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U.S. Army Corps of Engineers

New England District
Concord, Massachusetts

Soil and Sediment Remediation
Open Burning Grounds
Seneca Army Depot Activity
Romulus, New York

Contract No. DACW33-95-D-0004

REVISED DRAFT
PROJECT WORK PLAN
Delivery Order No. 0013
DCN: SEDA-042299-AACL

April 1999

98P-0892

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT WORK PLAN
SOIL AND SEDIMENT REMEDIATION
OPEN BURNING GROUNDS
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

REVISED DRAFT

Contract No. DACW33-95-D-0004
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DCN: SEDA-042299-AACL

Prepared for:

U.S. ARMY CORPS OF ENGINEERS
NORTH ATLANTIC DIVISION
NEW ENGLAND DISTRICT
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Concord, Massachusetts 01742-2751

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Manchester, New Hampshire 03101-1501

April 1999

W.O. No. 03886-118-013-0140-01

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LIST OF ACRONYMS

ASTM	American Society for Testing and Materials
BEC	Base Environmental Coordinator
CENAN	U.S. Army Corps of Engineers, New York District
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CPM	Critical Path Method
CQCP	Contractor Quality Control Plan
CRZ	Contamination reduction zone
cy	cubic yards
DCN	Document Control Number
EODT	EOD Technologies, Inc.
EPA	U.S. Environmental Protection Agency
EZ	Exclusion zone
MSL	Mean Sea Level
NPDES	National Pollutant discharge Elimination System
NYSDEC	New York State Department of Environmental Conservation
OB	Open Burning
PCBs	polychlorinated biphenyls
PPE	personal protective equipment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RP	responsible party
S/S	solidification/stabilization
SAP	Sampling and Analysis Plan
SEDA	Seneca Army Depot Activities
SPDES	State Pollutant Discharge Elimination System
SSHASP	Site Safety and Site Specific Health Plan
SHSC	Site Health and Safety Coordinator
SSHP	Site Safety and Health Plan
SVOCs	semivolatile organic compounds
SZ	Support zone
TCLP	Toxicity Characteristic Leaching Procedure
TO	Task Order
UXO	unexploded ordnance
VOCs	volatile organic compounds
WESTON®	Roy F. Weston, Inc.
WP	Work Plan

SECTION 1

INTRODUCTION

1. INTRODUCTION

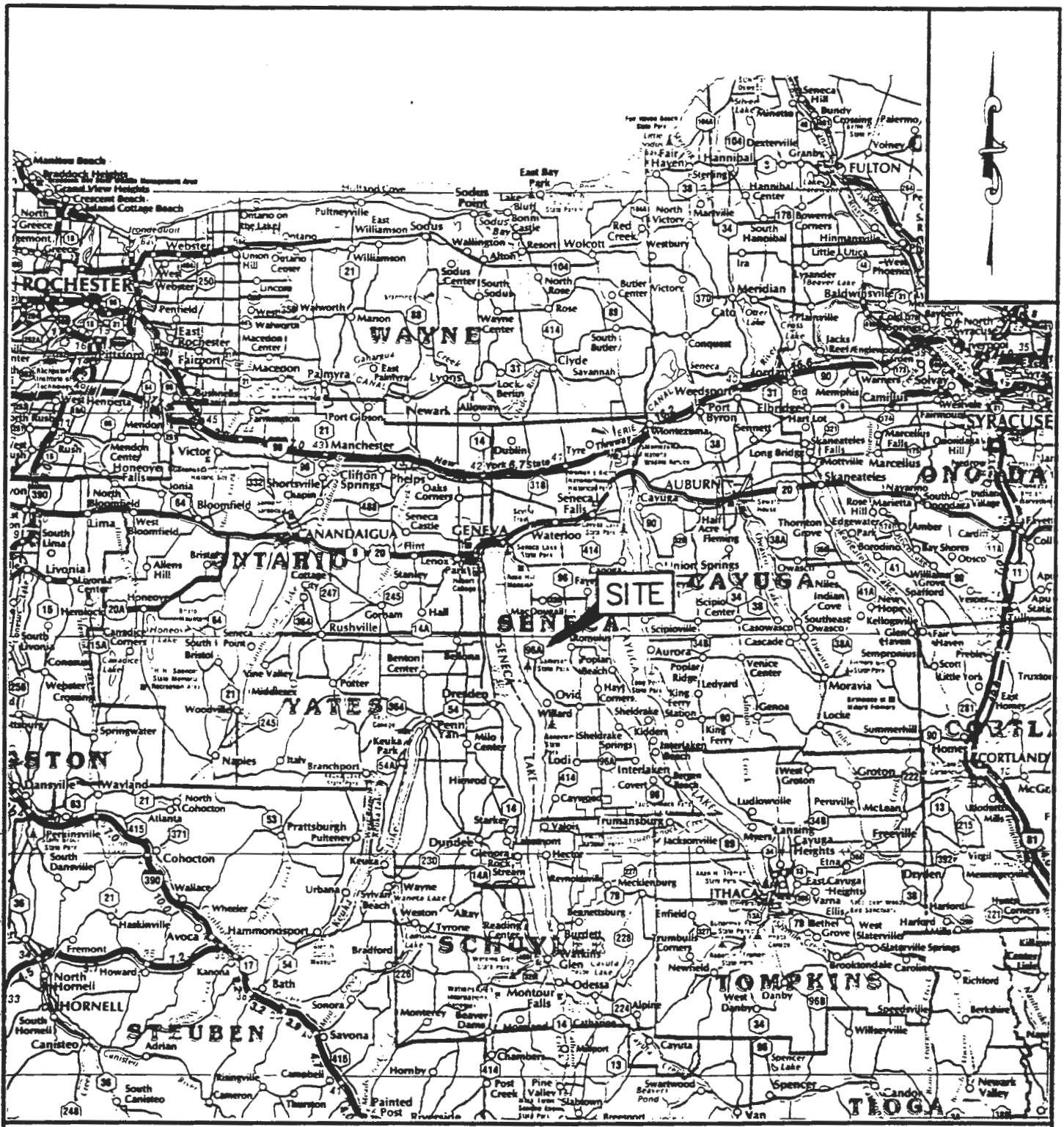
This Revised Draft Project Work Plan (WP) defines the technical approach of Roy F. Weston, Inc. (WESTON®) for the Scope of Services (SOS) at the Open Burning (OB) Grounds Soil and Sediment Remediation Project located at the Seneca Army Depot Activities (SEDA) site in Romulus, New York (Delivery Order No. 0013).

The project involves site surveying, unexploded ordnance (UXO) clearance, excavation, staging and sampling of excavated soils, stabilization of soils and sediments exceeding Toxicity Characteristic Leaching Procedure (TCLP) criteria, sampling of excavations and site perimeter limits, off-site disposal of contaminated soils and sediments, excavation of contaminated creek sediments, treatment of wastewater generated from site activities, construction of a soil cover, and wetlands restoration. EOD Technologies, Inc. (EODT), will be performing all operations within the OB Grounds related to the handling and transportation of soils containing OE, including but not limited to installation and maintenance of erosion and sedimentation controls, excavation, sifting, and transportation of OB Grounds Soils, dewatering, and surface clearance of the entire 30 acre area following excavation.

1.1 SITE BACKGROUND

The OB Grounds site was included on the Federal Facilities National Priorities List on 13 July 1989. In early 1995, under the Base Realignment and Closure (BRAC) process, the Department of Defense recommended closing SEDA. This recommendation was approved in October 1995 and SEDA is scheduled for closure by July 2001. All work performed under this contract will be performed in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the "Federal Facility Agreement under CERCLA Section 120 in the matter of Seneca Army Depot, Romulus, New York."

Since its inception in 1941, SEDA's primary mission has been the receipt, storage, maintenance and supply of military items. This function includes disposal of military ammunition and explosives by burning and detonation. Originally, open burning of munitions was conducted directly on the land surface. However, due to the poorly drained soils, the individual burn pads



NOTE

DRAWING BASED ON MAP OF NEW YORK STATE, BY MAP WORKS, INC., ROCHESTER NEW YORK, DATED 1998.

0 5 10 15 20 25 Miles

0 5 10 15 20 25 30 35 Kilometers

One inch equals approximately 11.7 miles or 19 kilometers.

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

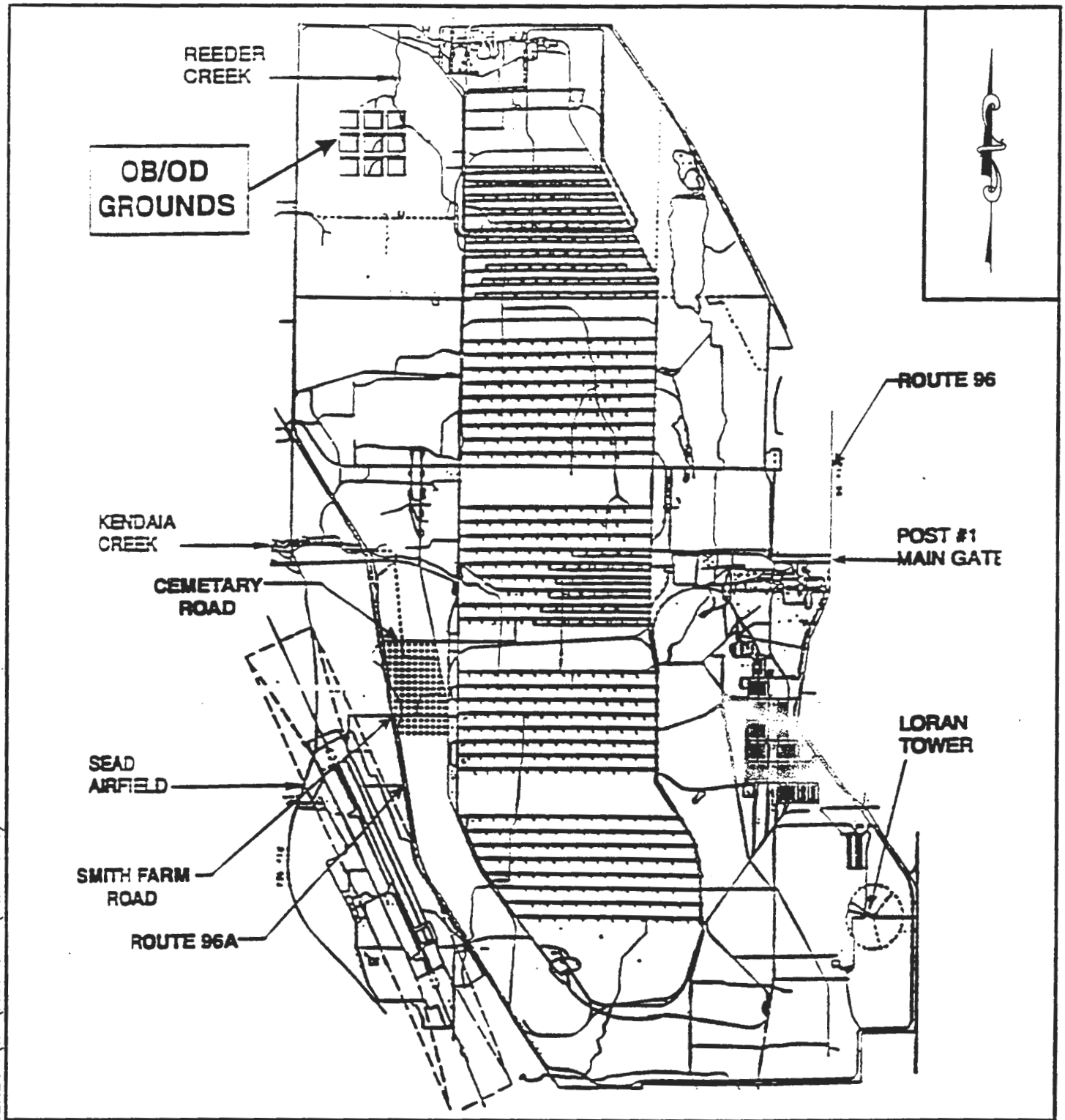
DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

SITE LOCATION MAP

WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

DRAWN	A.J.M.
DATE	AUG. 1998
FIGURE NO.	1–1

FILE NAME: G:\DESIGN\DWG\ACOE\SENECA\WP\FIG1-1 (PLOT 1=1)



NOTE
DRAWING BASED ON FIGURE 2-2, SENECA ARMY DEPOT MAP, BY PARSONS ENGINEERING SCIENCE, INC., DATED FEB. 1997.

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

SEDA MAP

WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

DRAWN A.J.M.
DATE AUG. 1998
FIGURE NO. 1-2

FILE NAME: G:\DESIGN\DWG\ACOE\SENECA\WP\FIG1-2 (PLOT 1=1)

1.3 PROJECT OBJECTIVES

The objectives of this WP are to address the remediation of the OB Grounds and Reeder Creek areas within SEDA. Specific project objectives include the following:

- Perform surveying to layout excavation areas (performed by others).
- Excavate, sift, and transport Case I (>800 mg/kg lead) and Case II (>500 mg/kg) soils from burn pad and berm areas A. B, C, D, E, F, G, H, and J to WESTON stockpile (performed by EODT).
- Sample Case I and Case II soils for TCLP metals at stockpile staging area (WESTON).
- Transport and dispose of Case II soils (that pass TCLP) offsite as Subtitle D Non-Hazardous material (WESTON).
- Excavate sediment (Case I) from Reeder Creek (WESTON).
- Perform stabilization treatment on soils and sediment exceeding TCLP limits prior to off-site disposal as a Subtitle D Non-Hazardous material (WESTON).
- Excavate, sift, and transport Case III soils (<500 mg/kg lead), performed by EODT (WESTON).
- Sample Case III soils for total lead at stockpile staging area (WESTON).
- Backfill and/or stage Case III soils for long term storage (performed by EODT)
- Excavate, sift, and transport all remaining surface soil to a depth of 1' bgs within the 30 acre OB Grounds. To be placed into stockpile staging area (performed by EODT).
- Sample surface soils for total lead at stockpile staging area (WESTON)
- Perform surface and perimeter sampling within the OB Grounds. (WESTON)
- Determine if new surface with one foot of soil removed meets the ROD requirements for total lead below a concentration of 60 mg/kg. Install, reduce, or eliminate the proposed 12" soil cover based upon concentrations of total lead in surface soils that are > 60 mg/kg (WESTON).
- Abandon existing monitoring wells and construct new wells. (WESTON)

The work will be implemented in accordance with the following plans, which are part of the WP.

- Site Safety and Health Plan (SSHP)

SECTION 2

MANAGEMENT

2. MANAGEMENT

This section describes WESTON's proposed project team, key contacts, the project schedule, project management, meetings, and status reports for the OB Grounds remediation project.

2.1 PROJECT ORGANIZATION

Figure 2-1 shows WESTON's proposed project team.

2.1.1 Key Contacts

The responsible party (RP) for the site is the Seneca Army Depot. The SEDA BEC contact at the site is Mr. Steven Absolom. Mr. Absolom may be reached at:

Commander
Seneca Army Depot Activity
Attn: Engineering and Environmental Office (Mr. Absolom)
Romulus, New York 14541

The Corps of Engineers, New York District (CENAN) is responsible for the implementation of this WP. The CENAN contacts are Mr. Randy Battaglia (Project Manager), Mr. Bill Ebersbach (Contracting Officers Representative), and Mr. Tom Battaglia (Project Engineer). The mailing addresses at the CENAN and phone numbers for these contacts are as follows:

Mr. Randy Battaglia (CENAN-PP-E)

U.S. Army Corps of Engineers
Seneca Resident Office
Bldg. 115, State Rt. 96
Romulus, NY 14541-5001
(607) 869-1523

Mr. Bill Ebersbach (COR)

U.S. Army Corps of Engineers
New York District
Ft. Drum Resident Office
Ft. Drum, NY 13602-5200
(315) 772-4103

Mr. Tom Battaglia (CENAN-PP-CM)

U.S. Army Corps of Engineers
Seneca Resident Office
Bldg 101, State Rt. 96
Romulus, New York 14541-5001
(607) 869-1353

2.1.2 WESTON Personnel

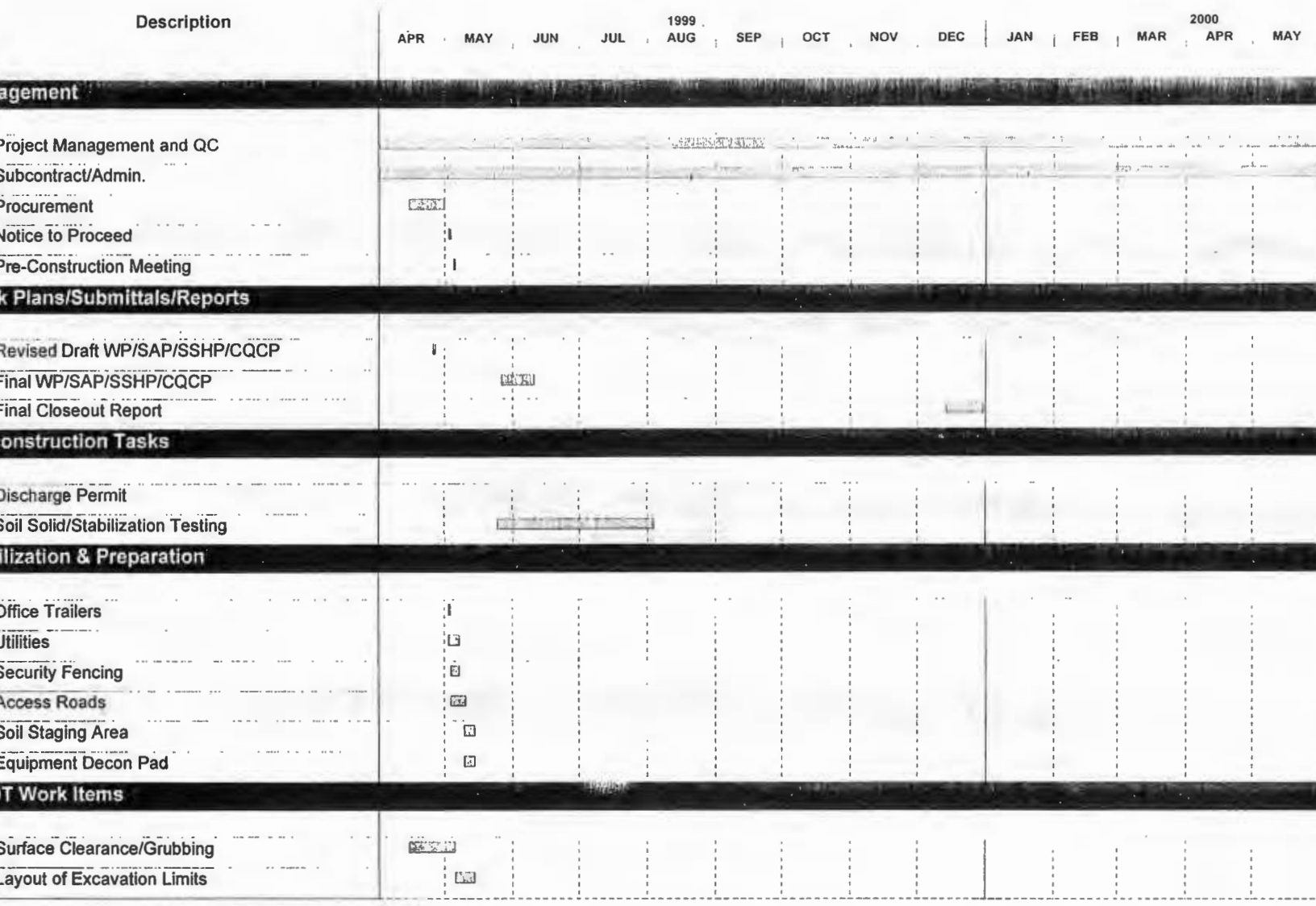
WESTON's management team will be led by the Program Manager (Mr. Roberto Rico), the Deputy Program Manager (Mr. Bruce Campbell), and Project Manager (Mr. Christopher Kane). They will be responsible for WESTON's overall performance on this TO. The WESTON project team organizational chart is presented in Figure 2-1. The WESTON project field team will consist of a Site Manager, a Project Engineer/Quality Control (QC) Officer, a Site Safety and Health Officer (SSHO), and one Sampling Technician. The management team will closely monitor site activity, performance, costs, schedule, QC, and safety to ensure that the project objectives set forth in the SOW dated March 1998 and described in Section 1 of this WP are achieved. The Site Manager, Project Engineer/QC Officer, SSHO, and Sampling Technician shall remain on-site throughout the duration of the project. Other WESTON personnel may be utilized as conditions warrant.

The WESTON Site Manager will keep the CENAN and the Base Environmental Coordinator updated on all efforts during mobilization and during the performance of site work activities. Proper notification to the Base Environmental Coordinator by WESTON will be made through the CENAN representative regarding site activities and any site-specific situation. Logistical coordination will be performed with the Base Environmental Coordinator directly, if necessary.

