100 percent of any identified firing points and target areas within the Former Small Arms Range at the Lake Housing Area. The geophysical surveys will extend sufficiently away from such areas to delineate the extent of the impacted area. After clearance of vegetation and initial surveying to setup grids, the Geonics EM-61 will be towed along parallel lines spaced 3 feet apart to achieve 100 percent coverage. If potentially impacted areas are not identified, then parallel transects, spaced 50 feet apart, will be cut and surveyed across the entire 6-acre site.

3.2.4 Data Analysis and Interpretation

All data collected in the field will be stored electronically on field laptop computers or on personal computers (PCs). Data from the EM-61 and Trimble GPS surveys will be downloaded from the data loggers daily or twice daily to assure that work to be performed will not be interrupted by a lack of storage capacity in the data loggers. All raw field data will be backed-up each night and kept in a location separate from that of the day to day operations.

If necessary, the data will be post-processed by combining the EM-61 results and GPS positioning data. This is done by matching time-stamped positioning data to time-stamped geophysical data. This step may be performed with the Geonics Dat-61 software package. At this point, the geophysical data will be reviewed.

After pre-processing, data from the EM surveys will be exported from the Dat-61 software into standard mapping and analysis packages, such as Geosoft, Arcview, and/or Surfer. Once the data are imported into the processing software, leveling (adjusting to a common baseline), correction for sensor to GPS antenna offset, contouring, and target analysis and selection will be performed. A raster image will be used to produce an anomaly map that identifies the locations of potential anomalies.

3.3 SOIL INVESTIGATION

3.3.1 Sampling Objectives

The objective of the soil sampling program at the Former Small Arms Range at the Lake Housing Area is to determine whether past use of the site as a rifle range has impacted the environment. This objective will be accomplished by targeted soil sampling of potential hotspots as delineated by geophysical anomalies. The objective is *not* to fully characterize the extent and distribution of chemical constituents if present.

3.3.2 Sampling Locations

Studies have shown that explosives residues tend to be concentrated in the surface soils (Jenkins and others, 1998). The objective of the soil sampling is to determine whether explosives and metals have impacted the area of interest, and not to fully determine the vertical distribution of these compounds. For this reason, all soil samples will be taken from the near-surface interval (0 to 6-inch depth) in effort to detect the maximum potential level of explosives.

A minimum of 18 surface soil samples will be collected to characterize the potential impact of the former small arms range on the environment. The soil samples will be collected in areas of visible impact (e.g, staining, OE scrap, stressed vegetation) or in areas that exhibit an anomalous geophysical response. The specific locations of these soil samples will be determined after the site visit and performance of the geophysical surveys.

3.3.3 Sampling Procedures

The heterogeneity of explosives in soils poses significant problems for site characterization (Jenkins and other, 1996). Several options exist for overcoming this problem, such as collecting more samples, compositing samples, homogenizing samples, and extracting larger samples. Parsons proposes to composite and homogenize soil samples to improve the characterization of the site.

At each explosives and metals sampling location, four discrete (grab) surface soil samples will be collected from the pattern shown in Figure 3-1. Using a decontaminated stainless steel spade or shovel, the vegetation will be removed and a 6-inch deep hole will be excavated at each discrete sample location. Care will be taken to remove approximately equal amounts of soil across the full depth interval to provide a representative vertical composite. Approximately 250 grams of soil will be collected in this manner from each discrete sampling location and placed into a stainless steel