2.2 PROJECT SCHEDULE

The Project Schedule has been prepared using Primavera Systems, Inc. Critical Path Method (CPM) software and is organized by the tasks outlined in the WBS. The Project Schedule is presented in Figure 2-2. The left portion of the schedule contains the WBS number, task description, remaining duration and early start and finish dates. The right side of the schedule depicts the task period of performance presented in Gantt bar chart form. Task time-frames have been established using estimated durations for labor and where applicable, material procurements. WESTON's projected start date (5 May 1999) and critical tasks are currently based on EODT activities as outlined in the progression schedule submitted by HND

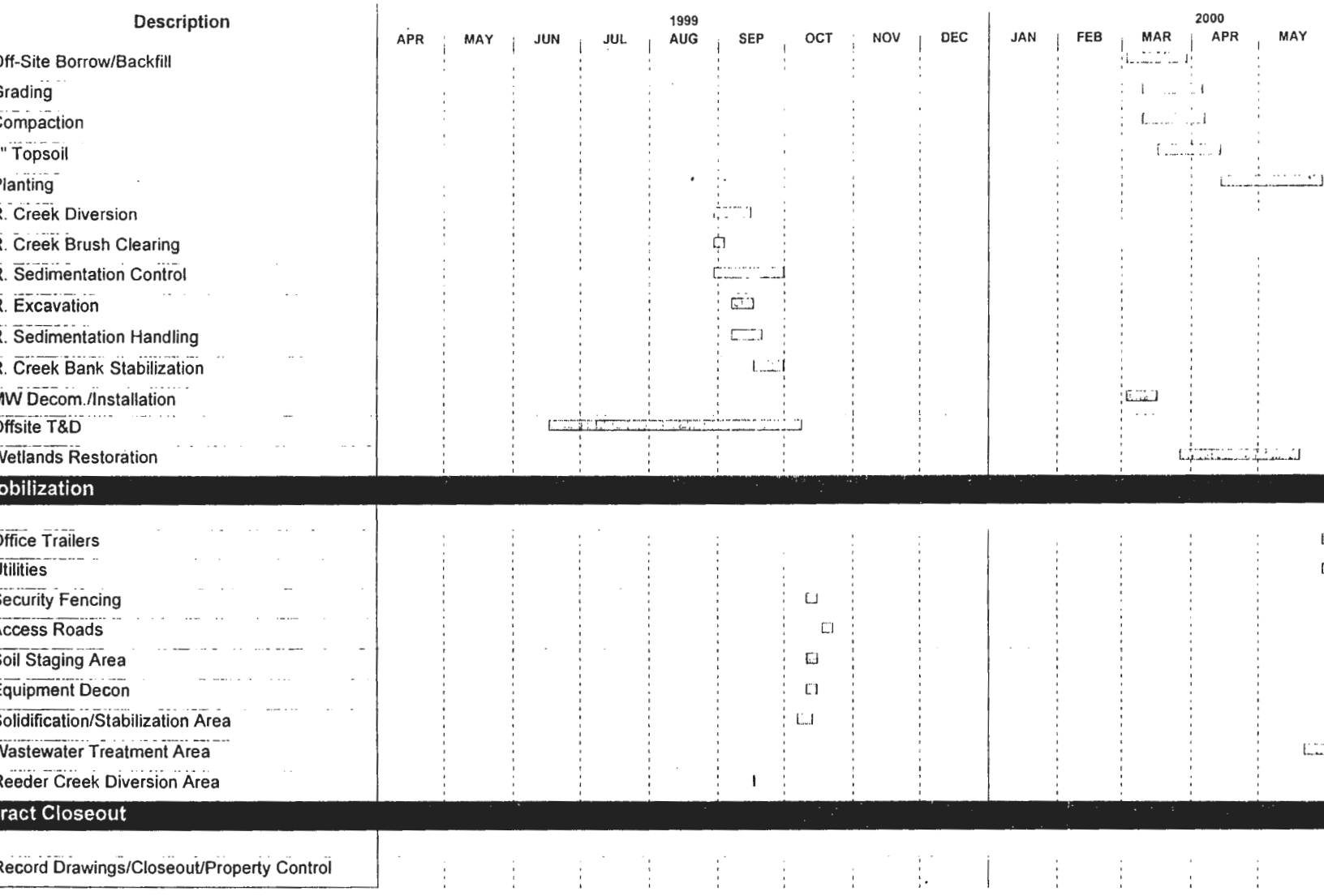
FIGURE 2-2
REMEDIAL ACTION PROJECT SCHEDULE
SENECA ARMY DEPOT ACTIVITY OB GROUNDS SOIL & SEDIMENT REMEDIATION
ROMULUS, NEW YORK



AUG98
JUL00
EN7
APR99
A
stems, Inc.

U.S. ARMY CORPS OF ENGINEERS, N.E. DIVISION
CONTRACT NO. DACW33-95-D-0004
TASK ORDER NO. 0013

FIGURE 2-2
REMEDIAL ACTION PROJECT SCHEDULE
SENECA ARMY DEPOT ACTIVITY OB GROUNDS SOIL & SEDIMENT REMEDIATION
ROMULUS, NEW YORK



AUG98
JUL00
EN7
APR99
A
stems, Inc.

U.S. ARMY CORPS OF ENGINEERS, N.E. DIVISION
CONTRACT NO. DACW33-95-D-0004
TASK ORDER NO. 0013

SECTION 3

PRE-CONSTRUCTION TASKS

3. PRE-CONSTRUCTION TASKS

The following pre-construction tasks have been identified:

- Permitting (wastewater, and landfill certifications).
- Soil solidification testing to establish the required mix for solidification of soils.
- Locate off-site borrow pit and sample soils.

3.1 DELIVERABLES

Project plans will be submitted prior to the start of construction activities. These plans include the Revised Draft Project Work Plan (WP), CQCP, SAP, QAPP, SSHP and SSHASP.

3.1.1 Project Work Plan

The WP was developed to describe the site background, project objectives, compliance with Federal, State, and local regulations, the basis for the technical approach, and a comprehensive work breakdown structure (WBS) to complete the project.

3.1.2 Sampling and Analysis Plan

The SAP outlines detailed procedures for contaminated materials sampling and chemical analysis. The SAP describes the project quality assurance/quality control (QA/QC) requirements associated with sampling, analytical, and data management for the disposal-contaminated soils generated during the remediation activities. The QA/QC requirements include key personnel, the specific responsibilities for sampling, sample handling, chain-of-custody, documentation, analytical procedures, and data review to be used throughout the project for chemical data management. The SAP/QAPP is a separate stand-alone document to be used to conjuncture with the WP.

3.1.3 Site Health and Safety Plan(SSHP)

The SSHP was written in accordance with 29 CFR 1910.120(b)(4) and the requirements outlined in the SOW. The SSHP describes the remediation areas and the remediation activities for the SEDA OB Grounds site. The SSHP includes appropriate information and guidelines for all

storm water pollution prevention plan which will incorporate applicable local and state sediment and erosion control requirements will be prepared by the OB Grounds sitework contractor (if required).

Landfill Certifications

Before shipping any materials from the site to off-site disposal facilities. WESTON will provide the following documentation:

1. Letters from NYSDEC and USEPA stating that the proposed landfill facilities are in compliance with all applicable regulations.
2. Letters from each of the proposed landfills that the facility can accept waste from the SEDA OB Grounds.

WESTON will submit a waste characterization report to NYSDEC. The report will summarize soil and sediment analytical results from the RI and results from the S/S treatability testing event.

3.3 SOIL SOLIDIFICATION/STABILIZATION TESTING

WESTON has evaluated several factors in determining the soil solidification/stabilization methods proposed for the OB Grounds Remediation. Production rates, percent swell, curing periods. temperature limitations. and bench scale testing results were all evaluated in determining the specific treatment method. Bench scale testing was to be performed as a pre-construction task in order to evaluate bids. however, the representative five gallon soil samples taken from Burn Pads B. C. G. and J from a 0-2.5 ft. depth within the OB Grounds representing "worst case" concentrations did not compare to expected pre-treatment total lead or TCLP metals concentrations. The total metals concentration, while high at 2,100 mg/kg, resulted in TCLP metals concentrations that currently meet "non-hazardous" disposal requirements prior to treatment (i.e.. TCLP lead was reported at 2.8 mg/l). Because of these results, both historical data and the treatability sample results were used in evaluating the preliminary mix design(s).

WESTON will perform a treatability study based on guidance in the document "Engineering and Design Treatability Studies for Solidification/Stabilization of Contaminated Material", dated 28 February 1995 by the U.S. Army Corps of Engineers. WESTON will send out samples of

SECTION 4

MOBILIZATION

4. MOBILIZATION

4.1 PERSONNEL AND EQUIPMENT

WESTON will mobilize personnel, equipment, materials, and subcontractors to the SEDA OB Grounds to implement the specific tasks scheduled to be performed. A WESTON project field team will be selected to efficiently execute each phase of the site operations. The crew will consist of a Site Manager, Site Safety and Health Officer (SSHO), a Project Engineer/QC Officer. Sampling Technician, and general construction personnel, as required. WESTON has designated certain qualified individuals to perform dual roles to maximize operation efficiency. Figure 2-1 depicts the Weston Project Team's Organization Chart. This chart includes office support and site management personnel.

Mobilization of staff and construction facilities will be initiated upon Notice to Proceed. WESTON will work with base personnel to determine security procedures to be followed for subcontractors, suppliers, and deliveries to ensure timely deliveries and minimal delays coming to the site. WESTON will provide documentation pertaining to completion of Form 268 if required. With the support of SEDA personnel, WESTON will notify the installation environmental coordinator and/or Dig-Safe to identify and locate utilities within the OB Grounds. WESTON will then mark utilities, survey bench-marks, and groundwater monitoring wells so they are protected from damage. WESTON will also investigate the need for, and if necessary, obtain, local permits (e.g., utility clearance and digging permits). After receipt of necessary permits, utility clearances, and clearance by the UXO Contractor, WESTON's temporary facilities will be established, including the delivery and set-up of a sample trailer, storage facilities, decontamination facilities (personnel and equipment), potable water, communications equipment, and sanitary facilities. WESTON will utilize existing SEDA facilities that are available for a site office. Construction equipment will be brought on-site in a phased manner, as required, to support the field work at the designated access gate along Route 96A.

WESTON will designate work areas or zones, as suggested in *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH/OSHA/USCG/EPA, November 1985. The areas surrounding the work area will be divided into the following three zones:

1. Exclusion zone (EZ)
2. Contamination reduction zone (CRZ)
3. Support zone (SZ)

The EZ will include the OB Grounds (managed by another contractor), the soils staging and treatment area, and the waste water treatment staging area. An EZ will also be established adjacent to the area specific to the Reeder Creek remediation/sediment removal areas. The CRZ will include the decontamination pad, personnel decontamination trailer and any equipment spray down zones. The SZ will include parking/staging areas, site sample trailer location, perimeter access roads and any other area outside the CRZ.

4.3 SITE SECURITY AND CONTROL

The objective of this Site Security and Control Plan is to establish procedures for maintaining site security during all work activities performed at the Open Burning Grounds at the Seneca Army Depot, Romulus, New York. WESTON will comply with existing access control procedures, site security protocols, and work permit requirements of SEDA.

SEDA Requirements

WESTON will provide a list of all employees, subcontractors, and suppliers to the POC/COR. Samples of signatures for all employees on the list will be provided. Confirmation of employment SDSSE-SC Form 268 will be executed for all WESTON employees and employees of subcontractors at least 72 hours before the start of work.

WESTON will obtain camera permits (if required). All vehicles entering the Site will be required to follow the posted Speed Limits (Ammo Area – 5 mph, Limited/Exclusion Area – 25 mph). WESTON will brief all employees and subcontractor employees of the procedures to be followed if explosives laden vehicles are encountered. If encountered, the driver must pull over and stop to allow the explosive laden vehicle to pass. Drivers shall remain a minimum of 100 feet behind explosive laden vehicles if following. Intersections will not be entered if explosives

SECTION 5

SITE PREPARATION

5. SITE PREPARATION

Site preparation activities include installation of erosion and sedimentation controls, clearing and grubbing at staging areas or at Reeder Creek (which will be cleared by SEDA staff), site survey, access road preparation, soil treatment and staging area installation, and installation of a wastewater treatment and collection area. EODT will be performing OE clearance of the OB Grounds prior to the start of any site activities within the OB Grounds.

5.1 EROSION CONTROL

WESTON will provide and install temporary erosion and sedimentation control measures where necessary. WESTON anticipates installing these controls along the proposed haul roads and along the perimeter of the soil staging and treatment areas. These controls will also be placed along the Reeder Creek bank where necessary. Controls will include installation of silt fence and hay bales and will be established before work begins. EODT will be responsible for erosion control within the OB Grounds; however, it is not anticipated that erosion and sedimentation control measures will be installed along the perimeter of the 30-acre OB Grounds.

5.2 LAND CLEARING

Following mobilization to the site and set up of temporary facilities, WESTON will initiate limited clearing activities. All clearing and grubbing within the OB Grounds will be performed by EODT. WESTON anticipates that the stockpile and staging areas will be cleared by SEDA staff. The Reeder Creek area may be cleared by SEDA staff, however, this work may not occur until Summer 1999 and may be performed by WESTON. Trees greater than 2 inches will be removed using chainsaws and heavy clearing equipment. Grubbing will also be performed along the creek bank at selected locations due to the need to grade the area for access by heavy equipment. No clearing for haul roads is anticipated because existing roads will be used.

existing slopes are too steep. The excavator will work along the west bank wherever possible and proceed north to minimize excessive platform (fill) construction areas.

5.3 SITE SURVEY

Site surveying will be performed continuously during the project to control line and grade. Surveying will include: tying in of existing control points; establishing new control points for limits of "hot spot" excavations, limits of soil cover, limits of Reeder Creek excavation; and performing cross-sections of Reeder Creek before and after excavation activities. EODT will be performing the initial phases of the survey work to layout excavation limits. A 100 foot grid system has already been established and will be utilized by WESTON for controlling sampling and/or excavation activities.

5.3.1 Existing Control Tie-in/Establish Additional Control

EODT will perform initial tie-in of existing control points to allow for layout of excavation limits. The surveyors will use control points SEAD-4, SEAD-5, and SEAD-6 to begin work. Coordinates and elevations are provided on Figure 23 from the Draft Technical Specifications (Parsons 1998). These points will be used by EODT and WESTON to create additional control to be used to complete other phases of the project, including Reeder Creek cross-sections, soil cover limits layout, pad excavation layout, and wetlands layout. The exact number and location of additional control points will be determined by WESTON, EODT, and the surveyors in the field.

5.3.2 Stakeout of Soil Cover, 100 x 100 Foot Grid, Excavation Limits, and Individual Wetlands Limits

The surveyors will stake out or reset the initial limits of the soil cover (if required). Coordinates provided on Figure 26 from the Final Technical Specifications (Parsons 1998) will be used to stake out the soil cover. WESTON will then use these limits to perform soil sampling along the perimeter of the soil cover. The limits will be expanded at locations where lead concentrations exceed 60 mg/kg. The actual limits of the soil cover will be provided on as-built drawings.

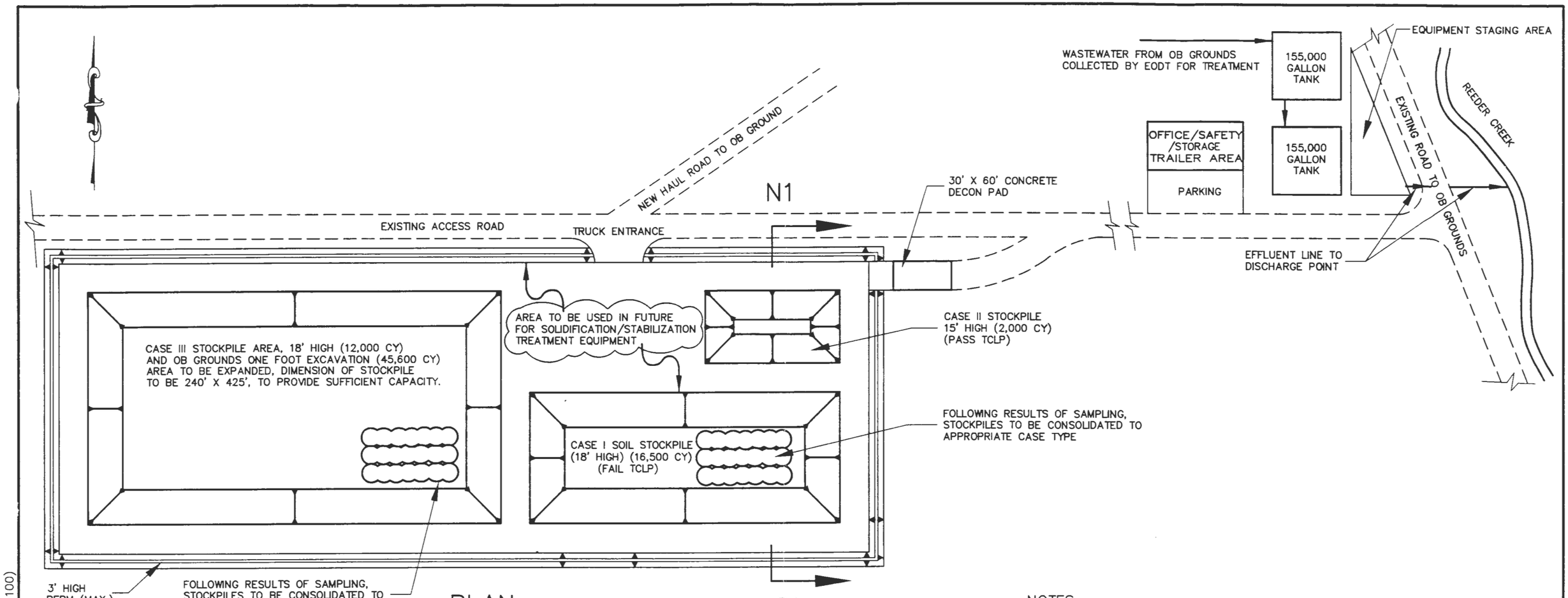
staging area. WESTON plans to utilize several rolls of government owned 20-mil polyethylene already at the SEDA and will procure additional supplies as necessary. At the edges of the stockpile area, the liner will be placed over a 3' berm and keyed into the ground surface. The liner will be overlapped to minimize penetration by water. A geotextile cushion fabric will be placed over the liner to protect it from heavy equipment traffic. Before soil is placed on the liner, sandbags will be used to anchor the liner in place to prevent it from being displaced by wind. Soils will be placed on the poly, shaped to shed water, covered with tarps, and weighted with sand bags. WESTON anticipates creating three separate stockpiling areas within the larger liner area. The Case 1 area is designed for 16,500 cy and the Case 2 area for 2,000 cy. A third area for Case 3 soils and soils generated from the one foot cut across the entire OB Grounds is designed to hold approximately 58,000 cy of soil. A separate staging area may be constructed for sediment handling. Figure 5-1 shows the proposed design and maximum limits of the soil stockpiling staging area. Because the exact volume of Case 1, Case 2 and Case 3 soils will vary from anticipated quantities, the exact configuration of stockpiles is likely to be different than what is shown in Figure 5-1. WESTON will construct the staging area based on required capacity only.

5.6 DECONTAMINATION PAD

WESTON will construct a 20 by 50 foot decontamination pad at the exit to the stockpile area. The subgrade will be graded and compacted. The pad will be constructed out of concrete and will be sloped to one corner to allow for collection of wastewater in a sump. This will allow for easy maintenance and cleaning of the pad so that trucks exiting the site are not delayed. Water will be pumped out of the decon pad to a holding tank or directly to the wastewater treatment system. The proposed decon pad was chosen over the crushed stone collection pad since fines could eventually block voids within the crushed stone for proper water drainage which may lead to ponded sections of water.

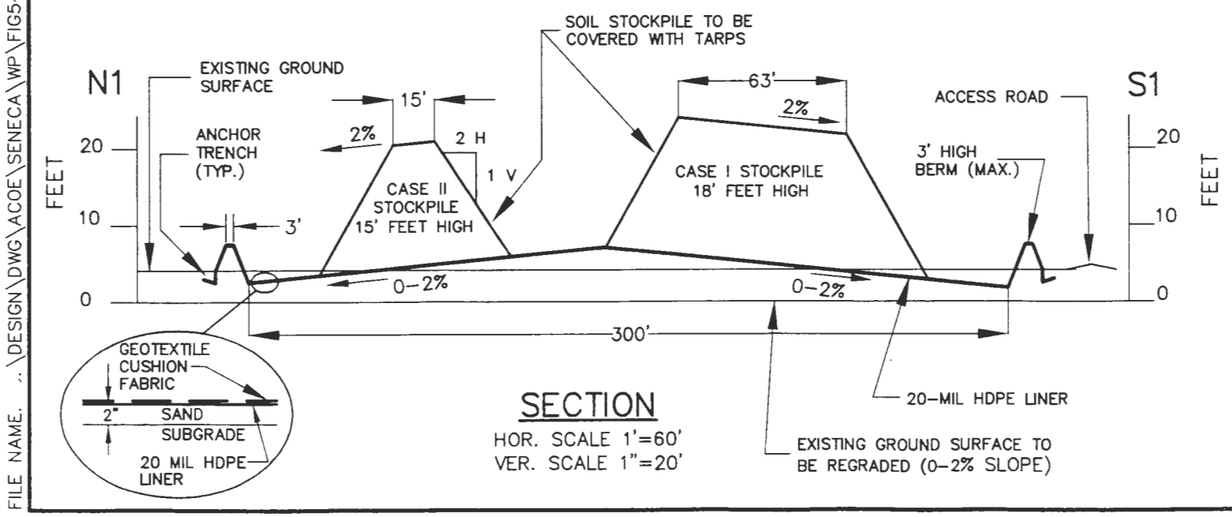
5.7 WASTEWATER TREATMENT COLLECTION AREA

WESTON will grade the area for ModuTank placement and wastewater treatment equipment (approximately 1 acre) to subgrade elevations. Each ModuTank has a capacity of 155,000



PLAN

1"=100'



SECTION

HOR. SCALE 1'=60'
VER. SCALE 1"=20'

NOTES:

1. ACTUAL CONFIGURATION WILL VARY BASED ON EXCAVATION RATES, SAMPLING RESULTS, AND QUANTITIES ENCOUNTERED.
2. PROPOSED SIZE OF STOCKPILE STAGING AREAS IS CURRENTLY BASED ON TOTAL PROJECTED CASE 1, 2, AND 3 VOLUMES. WESTON WILL MINIMIZE THE REQUIRED 870' X 330' STAGING AREA BASED ON THE ACTUAL BACKFILL VOLUME AND LOAD OUT SCHEDULE.
3. PERIMETER BERM WILL MINIMIZE ANY RUNOFF FROM SOIL STAGING AREA. ADDITIONAL EROSION CONTROL MEASURES WILL BE INSTALLED IF NECESSARY.

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

SOIL STAGING AND WASTEWATER TREATMENT AREAS

WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

DRAWN CDT
DATE APRIL 1999
FIGURE NO. 5-1

FILE NAME. ..\DESIGN\DWG\ACOE\SENECA\WP\FIG5-1 (PLOT 1=100)

SECTION 6

SITE WORK

6. SITE WORK

EODT will perform UXO clearance, excavation, soil screening, and dewatering at the OB Grounds. WESTON will coordinate dewatering activities with the UXO contractor due to the 1,181' distance restriction during materials handling activities. WESTON will manage and sample all soils transported to the stockpile area by EODT and will treat water pumped to the wastewater treatment system by EODT.

6.1 EXCAVATION AND SOIL SCREENING

Following UXO clearance, EODT will begin excavation and screening contaminated soils at "hot spot" areas, i.e., Areas A-J. Based on current plans, EODT will first excavate the Case 1 soils followed by Case 2 and 3. The volume of material to be excavated from Case 1 and Case 2 areas is estimated to be 18,500 cy (Final Technical Specification). All soils will be screened to 1-inch minus by EODT. Based on information provided in the draft specifications, the EODT draft work plan, and discussions with CENAE/CENAN, an excavation production rate of 400 cubic yards (cy) per day is assumed (per unit) with a sifting rate of 1000 cy per day. This will vary depending on field conditions. Per discussions with CENAE/CENAN, WESTON will provide tanks to EODT for dewatering the excavations prior to backfill and as needed during excavation due to the 1,181 foot restriction distance is required. As soon as possible following excavation, WESTON will collect confirmation samples from the excavations (see Section 6.2 for Confirmatory Sampling Plan) during EODT non-work hours (EODT will be working four 10-hour days per week). Additional excavation will be performed if necessary depending on the results of confirmation sampling and analysis. EODT will accompany WESTON during sampling. WESTON will sample Case 1 soils (estimated volume of 16,500 cy) prior to treatment to minimize unnecessary treatment. This may eliminate additional treatment costs for stabilization of soils.

Additional soils to be excavated include an estimated 12,000 cy of soil to be screened for UXO clearance only (Case 3) and approximately 48,000 cy soils to be generated from a one foot cut across the entire 30-acre OB Grounds.

6.2 CONFIRMATORY EXCAVATION AND PERIMETER SAMPLING

WESTON will select locations for confirmation sampling at individual excavations. Samples will be collected at the following frequencies:

> Sidewalls: 1 sample per 200 feet of sidewall, with a minimum of 1 sample per sidewall (4 samples minimum, if 4 or more sidewalls) per excavation. Some berm excavations will have less than 4 side walls and in some cases, there will be no sidewalls for berms. This is due to the fact that some berm excavations will match surrounding grades and no sidewalls will be present.
>
> Floors: 1 sample per 2,500 square feet (sf), with a minimum of 1 sample per excavation.

Samples will be analyzed for total lead to determine if the clean-up level of 500 mg/kg lead has been exceeded. At areas where results show concentrations above 500 mg/kg lead, additional excavation will be performed and the area will be re-sampled. Figure 6-1 shows proposed locations for confirmatory and perimeter samples and numbers of sidewall and floor samples to be collected from each of the pad and berm excavations. Figure 6-2 shows confirmatory sample locations for burn pad and berm excavations at Area J.

The soil along the perimeter of the area that will receive the 12-inch soil cover will be sampled to assure the 60 mg/kg of lead objective is met. One grab sample will be collected every 200 feet along the perimeter of the area. These samples will be sent off-site to a certified laboratory and will be analyzed for total lead. Based on the results of the analysis the area to be covered may be extended to cover areas that have soil with over 60 mg/kg of lead. These areas will be resampled to assure that the 60 mg/kg criteria is met.

In addition to perimeter sampling, WESTON will sample the entire 30-acre OB Grounds (except excavations which have already been sampled) following the one foot cut across the entire site. These samples will be collected at frequency of 1 per 10,000 sf (100' x 100' grid). These samples will be analyzed for total lead and compared to the 60 mg/kg total lead limit for the proposed soil cover. WESTON anticipates that the CENAN will determine whether a full soil cover over the entire site is necessary based on the results of this sampling event (the samples will be reviewed with the ROD requirement for total lead at 60 mg/kg).

6.3 BACKFILL AND COMPACTION

Excavations at the OB Grounds will be backfilled by EODT following confirmation that concentrations of lead at excavation walls and floors are less than 500 mg/kg lead. Backfill material will consist of suitable on-site soils previously excavated with lead concentrations less than 500 mg/kg and off-site material provided by WESTON. Backfill from on-site sources that is less than 500 mg/kg lead may be placed into excavations with a one foot clearance for the final grade. Soil with less than 60 mg/kg total lead will be required for the top foot of backfill. All off-site borrow sources will be sampled and analyzed before being approved for use at the site. Off-site borrow will be analyzed for TAL metals, explosives, TCL volatile organic chemicals (VOCs) and semivolatile organic chemicals (SVOCs), and polychlorinated biphenyls (PCBs)/pesticides at a frequency of one sample per 5,000 cy of material. The backfill will be visually inspected to verify its consistency with the original sample. Headspace samples will be collected (3 per day) prior to acceptance as the material is brought to the site. The final quantity of backfill imported from off-site sources by WESTON will depend on the amount of on-site material that is suitable for backfill and the actual quantities of soil excavated.

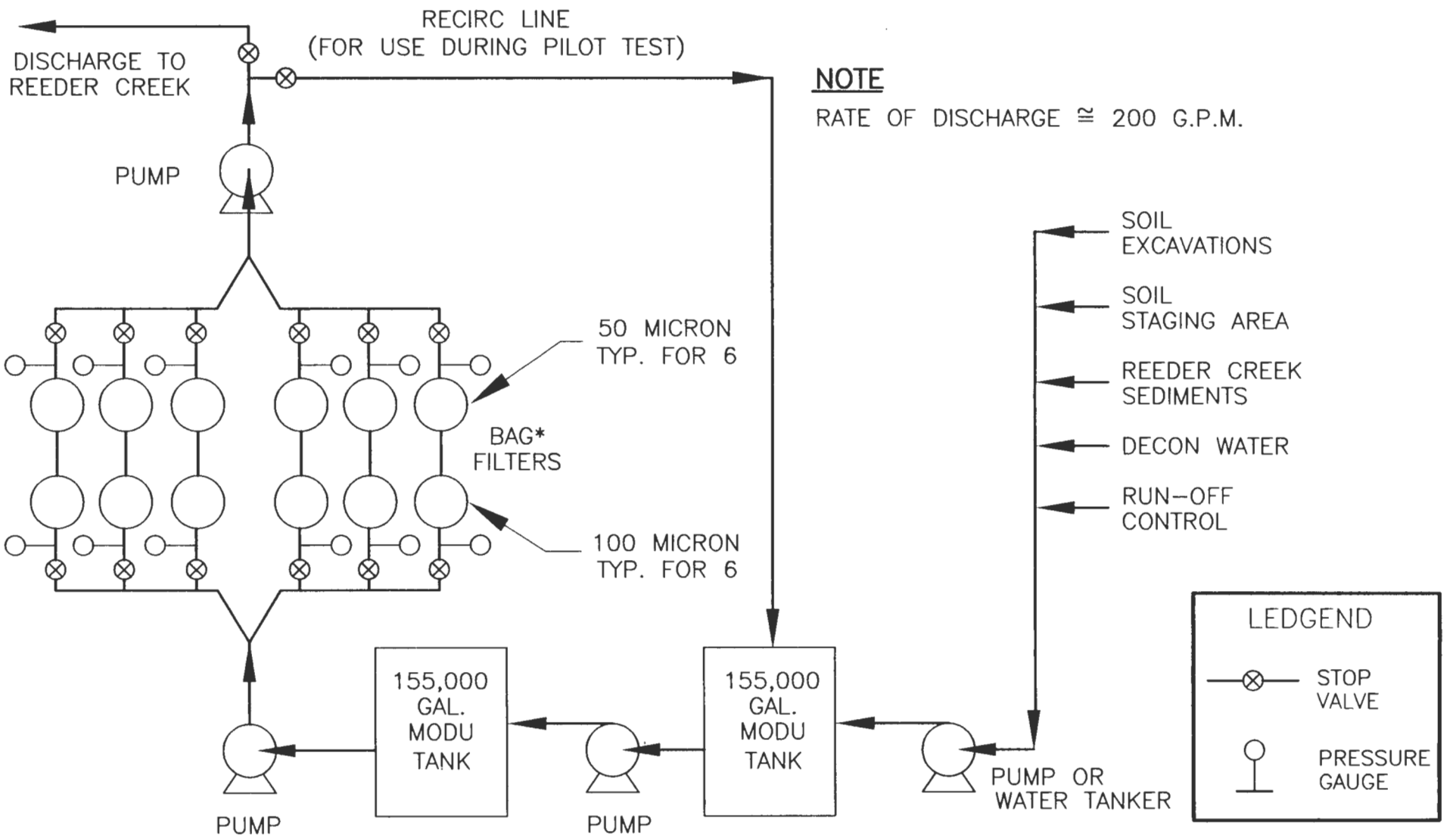
Off-site borrow will be imported as fill from an off-site source, staged, and backfilled as needed. The material will meet the American Society for Testing and Materials (ASTM) classifications GW, GM, GC, SW, SM, and SC as determined by ASTM D2487. WESTON recommends that clean fill be tested for gradation at least once per borrow source and any time a visual change in the material characteristics is observed. Soils will be used according to a WESTON qualifications letter to the CENAN comparing suppliers of borrow material per specification. Backfill material will be placed in loose lifts and compacted with four passes of a vibratory roller to maintain a 1' clearance. WESTON is responsible for providing the fill while EODT will be responsible for backfilling and compaction.

gallons and consists of a 68' by 68' steel frame (when erected) with a reinforced polythylene liner placed over a geotextile layer. The steel form is 4'- 9" high and supports the liner and water in the tank. Grading will include a slight slope which will facilitate cleanout of the ModuTank at project completion. A 3-inch layer of sand will be placed over the ground surface prior to liner installation. WESTON proposes sampling the subgrade material prior to startup of the system to collect baseline information. At the end of the project, post-construction samples will be collected to verify that leakage and/or releases have not contaminated the underlying area.

The area adjacent to the ModuTanks will be used for staging of the water treatment equipment. Grading for this area will include leveling and grading to drain. Water treatment equipment will be delivered to this area and set up. The treatment system will be capable of treating an average of up to 200 gallons per minute to remove solids from the wastewater to meet the New York State Department of Environmental Conservation (NYSDEC) Substantial Equivalent State Pollutant Discharge Elimination System (SPDES) Discharge criteria in accordance with project specifications. A flow diagram for the proposed treatment system is shown in Figure 5-2. WESTON proposes using a system with 6 parallel filter assemblies, each consisting of a 2 stage filtering process, to achieve required results. The system will have a total unfouled capacity of 300 gallons per minute.

Installation of the ModuTanks will provide storage capacity for wastewaters generated throughout the project. The ModuTanks will provide a two stage setting process to remove precipitated and suspended solids in the water before treatment. This will reduce the loading on the filters and therefore the frequency of filter changeout. In addition, the storage capacity provides a buffer for initial pilot testing (an 8 week capacity may be required), during which time discharges are not permitted. This system was based on Parsons Final Technical Specification (August 1998) which indicated that filtering of groundwater samples produced results below the New York State Class D surface water standards.

FILE NAME: G:\DESIGN\DWG\ACOE\SENECA\WP\FIG5-2.DWG (PLOT 1=1)



*ACTUAL CONFIGURATION INCLUDING NUMBERS OF FILTERS AND FILTER SIZES TO BE DETERMINED BASED ON INITIAL OPERATION AND SAMPLING OF SYSTEM.

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

CONCEPTUAL WASTEWATER TREATMENT FLOW DIAGRAM

WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

DRAWN CDT
DATE APRIL 1999
FIGURE NO. 5-2

NOTE

PERIMETER CONFIRMATION SAMPLES TAKEN AT A FREQUENCY OF 1 PER 200 L.F.

LEGEND

A = AREA OF EXCAVATION (SQ.FT.)

B = NUMBER OF CONFIRMATION BOTTOM SAMPLES (1 SAMPLE PER 500 SQ. FT.)

S = NUMBER OF CONFIRMATION SIDEWALL SAMPLES (1 SAMPLE PER 200 L.F. OR AT A MINIMUM OF 1 PER SIDEWALL)

CASE 1 LEAD > 800ppm

CASE 2 LEAD > 500ppm < 800ppm

CASE 3 LEAD < 500ppm

PROPOSED PERIMETER CONFIRMATION SAMPLING POINTS (TYP.)

F-1 BERM N	
A	900
B	1
S	1

F-2 PAD	
A	1700
B	1
S	2

GB-19/34 1	
A	2600
B	2
S	4

F-1 PAD	
A	10100
B	5
S	6

D-1 BERM	
A	4600
B	2
S	4

GB-13 1	
A	2800
B	2
S	4

SW-220 1	
A	3800
B	2
S	5

B-1 BERM	
A	3000
B	2
S	0

D-1 PAD	
A	2200
B	1
S	4

B-1 PAD	
A	3900
B	2
S	4

GB-24 1	
A	2400
B	1
S	4

GB-1 CASE 2	
A	1700
B	1
S	4

H-1 PAD	
A	2500
B	1
S	3

F-1 BERM S	
A	7600
B	4
S	2

A-1 BERM	
A	2250
B	1
S	0

A-1 PAD	
A	2700
B	2
S	4

A-2 BERM	
A	2750
B	2
S	0

H-1 BERM	
A	9000
B	4
S	2

GB-15 1	
A	4700
B	2
S	4

J-2 BERM	
A	600
B	1
S	2

G-1 PAD E	
A	9300
B	4
S	4

E-1 BERM	
A	3000
B	2
S	1

C-1 PAD	
A	1350
B	1
S	4

LLH-2	
A	3300
B	2
S	1

J-1 PAD	
A	31200
B	13
S	7

G-2 PAD	
A	8700
B	4
S	3

C-1 BERM	
A	3600
B	2
S	0

GB-2/23/12 1	
A	29500
B	12
S	12

LLH-1	
A	2200
B	1
S	2

G-1 PAD W	
A	7400
B	3
S	0

G-1 BERM W	
A	8400
B	4
S	4

G-2 BERM	
A	3700
B	2
S	0

G-1 BERM E	
A	4100
B	2
S	2

APPROXIMATE LIMIT OF SOIL COVER

GRAPHIC SCALE

0 100 200 300 400

APPROXIMATE SCALE IN FEET

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

PERIMETER AND POST EXCAVATION CONFIRMATORY SAMPLING PLAN

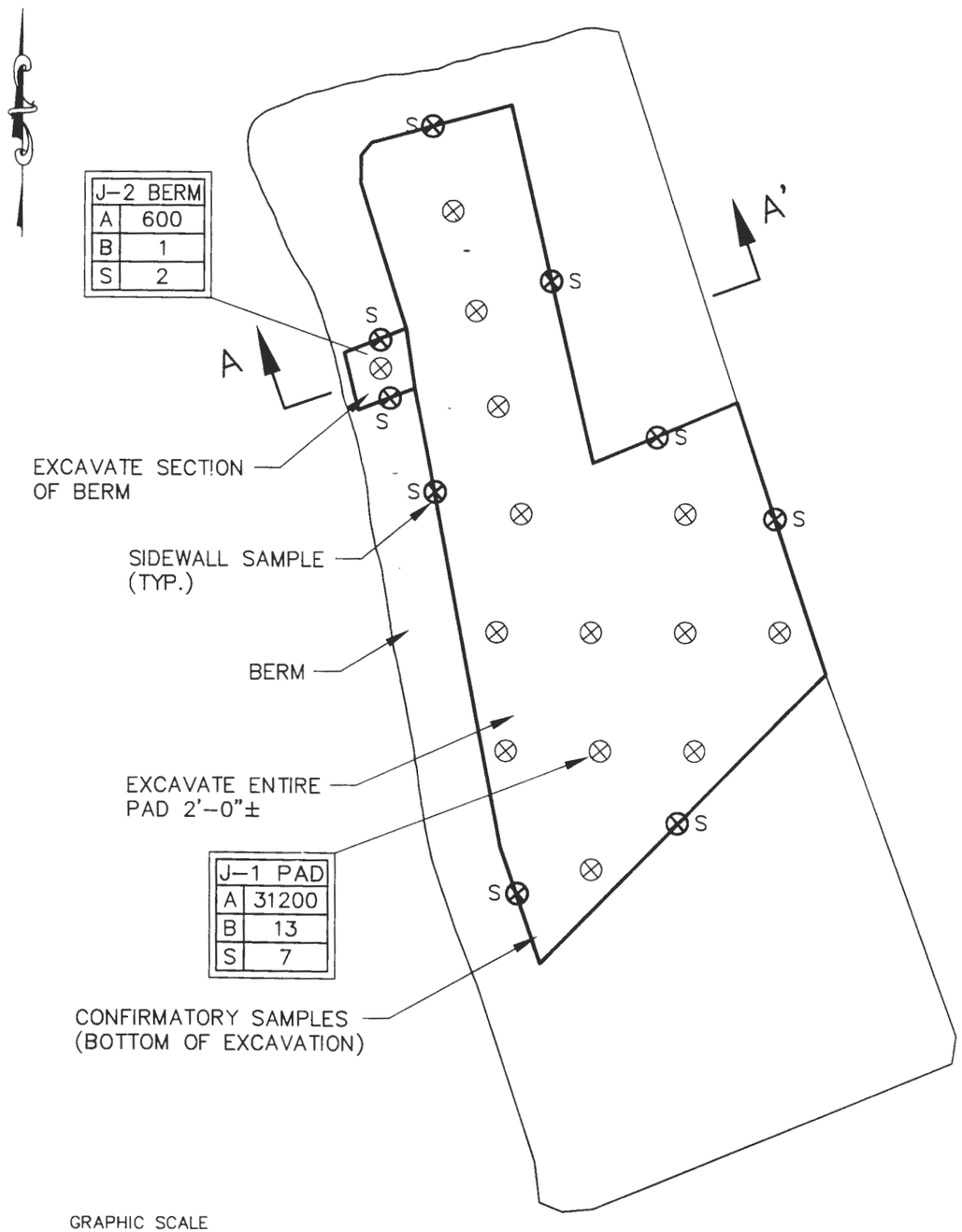
WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

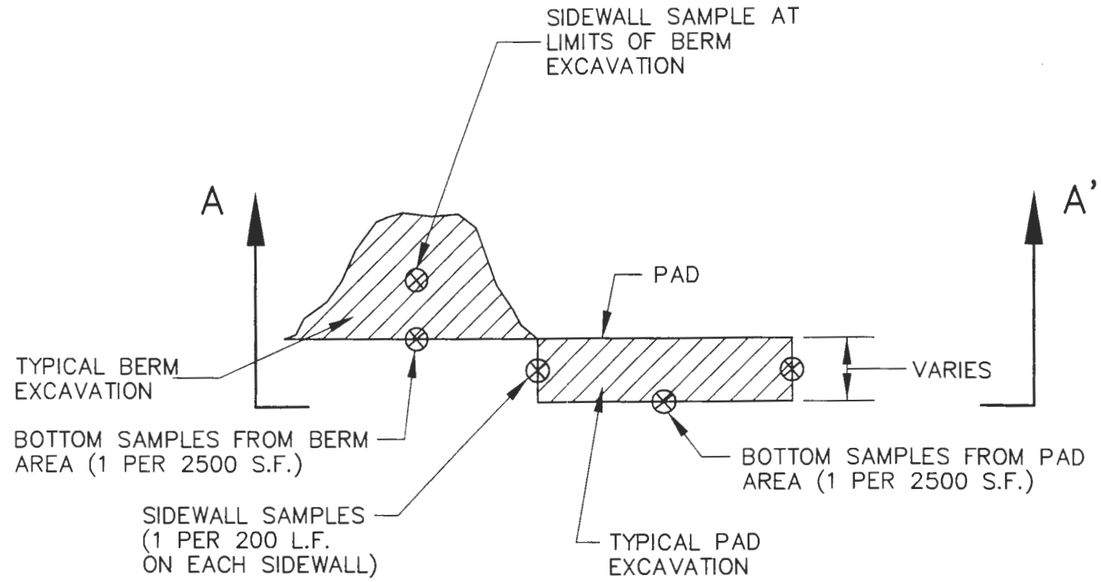
DRAWN CDT

DATE APRIL 1999

FIGURE NO. 6-1

FILE NAME: G:\DESIGN\DWG\ACOE\SENECA\SAP\FIG6-1 (PLOT 1=200)





NOTE
SIDEWALL SAMPLES TAKEN AT CENTER OF SIDEWALL.

TYPICAL CONFIRMATION SAMPLING CROSS SECTION (A–A')

NOT TO SCALE

GRAPHIC SCALE
0 30 60 90 120
APPROXIMATE SCALE IN FEET

FILE NAME: G:\DESIGN\DWG\ACOE\SENECA\SAP\FIG6-2 (PLOT 1=60)

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

AREA J
CONFIRMATORY SAMPLING PLAN

WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

DRAWN CDT
DATE APRIL 1999
FIGURE NO. 6–2

SECTION 7

WASTEWATER TREATMENT

7. WASTEWATER TREATMENT

EODT will pump water from the OB Grounds to WESTON's treatment system, due to the 1,181 foot withdrawal distance during ordnance screening. WESTON will treat wastewater generated from a number of site activities. These activities include excavation dewatering, soil and sediment dewatering, creek dewatering and decontamination. The components of the systems include water storage, water treatment, and water discharge.

7.1 EXCAVATION DEWATERING

Excavations will be dewatered during active excavation as necessary and immediately prior to backfilling by EODT. In no case shall water be pumped continually following completion of excavation since a minimum of 5 days may elapse between the sampling event and backfilling. Water will be pumped to the wastewater storage and treatment area (see Section 7.3). WESTON will provide fractational(frac) tanks necessary to complete dewatering; however, EODT will provide all other equipment to pump and transport water to WESTON's water storage tanks and the labor to operate the dewatering equipment. Berms excavated to surrounding ground surfaces will not extend into the groundwater table.