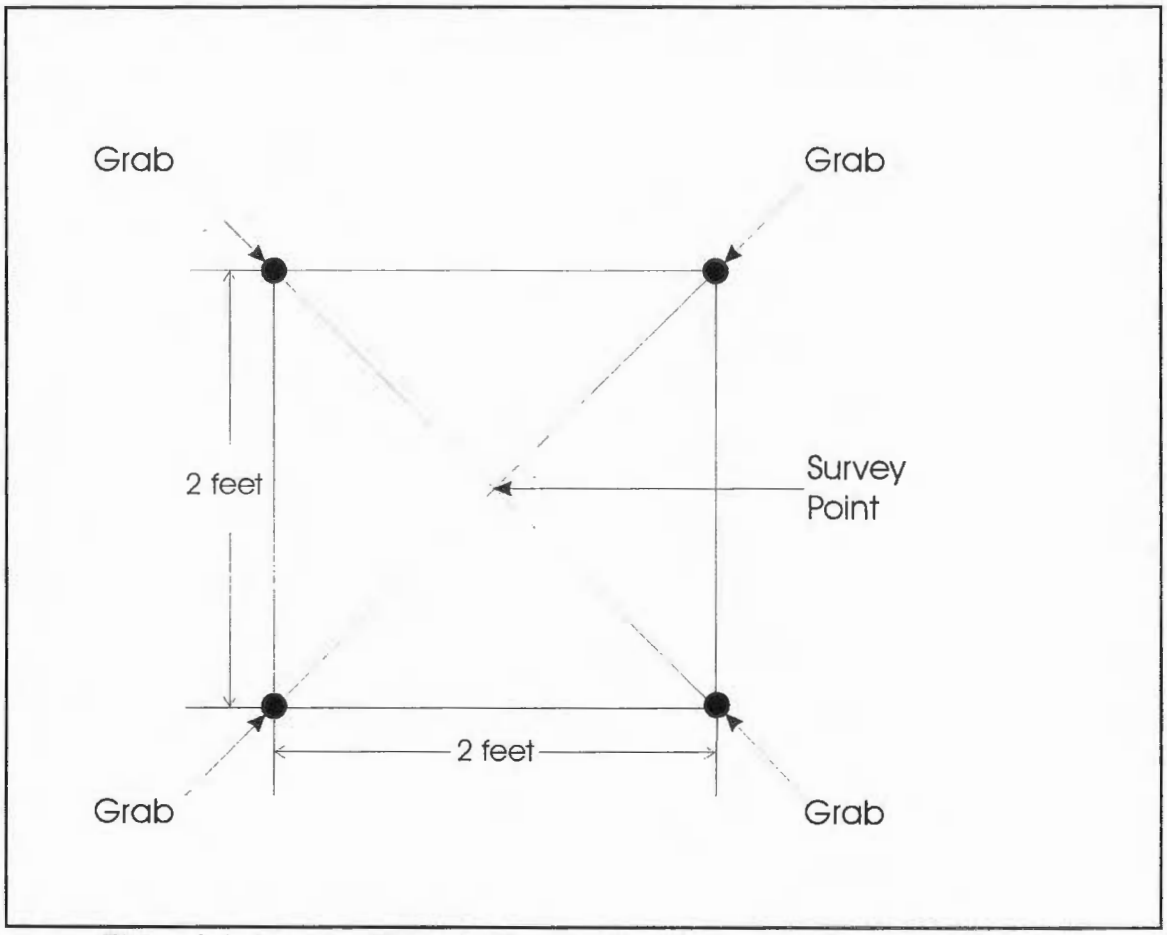


Figure 3-1. Layout of Discrete Samples Used to Prepare Composite Samples

bowl. After removing large stones and pieces of vegetation, the composited sample will be homogenized. Soil sampling procedures are specified in Section 3.4.4 and Section 4.1 of the Field Sampling and Analysis Plan (Parsons, 1995, Appendix A).

Each soil sample will be described according to the Unified Soil Classification System (USCS) as presented in ASTM Method D 2488, Standard Practice for the Description and Identification of Soils (Visual-Manual Procedure). A complete description of the soil type will be recorded in the field logbook. Discrete samples collected in the manner described above should normally be of the same soil type, and therefore a description of the composite sample would be adequate.

Field quality control (QC) will consist of the collection and analysis of one rinsate blank sample (5%) and one field duplicate sample (5%). Field QC samples will be identified using standard sample identifiers, which will provide no indication of their QC role. Quality Assurance/Quality Control (QA/QC) sampling requirements are described in Section 5.4 of Appendix C of the Generic

Installation RI/FS Workplan (Parsons, 1995). Required sample containers, preservation techniques, and holding times are also specified in the Generic Installation RI/FS Workplan.

3.3.4 Sample Analysis

All soil samples will be analyzed for Target Analyte List (TAL) metals and cyanide according to the NYSDEC Contract Laboratory Program (CLP) Statement of Work (SOW), explosive compounds by EPA SW-846 Method 8330, and Total Organic Carbon (TOC) by the L. Kahn Method. A summary of the number of samples and analyses to be performed on these soil samples is shown in Table 3-1. A detailed description of these methods, as well as lists of reported analytes, are presented in Appendix C, Chemical Data Acquisition Plan, of the Generic Installation RI/FS Workplan (Parsons, 1995).

Table 3-1
Summary of Sampling and Analyses

Analysis	Number of Soil Samples	Number of Groundwater Samples
Total Metals and Cyanide TAL NYSDEC CLP	20*	5*
Nitroaromatics and Nitramines EPA Method 8330	20*	5*
Total Organic Carbon L. Kahn	18	

*Includes field duplicate and rinsate blank.

3.4 GROUNDWATER INVESTIGATION

3.4.1 Sampling Objectives

The objective of the groundwater sampling program at the Former Small Arms Range at the Lake Housing Site is to determine whether past use of the site as a rifle range has impacted the groundwater on site. This objective will be accomplished by the installation and sampling of monitoring wells. The objective is *not* to fully characterize the extent and distribution of chemical constituents if present.

3.4.2 Sampling Locations

A minimum of three monitoring wells will be installed and sampled at the Former Small Arms Range at the Lake Housing Site. All wells will be screened across the water table in the glacial till and weathered shale aquifer. MW119-1 will be installed in the southeastern corner of the site to assess background groundwater chemistry. A second well (MW119-2) will be installed down-slope (westerly) from the former range to assess the potential impact on the groundwater quality. A third well (MW119-3) will be placed between the former range and Kendaia Creek to the northeast. This well will measure the effect of the creek on the local groundwater flow. The wells will be installed in a triangular pattern, rather than a linear arrangement, to provide the best configuration for determining the groundwater flow direction beneath the site. Monitoring wells MW119-2 and MW119-3 will be installed as close as possible to potential source areas while still serving the purpose of hydrogeologic characterization. Additional monitoring wells may be necessary to establish adequate baseline data, depending on the results of the geophysical investigations.

3.4.3 Sampling Procedures

Monitoring well installation, development, and sampling procedures for overburden monitoring wells are described in Appendix A, Field Sampling and Analysis Plan (FSAP), of the Generic Installation RI/FS Work Plan (Parsons, 1995). In particular, the installation of monitoring wells is described in Section 3.5 of the FSAP, and the development and sampling of wells is described in Section 3.6.

After well installation, the horizontal location and the elevation of the top of the PVC riser will be surveyed. The requirements of field surveying are described in Section 3.13.1 of the FSAP. Groundwater levels will be measured in each of the monitoring wells in accordance with Section 3.11.1 of the FSAP. A slug test will be performed on each monitoring well to measure in situ hydraulic conductivity in the screened interval within the overburden (FSAP, Section 3.11.3.1).

3.4.4 Sample Analysis

Groundwater from each monitoring well will be sampled and analyzed once for metals and explosives as shown in Table 3-1. Appendix C, Chemical Data Acquisition Plan, of the Generic Installation RI/FS Work Plan (Parsons, 1995) describes in detail the quality assurance objectives and quality control procedures to be followed by the field sampling teams and the analytical laboratories.