7.2 PILOT TESTING

The Final Technical Specifications (August 1998) indicate that groundwater samples were filtered using a 0.45 micron field filter. The proposed treatment system has been designed around the fact that field filtering of groundwater samples produced results which were below the NYSDEC Class D surface water standards. However, WESTON is required to meet NYSDEC Class C surface water standards in the SPDES discharge permit. Due to several factors, WESTON will perform pilot testing using much larger size filters. Class C standards are more stringent than Class D surface water standards (discharge requirements). None of the groundwater samples exceeded the 200 µg/l Class D standard for lead; however, exceedance of lead could occur due to contact between contaminated soils and the turbid nature of water accumulating in the excavations. This water is expected to be substantially more turbid than groundwater. Based on this, WESTON proposes pilot testing with several different size filters in

the range of 10 to 100 microns to optimize the system (see Section 5.7 for a description of the treatment system). If a filter size below 10 microns is needed, costs to operate and maintain the system may be substantially higher.

The treatment system will be delivered to the site and set up at an area inside the OB Grounds that is adjacent to Reeder Creek (if possible). EODT may use fractational tanks provided by WESTON to store site water following initial excavation activities by EODT. EODT will be responsible for transporting wastewater from the OB Grounds to the WESTON treatment area. EODT will discharge water to the first 155,000 gallon ModuTank. Water will be pumped from the tank, through the filter system and into the second ModuTank. The water will be sampled prior to and following treatment and analyzed for the Class C surface water parameters after the system reaches a steady state at typical operating flow rates (approximately 150 to 200 gallons per minute). This procedure will be repeated for several different filter size combinations. If results are unsatisfactory, smaller size filters or other methods of treatment including chemical or physical treatment methods will be considered. Once the system is fully operational, a dual stage settling to allow solids to settle out of suspension, will be utilized. The pilot test will be implemented and reported in accordance with NYSDEC SPDES effluent requirements to discharge site waters to Reeder Creek.

7.3 WASTEWATER COLLECTION AND DISCHARGE

Two 155,000 gallon ModuTanks will provide storage capacity for wastewater treatment. Contingent upon approval from NYSDEC to operate the system on a full-scale basis under a SPDES permit, WESTON will begin full-time operation of the wastewater treatment system following the pilot test. The system will be operated throughout the OB Grounds and Reeder Creek remediation activities. Water which accumulates in excavations, weeps from stockpiled sediments, collects in the decontamination pad and soil staging area, and accumulates into the creek bed will be pumped to the treatment system for treatment. WESTON anticipates that excavations will be pumped only once just before backfilling. Additional pumping may be required during excavation depending on EODT's actual excavation production rate. In addition, water in the individual wetlands at the OB Grounds may require pumping and treatment if present at the time of rough grading for soil cover construction.

The two 155,000 gallon storage tanks will provide a dual stage settling system. These tanks will be used to allow settling of suspended and precipitated solids (mainly iron) prior to treatment to reduce the loading on the filter system. The first tank will allow coarser particles to settle out. The second tank will provide additional residence time for the smaller particles to settle. Water will be pumped from the first tank to the second tank, and from the second tank to the treatment system in a manner which will minimize disturbance to the water and re-suspension of solids. This can be accomplished by using a weir outlet to the pump intake hose. The solids which settle out will collect on the bottom of the tanks. At the completion of dewatering activities the solids will be removed from the tank using a vactor truck, followed by surface cleaning of the poly. Collected solids will be treated using the on-site stabilization process and disposed of off-site with soils. Water collected following completion of stabilization activities may be collected in frac tanks in lieu of accumulating additional solids on the ModuTank liners. Treated water will be discharged either directly to Reeder Creek or to a nearby drainage ditch which leads to Reeder Creek. Continuous sampling and reporting will be performed as required by the SPDES permit. The discharge point will be lined with rip rap to minimize erosion.

The filter bags to be used in the treatment system will require changeout. The frequency of the changeout is assumed at 1 lb. of solids for 2,000 gallons of water but will depend on the actual quality of the water entering the treatment system, the flow rate of water treated, the size of the filters and the NYSDEC SPDES discharge criteria. Clogged filter bags will be backwashed and reused if possible and shipped off-site as debris when no longer useable. The pilot test will be used to determine the frequency of filter bag changeouts.

SECTION 8

SEDIMENT REMEDIATION

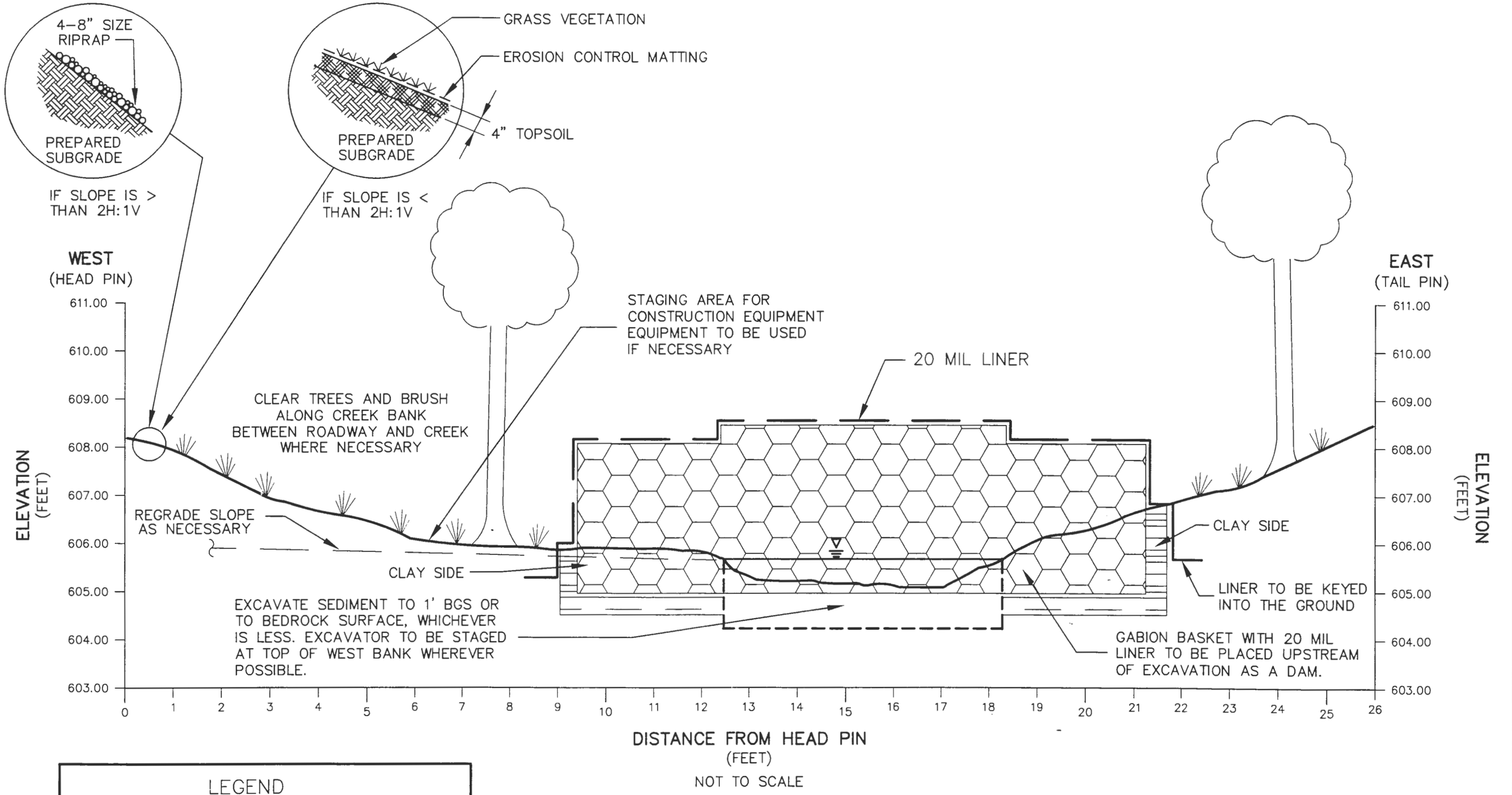
8. SEDIMENT REMEDIATION

WESTON's scope of work for the Reeder Creek Remediation includes clearing (if not performed by SEDA), diverting the creek, excavating the creek, dewatering sediments, sampling stockpiled sediments, treatment of sediments, disposing of sediments, and stabilizing the creek banks. Sampling of sediments will be performed to determine if the sediments require treatment before off-site disposal. No confirmation sampling of the creek excavations is required. Figure 8-1 provides a detail of the work to be performed in Reeder Creek.

Following the initial survey of Reeder Creek and layout of the excavation limits, SEDA staff will clear vegetation between the access road and the creek along the west bank of the creek. WESTON will install silt fence and hay bales along the creek bank as necessary to prevent siltation of the creek. The creek excavation will be performed from the west bank using an excavator with an extended "long reach" boom. Clearing along the creek will be performed to allow access by heavy equipment to excavate the sediments. Trees greater than 2 inches in diameter will be removed and cut flush with the ground surface. Stumps will be grubbed where necessary. Depending on the severity of the creek bank slopes, access to the creek bed may need to be improved by leveling and grading areas so that the excavator has a stable platform. A long reach excavator will be used to minimize the need to construct equipment platforms and will allow for direct loading of trucks.

8.1 INSTALL STREAM DIVERSION SYSTEM

WESTON anticipates that creek excavation will require approximately 3-4 weeks to complete. WESTON anticipates damming the creek upstream of each section of the creek to be excavated. A series of gabion baskets will be placed at the upstream side of the excavation. A 20-mil liner will be placed over the baskets and keyed into the creek bed. Clay will be used to seal the sides of the dam. WESTON anticipates that this system will be set up and moved several times to allow for remediation of the creek in sections.



FILE NAME: c:\DESIGN\DWG\ACOE\SENECA\WP\FIG8-1 (PLOT 1=2)

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

REEDER CREEK SEDIMENT EXCAVATION DETAIL

WESTON MANAGERS DESIGNERS/CONSULTANTS MANCHESTER NEW HAMPSHIRE

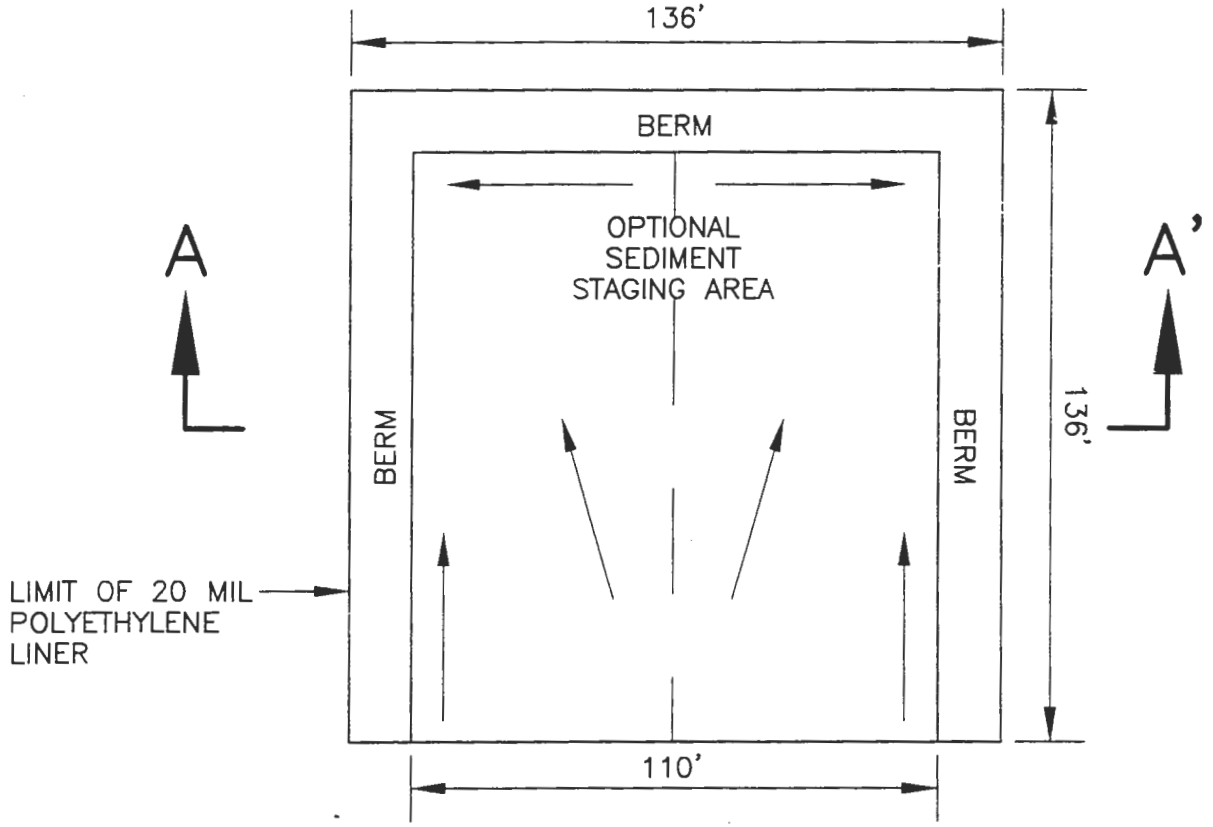
DRAWN CDT
DATE APRIL 1999
FIGURE NO. 8–1

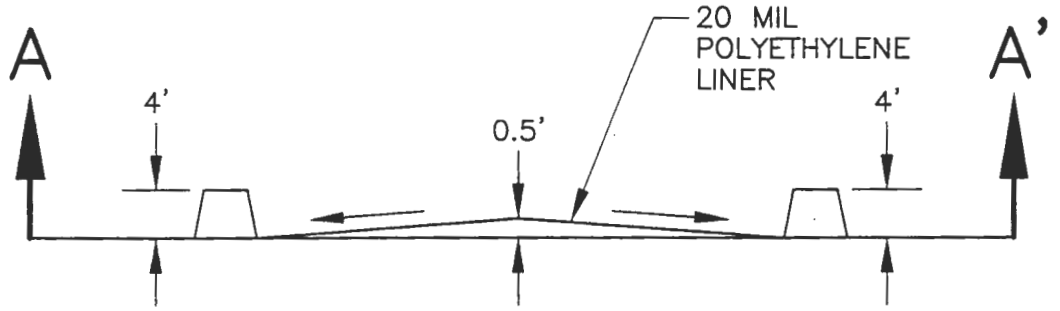
8.2 SEDIMENT AND CREEK DEWATERING

Following diversion of the creek, water within the dammed section of the creek will flow out of the area to be excavated by gravity. As the water level downstream of the dam decreases, water upstream of the dam will be pumped around the excavation to a discharge point downstream of the excavation. The discharge area will be lined with rip-rap stone to minimize scouring at the discharge point. Stream flow will be maintained through continuous pumping during excavation. The distance required to pump water will be kept manageable by installing stream diversions at various points along the sections of Reeder Creek as the remediation progresses. Remaining standing water and water which accumulates during excavation will be considered contaminated and will be pumped to the wastewater treatment area since some sediments may become suspended during pumping. Excavation will proceed immediately downstream of the dammed section once standing water has been removed. Based on the information provided in the Final Technical Specifications, the typical flow rate for the creek is 0.1 cfs, or approximately 45 gpm; therefore, water will be pumped using a standard submersible pump and 3-4 inch flexible hose.

8.3 SEDIMENT EXCAVATION, COLLECTION, AND STOCKPILING

Sediments will be excavated to a depth of one foot or to the depth of bedrock, whichever is less. As a precautionary measure, WESTON may require the support of EODT for OE avoidance during the creek remediation. Excavation will be accomplished using a tracked excavator with sufficient arm length to reach across to the other side of the creek. Sediments will be excavated and directly loaded to trucks whenever possible, or consolidated into stockpiles within the creek bed if necessary, depending on the consistency of the sediments. This will allow for partial dewatering of sediments before transport to the sediment staging area. Sediments will then be loaded onto transport trucks and stockpiled within a 110 by 110 foot bermed, sloped, lined staging area within the larger stockpiling area (see Figure 8-2). Additional dewatering will occur while the sediments are staged in this area. Accumulated water will be pumped out of this area and transported to the water treatment area periodically (as required). Confirmation sampling of the creek is not required. Sediments will be stockpiled in 200 cy increments and sampled for TCLP metals to determine if S/S is required before off-site disposal. All sediments will be shipped off-site for disposal, treated and untreated.





NOTES:

1. ARROWS INDICATE DIRECTION WATER WILL FLOW
2. SEDIMENT STAGING AREA TO BE CONSTRUCTED WITHIN PROPOSED STOCKPILE AREA

SCALE
HORIZ. 1"=40'
VERT. NTS

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

OPTIONAL SEDIMENT STAGING AREA

WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

DRAWN CDT
DATE APRIL 1999
FIGURE NO. 8-2

FILE NAME: G:\DESIGN\DWG\ACOE\SENECA\WP\FIG8-2.DWG (PLOT 1=40)

At the completion of creek excavation, the creek will be resurveyed to verify that one foot of creek sediments have been removed.

8.4 WATER TREATMENT

Water that accumulates upstream of the dikes during excavation of the Creek will be pumped to a discharge point downstream of the excavation area. This water will not be treated since it will be diverted around sediment removal areas. Water that enters the dammed section of the creek via infiltration of the earth berms and from dewatering of sediments will require treatment. This water will be pumped to tanker trucks and transported to the wastewater treatment system. If the wastewater treatment area is sufficiently close to the creek excavation, water will be pumped directly from the creek to the wastewater treatment area. Frac tanks may be used as an intermediate step between the creek and the wastewater treatment system if necessary.

8.5 BANK STABILIZATION

Following excavation, the creek bank will be stabilized (where disturbed). Weston does not anticipate disturbing large areas of the slope. Where applicable, WESTON will perform the following general procedures:

- regrade the slope (as necessary)
- install rip rap (4-8" size) at culvert outlets
- top soil (2-4 in.)
- establish vegetation where necessary to stabilize the creek bank.

Rip rap will also be installed at steep areas where there is high potential for erosion. Top soil will be placed only at disturbed areas so that vegetation can be reestablished. Erosion control matting will be used where necessary to control washout where vegetation is to be re-established. Silt fence and hay bales will be used at disturbed areas until vegetation is reestablished to prevent erosion of fines into the stream. WESTON anticipates using a grass seed mix including clover, tall fescue and perennial ryegrass or similar in accordance with "New York Guidelines for Urban Erosion and Sediment Control".

SECTION 9

CHARACTERIZATION, TRANSPORTATION, TREATMENT AND DISPOSAL

9. CHARACTERIZATION, TRANSPORTATION, TREATMENT AND DISPOSAL

This section describes the procedures that will be followed for characterizing wastes for treatment and off-site disposal. EODT will transport all soils from the OB Grounds to the WESTON stockpile staging area. WESTON will manage contaminated soils and sediments within the stockpile area. The piles will initially be segregated and stockpiled by EODT by case number at the direction of WESTON.

Once sample results are received, WESTON will relocate soils to the appropriate stockpile area according to "Case Type".

9.1 STOCKPILE SEGREGATION

All stockpiling and staging of soils that WESTON is responsible for will occur within the WESTON soil staging area. Stockpiles will be constructed to facilitate placement of covers and to facilitate proper drainage. Covers for stockpiles will be 10-mil polyethylene plastic or similar material. All covers will be weighted down with sandbags and/or other suitable heavy objects to resist wind loads.

9.1.1 Case 1 Soils

Case 1 soils (containing >800 mg/kg lead, volume estimated at 16,500 cy) will be excavated by EODT, screened to 1 inch minus and transported by EODT to the WESTON staging area. In order to minimize unnecessary treatment costs, WESTON will sample the Case 1 soil piles in 200 cy increments for TCLP metals. If the soils fail TCLP, they will be consolidated by WESTON into a single larger pile for stabilization treatment (at a later date). If the soils pass TCLP, they will be removed from the Case 1 stockpile and placed into the Case II stockpile for off-site disposal. This is a variance agreed upon by the CENAE in lieu of Parsons Technical Specifications dated August 1998 which states that all Case 1 soils will be treated directly without first sampling for TCLP.

9.1.2 Case 2 Soils

Case 2 soils contain lead at concentrations greater then 500 mg/kg and will require off-site disposal. The estimated volume of Case 2 soils is 2,000 cy. Case 2 soils will be transported to the WESTON stockpiling area from the OB Grounds by EODT. Case 2 soils will be stockpiled and sampled for TCLP metals at 200 cy intervals. Case 2 soils which fail TCLP will be moved to the Case 1 stockpile for stabilization treatment. Case 2 soils passing TCLP will be consolidated into a larger stockpile for off-site disposal.

9.1.3 Case 3 Soils

EODT will excavate, screen, and stockpile Case 3 soils in 200 cy increments. WESTON will sample the Case 3 soils for total lead. If the soils contain less than 500 mg/kg lead, they will remain within the OB Grounds for future use as backfill. If the soils contain greater than 500 mg/kg lead, they will be sampled for TCLP metals. Depending on the TCLP results, the soils will be transported by EODT to the WESTON soil staging area and staged with soils to be stabilized before off-site disposal (Case 1) or staged with Case 2 soils to be transported off-site. Once all the excavations are backfilled, remaining Case III soil will be directly transported to staging area following sifting for testing.

9.1.4 One Foot Excavation Over Entire OB Grounds

EODT will excavate the entire 30 acre OB Grounds site (excluding those locations previously excavated and backfilled) to at least one foot bgs. WESTON estimates that the actual volume of material generated from this excavation is 45,600 cy (excluding pads and berms). EODT will transport the soils to the WESTON stockpile area. WESTON will sample the soils for total lead at the 200 cy frequency. Soils exceeding 500 mg/kg lead will be sampled for TCLP metals. If the soil fails TCLP, it will be relocated to the Case 1 stockpile. If it passes TCLP, it will be relocated to the Case 2 stockpile. Soils with less than 500 mg/kg lead will be consolidated for long-term storage.

9.1.5 Creek Sediments

Excavated creek sediments may first be dewatered adjacent to the creek and transported to the sediment staging area within the WESTON staging area. Sediments will then be stockpiled in 200 cy increments and sampled for TCLP. Upon receipt of TCLP results, the sediments will then be stockpiled for off-site disposal or stockpiled for stabilization treatment prior to off-site disposal.