3.5 DATA VALIDATION

Analytical data developed during this environmental baseline survey will be used to support final decisions relative to the final disposition of the former shooting range. Analyses proposed as part of the investigation of the former shooting range at the Lake Shore Housing include analysis of explosives and metals in soil and groundwater, and total organic carbon analysis in soil. Sample analysis for explosives will be performed in accordance with SW-846 Method 8330. In order to meet the requirements of New York State, environmental samples for metals will be collected and analyzed according to US EPA and NYSDEC CLP protocols. Determinations of total organic carbon levels will be completed using the Lloyd Kahn protocol.

Validation of analytical data resulting from explosive determinations in soil and groundwater will be performed in a manner that is generally consistent with procedures defined in the US EPA's "National Functional Guidelines for Organic Data Review" and consistent with US EPA Region 2's Standard Operating Procedure HW-16, Explosive Residues (Nitroaromatics and Nitroamines by HPLC, Revision 1.3, September 1994).

The data package submittal requested from the laboratory for the explosive and metals determinations in soil and groundwater will contain all data generated in during the analysis analyses, including mass spectral identification charts, mass spectral tuning data, spike recoveries laboratory duplicate results, method blank results, instrument calibration, and holding times documentation. All sample data and laboratory quality control results will be requested for soil analyses completed for TOC.

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 TOC data. A qualitative review includes and analysis of the following items as they are applicable to the Lloyd Kahn procedure: data completeness, custody documentation, holding times, laboratory and field QC blanks, instrument calibrations, laboratory control sample recoveries, matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy, laboratory duplicate precision, instrument performance, surrogate recoveries for organic analyses, field duplicate precision, internal standard responses for organic analyses, instrument run logs, and all other laboratory QC samples.

Metal and explosive 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).

4 PLANS AND MANAGEMENT

4.1 REFERENCED PLANS

The following plans from the Generic Installation RI/FS Workplan for Seneca Army Depot Activity (Parsons, 1995) are incorporated by reference into this document:

- Appendix A. Field Sampling and Analysis Plan
- Appendix B. Site-Specific Safety and Health Plan (SSHP)
- Appendix C. Chemical Data Acquisition Plan

4.2 SCHEDULING

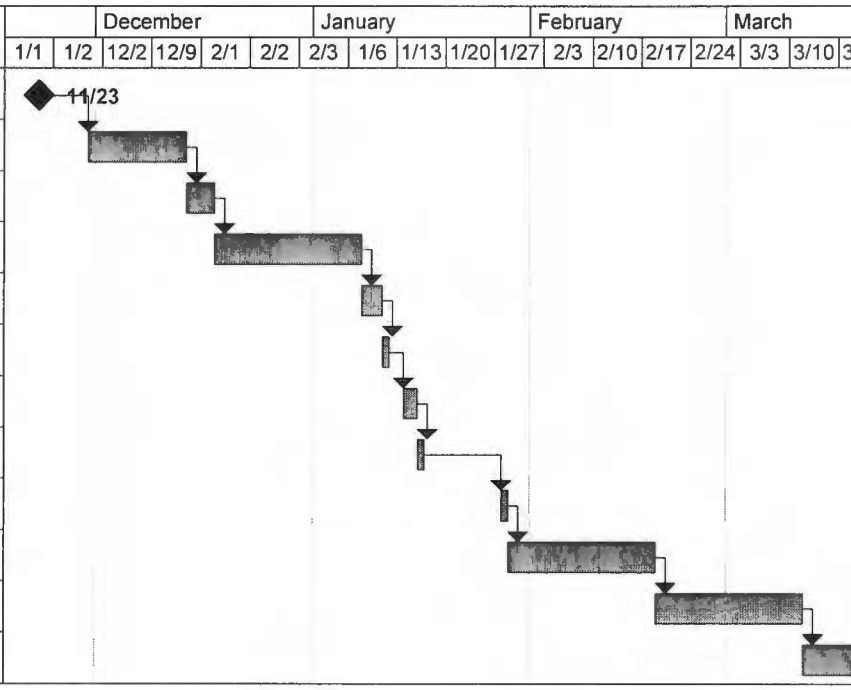
The proposed schedule for performing the work at the Former Small Arms Range at the Lake Housing Area is presented in Figure 4-1.

4.3 STAFFING

The project team organization for performing the work described in this Work Plan is presented in Figure 4-2.

FIGURE 4-1.
SCHEDULE FOR FIELD INVESTIGATION OF THE FORMER SMALL ARMS RANGE AT THE LAKE HOUSING SITE, SENECA ARMY DEPOT ACTIVITY

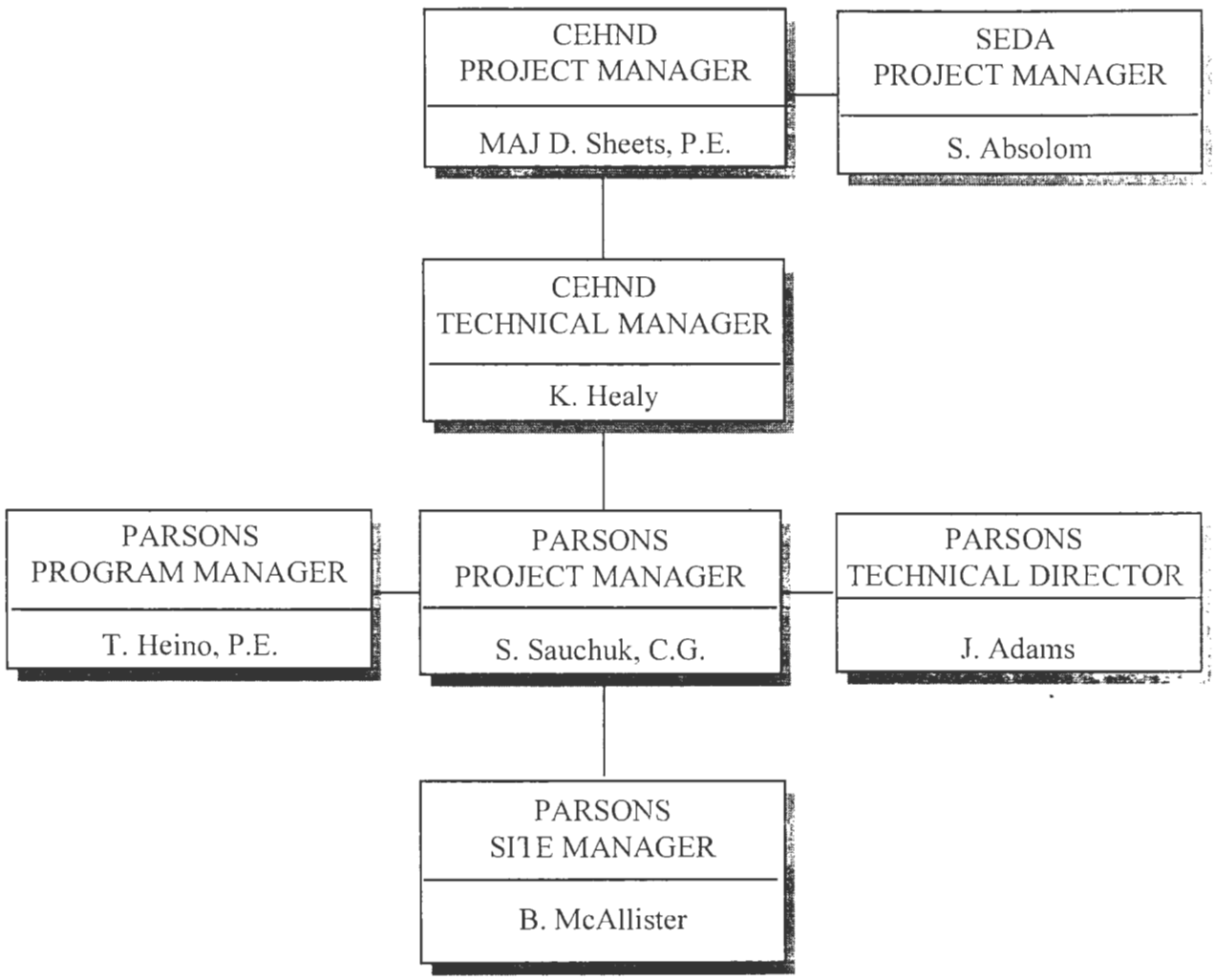
Name	Duration	Start	Finish
e to Proceed	0 days	Fri 11/23/01	Fri 11/23/01
rical Information Review	10 days	Fri 11/30/01	Thu 12/13/01
Visit	2 days	Fri 12/14/01	Mon 12/17/01
rance of Vegetation	15 days	Tue 12/18/01	Mon 1/7/02
hysical Surveys	3 days	Tue 1/8/02	Thu 1/10/02
lation of Monitoring Wells	1 day	Fri 1/11/02	Fri 1/11/02
Sampling	2 days	Mon 1/14/02	Tue 1/15/02
lopment of Monitoring Wells	1 day	Wed 1/16/02	Wed 1/16/02
ling of Monitoring Wells	1 day	Mon 1/28/02	Mon 1/28/02
nical Analyses	15 days	Tue 1/29/02	Mon 2/18/02
Validation	15 days	Tue 2/19/02	Mon 3/11/02
aration of Report	15 days	Tue 3/12/02	Mon 4/1/02



dule
/6/01

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

FIGURE 4-2.
PROJECT TEAM ORGANIZATION FOR THE EBS AT THE FORMER SMALL ARMS RANGE AT THE LAKE HOUSING AREA, SENECA ARMY DEPOT ACTIVITY



5 REFERENCES

Jenkins, T.F., Grant, C.L., Brar, G.S., Thorne, P.G., Ranney, T.A. and Schumacher, P.W., September 1996, Assessment of Sampling Error Associated with Collection and Analysis of Soil Samples at Explosive Contaminated Sites, U.S. Army Cold Regions Research and Engineering Laboratory, Special Report 96-15.

Jenkins, T.F., Walsh, M.E., Thorne, P.G., Miyares, P.H., Ranney, T.A., Grant, C.L., and Esparza, J.R., August 1998, Site Characterization for Explosives Contamination at a Military Firing Range Impact Area, U.S. Army Cold Regions Research and Engineering Laboratory, Special Report 98-9.

Parsons Engineering Science, Inc., August 1995, Final, Generic Installation Remedial Investigation / Feasibility Study (RI/FS) Workplan for Seneca Army Depot Activity.

Parsons Engineering Science, Inc., May 2000, Final, Ordnance and Explosives Engineering Evaluation / Cost Analysis, Appendix C., Site Specific Geophysical Proveout.

U.S. Army Corps of Engineers, St. Louis District (CEMVS), December 1998, Final, U.S. Department of Defense, Base Realignment and Closure, Ordnance and Explosives Archive Search Report, Findings, Seneca Army Depot, Romulus, Seneca County, New York.

U.S. EPA Region 02 Standard Operating Procedure HW-16, Revision 1.3, September 1994: Nitroaromatics and Nitroamines by HPLC.

U.S. EPA, EPA 530/SW-846 Test Methods for Evaluating Solid Waste: Physical / Chemical Methods 3rd ed plus updates - 4 volumes, Office of Solid Waste and Emergency Response, November 1986

U.S. EPA, January 2000, Final, Data Quality Objectives Process for Hazardous Waste Investigations, EPA QA/G-4HW, EPA/600/R-00/007.

U.S. EPA, October 1988, Interim Final, Guidance For Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01.

U.S. EPA, October 1999, EPA-540/R-99-008 (PB99-963506), Contract Laboratory Program National Functional Guidelines for Organic Data Review.

U.S. EPA, September 1994, Guidance for the Data Quality Objectives Process. EPA QA/G-4, EPA/600/R-96/055.