9.2 STOCKPILE SAMPLING

All soil samples will be collected as composite samples from 5 discrete locations at each 200 cy stockpile. Every tenth TCLP sample will be analyzed for the full list of TCLP parameters (VOCs, SVOC, pesticides, and metals) for off-site disposal characterization purposes.

Soils from Cases 1 and 2 will be sampled for TCLP metals to determine if S/S treatment is required prior to off-site disposal.

Soils excavated for UXO clearance only and from the entire 30-acre OB Grounds area will be sampled for total lead. If total lead is more than 500 mg/kg, the soils cannot be backfilled on site and sampling for TCLP metals will be performed.

9.3 SOIL STABILIZATION TREATMENT, SAMPLING, AND DISPOSAL

The goal of soil treatment is to render hazardous soil non-hazardous so that soils can be disposed of off-site in a RCRA subtitle D facility. Results of the bench-scale treatability study will be used to scale up the selected treatment process for full-scale application. Soils failing TCLP will be mixed in a controlled operation with reagents that will render soils non-hazardous following treatment. Some treatment processes use a pugmill and systems of conveyors while others use a mixing pad and conventional heavy equipment with mixing apparatus attached to achieve blending of soil and reagents.

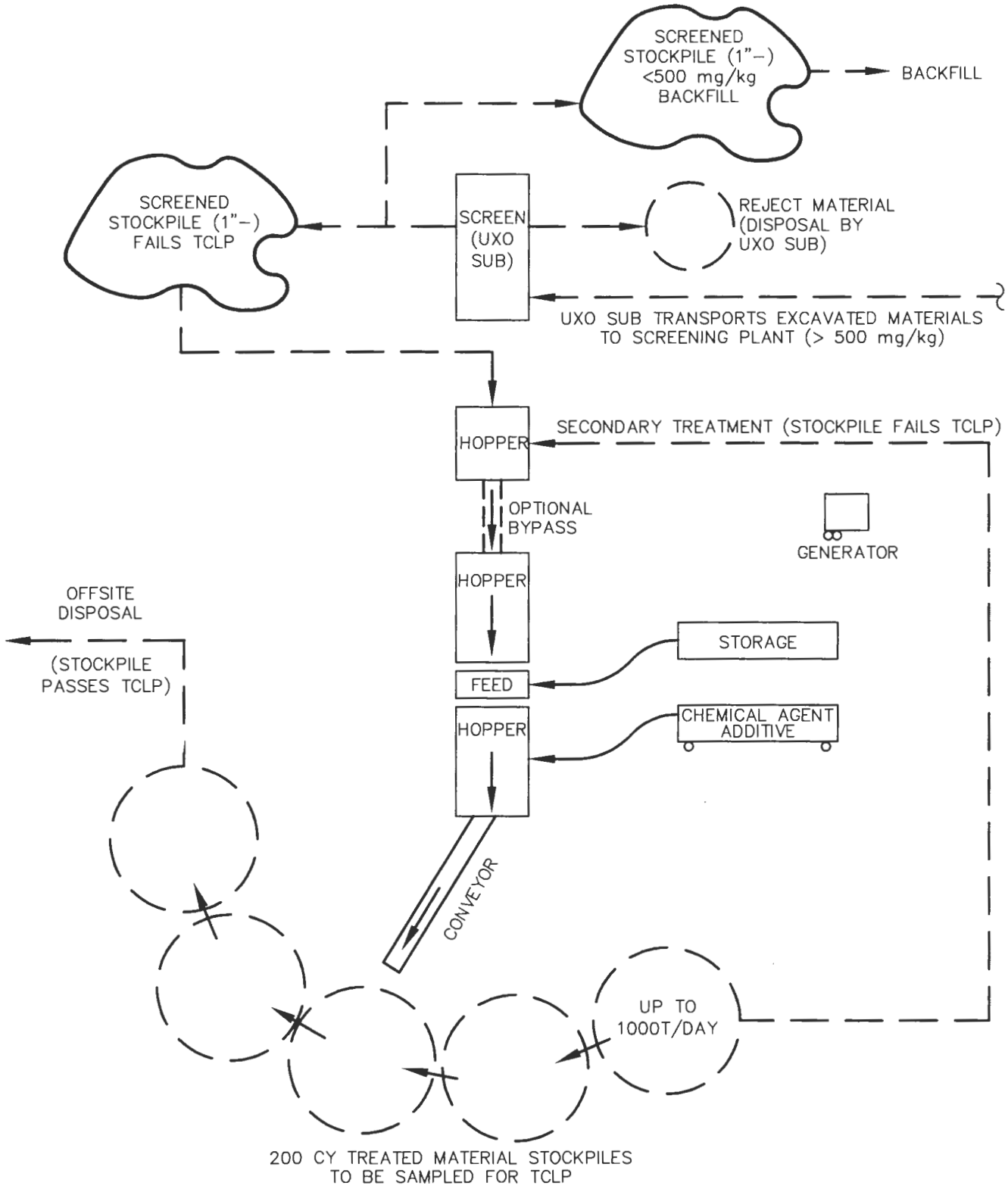
Case 1 soils and other soils which exhibit the toxicity characteristic will be treated before off-site disposal. Treated soils will be sampled for TCLP metals. Quantities for stabilization may increase due to treatment requirements for lead TCLP. Soils passing the TCLP will be handled as

non-hazardous soil and transported for off-site disposal. Soils failing the TCLP requirements will be retreated and resampled until no longer hazardous. Figure 9-1 shows a typical plan of the stabilization process layout.

9.4 NON-HAZARDOUS SOIL TRANSPORTATION AND DISPOSAL

Non-hazardous soils with lead concentrations greater than 500 mg/kg and that pass the TCLP will be transported off-site without treatment. Additional sampling of soils will be required to meet the off-site disposal facilities' profile requirements. One composite sample will be collected for each waste stream (for profiling purposes) and will be analyzed for corrosivity, ignitability, reactivity, toxicity (TCLP for VOCs, SVOCs, metals, pesticides, and herbicides), total VOCs, total SVOCs, total PCBs/pesticides, paint filter (free liquids), percent moisture, and total metals, in accordance with disposal facility requirements.

The contaminated material will be characterized for off-site disposal based on soil laboratory data following all applicable local, State and Federal regulations. Once the material has been characterized and specific waste codes have been assigned to the materials, waste profile sheets will be completed for submittal to a licensed and appropriate disposal facility for acceptance. WESTON will submit the profiles along with applicable analytical data to the TSDF for acceptance. Once the waste stream is accepted, WESTON Project/QC Engineer will coordinate all shipments with the transporter and TSDF for disposal as a RCRA Subtitle D non-hazardous waste. The manifest and/or shipping document forms will be prepared by the transporter and submitted to WESTON for review and approval prior to scheduling. The U.S. Army Corps of Engineers will sign on behalf of the generator on each manifest/shipping record. Completed manifests and/or shipping documents shall be forwarded to WESTON (within 30 days) following disposal at the TSDF. A certificate of disposal shall be prepared by the TSDF for each shipment and submitted to WESTON for final closeout.



NOTE: OPTIONAL LIME / ASH STABILIZATION METHOD WILL REQUIRE A BULKING / MIXING AREA IF CHOSEN AS STABILIZATION METHOD.

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

SOIL STABILIZATION / SOLIDIFICATION TREATMENT PROCESS PLAN

WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

DRAWN T.A.C.
DATE APRIL 1999
FIGURE NO. 9–1

FILE NAME: G:\DESIGN\DWG\ACOE\SENECA\WP\FIG9-1 (PLOT 1=1)

9.5 MISCELLANEOUS WASTE DISPOSAL

Miscellaneous waste will be generated during this project including PPE and construction debris. Debris will be generated from removal of the soil staging area liner. concrete decontamination pad and erosion control materials. Disposable personal protective equipment (PPE) will be collected in the solid waste container maintained on-site. WESTON will sample PPE and debris as required by the disposal facility for acceptance of the material.

SECTION 10

SITE RESTORATION

10. SITE RESTORATION

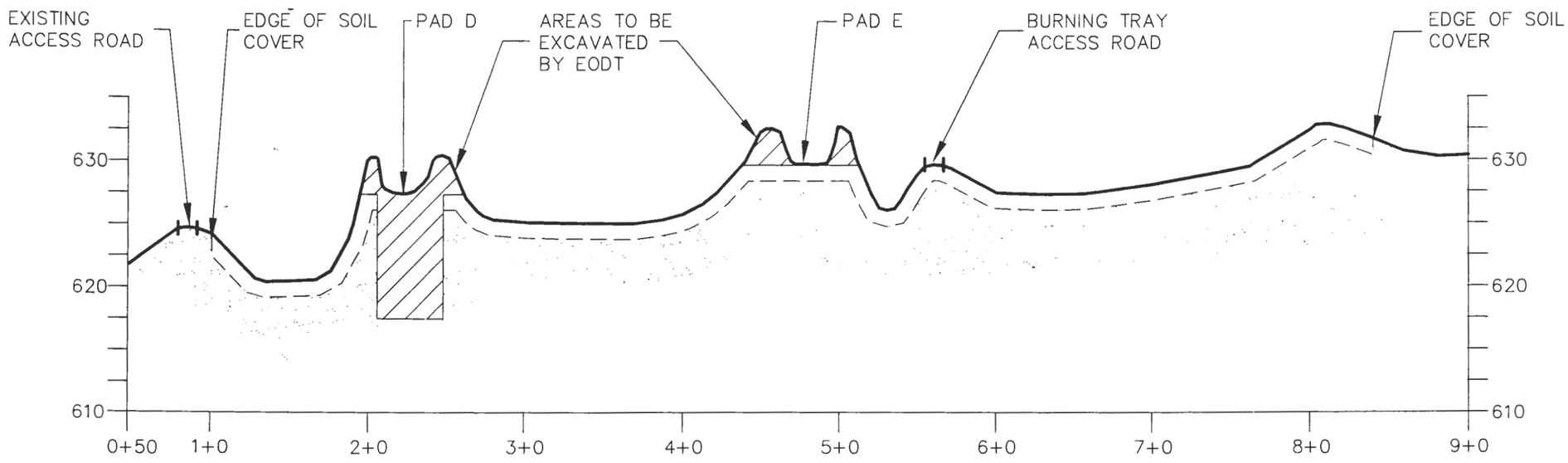
Following excavation of one foot across the entire OB Grounds, the area will be surveyed to ensure a depth of 1 ft. is achieved and sampled. The CENAN will determine whether a one foot proposed soil cover will be constructed based on a comparison of actual lead concentration vs. the 60 mg/kg cover requirement. Figure 10-1 shows a cross section of typical pad, berm, and one foot excavation across the site. Site restoration will include construction of a 12" soil cover, wetlands replication and other site restoration of areas disturbed during construction activities. The 12 in. layer must be placed on areas where the 1 ft. of excavation has resulted in total lead concentrations exceeding 60 mg/kg. This layer will consist of 8" of fill and 4" of topsoil.

10.1 WETLAND LAYOUT

The limits of the wetland restoration areas will be staked out following completion of the 1 ft. cut across the entire site and subsequent sampling. Figure 10-3 (Proposed Final Grading Plan) delineates the proposed locations of the replicated wetland locations. Grade stakes identifying the depth of fill will be established from the revised grades. Due to the irregular contour pattern of the 30 acre site and cover requirements, it is anticipated that at least one foot of fill is required in order to achieve sustainable wetland areas within the 30 acre OB Grounds that are 12" above the existing grade. In the event that the ROD requirement of 60 mg/kg is not exceeded, the CENAN will evaluate whether any soil cover will be placed. Additional soil testing may be required in order to determine capacity of soils to sustain a wetland. Currently, WESTON proposes to utilize a wetland seed mix that is indigineous to the area.

10.2 ROUGH GRADING

The actual limits of the soil cover and rough grading will be determined following sampling of the site perimeter. WESTON will install grade stakes throughout the 30 acre OB Grounds to establish subgrade elevations. Individual pad excavations will be backfilled and compacted to match existing grades. The entire 30 acre OB Grounds including the former pad excavations will be rough graded to an elevation approximately 12 inches below the final grades. Additional fill may be required to achieve subgrade elevations. All fill will be documented as clean fill as



HOR. SCALE 1"=80'
VER. SCALE 1'=10'

LEGEND

- EXISTING GROUND SURFACE
- PAD/BERM EXCAVATION LIMITS
- PAD/BERM EXCAVATION
- GROUND SURFACE AFTER ONE FOOT CUT ACROSS ENTIRE OB GROUND

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

N-S CROSS-SECTION THROUGH PADS D AND E

WESTON MANAGERS DESIGNERS/CONSULTANTS MANCHESTER NEW HAMPSHIRE

DRAWN CDT
DATE APRIL 1999
FIGURE NO. 10-1

FILE NAME: c:\DES\DWG\ACOE\SENECA\WP\FIG10-1 (PLOT 1=80)

PROPOSED PERIMETER CONFIRMATION SAMPLING POINTS (TYP.)

APPROXIMATE LIMIT OF SOIL COVER

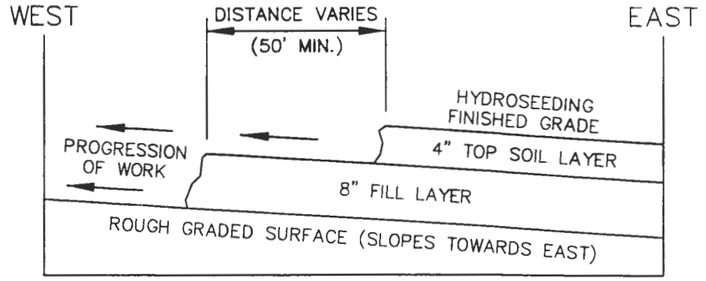
DISTANCE VARIES (50' MIN.)

HYDRO SEEDING

TOPSOIL SPREADING

FILL SPREADING AND COMPACTION

ROUGH GRADING



CONCEPTUAL EAST–WEST DETAIL

NOT TO SCALE

GRAPHIC SCALE

0 100 200 300 400

APPROXIMATE SCALE IN FEET

NOTES:

1. FOLLOWING EXCAVATION OF ONE FOOT ACROSS ENTIRE OB GROUNDS, THE RESULTING SURFACE WILL BE SAMPLED FOR LEAD EVERY 10,000 SF. BASED ON THE RESULTS, A DETERMINATION WILL BE MADE AS TO WHETHER OR NOT TO CONSTRUCT A 12" SOIL COVER. THIS PLAN SHOWS THE GENERAL SEQUENCE OF ACTIVITIES SHOULD A SOIL COVER BE CONSTRUCTED.

2. THIS PLAN DOES NOT IDENTIFY WETLAND AREAS THAT WILL BE RE–ESTABLISHED.

REMEDIAL ACTION AT THE OPEN BURNING GROUNDS (OB)
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

PROPOSED SOIL COVER PLAN

WESTON MANAGERS DESIGNERS/CONSULTANTS
MANCHESTER NEW HAMPSHIRE

DRAWN CDT
DATE APRIL 1999
FIGURE NO. 10–2

FILE NAME: G:\DESIGN\DWG\ACOE\SENECA\WP\FIG10-2 (PLOT 1=200)

30 acres. This area could increase depending on the results of the planned confirmatory sampling. The subcontractor shall provide, prior to application of the hydroseed, a Certificate of Compliance certifying the type of seed mix being applied and detailed instructions for maintenance of the hydroseed areas until they reach maturity.

The seed will meet the requirements of the appropriate state and Federal agricultural and vegetable seed laws. This mix will also contain slow-release fertilizer for starting grass seed and limestone. The chemical analysis shall be (approximately) 15-10-10.

Seeded areas shall be protected and maintained by watering, mowing and replanting as necessary for at least 30 days to establish that the seed mix has properly germinated and is accepted.

SECTION 11

MONITORING WELLS

11. MONITORING WELLS

11.1 WELL DECOMMISSIONING

There are 31 wells that will require decommissioning. WESTON will follow the NYSDEC Groundwater Monitoring Well Decommissioning Procedures when decommissioning the wells. The purpose of these procedures is to remove the well and leave the boring in a sealed state which will not promote the migration of contamination. A cement/bentonite grout mixture will be pumped into the well as it is pulled out of the ground. This will ensure that a good seal is made in the boring as the well is removed. The grout mixture will be pumped into the existing ground surface and cured in place. WESTON recommends decommissioning the wells in the Spring of 1999 to eliminate concerns related to damaging the wells during the OB Grounds excavation. Monitoring well decommissioning procedures are included in Appendix E.

11.2 WELL INSTALLATION

Seven new wells will be installed. Three wells will be installed to the east of the groundwater divide. three wells will be installed to the west of the groundwater divide, and the seventh will be installed at an upgradient location. All locations will be designated by the CENAN. The wells will be installed at similar depths to the original wells. The well material will be Schedule 40 stainless steel. The screens will be 10 feet long, 0.01 inch slotted. A sand pack will be placed around the screen to a depth approximately five feet above the top of the screen. Above the sand pack. the boring will be backfilled with grout to within three feet of the ground surface. A steel casing approximately seven feet long will be installed with three to four feet below ground surface and three to four feet above grade. The casing will be secured in place with a concrete collar poured from three feet below grade to the ground surface to withstand frost heave. Well caps will be installed and the casings locked. The wells will be installed after excavations are completed. Appendix H contains "Well Installation Procedures" from Appendix A, Field Sampling and Analysis Plan, Generic Installation RI/FS Work Plan, Seneca Army Depot Activity, Romulus, New York.

SECTION 12

DEMOBILIZATION

12. DEMOBILIZATION

Following completion of all sitework and restoration activities, WESTON shall demobilize all personnel, equipment, and materials. All contaminated material shall be properly loaded and transported off-site to a disposal facility. Subcontractors will demobilize the heavy equipment. All temporary erosion control measures such as construction fence, silt fence, hay bales, line posts, and banner guard will be removed and WESTON shall demobilize the temporary storage/site and office location. Coordination with the Base Environmental Coordinator will be performed to remove all utilities and to ensure existing conditions are established prior to demobilization.

SECTION 13

TASK ORDER CLOSEOUT

13. TASK ORDER CLOSEOUT

13.1 CLOSEOUT CHECKLIST

The process for Task Order closeout will include the following:

- Deliverables - WESTON will ensure that all deliverables have been submitted. WESTON and CENAN will ensure that all deliverables have been approved and accepted, as applicable.
- Acceptance - WESTON and CENAN will assure all work has been inspected and accepted.
- Final Report and As-Builts
- Records Transfer - WESTON will provide a copy of its Document Control Number (DCN) list to CENAN. WESTON will provide originals or copies of documents on DCN list as requested by CENAN. WESTON will retain other documents as required by the contract.
- Government Property Disposition - CENAN will conduct a complete inventory with WESTON of all property provided by the Government or purchased under the task order. Excess property will be disposed of in accordance with established policy. CENAN will approve final disposition of property.
- Release of Liens and Waiver of Claims - WESTON will submit a release of liens and waiver of claims with its final invoice.
- Final Invoice - WESTON will submit a final invoice with all costs and fee (minus DCAA criteria).
- Audit - Upon receipt of a task order closeout checklist/report prepared by CENAN PM CENAN Contract Specialist will request an audit by the cognizant audit agency.
- Balancing Cost/Fee Adjustment - Upon receipt of the audit report, a modification will be issued to adjust the task order cost and fee.

SECTION 14

REFERENCES

14. REFERENCES

American Society for Testing and Materials, (ASTM). C 117 *Standard Test Method for Materials Finer than 75-mm (No.200) Sieve in Mineral Aggregates by Washing.* Philadelphia, PA.

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Department of the Army, U.S. Army Corps of Engineers, Washington, DC. 1995. *Engineering and Design Treatability Studies for Solidification/Stabilization of Contaminated Material.*

EOD Technology, Inc. Knoxville, TN. 1997. Prepared for U.S. Army Engineering and Support Center, Huntsville, Alabama. *Workplan for the Ordnance and Explosive Removal Action, Open Burning (OB) Grounds – Volumes I and II.).* Seneca Army Depot Activity (SEDA), Romulus, NY.

New York State Soil and Water Conservation Committee. *New York Guidelines for Urban Erosion and Sediment Control*. Syracuse, N.Y., October 1991.

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Parsons Engineering Science, Inc. Boston, MA. 1997. Prepared for U.S. Army Corps of Engineers. *Draft Record of Decision, Former Open Burning (OB) Grounds Site.).* Seneca Army Depot Activity (SEDA), Romulus, NY. Contract No. DACW33-95-D-00005.

Parsons Engineering Science, Inc. Boston, MA. 1998. Prepared for U.S. Army Engineer Division, Huntsville, Alabama. *Section C – Technical Specifications Soil and Sediment Remediation at the*

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APPENDIX A

CONTRACTOR QUALITY CONTROL PLAN

CONTRACTOR QUALITY CONTROL PLAN
SOIL AND SEDIMENT REMEDIATION
OPEN BURNING GROUNDS
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

DRAFT FINAL

Contract No. DACW33-95-D-0004
Task Order No. 0013
DCN: SEDA-100998-AABF

Prepared for:

U.S. ARMY CORPS OF ENGINEERS
NORTH ATLANTIC DIVISION
NEW ENGLAND DISTRICT
696 Virginia Road
Concord, Massachusetts 01742-2751

Prepared by:

ROY F. WESTON, INC.
One Wall Street
Manchester, New Hampshire 03101-1501

April 1999

W.O. No. 03886-118-013-0140-01

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Section **Page**

LIST OF TABLES

Title **Page**

LIST OF ACRONYMS

CENAE	U.S. Army Corps of Engineers. New England District
COR	Contracting Officer's Representative
CQCP	Contractor Quality Control Plan
OTS	Office of Toxic Substances
RAWP	Remedial Action Work Plan
SAP	Sampling and Analysis Plan
SOW	Scope of Work
WESTON®	Roy F. Weston. Inc.

SECTION 1

OVERVIEW

1. OVERVIEW

This Contractor Quality Control Plan (CQCP) was developed to identify and implement quality requirements to ensure that project activities are conducted appropriately. The CQCP was prepared for the Corps of Engineers, North Atlantic Division, New England District (CENAE), in compliance with the specifications and the Scope of Work (SOW), Contract No. DACW33-95-D-0004 at the Seneca Army Depot Activity in Romulus, NY.