Woodward-Clyde, February 1996, Environmental Baseline Survey Report, Seneca Army Depot, New York.

Response to the Comments from the U.S. Environmental Protection Agency

Subject: Draft Work Plan for the Environmental Baseline Survey (EBS) at the Former Small Arms Range at the Lake Housing Site
Seneca Army Depot Activity, June, 2001

Comments Dated: August 10, 2001

Date of Comment Response: November 13, 2001

General Comments:

1. Comment: The Work Plan proposes 18 composited soil samples (and two QA samples) collected either from areas of visible impacts or associated with geophysical anomalies. Specific sampling locations will be determined after the site visit and performance of the geophysical surveys. Lacking the site visit and geophysical survey results, however, it is premature to specify a precise number of sampling locations in the Work Plan. Instead the Work Plan should indicate an approximate number of 18 sampling locations are planned subject to review of the site visit and geophysical results by the regulatory agencies.

   Response: Agreed. The number of samples is approximate; however, the Army does not believe that more than 18 samples will be required to adequately characterize the site.

Specific Comments:

1. Comment: *Section 2.1 Conceptual Site Model, Page 2-1.* Please include a section describing potential receptors of concern.

   Response: Agreed. This section will be added.

2. *Section 2.2.2, Sources of Chemical-Specific ARARs, Page 2-7.*

   Comment: The following Federal source should be added, moving it from Section 2.2.5: Safe Drinking Water Act, Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50 - 141.51).

   Response: Agreed. This source will be moved to Sec. 2.2.2.

   Comment: "Department of Environmental Conservation" should be added to the end of the citations within the 9th and 11th bulletted items in the New York State section, to make them consistent with the 10th bulletted item.

   Response: Agreed. These words have been added.

   Comment: No Chemical-Specific ARARs that pertain directly to soil ARARs have been identified. Sources of ARARs for compounds that may be present in soil should be identified and included. For example, USEPA Risk Reference Doses (RfDs) and USEPA Carcinogen Assessment Group Cancer Slope Factors (CSFs) should be included in the Federal Section. If any sources of ARARs for compounds that may be present in soil have been included, this should be stated in their citations for clarity.

   Response: Since the USEPA references provided above are non-promulgated advisories or guidance documents, they will be listed as Federal To Be Considered Criteria (TBC) in Section 2.2.5.

3. *Section 2.2.3, Sources of Location-Specific ARARs, Page 2-8.*

   Comment: The following Federal sources should be added: National Environmental Policy Act (NEPA), Wetlands, Floodplains, Important Farmland, Coastal Zones, Wild and Scenic Rivers, Fish and Wildlife and Endangered Species (40 CFR 6.302).

   Response: Agreed. These sources have been added.

   Comment: The following should be added to the 5th bulleted item: NEPA at the beginning of the citation, and "and Floodplain Management" after the word Procedures and prior to the regulatory citation.

   Response: Agreed. These words were added.

   Comment: The date should be completed for the citation within the 8th bulleted item in the Federal section. A digit appears to be missing in the year of the citation.

   Response: Agreed. The date was corrected.

   Comment: As a general note, some of the wetlands regulations cited in this section could also be considered as Action-Specific ARARs depending on the remedial actions performed.

   Response: Agreed. Some of the wetlands regulations are both location-specific and action-specific ARARs.

4. *Section 2.2.4, Sources of Action-Specific ARARs, Page 2-9.*

   Comment: The following Federal source should be added: RCRA Identification and Listing of Hazardous Wastes, Toxicity Characteristic (40 CFR 261.24).

   Response: Agreed. This source was added.

   Comment: The following Federal source should be added: Federal Ambient Water Quality Standards (AWQCs) (33 USC 1314(a), 40 CFR 122.44).

   Response: Agreed. This source was added.

5. *Section 2.2.5, Sources of TBC Criteria, Page 2-10.*

   Comment: The following Federal source should be added: USEPA OSWER Publication 9345.3-03 FS, Management of Investigation-Derived Waste, January 1992.

   Response: Agreed. This source was added.

6. Comment: *Section 2.3, Data Quality Objectives, Page 2-16*: The text states that Level 3 data packages will be obtained for most analyses and Level 4 data packages will be obtained for metals analyses. No mention is made of any data validation to be performed on these data packages. If level 3 and 4 data packages are to be obtained for the project, then commensurate levels of data validation should be performed (EPA Tier II and III). A more detailed discussion of the data validation requirements for the project should be included in this section of the text.

   Response: Agreed. The data validation requirements for this project will be consistent with other Seneca projects. A more detailed discussion of data validation requirements was added.

7. Comment: *Section 3.1 Historical Information Review and Site Visit, Page 3-1.* The document implies that areas of concern (i.e., firing points and target areas, typically earthen berms) will be identified by a site visit and a historical information review. However, on page 2-1, Section 2.2.1, the OE ASR stated that "there is no target berm or evidence of ordnance in this area". Please indicate the difference between effort and the previous ASR.

   Response: The target berms are rumored to have been bulldozed flat, and thus would not have been readily apparent during the OE ASR site visit. The site visit to be conducted as part the proposed investigation would be more extensive and thorough than the OE ASR. In particular, metal detectors will be used to screen areas for the metal debris characteristic of firing points (brass cartridge casings) and target areas (lead bullets).

8. Comment: *Section 3.3.2, Sampling Locations, Page 3-3 Paragraph 1.* The text states that soil samples will be collected at depths of zero to two inches in order to assess surficial impacts from previous site uses as a firing range. Section 2.1 of this document describes a photograph taken for a 1998 report in which the site was heavily vegetated with brush and trees. Since the site has been vegetated for a currently unknown length of time, a large amount of organic matter deposited after the Small Arms Range became inactive may be present in the first few inches of soil. To collect representative samples, the surficial soil samples should therefore be collected at depths of zero to six inches rather than zero to two inches. The text here and in Section 3.3.3 should be modified accordingly.