This plan was prepared to ensure that all work is accomplished with an acceptable level of internal controls and review procedures. These controls and procedures will eliminate conflicts, errors, and omissions, and will ensure the technical accuracy of all deliverables. This plan was prepared with guidance from Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80 and from the Office of Toxic Substances (OTS) Guidance Document for the Preparation of Quality Assurance Project Plans, dated 9 September 1987.

Under contract with CENAE, Roy F. Weston, Inc. (WESTON®) will implement remedial activities for the Open Burning Grounds and Reeder Creek. To achieve this goal, sampling, creek excavation, full-scale stabilization and off-site disposal will be performed. It is estimated that a total of 18,000 cubic yards of contaminated soil will be excavated, treated on-site, and disposed of off-site. The site contaminant that has been characterized during previous work and which will drive the remediation at the site is lead.

The work will consist of the following:

- Pre-Construction Tasks
- Soil Handling
- Dewatering and water treatment
- Off-Site Disposal
- Wetland Restoration
- Surveying
- Documentation/Recordkeeping
- Site restoration and demobilization
- Mobilization and site preparation
- Soil Solidification/Stabilization
- Sampling/Stockpile Management
- Soil Cover Construction
- Sediment Removal
- Monitoring Well Installation and Decomissioning
- Final Report Preparation

SECTION 2

SCOPE

2. SCOPE

The scope of this plan provides quality control (QC) measures applicable to administrative, engineering, and technical activities associated with the remediation at SEDA. The requirements of this plan are also applicable to all WESTON-affiliated project support groups and their contractors and subcontractors unless an alternate Quality Control Plan, which is consistent with or exceeds the requirements of this document either in whole or in part, is used. This CQCP has been developed for the activities associated with the above tasks.

SECTION 3

PROJECT ORGANIZATION AND RESPONSIBILITIES

3. PROJECT ORGANIZATION AND RESPONSIBILITIES

Under the direction of CENAE, WESTON is responsible for implementing the SOW. WESTON will provide a staff of experienced administrative and technical professionals to serve as key personnel for this project. These personnel were selected for their management and technical abilities. A discussion of WESTON roles and responsibilities and a project organizational chart is presented in Section 2 of the Work Plan (WP).

SECTION 4

FIELD ACTIVITIES

4. FIELD ACTIVITIES

4.1 QUALITY REQUIREMENTS

The quality requirements associated with field activities in support of this task order are defined in Table 4-1. These requirements apply to all field activities that affect the quality of work and work products. The quality requirements associated with sampling and analysis are identified in the Sampling and Analysis Plan (SAP). The approved SAP will be followed for sampling activities, except in cases where field conditions may not coincide with the conditions outlined in the SAP.

QA/QC checks will be conducted as follows:

- **Daily Briefings** - The Site QA/QC Officer will ensure that daily safety and operational briefings are conducted routinely. The Site QA/QC Officer will accomplish this by personally observing or conducting the briefings.

- **Communications** - Positive communications with CENAE Field Representative and site personnel will be maintained throughout the workday.

  - Communication checks will be conducted each morning prior to starting work, after the lunch break, and following any period of prolonged interruption of operations.

  - Teams will not start operations until satisfactory checks have been achieved.

- **Training** - The Site Safety and Health Officer will ensure that initial site-specific training is performed for all field personnel prior to startup of field activities, and that all safety control measures have been established.

Training will be accomplished using only approved training materials

- **Documentation** - The Site QA/QC Officer will ensure the completion of all documentation of all surveys and clearance reports.

- **Review** - The Site Manager will review all documentation for accuracy.

Table 4-1

Remediation Activities
Open Burning Grounds Remediation
Seneca Army Depot Activity

Objective	Activity	Activity Quality Requirement	Quality Control Verification
Planning	Pre-construction tasks	Prepare all required plans, submit required information to start project.	None.
Prepare Site	Mobilization/site preparation	Mobilize equipment and personnel according to schedule. Prepare site for remedial activities.	Daily Inspection Report. Daily Site Health and Safety Meeting Report. Daily Equipment Checklist. Construction Equipment Inspection Checklist.
Site-work	Soil handling	Move soils from stockpile locations to stabilization treatment, load trucks.	Daily Inspection Report. Daily Site Health and Safety Meeting Report. Daily Equipment Checklist. Construction Equipment Inspection Checklist. Health and Safety Compliance Inspection.
Site-work	Soil stabilization	Treat soils to remove toxicity characteristic for lead before off-site disposal.	Daily Inspection Report. QA Audit Checklist and Audit Form Daily Site Health and Safety Meeting Report. Daily Equipment Checklist. Construction Equipment Inspection Checklist. Health and Safety Compliance Inspection.
Site-work	Excavation dewatering and water treatment	Remove, treat, and discharge water in accordance with schedule and NYSDEC permit requirements.	Daily Inspection Report. Daily Site Health and Safety Meeting Report. Daily Equipment Checklist. Construction Equipment Inspection Checklist. Health and Safety Compliance Inspection.
Site-work	Sampling	Characterization of soils, confirmation of excavation limits, compliance with discharge requirements	Daily Inspection Report. Daily Equipment Checklist.
Disposal	Off-site disposal	Transport soils for off-site disposal	Daily Inspection Report. Daily Equipment Checklist.

Table 4-1

Remediation Activities
Open Burning Grounds Remediation
Seneca Army Depot Activity
(Concluded)

Objective	Activity	Activity Quality Requirement	Quality Control Verification
Site-work	Soil cover construction	Construct soil cover over soils containing >60 mg/kg lead.	Daily Inspection Report. QA Audit Checklist and Audit Form Daily Site Health and Safety Meeting Report. Daily Equipment Checklist. Construction Equipment Inspection Checklist. Health and Safety Compliance Inspection.
Site-work	Wetland restoration	Restore wetlands removed during soil cover construction.	Daily Inspection Report. QA Audit Checklist and Audit Form Daily Site Health and Safety Meeting Report. Daily Equipment Checklist. Construction Equipment Inspection Checklist. Health and Safety Compliance Inspection.
Site-work	Sediment removal	Remove contaminated creek sediments.	Daily Inspection Report. QA Audit Checklist and Audit Form Daily Site Health and Safety Meeting Report. Daily Equipment Checklist. Construction Equipment Inspection Checklist. Health and Safety Compliance Inspection.
Site-work	Surveying	Stake-out excavation limits, document sampling locations and final limits of excavations.	Daily Inspection Report.
Site-work	Monitoring well decomissioning and installation	Remove old wells and install new wells in accordance with NY State requirements	Daily Inspection Report. QA Audit Checklist and Audit Form Daily Site Health and Safety Meeting Report. Daily Equipment Checklist. Construction Equipment Inspection Checklist. Health and Safety Compliance Inspection.

4.2 FIELD DOCUMENTATION

All field activities affecting quality control will be performed in accordance with documented procedures, instructions, or drawings identified in the specifications. During all field activities, WESTON will use the following reporting formats:

- Daily Inspection Report (Form 1).
- Quality Assurance Audit Checklist and Audit Notes (Form 2).
- Daily Site Health and Safety Meeting Report (Form 3).
- Daily Equipment Checklist (Form 4).
- Construction Equipment Inspection Form (Form 5).
- Health and Safety Compliance Inspection (Form 6).
- Field Logbooks.

These reports will be used to document construction quality control activities. Related laboratory test reports and vendor data will be attached to these QC reports when daily work activities are associated with these data.

SECTION 5

FIELD INSPECTIONS

5. FIELD INSPECTIONS

The WESTON Site QA/QC Officer will maintain a field logbook of the inspection and test activities. This daily logbook will be used in preparing the Daily Construction Quality Control Report form. The Daily Construction Quality Control Reports for the activities of each day of the previous week will be submitted weekly to the Contracting Officer's Representative (COR). Reports will not be submitted for days on which no work is performed. At a minimum, one report will be submitted for every seven days of no work and on the last day of a period of work stoppage. Reports will be signed and dated by the Site QA/QC Officer.

The Daily CQC Report and the Daily Inspection Report include:

- Contractor/subcontractors and responsibilities.
- Equipment used, with any idle or downtime noted.
- Location, personnel, and description of work for each day.
- Test and/or control activities performed. Any deficiencies to the specifications will be noted along with the corrective action taken.
- Quantity of materials received at the site. For all materials received, acceptability, storage, and compliance with specifications will be noted.
- Review of submittals.
- Off-site surveillance activities.
- Safety evaluations including a description of inspections, results, and any corrective actions.

SECTION 6

AUDITS

6. AUDITS

Field performance will be evaluated to ensure that the quality standards and objectives of the WP are met. The evaluation will be accomplished through audits and corrective action through use of the Daily Construction Quality Control Report (Form 2, Appendix A). Audits will be conducted and corrective actions will be implemented when non-conformances or deficiencies are identified. Additional audits will be conducted periodically. The audits will be planned and conducted by the Program or Project QC Manager, Site QA/QC Officer, or the Site Health and Safety Officer and clearly defined before they are initiated. Procedures for auditing activities will be identified prior to implementation of the audits.

The audit process will involve identifying non-conformances or deficiencies, reporting and documenting them, initiating corrective action through appropriate channels, and following up with a compliance review. Records will be kept of all auditing tasks and findings on the Quality Assurance Audit Checklist and Audit Notes (Form 3, Appendix A). In addition, copies of the audit findings will be provided to CENAE within 1 week of completion of the audit.

Additional field activities requiring an audit include the sampling activities. Proper sample collection (location, number, parameters, and QA/QC samples) and delivery (packaging, labeling, chain-of-custody, custody seals, etc.) will be closely verified.

The field teams involved with the construction activities are responsible for reporting all suspected technical non-conformances or deficiencies to the Program or Project QC Manager. The Program or Project QC Manager is responsible for evaluation of the situation and taking action, if any is required, after following the notification protocol.

APPENDIX A

FORMS

FORM 1
DAILY INSPECTION REPORT

Daily Inspection Report

WESTON MANAGERS DESIGNERS CONSULTANTS
CONCORD, NEW HAMPSHIRE
BOSTON, MASSACHUSETTS
HARTFORD, CONNECTICUT

DATE: _____

WEEK NO.:	HOURS ON SITE.	WRITTEN BY:	REVIEWED BY:	WORK ORDER AND TASK:

WEATHER/TEMPERATURE:

LOCATION OF WORK:

WESTON PERSONNEL:	EQUIPMENT:	VISITORS:
SITE MANAGER:		
SITE ENGINEER:		
SHSC:		
OTHERS:		

SUBCONTRACTOR:	TRADE/SERVICE:
(1)	
(2)	
(3)	

AGREEMENTS MADE/PHONE CONVERSATIONS: _____

MATERIALS DELIVERED (Amount, Condition, Purpose): _____

TEST DATA (List items here and record details on appropriate test data sheet): _____

SAFETY VIOLATIONS/COMMENTS: _____

WORK COMPLETED BY WESTON: _____

WORK COMPLETED BY SUBCONTRACTORS: _____

Daily Inspection Report

DATE: _____

WESTON MANAGERS DESIGNERS CONSULTANTS
CONCORD, NEW HAMPSHIRE
BOSTON, MASSACHUSETTS
HARTFORD, CONNECTICUT

Report is complete and correct. Work in compliance with contract except where noted.

CQC INSPECTOR (Print Name): _____ CQC SIGNATURE: _____

TYPE OF INSPECTION (Preparatory, Initial, Follow Up):

CQC FINDINGS (Satisfactory Work Completed and Deficiencies): _____

RECOMMENDED CORRECTIVE ACTIONS: _____

SAFETY OBSERVATIONS: _____

WORK PERFORMED BY WESTON (Continued): _____

WORK PERFORMED BY SUBCONTRACTORS (Continued): _____

FORM 2
QUALITY ASSURANCE AUDIT CHECKLIST AND AUDIT FORM

QUALITY ASSURANCE AUDIT CHECKLIST AND AUDIT NOTES

1. Audit Number:_____

(Contract No. and Audit No.)
Note: several different forms covering several dates or locations may be required for a single auditing event.

2. Auditor:_____

3. Date: _____ 4. Time:_____

5. Location:_____

6. Persons Contacted:_____

7. Consistency with Schedule: _____

8. CQCP Staffing Changes (have they been approved by Contracting Officer, have qualifications been appended to the plan?):_____

9. Documents Available (yes/no observations):_____
CQC Plan:_____
CENAE specifications:_____
Site Safety and Health Plan:_____
Drawings, as built (maintained?):_____
Daily CQC reports (on file, up-to-date, complete?):_____
Inspection records (type of inspection, up-to-date, filed properly, completed properly, signed, follow-up on noncompliance?)_____
Test records (type of test, up-to-date, filed properly, completed properly, signed, follow-up on noncompliance?):_____

10. Chemical Quality Management:
Sample log:_____
Chain-of-custody forms on file:_____
Laboratory reports (on schedule, in accordance to format, include QC data?):_____
_____
_____
Equipment calibration records (up-to-date, complete?):_____
_____

11. Health and Safety:

Site Safety and Health Officer or alternate on-site (name?):_____

Personnel on-site (current with field certification requirements?):_____

_____

Safety log (up-to-date, complete?):_____

Daily inspection records (up-to-date, complete, follow-up?):_____

Required monitoring instruments on-site:_____

Monitoring instrument calibration records (on file and up-to-date?):_____

_____

12. Field Inspection:

Type or nature of work observed:_____

Persons and/or subcontractor doing work:_____

Applicable specifications:_____

Work being done in accordance with specifications?_____

Work completed consistent with schedule?_____

Safety rules being adhered to?:_____

Work zones delineated and honored?_____

Personal protective equipment used?_____

Other safety issues:_____

FORM 3
DAILY SITE HEALTH AND SAFETY MEETING REPORT

SAFETY MEETING REPORT

REEDER CREEK/OB GROUNDS REMEDIATION
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

MEETING DATE: _____ TIME: _____ TO _____

MEETING LOCATION: _____

MEETING CONDUCTED BY: _____

ATTENDEES:

TASKS TO BE PERFORMED:

SAFETY TOPICS DISCUSSED:

SAFETY QUESTIONS/CONCERNS FROM PREVIOUS WORK:

CORRECTIVE ACTION/FOLLOW-UP:

Complete this form following each daily safety briefing and submit to SHSC.

FORM 4
DAILY EQUIPMENT CHECKLIST

WESTON
INSPECTION CHECK LIST FOR HEAVY EQUIPMENT

General Instructions:	
1. WHEN	At the **START** of **EACH** work shift.
2. BY WHOM	Someone who is familiar with the equipment.
3. STANDARD	Safe operating condition and free from apparent damage that could cause failure while in use.
4. DOCUMENTATION	Operator to complete. Submit completed form daily to SHSC.
5. WHAT	Make/Description:
	Model:
	Serial Number:

CHECK LIST

ITEM	OK	**NOT** OK	COMMENTS
BRAKES			
BRAKE LIGHTS			
REVERSE SIGNAL			
ALARM			
HORNS			
TIRES			
STEERING			
SEAT BELT(S)			
OPERATING CONTROLS			
FIRE EXTINGUISHER(S)			
LIGHTS			
COUPLING DEVICE(S)			
WINDSHIELD			
WINDSHIELD WIPER(S)			
GUARDS			
FREE OF LEAKS?			
BRAKE/HYDRAULIC LINES			
BRAKE FLUID LEVEL			
HYDRAULIC FLUID LEVEL			
ENGINE OIL LEVEL			
OTHER:			

DATE:	TIME:
FUEL LEVEL:	ODOMETER:
PRINT INSPECTOR'S NAME:	
INSPECTOR'S SIGNATURE:	

FORM 5
CONSTRUCTION EQUIPMENT INSPECTION CHECKLIST

SAFETY INSPECTION CHECK LIST FOR CONSTRUCTION EQUIPMENT

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND

CONTRACTOR	CONTRACT NO.
TYPE OF EQUIPMENT	MACHINE NO.
DATE OF INSPECTION	
INSPECTED BY *(Signature)*	APPROVED BY *(Signature)*

NOTE: Corps of Engineers General Safety Requirements references are shown in Parentheses. Before any machinery is placed in use, it shall be tested and inspected by a competent mechanic and certified to be in safe operating condition. Records will be maintained readily available for inspection at the site. Inspection will be renewed within 6 months.

TRACTORS, TRUCKS, CRANES, SHOVELS, EARTH-MOVING EQUIPMENT	YES	NO	NOT APPL.
1. Is lock provided to prevent starting by unauthorized persons? (18A10)			
2. Is maintenance schedule conforming with manufacturer's recommendations kept for this machine? (18A02)(18A03)			
3. Are adequate Class B fire extinguishers installed on the equipment and ready for use, suitably placed, and distinctly marked, and visibility to them not obstructed? (13A02)(13A03)			
4. Are Operators experienced and able to read and understand signs, notices, operating instructions, and signals to be used? (05A07)			
a. Are Crane Operators 21 years of age? (05A04)			
b. Are Drivers of motor vehicles used on highways over 18 and have a valid license? (05A06)			
c. Is there a known heart condition, epilepsy, or other ailment detrimental to safe operation of the equipment? (05A01)			
5. Operating Test. Prior to being placed in operation all hoists, cranes and derricks will be tested using not less than 125% of the maximum anticipated load at the maximum boom radius to be used during operations. All motions of equipment will be performed during test at variable boom angles. (18D01) Particular attention shall be given that under no circumstances will the maximum anticipated load used for computing static test load exceed the manufacturer's rating. The contractor will provide the test weights. Date _____ Weight of static test load _____ tons. Maximum radius at which test conducted _____ ft. Length of boom _____ ft.			
6. Is a safe-load-capacity chart ENG Form 3364 for various boom radii posted in the cab of the crane? Is this chart applicable to present boom length, counter weight, etc.? (18C05)(18E01)			

TRACTORS, TRUCKS, CRANES, SHOVELS, EARTH-MOVING EQUIPMENT	YES	NO	NOT APPL.
7. Is a warning sign ENG Form 3363 for overhead electric lines posted at Operators position in crane? (15E08)			
8. Are all self-propelled construction units, - except light service vehicles such as panels, pick-ups, or station wagons and heavy crawler-type cranes, power shovels, back-hoes and draglines, - equipped with a reverse signal alarm which will operate automatically when the venicle moves in reverse and giving approved audible sound alarm? (18B01)			
9. Do tractors, dozers, front end loaders, graders and rollers have seat belts and rollover bars certified to S.A.E. Standards or previous Corps of Engineers approval? (18A20)			
10. If used for clearing of woods, do tractors, dozers and similar machines have heavy canopy or grille to protect Operator from falling or flying objects? (18A19)			
11. Are belts, gears, shafts, pulleys, sprockets, blades, drums, flywheels, chains, or other reciprocating, rotating or moving parts adequately guarded? (18B03)			
12. Are hook rollers free to turn and secured on turntable?			
13. Are all hot pipes and surfaces exposed to accidental contact suitably guarded or insulated? (18B04)			
14. Are fuel tanks located so that spills or overflows will not come in contact with engine, exhaust, or electrical connections? (18B05)			
15. Are exhausts and discharges so directed as not to endanger workmen or obstruct view of operator? (18B06)			
16. Are platforms, catwalks, steps, hand holds, and guardrails provided to assure safe footing and accessways? (18B08)			
17. Are cranes and derricks equipped with boom angle indicator and load-indicating device to prevent overloading? (18C14)			
18. Are all drums on load hoisting equipment equipped with dogs, pawls, or other positive locking devices? (18C03)			
19. Is there sufficient cable to allow two full wraps of cable on drums at all working positions? (18C07)			
20. Is hoist braking equipment capable of holding at least the full test load? (18C04)			
21. Is tagline provided to be attached for controlling swing of crane lifts? (18C10)			
22. Is the crane equipped with a shock-absorbing type boom stop? (Cable stops and welded struts are unacceptable) (18D03)			
23. Are guard rails, barriers and warnings placed around danger area to prevent persons being struck by swing of counterweight or cab? (18A21)			

TRACTORS, TRUCKS, CRANES, SHOVELS, EARTH-MOVING EQUIPMENT	YES	NO	NOT APPL.
24. Do all points requiring lubrication during operation have such fittings located or guarded in such manner that personnel servicing the equipment are protected from injury? (18A25)			
25 Do all modifications, extensions, replacement parts, and/or repairs to equipment maintain the minimum factor of safety as the original equipment with new, manufacturer's parts? (18C02)			
26. Are any of the structural members bent or rusted, or do they otherwise show signs of damage?			
27. Are running lines of hoisting equipment exposed to hazardous contact adequately guarded? (15E09)			
28. Are drums, sheaves, sheave pins, and pulleys smooth and free of defects? (17C07)			
29. Are wire rope, sockets, splices, thimbles, clips, and chains adequate and properly applied and in good operating condition? (17C01-11)(17D01-03)			
30. Are hooks, shackles, rings, pad eyes, and other fittings in good condition? (17A05)			
31. Are fueling cans used with this equipment approved type safety cans? (12E25)			
32. Are clamshell, orange-peel and dipper buckets all without missing teeth, worn shell, makeshift bolted connections or holes rusted through shell?			
33. Are concrete buckets equipped with extension to gate lever for safe dumping?			
34. Are adequate guardrails provided around the skips of pavers, concrete mixers and similar equipment? Guard is required for open end of skip. (18B07)			
35. Are all motor vehicles equipped as follows? (19A06)(19A12)			
a. Directional signal lights both front and rear?			
b. Two headlights: one on each side: one red tail light and one red or amber stop light?			
c. Rear view mirror?			
36. Are service and parking brakes in good operating condition? (19A07)			
37. Are trucks over 5 tons and heavy hauling units equipped with emergency brakes automatically stopping machine if service brakes should fail? (19A07)			
38. Are windshields on equipment provided with windshield wipers in proper operating condition? (19A10)			
39. Is all glass in windshields, cabs, windows and doors of safety glass without holes, breaks or cracks? (19A15, 19A16)(18A18)			
40. Are running boards and steps of vehicles provided with non-slip surfaces? (19A14)			