   Response: Agreed. Soil samples will be collected at depths from 0 to 6 inches.

9. Comment: *Section 3.3.3, Sampling Procedures, Page 3-3, Paragraph 2.* The text describes using plastic bags to homogenize soil samples. Since this procedure is non-standard, additional QA samples (for example, a duplicate sample from several composited batches) should be proposed to test the stated hypothesis that homogenization is more effective with the use of plastic bags rather than the accepted practice of stainless steel bowls.

   Response: In order to avoid the costs of additional QA samples and uncertainties with non-standard methods, mixing in stainless steel bowls will be used to homogenize composited samples.

10. Comment: *Section 3.3.3, Sampling Procedures, Page 3-4, Paragraph 3.* The text describes the rinseate blank sample and field duplicate sample to be submitted as a quality control samples for the shallow soil sampling program. Please note that these samples should not be labeled with obvious identifiers, such as "DUP" or "BLANK" but rather, with false sample names that should be recorded in the field log book for future reference. Submission of blind quality control samples is standard practice.

    Response: Agreed. One sentence will be added to this paragraph stating the requirement of blind field quality control samples.

11. Comment: *Section 3.3.4, Sample Analysis, Page 3-4.* The text states that the shallow soil samples will be analyzed for TOC. Owing to the high amount of organic matter probably present in the top few inches of soil, the soil samples should be collected at a depth of zero to six inches rather than zero to two inches, so that the surface layer of the vegetation does not bias the TOC analysis results.

    Response: Agreed. The TOC samples will be collected from 0 to 6 inches.

12. *Section 3.4.2 Sampling Locations, Page 3-6.*

    Comment: Based on the approximate size of the site presented on Figure 2-1 (600 feet by 400 feet), consideration should be given to the number of wells proposed. Considering the potential size of the site, three monitoring wells may not be enough to establish baseline data. Additionally, the results of the

geophysical survey work may reveal numerous potential source areas, all of which would merit characterization in a baseline survey sampling effort. Contingency plans should be discussed in this section to install more than three wells.

Response: Agreed. Based on the results of the geophysical investigations, additional monitoring wells may need to be installed to establish adequate baseline data. Any changes required will be addressed as an addendum to the Work Plan and a modification to the SOW.

Comment: Three monitoring wells are proposed at locations on the perimeter of the site. The stated goal of the groundwater sampling is to establish whether past use of the site as a rifle range has impacted site groundwater, and not to fully characterize the nature and extent of contamination. Due to the low permeability expected for the clay-rich till and weathered shale stratigraphic units in which the wells will be screened, it is not likely that metals and/or explosive materials which may have reached the water table have traveled very far from the source area(s). The goal of the groundwater sampling program would be better served by installing monitoring wells in areas potentially impacted by past uses of the site, which are to be identified by the geophysical survey work to be performed. Monitoring wells should be installed in potential source areas identified by the geophysical survey.

Response: Monitoring wells MW119-2 and MW119-3 will be installed as close as possible to potential source areas while still serving the important purpose of hydrogeologic characterization. MW119-1 is a background well. As stated above, additional monitoring wells may be necessary to establish adequate baseline data, depending on the results of the geophysical investigations.

13. Comment: *Section 3.4.4, Sample Analysis, Page 3-7.* See Specific Comment 8 above.

    Response: Agreed.

14. Comment: *Figure 4-1, Schedule for Field Investigation of the Former Small Arms Range.* Additional time should be allowed within the schedule for data validation. See Specific Comment 5 above.

    Response: Agreed. Data validation will be added with a duration of 15 days.

Response to the Comments From New York State Department of Environmental Conservation

Subject: Draft Work Plan for the Small Arms Range at the Lake Housing Area
Seneca Army Depot Activity, June 2001

Comments Dated: August 8, 2001

Date of Comment Response: November 13, 2001

1. Comment: In this draft, there is no indication of the size of this site. How can the Army justify the number of proposed surface soil samples to be taken "to characterize the potential impact of the former small arms range environment," without knowing the approximate size of the site?

   Response: The size of the site is approximately 400 feet by 600 feet, as shown on Figure 2-1. The number of samples was based on this approximate area. Additional samples may be required if the site is found to be significantly larger.

2. Comment: A more detailed figure showing the approximate location of the structures should be included (i.e., photograph of the OE-ASR indicating the tower).

   Response: The specific locations of the small shack and tower identified in the OE ASR were not provided in the available documentation. The photograph of the tower does not provide any information on the location of these structures. These structures are too small to appear on existing aerial photographs. One purpose of the site visit will be to map the location of these structures.

3. Comment: Please clarify how a geophysical survey is appropriate for determining surface soil sampling locations at this former small arms range site.

   Response: The geophysical survey will detect metal in the soil, due to its increased bulk electrical conductivity. Activities at a small arms range can be expected to increase the concentration of near-surface metals. Target berms will have high concentrations of metallic lead from bullets, and firing points will have high concentrations of brass from cartridge casings. Areas with higher concentrations of metal will be sampled. Please refer to Section 3.2.1 for additional information.

FINAL

WORK PLAN
FOR THE ENVIRONMENTAL BASELINE SURVEY (EBS)
AT THE FORMER SMALL ARMS RANGE
AT THE LAKE HOUSING SITE,
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Prepared For:

Seneca Army Depot Activity
and
U.S. Army Corps of Engineers
New York District
and
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Contract No. DACA87-95-D-0031
Delivery Order No. 27
739855

November 2001

Response to the Comments from the U.S. Environmental Protection Agency

Subject: Draft Work Plan for the Environmental Baseline Survey (EBS) at the Former Small Arms Range at the Lake Housing Site
Seneca Army Depot Activity, June, 2001

Comments Dated: November 1, 2001

Date of Comment Response: January 2, 2002

Responder's Note:

The US EPA, Region 2 initially issued comments on the subject work plan in a letter to Mr. Stephen M. Absolom, BRAC Environmental Coordinator, Seneca Army Depot, dated August 10, 2001. A revised copy of the comments on the Draft Work Plan was issued by the US EPA, Region 2 on November 1, 2001. Essentially, the two sets of comments are equivalent, with the exception that the US EPA' s Specific Comment pertaining to Section 2.3, Data Quality Objectives (Specific Comment #5 of the August 10, 2001 comment letter) of the work plan, was expanded. The following material is provided to address the expanded content of the US EPA's comment pertaining to Data Quality Objectives.

Comment (from US EPA's November 1, 2001 letter):

Section 2.3, Data Quality Objectives, Page 2-16. The text states that Level 3 data packages will be obtained for most analyses and Level 4 data packages will be obtained for metals analyses. No mention is made of any data validation to be performed on these data packages.

Please note that reference to EPA Data Quality Objectives Levels 3 and 4 is outdated. This is from EPA document "Data Quality Objectives for Remedial Response Activities," March 1987, EPA/540/G-87/003. EPA's latest guidance on the Data Quality Objective process can be found in "Guidance for the Data Quality Objective Process," 9/94, EPA QA/G-4, available at the following web site:

http:/ /www.epa.gov/quality1/qa_docs.html

This guidance elaborates upon the systematic planning process which should currently be used to define the quality and quantity of data needed to support the environmental decision at hand. It does not define the contents of a data package. EPA recommends that the contents of the data packages obtained during this investigation be explicitly defined in this Work Plan or the Sampling and

Analysis Plan (if a SAP is being prepared).

The above information should be used by SEDA and incorporated into Section 2.3. [*Responder's Notation: Due to other changes required in response to oversight agency comments, Section 2.3 of the original document is now 2.4 in the revised document.*]

In addition, the data validation procedures to be employed here should be explicitly referenced or included. EPA Region 2 has data validation SOPs for the CLP organics, inorganics and some SW-846 analytical methods. These can be found on our web site:

http:/ /www.epa.gov/region02/desa/hsw/sops.htm

These SOPs should be used first and foremost. For those analytical methods which do not have a SOP which is presented on the Region 2 web page, it is required that all of the QA criteria stated in the analytical SOP as being "recommended," be performed and subsequent data validation (assessment of the results versus the QA/QC criteria in the method) procedures be included in the site specific SAP.

Response:

Requested changes updating the general discussion of Data Quality Objectives have been incorporated into section 2.4 of the Revised Work Plan. The Army has employed the EPA's recommended procedure in the development of the most recent investigation plan for the Small Arms Range at the Lake Shore Housing. However, outdated references remained. These references have now been updated.

A new section (Section 3.5) has been prepared. This section will discuss the requirements for the analytical data packages. Specific references to the data validation procedures components that will be completed for these analyses are also identified. The proposed revised write-ups relating to the Data Quality Objective Process and Data Validation are provided as attachments to this response.

2.4 DATA QUALITY OBJECTIVES (DQOs)

The RI/FS process requires decisions regarding future site remedial actions, including whether or not any actions are required. The RI serves as the mechanism for collecting and assessing data that will be used in the decision making process. During this portion of the overall process, data are collected and assembled to:

- characterize site conditions;
- determine the nature of the waste(s) or contaminant(s) present;
- assess the risk posed to human health and the environment by the identified waste(s) or contaminant(s); and
- perform testing to evaluate the potential performance and cost of treatment technologies that are being considered for use.

The FS provides the mechanism within which the alternative remedial actions are developed and scoped, assessed and evaluated. Ultimately, the output of the combined RI/FS process is a recommended alternative for remedial actions needed at the site that is based on the data that is developed during the RI/FS. Consequently, the collected data must be of sufficient quantity and quality to support defensible decision making.

The U.S. Environmental Protection Agency's (EPA's) Quality Assurance Management Staff (QAMS) developed the Data Quality Objectives (DQO) Process (US EPA, 1996) as a systematic planning tool for developing data collection designs that support defensible decision making in a resource-effective manner. Proper application and use of the EPA's recommended DQO Process can improve the effectiveness, efficiency and defensibility of data collection efforts used in the development and recommendation of potential remedial actions.

The DQO Process is an iterative process that consists of seven steps, as is shown in **Figure 2-3**. The output from each step influences the choices that may be made later in the Process, and may lead to reconsideration of prior decisions due to the development or discovery of new data that does not support prior decisions. The first six steps focus on the development and specification of decision performance criteria or the data quality objectives (DQOs) that will be used to develop the data collection design. Key components of each of these steps are highlighted below:

- State the Problem – Concisely describe the problem to be studied. Review existing information and data to serve as the basis of the problem definition.

- Identify the Decision – Identify what questions the investigation/study will attempt to resolve, and the actions that may result.
- Identify the Inputs to the Decision – What information/data needs to be obtained and collected to resolve the problem identified?
- Define the Study Boundaries – Specify the time periods and spatial area to which the decisions will apply. Determine where and when data should be collected.
- Develop a Decision Rule – Define the statistical parameter of interest, specify the action level, and integrate the previous DQO inputs into a single statement that describes the logical basis for choosing among the alternatives.
- Specify Tolerable Limits on Decision Errors – Define decision error rates based on the consideration of making an incorrect decision.

The last step of the DQO Process is the development and specification of the data collection design based on the DQOs. During this step, all of the data and information developed and collected during the prior steps of the process are evaluated and used to generate alternative data collection designs that could be applied to resolving the identified problem. Once the alternative data collection strategies are identified, the most resource-effective design that meets all the DQOs may be selected and implemented.

Each of the first six steps of the DQO has been incorporated into the development and presentation of this work plan for the proposed environmental baseline survey for the Small Arms Range at the Lake Shore Housing. This work plan presents the Army's recommended approach to conducting an investigation that will be used to prepare a Decision Document that will be used to justify the future disposition of the site.