TRACTORS, TRUCKS, CRANES, SHOVELS, EARTH-MOVING EQUIPMENT	YES	NO	NOT APPL.
41. Are dump bodies provided with hinged struts or other suitable device for locking body in raised position? (19A20)			
42. Are tail-gate dumping devices so arranged that Operator will be in the clear while dumping load? (19A22)			
43. Are approved seat belts installed for driver and all passengers?			
44. Is engine equipped with power-operated starting device? (19A23)			
45. Is air-pressure gage in operative condition on equipment with air brakes? (21A10)			
46. Is air tank equipped with drain valve in an accessible position for daily draining? (21B24)			
47. Are towing devices structurally adequate and properly mounted with safety chains to prime mover? (19A17, 19A19)			
48. Are stone ejectors mounted between each pair of dual wheels?			
49. Is there an approved cover prepared for covering loads of loose material while on the road?			
PRESSURIZED, ELECTRICAL, POWER SYSTEMS			
50. Is an approved pressure gage installed on pressurized system? (21A10) No valve between gage and vessel or equipment? (21A10, 21A12)			
51. Is safety or relief valve sealed after adjustment? (21A14)			
52. Does receiver of air compressor bear certificate of hydrostatic pressure test at 125% of working pressure within two years? (21A01)			
53. Are all pneumatic hose connections provided with safety lashing? (21A18)			
54. Are guards for protection of Operator's feet installed on power screeds, concrete finishing machines, mowers, etc.? (18B11)			
55. Is there a guard mounted on all chain saws, circular saws, and band saw blades? Are radial saws provided with automatic retracting device? (16C01)			
56. Have all enclosed scaffold machines been dismantled, inspected, lubricated, and tagged with name and date by a Licensed Rigger?			
57. Is electric welding machine bonded to engine? (15C02)			
58. Are all portable electric generators and electrical equipment properly grounded to water lines or ground rods?			
FLOATING PLANT			
59. Are all decks, stair treads and walkways of non-slip surface? (26B03)			
60. Are guard rails and grab irons mounted on all weather decks? (26B10)			
61. Is built-in automatic fire extinguishing system installed at enclosed power plants? (26C02)			
62. Are U.S.C.G. lights and shapes mounted on vessel? (26A01)			

FLOATING PLANT	YES	NO	NOT APPL.
63. Are safe boarding ladders, and gangplanks with handrails provided? (26B01)			
64. Is rescue boat prepared and used only in emergency? (07G01-07)			
65. Does motor boat carry decal of safety inspection by U.S.C.G. or Auxiliary?			
66. Is there U.S.C.G.-approved life vest for every person aboard? (07E02)			
67. Is a life ring on 50-foot line hung on each side of deck? (07F04)			
68. Are waterlights attached to ring buoys? (07F06)			
69. Are safe climbing devices or enclosing cages built on ladders up boom and spud or drilling mast? (30B14, 30B15)			
70. Are deck obstructions painted with wide diagonal yellow and black stripes? (26B09)			
71. Are all repairs completed watertight and thoroughly inspected? (26A06)			
72. Is vessel certificated by U.S.C.G.? (26A01)			
73. Is Captain of uncertificated vessel over 26 feet long Licensed by U.S.C.G. for towing in this area? (26A02)			
74. Does dredge pipe line have attachments for walkway and hand rail? (26B06)			
75. Remarks: Other equipment inspected. (Conveyors, batch plants, elevators, material hoists, cableways, airtracks, earth augers, special purpose).			

FORM 6
HEALTH AND SAFETY COMPLIANCE INSPECTION

PROJECT MANAGER'S H&S COMPLIANCE INSPECTION

PM name: _____ Date: _____
Client name: _____ W.O. No.: _____
Site location: _____ Site phone no.: _____
Inspection conducted by:
__ PM in person __ PM via phone (Contact Name: _____)
__ PM's designee (Designee's Name: _____)

1. Is the HASP available at the site? __yes __no Signed by all personnel? __yes __no
(Have the cover page and site worker sign-off page faxed and attached to this form.)

2. What tasks are active? _____.

3. What special H&S considerations are necessary? (e.g., confined spaces, fall protection, construction safety, excavation evaluations, radiation, etc.) _____
_____.

4A. List the name of the SHSC/FSO on Line (a) and any other employees working at the site on lines (b) through (i). Verify and check (✓) if field certifications are current:

Name	RFW or Sub?	Training	Medical	Fit Test
a.				
(For above, circle: SHSC or FSO)				
b.				
c.				
d.				
e.				
f.				
g.				
h.				
i.				

4B. For large projects, is documentation on-site for employee certifications? __yes __no __NA

5. Is emergency contact information available on-site? __yes __no
(Have a copy faxed from the site and attached to this report.)

6. Describe the ambient temperatures during recent work shifts: _____.

PM Signature/Date: _____

PROJECT MANAGER'S H&S COMPLIANCE INSPECTION

7. Was the level of PPE used for each task today as required by the HASP? __yes __no

8A. What contaminant monitoring is conducted? _____.

8B. How are results documented? ___Logbook ___Forms ___other (describe): _____.
(Have the most recent results and calibration information faxed and attached to this form.)

9. What other monitoring is done? (e.g., heat stress, cold, noise, etc.) _____.

10. How are work zones marked and/or designated? _____.

11. Are personnel and equipment decon performed as required by the HASP? __yes __no

12. Are first aid and CPR services provided as required by the HASP? __yes __no

13. When were first aid kits, BBP kits, and fire extinguishers last inspected? _____.
(Have documentation faxed and attached to this form.)

14. Was site-specific hazard communication completed and properly documented? __yes ___no
(Have checklist in HASP Attachment D faxed and attached to this form.)

15. When was the last safety briefing conducted? _____. List topic(s) discussed:
_____.
(Have minutes/sign-up sheet faxed and attached to this form.)

16. Explain any negative findings below: _____

PM Signature/Date: _____

APPENDIX B

AIR MONITORING PLAN

APPENDIX B

AIR MONITORING PLAN

This Air Monitoring Plan addresses the requirements to comply with NYSDEC TAGM HWR-89-4031 for monitoring of fugitive dust (see Appendix F). This TAGM requires that particulate matter less than 10 microns (respirable dust or PM_{10}) be monitored real time and discusses mitigative measures to be taken if PM_{10} dust levels exceed 150 $\mu g/m^3$. Activities that could potentially generate fugitive dust include excavation, hauling of soil to soil staging area, solidification treatment, material hauling trucks (fill and off-site disposal), and soil cover construction.

WESTON will monitor for PM_{10} immediately downwind of activities potentially generating dust. The guidance requires that if the downwind concentration is more than 150 $\mu g/m^3$, the same portable monitor must be used to immediately measure upwind dust concentrations. To be more conservative, WESTON will measure upwind dust concentrations using the same meter if downwind measurements exceed 100 $\mu g/m^3$. If the downwind measurement is 75 $\mu g/m^3$ greater than the upwind measurement, WESTON will apply additional dust suppression measures to reduce the respirable dust concentrations. In addition, if WESTON observes visible dust leaving the site, additional dust control measures will be implemented. If the action level of 150 $\mu g/m^3$ above upwind concentrations is exceeded, WESTON will notify the Division of Air Resources within five working days of the occurrence, in accordance with the TAGM.

WESTON will be implementing dust control measures during site activities that create dust. The activities most likely to cause dusting problems for this project include hauling of contaminated soil and clean fill, soil cover construction, and solidification treatment. Most of the excavation will be performed by the UXO contractor. The excavations that WESTON will be performing are not likely to generate dust because the material is expected to be wet (Reeder Creek sediments). Soil loading is also not expected to create nuisance dust because soils are expected to be wet. To control dust at haul roads and during soil cover construction, WESTON will use a water truck capable of wetting roads and the active soil cover construction area. The water truck will be used as necessary to control dust. Vehicle speeds will be restricted to control dust as necessary.

If dust control measures do not reduce dust below the required 150 $\mu g/m^3$ above background levels, work will be suspended, and corrective measures will be evaluated and implemented before resuming work. If weather conditions cause excessive dust and mitigative measures are ineffective, WESTON will consider suspending work until weather conditions improve. WESTON shall ensure that stockpiles are covered to prevent migration.

APPENDIX C

DUST CONTROL PLAN

APPENDIX C

DUST CONTROL PLAN

The purpose of this plan is to describe procedures that will be used to prevent and to minimize dust levels and erosion. Dust may be generated due to truck traffic, heavy equipment traffic, and operation of the solidification treatment equipment. Dust Control measures will be taken at the site during mobilization, construction, and demobilization activities. Although air monitoring will be performed downwind of work activities, precautionary measures will be followed.

The climate during the work activities is estimated to fluctuate between 40°F and 90°F (May – Sept.). and the soil in the top two feet is generally broken up shale, with glacial till beneath. Construction activities will be monitored; however, it is not expected that excavation activities will produce significant levels of dust due to the high water table. Activities that are likely to cause dust at higher levels include hauling of contaminated material to the soil staging area, solidification treatment (due to reagents and mixing), contaminated and uncontaminated fill material hauling, and soil cover construction. During these activities, it is likely WESTON will implement dust mitigation procedures (see Air Monitoring Plan and Appendix F for monitoring procedures and action levels) in accordance with NYSDEC TAGM HWR-89-4031. Areas with heavy equipment and truck activity, access roads, soils to be treated, and treated soils will be sprayed using water trucks as necessary whenever the dust level increases. Both uncontaminated and contaminated stockpiles will be covered on a daily basis for both dust control and surface runoff prevention. Uncovered soil stockpiles will be sprayed with water at the end of each day to prevent dust if the soil dries out or on an as needed basis.

APPENDIX D

EROSION CONTROL PLAN

APPENDIX D

EROSION CONTROL PLAN

Hay bales and silt fencing will be used to control erosion and sediment run-off at construction areas with increased surface runoff (e.g., soil staging area) and where the potential of contamination into watershed areas exists (e.g., drainage of OB Grounds). EODT will be providing erosion and sedimentation control at the individual pads, berm areas, and screening areas during excavation; however, WESTON will be responsible for E&S controls at all other areas of the site and the OB Grounds during soil cover construction. Berms and drainage swales will be constructed where possible to divert runoff around construction areas. The silt fence will prevent any migration of sediment fines to non-construction areas.

Areas in need of repair during the course of the construction will be repaired and maintained for the remainder of the project. Any sediment buildup during construction activities will be removed. Erosion and sedimentation areas shall be monitored and controlled to maintain compliance and to avoid pollution of surface water. At the completion of construction activities, all erosion control measures will be removed, the area will be graded and restored to its existing condition.

APPENDIX E

NYSDEC GUIDELINES FOR EXPLORATORY BORINGS, MONITORING WELL INSTALLATION , WELL DECOMMISSIONING, AND DOCUMENTATION

GROUNDWATER MONITORING WELL DECOMMISSIONING PROCEDURES

October 1996

Prepared for:

New York State Department
of Environmental Conservation

Division of Environmental Remediation

Prepared by:

Malcolm Pirnie, Inc.

DECOMMISSIONING PROCEDURES

NYS SUPERFUND STANDBY CONTRACT
WORK ASSIGNMENT D002852-10

NPL SITE MONITORING WELL DECOMMISSIONING

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION

MAY 1995
Revised October 1996

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NYS SUPERFUND STANDBY CONTRACT
NPL SITE MONITORING WELL DECOMMISSIONING

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LIST OF FIGURES/LOGS & PLATES

LIST OF APPENDICES

Appendix	Description
A	Health and Safety Plan
B	Equipment Decontamination SOPs
C	Construction Inspection Forms
D	Hydraulic Pressure Testing SOP

EXAMPLE

HEALTH AND SAFETY PLAN
FOR
MULTIPLE NPL SITES MONITORING WELL DECOMMISSIONING

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LIST OF ATTACHMENTS

DISCLAIMER

October 21, 1996

RE: New York State Department of Environmental Conservation
Division of Environmental Remediation
Monitoring Well Decommissioning Procedures

Per your request, the enclosed referenced document is being made available to you for informational purposes. These procedures may be used as a guidance when decommissioning a monitoring well. Please note that this document does not address some site specific special situations that may be encountered in the field. These procedures have not been adopted by the Department of Environmental Conservation. Compliance with the procedures set forth in this document does not relieve any party of the obligation to successfully and satisfactorily decommission a well.

If you have any questions, please contact Ben Loredo, of my staff, at (518) 457-0927.

Sincerely,

Gerald J. Rider, Jr., P.E.
Chief, Operation, Maintenance and Support Section
Bureau of Hazardous Site Control
Division of Environmental Remediation
New York State Department of Environmental Conservation

Enclosure

INTRODUCTION

Malcolm Pirnie, Inc. has developed hazardous waste site monitoring well decommissioning procedures for the New York State Department of Environmental Conservation (NYSDEC) under the New York State Superfund Standby Contract, Work Assignment No. DO02852-10. These procedures have been established as a guide for successful decommissioning of wells that are no longer used for monitoring at select National Priorities List (NPL) sites in New York State. A well is successfully decommissioned when:

- Migration of existing or future contaminants into an aquifer or between aquifers cannot occur.
- Migration of existing or future contaminants in the vadose zone cannot occur.
- The potential for vertical or horizontal migration of fluids in the well or adjacent to the well is minimized
- Aquifer yield and hydrostatic head are conserved

The decommissioning procedures are based on NYSDEC-approved methods originally developed by Malcolm Pirnie which entailed an extensive literature search and consultations with industrial and NYSDEC officials. The literature search included sources from the National Ground Water Association, American Society for Testing and Materials (A.S.T.M.), State and EPA guidance documents, Malcolm Pirnie decommissioning procedures, and various other technical sources. A complete listing of sources is included at the end of these procedures. The industry officials consulted include drilling contractors, equipment suppliers and manufacturers, and A.S.T.M. members on Soil and Rock (D-18) and Water (D-19) committees.

These decommissioning procedures describe criteria for a satisfactorily decommissioning a monitoring well. Selection of a preferred decommissioning method will be dependent on site-specific and location-specific conditions such as the type of aquifer, the nature of the contamination, geological conditions and the type of well construction. Prior to initiating field work, the available site and location-specific data will be collected and

reviewed, and a pre-construction inspection of the monitoring well will be conducted to assist in determining the best-suited decommissioning method.

For maximum protection of human health and the environment, any material brought to the surface during the decommissioning process will be treated as a hazardous waste unless sample data indicates otherwise. The selection of disposal methods for these materials will depend on information reported in site investigation reports and analytical characterization of the retrieved materials for hazardous characteristics (see Sections 4.1.3 through 4.1.4). An appropriate procedure will be followed for the physical and hydrologic setting of the well that best protects the environment.

The following sections describe the procedures that will be implemented to properly decommission a well, including the procedure for selecting which decommissioning method will be used. There are eleven elements to be addressed in decommissioning a monitoring well at a hazardous waste site:

1) Reviewing Site Data
2) Selecting the Well Decommissioning Method
3) Preparing a Site-Specific Health and Safety Plan
4) Preparing a Materials Handling and Disposal Plan
5) Establishing Decontamination Procedures
6) Locating and Setting-Up on the Well
7) Removing the Protective Casing
8) Decommissioning of Screen and Riser
9) Selecting, Mixing, and Placing Grout
10) Backfilling and Site Restoration
11) Quality Assurance/Quality Control (QA/QC) Procedures

The proper well decommissioning methods and selection process are presented on the flow chart presented as Plate 1. For each decommissioning method, the specific procedures are determined by (1) geology, (2) contaminants, and (3) well design. For example, decommissioning a well that penetrates a confining layer may require a different approach than decommissioning an unconfined water table well.

1.0 REVIEWING SITE DATA

The first step in selecting the well decommissioning process consists of reviewing all pertinent site information; boring and well logs, field inspection sheets, and laboratory analytical results performed on site soil and groundwater samples. This site information will form the basis for decisions throughout the decommissioning process. Field inspection of the wells prior to decommissioning is also recommended to verify the characteristics and conditions of the wells. Special conditions such as access problems, well extensions through capped and covered landfills, and cap conditions due to seasonal weather patterns should be assessed. At well locations that have been extended, the burial of a previous concrete pad may require the excavation of soil to the top of the concrete pad to remove the well. Decommissioning work requiring the use of heavy vehicular equipment on RCRA landfill caps should be scheduled during dry weather if possible so as to minimize damage to the cover. If work must be performed during the Spring, Winter or inclement weather, special measures such as placement of plywood to reduce ruts should be employed to maintain the integrity of the completed landfill cover system. A sample Monitoring Well Field Inspection Log indicating the minimum information to be collected during field verification activities is included as Figure 1.

2.0 SELECTING THE WELL DECOMMISSIONING METHOD

The primary rationale for well decommissioning is to prevent contaminant migration along the disturbed construction zone created by the original well boring. This requires selection of a decommissioning procedure that takes into account factors such as:

- The hydrogeological conditions at the well site.
- The presence or absence of contamination in the groundwater.
- The original well construction details.

This section presents a summary of the well decommissioning methods and the selection process, which is illustrated in the flow chart presented as Plate 1. The primary well decommissioning procedures consist of:

- Casing pulling.
- Overdrilling.
- Grouting the casing in-place.
- Perforating the casing followed by grouting in-place.

A general discussion of each decommissioning procedure is presented in Sections 2.1 through 2.4.

2.1 CASING PULLING

In general, casing pulling is the preferred method for decommissioning wells where: no contamination is present; contamination is present but the well does not penetrate a confining layer; and when both contamination and a confining layer are present but the contamination cannot cross the confining layer. Additionally, the well construction materials and well depth must be such that pulling can be effected without breaking the riser.

Casing pulling involves removing the well casing by lifting. The procedure for removing the casing must allow grout to be added during pulling. The grout will fill the space once occupied by the material being withdrawn. Grout mixing and placement must be performed according to the procedures in Section 9.0.

An acceptable procedure to remove casing involves puncturing the bottom of the casing, flushing with water to remove sand (if necessary to mitigate lock-up of the casing during pulling), filling the casing with grout tremied from the bottom of the well, using jacks to free casing from the hole, and lifting the casing out by using a drill rig, backhoe, crane, or other suitable equipment. Additional grout must be added to the casing as it is withdrawn. In wells or wellpoints in which the bottom cannot be punctured, the casing or screened interval will be perforated prior to being filled with grout. This procedure should be followed for wells installed in collapsible formations or for highly contaminated wells. At site locations in which the borehole does not collapse it may not be necessary to perforate the well casing prior to pulling the well (i.e., grouting the borehole can be completed after the well materials have been removed). However, measurements of the borehole depth must

be taken before and after the well is pulled to ensure that no collapse of well construction or formation materials occurred.

In the event that the casing or well screen is severed during casing pulling or if borehole collapse occurs, the remaining materials can be removed by overdrilling using the conventional augering method described in Section 2.2. In situations where well materials such as PVC screens and risers are suspected to sever, and removal of all well materials is required (i.e., at wells that are contaminated or those that penetrate an aquiclude), the contractor should install rods inside the well so that the rods would serve as a steel guide pipe for advancing augers during overdrilling.

At sites in which well casings have been grouted into a rock socket the casing pulling procedure may not be feasible. An alternative procedure involving overdrilling into the bedrock, pulling the casing, and subsequently grouting the openhole interval may be employed. For uncontaminated wells or wells with low levels of contamination, overdrilling, grinding on the rock, and grouting inside and outside of the well should be acceptable if the casing cannot be pulled. When this procedure is not acceptable and the casing must be pulled from a contaminated well, a spin and flush drilling technique may be used to advance flushpoint casing equipped with a diamond cutting shoe to the bottom of the casing socket. Water used during the spin and flush casing advancement will be controlled by the use of oversized casing, a coupling and a drilling tee. Drilling water will be containerized and disposed of in accordance with the site specific Material Handling and Disposal Plan.

2.2 OVERDRILLING

Overdrilling is used where casing pulling is determined to be unfeasible, or where installation of a temporary casing is necessary to prevent cross-contamination, such as when a confining layer is present and contamination in the deeper aquifer could migrate to the upper aquifer as the well was pulled (see Section 2.5). The overdrilling method should:

- Follow the original well bore.
- Create a borehole of the same or greater diameter than the original boring.
- Remove all of the well construction materials.

SITE NAME:

SITE ID.:
INSPECTOR:
DATE/TIME:
WELL ID.:

MONITORING WELL FIELD INSPECTION LOG
NYSDEC WELL DECOMMISSIONING PROGRAM

	YES	NO
WELL VISIBLE? (If not, provide directions below)		
WELL I.D. VISIBLE?		
WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back)		

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL:

	YES	NO
SURFACE SEAL PRESENT?		
SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below)		
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		

HEADSPACE READING (ppm) AND INSTRUMENT USED

TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable)

PROTECTIVE CASING MATERIAL TYPE:

MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches):

	YES	NO
LOCK PRESENT?		
LOCK FUNCTIONAL?		
DID YOU REPLACE THE LOCK?		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes,describe below)		
WELL MEASURING POINT VISIBLE?		

MEASURE WELL DEPTH FROM MEASURING POINT (Feet):

MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet):

MEASURE WELL DIAMETER (Inches):

WELL CASING MATERIAL:

PHYSICAL CONDITION OF VISIBLE WELL CASING:

ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE

PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY.

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

REMARKS:

Acceptable methods for overdrilling include the following:

- Using conventional augering (i.e., a hollow stem auger fitted with a plug). The plug cutter will grind the well construction materials, which will be brought to the well surface by the auger.

- Using a conventional cable tool rig to advance casing having a larger diameter than the original boring. The cable tool kit is advanced within the casing to grind the well construction materials and soils, which are periodically removed with large diameter bailer. This method is not applicable to bedrock wells.

- Using an over-reaming tool with a pilot bit nearly the same size as the inside diameter of the casing and a reaming bit slightly larger than the original borehole diameter. This method can be used for wells with steel casings.

- Using a hollow-stem auger with outward facing carbide cutting teeth having a diameter two to four inches larger than the casing. Outward-facing cutting teeth will prevent severing the casing and drifting off center.