3.5 DATA VALIDATION

Analytical data developed during this environmental baseline survey will be used to support final decisions relative to the final disposition of the former shooting range. Analyses proposed as part of the investigation of the former shooting range at the Lake Shore Housing include analysis of explosives and metals in soil and groundwater, and total organic carbon analysis in soil. Sample analysis for explosives will be performed in accordance with SW-846 Method 8330. In order to meet the requirements of New York State, environmental samples for metals will be collected and analyzed according to US EPA and NYSDEC CLP protocols. Determinations of total organic carbon levels will be completed using the Lloyd Kahn protocol.

Validation of analytical data resulting from explosive determinations in soil and groundwater will be performed in a manner that is generally consistent with procedures defined in the US EPA's "National Functional Guidelines for Organic Data Review" and consistent with US EPA Region 2's Standard Operating Procedure HW-16, Explosive Residues (Nitroaromatics and Nitroamines by HPLC, Revision 1.3, September 1994).

The data package submittal requested from the laboratory for the explosive and metals determinations in soil and groundwater will contain all data generated in during the analysis analyses, including mass spectral identification charts, mass spectral tuning data, spike recoveries laboratory duplicate results, method blank results, instrument calibration, and holding times documentation. All sample data and laboratory quality control results will be requested for soil analyses completed for TOC.

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 TOC data. A qualitative review includes and analysis of the following items as they are applicable to the Lloyd Kahn procedure: data completeness, custody documentation, holding times, laboratory and field QC blanks, instrument calibrations, laboratory control sample recoveries, matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy, laboratory duplicate precision, instrument performance, surrogate recoveries for organic analyses, field duplicate precision, internal standard responses for organic analyses, instrument run logs, and all other laboratory QC samples.

Metal and explosive 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).

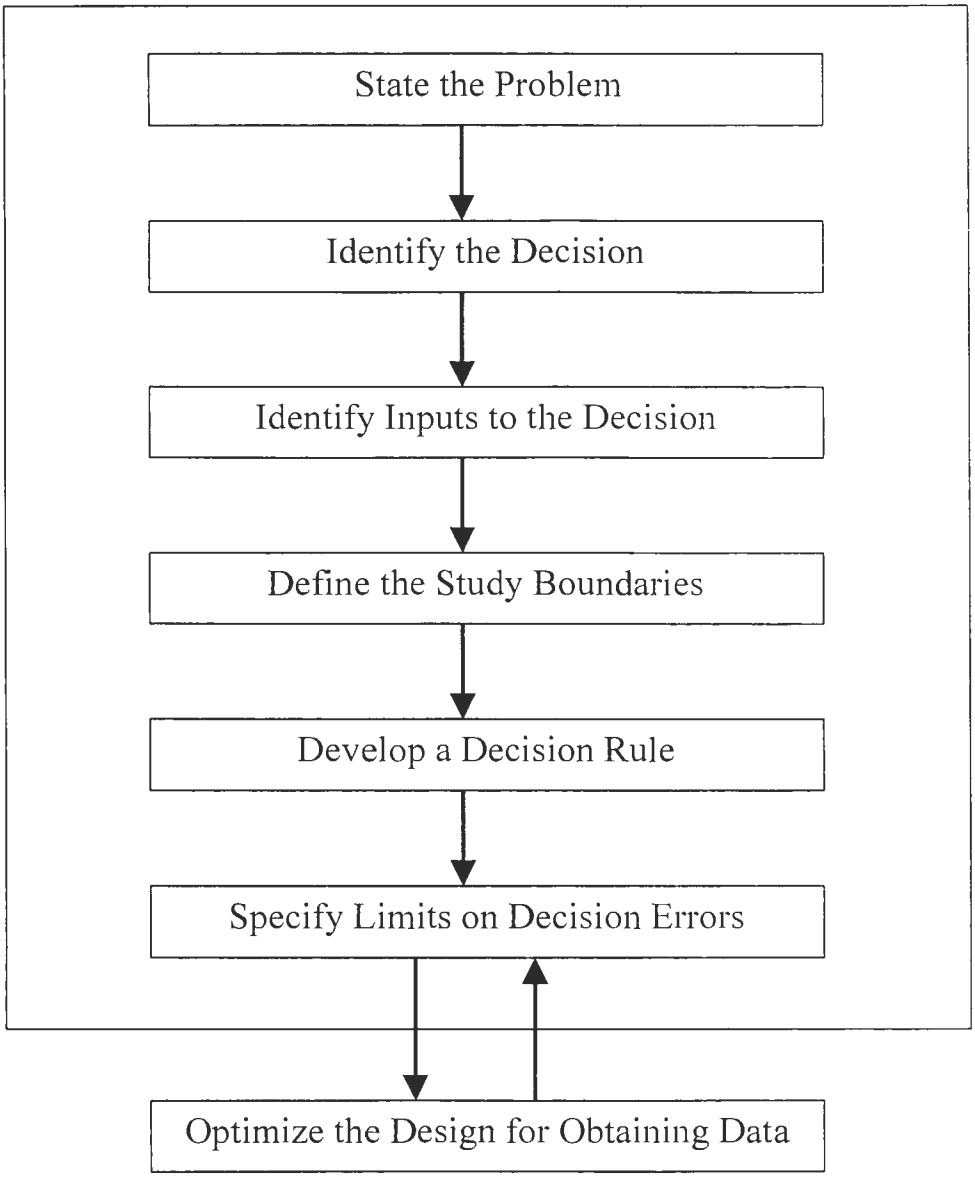

Figure 2-3

US EPA Quality Assurance Management Staff's

Data Quality Objectives Process

(Guidance for the Data Quality Objectives Process, EPA/600/R-96/055, Sept 1994)