- Using a hollow-stem auger with a steel guide pipe inside. The casing guides the cutter head and remains inside the auger. The guide pipe should be firmly attached to the inside of the casing by use of a packer or other type of expansion or friction device.

Prior to overdrilling, an expandable J-plug or other suitable well cap will be used to prevent the introduction of soil or cuttings into the well, thereby ensuring a continuous grout column for wells that are grouted in place.

In all cases above, overdrilling should advance through the original bore depth by a distance of 0.5 feet to ensure complete removal of the construction materials. When the overdrilling is complete, the casing and screen can be retrieved from the center of the auger (American Society for Testing and Materials, Standard D 5299-92, 1992), if one of the hollow stem auger methods described above is employed. Subsequent to overdrilling at flush mount well locations where it may be impractical to remove well materials from inside the augers, a 1-2 foot deep area should be excavated by hand around the flush-mount well to facilitate a conventional well removal while tremie-grouting inside the well. Alterna-

tively, the soil within the annular space may be removed by raising the augers to allow the soil to fall out and re-advance the augers to the original target depth. Grout should then be tremied within the annular space between the augers and well casings. The grout level in the borehole should be maintained as the drilling equipment and well materials are sequentially removed. After overdrilling is completed, the borehole must be grouted according to the procedures in Section 9.0 and the upper five feet of borehole must be restored according to the procedures in Section 10.0.

2.3 GROUTING IN-PLACE

Grouting in-place is the simplest decommissioning procedure, but offers the least long-term protection of all the methods. As discussed in Section 2.5, however, this method is preferred for the bedrock portion of bedrock wells, and is used for decommissioning cased wells in certain situations. For cased wells, the procedure involves filling the casing with grout to a level of five feet below the land surface, cutting the well casing at the five-foot depth, and removing the top portion of the casing and associated well materials from the ground. The casing must be grouted according to the procedures in Section 9.0. In addition, the upper five feet of the borehole is filled to land surface and restored according to the procedures described in Section 10.0.

For wells installed in bedrock, the procedure involves filling the casing (or open hole) with grout to the top of rock according to the procedures in Section 9.0. The grout mix, however, will vary according to the hydrogeological conditions as discussed in Section 2.5.

It should be noted that for wells located on landfills regulated under 6NYCRR Part 360, the screened interval of the well must be sealed separately and hydrostatically tested to ensure its adequacy before sealing the remaining borehole. The Standard Operating Procedure (SOP) for the hydrostatic test has been included under Appendix D.

2.4 CASING PERFORATION/GROUTING IN-PLACE

At this time, casing perforation is the preferred method for wells with four-inch or larger inside diameter which are designated to be grouted in-place in accordance with the selection flow chart. The procedure involves perforating the well casing and screen then grouting the well. A wide variety of commercial equipment is available for perforating casings and screens in wells with four-inch or larger inside diameters. Due to the diversity of application, experienced contractors must recommend a specific technique based on site-specific conditions. A minimum of four rows of perforations several inches long and a minimum of five perforations per linear foot of casing or screen is recommended (American Society for Testing and Materials, Standard D 5299-92, 1992).

After perforating is complete, the borehole must be grouted according to the procedures in Section 9.0 and the upper five feet of borehole must be restored according to the procedures in Section 10.0.

2.5 SELECTION PROCESS AND IMPLEMENTATION

Selection of the decommissioning method is governed by the flow chart presented as Plate 1. A discussion of the selection criteria and decommissioning methodology is presented below.

2.5.1 Contaminated Monitoring Wells/Piezometers

For wells and piezometers suspected or known to be contaminated with NAPL or DNAPL product, measurement of the product volume will be determined using a weighted cotton string or by using an interface probe. Subsequent to calculation of the product volume, the NAPL/DNAPL product will be removed from inside the well. Removal of the contaminant product will be accomplished by bailing, pumping or installing an absorbent passive recovery system. Subsequent to product recovery, all contaminated materials will

be disposed of in accordance with the segregation and containment procedures described in Section 4.1.2.

2.5.2 Bedrock Wells

As illustrated on Plate 1.if the well is constructed within a bedrock formation, the screened or the open hole portion of the well is grouted to the top of the bedrock. Prior to initiating any grouting procedure, the depth of the well will be measured to determine if any silt or debris infilling has plugged the well. If plugging has occurred, the well will be flushed with an appropriately sized roller bit or drill rods to remove or suspend the obstruction in the water column. The borehole will then be tremie grouted from the bottom of the well to the top of bedrock to insure a continuous grout column. Note that if the bedrock well is cased, the screen should be perforated to the top of the rock if the inside diameter of the casing is 4-inches or larger. Furthermore, if the screened interval transects multiple water bearing zones the special grout mix discussed in Section 9.1.3 should be used to ensure penetration of the sand pack.

After the rock hole is grouted, the overburden portion of the well is decommissioned in accordance with the following sections. If the borehole extends to the surface, no further decommissioning procedures are required; however, the boring should only be filled to within 5-feet of the ground surface and site restoration should be completed in accordance with Section 10.0.

2.5.3 Uncontaminated Overburden Wells

For overburden wells and the overburden portion of bedrock wells, the first decision point in determining the decommissioning method considers whether the overburden portion of the well exhibits evidence of contamination, as determined through historical groundwater and/or soil sampling results. If the overburden portion of the well is uncontaminated, the next criteria considers whether the well penetrates a confining layer. In the case that the overburden portion of the well does not penetrate a confining layer, the casing should be pulled (and tremie-grouted) if possible. As a general rule, PVC wells greater than 25-feet deep should not be pulled unless site-specific conditions or other factors indicate that the

well can be pulled without breaking. If the well cannot be pulled, such as in the case that a bedrock portion of the well has already been grouted in place, or if the well materials and depth prohibit pulling or will likely result in breakage, the well should be grouted in-place as accordance with Section 2.3 (if the casing is less than 4-inch in diameter) or Section 2.4 (if the casing diameter is 4-inches or larger).

If the overburden portion of the well penetrates a confining layer, the casing should be removed by pulling (if possible) in accordance with Section 2.1. If the casing cannot be removed by pulling, the well should be removed by overdrilling. The overdrilling method used will depend on the site-specific conditions and requirements. If pulling is attempted and fails (i.e., a portion of the riser breaks) the remaining portion of the well should be removed by using the conventional augering procedure identified in Section 2.2. In all cases, after the well construction materials have been removed, the borehole will be grouted in accordance with Section 9.0 and the upper five feet will be restored in accordance with Section 10.0.

2.5.4 Contaminated Overburden Wells

If an overburden well or the overburden portion of a bedrock well is contaminated as evidenced by historical sampling results, the first decision point in selecting a decommissioning procedure is whether the well penetrates a confining layer. If the well does not penetrate a confining layer, the selection process follows the same pathway as for uncontaminated wells that penetrate a confining layer (i.e., the casing is pulled, if possible; otherwise the well is overdrilled - see Section 2.5.3). Plastic sheeting should be placed around the well surface to contain contaminated materials displaced during removal of the well.

For overburden wells that are contaminated and which penetrate a confining layer, the next selection criteria is whether the well riser is a single stem or is telescoped inside one or more outer casings. The procedures to be followed in determining the decommissioning method are presented for both situations below.

2.5.4.1 Single Stem Riser

If the riser is a single stem, the potential for cross-contamination between confining layers must be addressed. In particular, if the lower confining unit is contaminated, there is a potential that the contamination may be transferred to the upper unit as the well construction materials are removed to the ground surface. In this event, it will be necessary to install a temporary casing having a diameter larger than the original borehole into the top of the confining layer. This may be accomplished using a hollow stem auger or by employing a spin and flush technique to advance the casing. If the confining layer is less than 5 feet thick, the casing should be installed to the top of the confining layer. Otherwise, it is installed to a depth of 2 feet below the top of the confining layer. After the temporary casing has been set, the well can be removed and grouted through pulling (if possible) or through overdrilling if pulling is not feasible. Plastic sheeting should be placed around the well surface to contain contaminated materials displaced during removal of the well. As an alternative to installation of a temporary casing, the hollow-stem auger could serve the same purpose in that it would prevent the contamination from migrating to the upper unit. The hollow-stem auger would be advanced into the confining layer until the joint between the uppermost sections was nearly flush with the ground surface, and the sections would be disconnected to expose the riser prior to pulling or overdrilling.

After the casing and screen are removed and the well is grouted, the temporary casing (if used) is removed and the casing and/or hollow stem auger can be decontaminated for reuse. The upper 5 feet of the well surface should then be restored in accordance with Section 10.0.

2.5.4.2 Telescoped Riser

If the riser is telescoped in one or more outer casings, the decommissioning approach is dependent on the integrity of the well seal. For the purpose of the monitoring well decommissioning procedures, the well seal is defined as the bentonite seal above the sand pack. Although it is not possible to visually inspect or otherwise test the well seal to assess its condition, an indication of the well seal integrity may be obtained through review of the

boring logs and/or a comparison of groundwater elevations if the well is part of a cluster. Any problems noted on the boring logs pertaining to the well seal, such as bridging of bentonite pellets or running sands, or disparities between field notes (if available) and the well log would indicate the potential for a poor well seal. Alternatively, if the well is part of a cluster a comparison of groundwater elevations between the shallow and deep wells should also be performed. By observing trends at other clusters it may be possible to identify inconsistencies in groundwater elevations at the well slated for decommissioning, thereby indicating a poor well seal.

If there is no evidence that the well seal integrity is compromised, the riser should be grouted in-place in accordance with Section 2.3 or 2.4, depending on the diameter of the well casing, and the upper 5 feet of the well surface should be restored in accordance with Section 10.0. If indications are that the well seal is not competent, it will be necessary to design and implement a special procedure to remove the well construction materials, as the presence and configuration of the outer casing(s) will be specific in the individual wells and will be a key factor in the decommissioning approach. The special procedure should be designed to mitigate the potential for cross-contamination during removal of the well construction materials, and should be designed prior to initiating field work.

3.0 PREPARATION OF A SITE-SPECIFIC HEALTH AND SAFETY PLAN

Prior to initiating decommissioning activities at a site, it is necessary to prepare a site-specific health and safety plan (HASP) in accordance with the requirements of 29 CFR 1910.120. Accordingly, the HASP should include:

- The names of key personnel responsible for site health and safety, including an appointed site health and safety officer.
- A safety and health risk analysis for each site task and operation.
- Employee training requirements.
- Personal protective equipment (PPE) to be used by employees for each of the site tasks and operations being conducted.

- Medical surveillance requirements.
- Frequency and types of air monitoring, personnel monitoring and environmental sampling techniques and instrumentation to be used.
- Site control measures.
- Decontamination procedures.
- Site standard operating procedures.
- A contingency plan for responses to emergencies.
- Confined space entry procedures.

An example of a health and safety plan is attached as Appendix A. This document provides a general framework for preparing a HASP. Examples of site-specific information, such as names of responsible personnel, contaminant data, and other information which must be developed to meet the OSHA requirements discussed above are included in Appendix A but will need to be modified in the site-specific HASP.

4.0 PREPARATION OF A MATERIALS HANDLING AND DISPOSAL PLAN

Materials handling and disposal procedures for each of the wells slated for decommissioning should be identified in a site-specific materials handling and disposal plan. This plan will be used as a guideline to ensure safe and efficient control of contaminated materials, and will promote conformance with the applicable regulatory requirements for storage, characterization, labeling, transportation and disposal of materials prior to off-site transport.

4.1 MATERIALS HANDLING PROCEDURES

The materials anticipated to be generated during well decommissioning activities include decontamination fluids, disposable safety equipment (including personal protective

equipment), drill cuttings, groundwater, well construction materials (PVC and/or stainless steel casings, well screens, sand, bentonite/grout mixtures, etc.), and any spill-contaminated materials. Proper handling of these materials is effected through a series of steps, including: identification/pre-characterization of the waste materials; segregation/containment of the wastes including storage in proper containers; characterization of the waste materials through analytical testing to determine the absence/presence or nature of the contamination, and proper labeling in accordance with 49 CFR Part 172. Each of these steps is described in the following sections.

4.1.1 Identification/Pre-characterization

Prior to initiating well decommissioning activities at a site, the site history, most importantly historical analytical data from the monitoring wells, must be reviewed as well as the monitoring well construction details: number, type (overburden, bedrock), depth, diameter, and construction materials. This knowledge will aid in estimating the nature and quantities of waste materials which potentially may be generated as a result of decommissioning activities and will also assist in pre-determining the number of roll-off boxes, 55-gallon drums, and any other containers necessary to contain the wastes generated at each respective site.

4.1.2 Segregation and Containment

During well decommissioning activities, generated waste materials must be contained and segregated according to the nature of the suspected contamination. Well materials generated from decommissioning those wells with known contamination will be segregated from materials generated from those wells with little to no contamination (based on historical results). Contaminated materials will be further segregated according to contaminant type (e.g., well materials suspected of containing volatile organic contamination will be segregated from materials suspected of containing Polychlorinated Biphenyl (PCB) contamination).

For wells exhibiting contamination, all materials brought to the surface must either be decontaminated, disposed of at an appropriate Treatment, Storage and Disposal Facility

(TSDF), or properly containerized in a secure area for disposal by others. For all uncontaminated wells, the materials (except the casings) can be left at the surface near the former well unless the surrounding land use prohibits this disposal (e.g., if the well is located in an area where people could be exposed to the materials left on the surface; or if recovered decommissioning materials would not be consistent with the intended use of the land). In this case, the materials must be disposed of in a 6NYCRR Part 360 landfill. For contaminated wells, PVC and/or steel casing materials may be decontaminated for disposal in a Part 360 landfill, provided that the decontamination effort is thorough and cost effective. Requirements for characterization and disposal of contaminated materials are discussed in Sections 4.1.3 through 4.1.5.

Containment methods will be based on the estimated quantity of materials anticipated to be generated at each respective site. Solid waste materials (i.e., well construction materials, soils, drill cuttings, PPE), will typically be contained in roll-off boxes or 55-gallon drums. Since federal DOT regulations (49 CFR Part 177) generally limit the combined truck and cargo weight to 80,000 lbs, most hazardous waste transporters will limit the roll-off box capacity to 20 tons of hazardous waste per shipment. Thus, if the materials are to be transported off-site to a treatment, storage and disposal facility (TSDF) that accepts bulk waste, and if the anticipated quantity of waste will be large (greater than 5 tons), water-tight roll-off containers may be more practical and cost-effective for temporarily containing and transporting the waste in lieu or in combination with 55-gallon drums (e.g., 55-gallon drums may still be used for personal protective equipment or other articles not directly derived from the abandoned well). The roll-off containers should be lined with disposable HDPE liners to prevent contact with the container, and will be initially labeled according to the source(s) of the contained waste materials. Likewise, if drums are used they will be lined with a protective plastic sleeve, filled and the drum initially labeled according to the source of the contaminated materials. After the contents of the roll-offs and drums have been characterized, they should be labeled in accordance with 49 CFR Part 172. Roll-off containers will be covered with polyethylene covers and tarps with bows during temporary storage and transportation, and all drums will be sealed.

Fluids generated during the decommissioning program will generally be contained in 55-gallon drums unless extremely large volumes are expected; in this case 5,000-gallon tankers or other suitable temporary storage may be used. All drums will be initially labeled according to the wastewater source(s) and will be assumed to contain the same contaminants as the groundwater measured by the particular monitoring well being decommissioned. All 55-gallon drums containing fluids should be sealed and temporarily stored at the decontamination pad until final off-site disposal at an approved treatment facility.

4.1.3 Characterization

Hazardous waste characterization is necessary to determine the nature of the waste materials, to verify whether the materials are hazardous, and to determine proper disposition. Characterization of waste materials will be conducted at each of the sites to determine the appropriate disposal requirements. The decision as to the number, location and types of samples to be collected will be site specific and will depend on factors such as the quantity of waste generated and type of containers used, the nature of the waste, and the distribution of contaminant types across the site with respect to the origin of the waste materials. In general, the sample collection program will be designed to ensure that analytical data representative of all the materials to be disposed will be generated from the minimal number of samples. This may be accomplished by means such as:

- collection of composite samples for contaminants such as metals and PCBs (compositing is not typically acceptable for volatile organic compound analyses).
- collection of grab samples from select drums/containers suspected of elevated contaminant concentrations based on visual observation (e.g., soil staining, liquid sheen or non-aqueous product) or PID screening

Sample analysis will be based on site history and the requirements of the disposal facility. At a minimum, the samples should be analyzed for the parameters of concern indicated by past monitoring well analytical results, as well as the hazardous waste

characteristic parameters: toxicity by TCLP; ignitability; reactivity; and corrosivity in accordance with 40 CFR Part 261.

4.1.4 Labeling

Depending on the nature of the materials, proper labeling of the storage containers (roll-offs and/or drums) must be completed according to 49 CFR Part 172.

4.1.5 Disposal

Disposal of waste materials will depend on whether the waste has been characterized as hazardous or non-hazardous. Non-hazardous waste will be disposed of on-site in accordance with NYSDEC TAGM #4032 with the prior consent of the owner and the Department, or may be landfilled at a permitted 6NYCRR Part 360 facility.

For wastes that exhibit contamination, the requirements for disposal or treatment will be dependent on the waste characteristics. To determine these requirements the following procedure should be followed upon receipt of the waste characterization results:

1) Determine if the waste is characteristically hazardous (by failure of any of the criteria for toxicity, corrosivity, reactivity, or ignitability) or if it is a listed hazardous waste per the classifications identified in 40 CFR Part 261.

2) Determine the EPA hazardous waste code(s) for the applicable waste classification(s) listed in 40 CFR Part 261.

3) Determine any treatment standards for the hazardous waste code(s) per 40 CFR Part 268. Depending on the waste classification, treatment standards may be based on final concentration in the waste/waste extract or may require a specific treatment technology (e.g., incineration).

4) If the hazardous waste contains other constituents that are not listed in the treatment standards, and if landfilling is a disposal option, it should be determined if the waste is a California List waste per the criteria in 40 CFR Part 268.32 (e.g., under these regulations, nonliquid wastes must not contain total halogenated organics at or in excess of 1,000 ppm).

5) If the hazardous waste meets all treatment standards including the California List Standards (if applicable), it may be disposed of at a permitted hazardous

waste land disposal facility. For each shipment the generator is required to provide the following manifest information:

- Hazardous Waste Code(s)
- Corresponding concentration-based or technology-based treatment standards.
- Manifest number.
- Waste analysis data.
- Certification Statement per 40 CFR 268.7(a)(2)(D)(ii).

In addition, the generator is required to maintain the records specified in 40 CFR Part 268.7(a)(7) for a minimum of 5 years.

6) If the waste fails to meet any of the treatment standards listed in 40 CFR Part 268, it must be sent to a treatment, storage, or recycling facility. If the waste's treatment standard is technology-based, it must be treated in accordance with the specified method. Land disposal is not allowable unless the waste is eligible for a National Capacity Variance (40 CFR Subpart C) and meets the California List standards. In all cases, the notification and recordkeeping requirements identified above must be fulfilled by the generator.

The hazardous waste will be transported in accordance with DOT regulations (49 CFR Parts 172-173) to either a secure hazardous waste landfill or TSDF, as appropriate. The contractor will be responsible for arranging for proper transportation and the disposal of the wastes. The Engineer will sign a hazardous waste manifest, as an agent of the Owner.

5.0 EQUIPMENT DECONTAMINATION REQUIREMENTS

Since the monitoring well decommissioning will involve multiple wells, there is a possibility of contamination from one well location to another. To avoid cross-contamination, procedures have been established for decontamination after operations at each well location is complete. The procedures for decontamination of personnel at the site will be specified in the site-specific Health and Safety Plan. Decontamination of equipment will

follow established equipment cleaning protocols which are written in accordance with the Engineer's corporate policies and OSHA regulations.

The drilling and excavation equipment (i.e., drill rigs, cutting bits, and associated equipment) will be cleaned at a constructed decontamination facility. In general, the decontamination facility (i.e., decon pad or wash pad) will consist of plywood placed over a heavy synthetic liner. The pad will slope down to a sump that will collect all liquids. A detailed description and drawing of the decontamination facility that will be constructed is included in Appendix B as Item 1.

The drilling and excavation equipment will be prepared before it is brought to the decontamination facility and then cleaned at the facility. The preceding preparation includes removing gross soil/rock from the equipment to minimize losses during movement to the decon pad. At the decontamination facility, the equipment will be rinsed with low-volume water or steam, washed with phosphate-free detergent, and rinsed again with pressurized low-volume water or steam. The equipment will be inspected by the Engineer's field representative after cleaning. The detailed cleaning procedures are included in Appendix B as Item 2.

In the event that sampling equipment must be used, the decontamination guidelines included in Appendix B as Item 3 will be followed. In general, these guidelines describe cleaning with non-phosphate detergent, then performing rinsing cycles with water and acid. After the equipment is air-dried, it must be wrapped in aluminum foil to avoid accidental contamination after cleaning.

After all equipment is decontaminated, the solutions produced must be properly containerized and disposed of. All other disposable contaminated supplies/equipment such as disposable safety and sampling equipment will also need to be properly disposed of. Unless characterization of the decon fluids and disposable equipment is performed in accordance with Section 4.0, these materials will be handled in the same manner as the drill cuttings/fluids from the well locations. All materials must be temporarily stored in a secure area such as the fenced decon pad.

If sampling is necessary, the Engineer's personnel will be responsible for the decontamination of the sampling equipment. The decontamination of drilling and excavation

equipment is the responsibility of the Contractor(s). The Engineer's field representative will make daily inspections to insure that decontamination procedures are being followed.

6.0 LOCATING AND SETTING-UP ON THE WELL

The following tasks shall be performed to locate the well to be decommissioned:

- Notify property owner and/or other interested parties including the governing regulatory agency prior to site mobilization whenever possible.
- Review information about the well contained in the site file. This information may include one or more of the following: the site map, well boring log, well construction diagram, field inspection log, well photograph, and proposed well decommissioning procedure.
- Verify the well location and identification by locating the identifying marker.
- Verify the depth of the well in the well construction log by sounding with a weighted tape.

After the well has been located, the decommissioning procedure should be selected in accordance with Section 2.0 based on the available boring and sampling data. The rig must be set up prior to initiating drilling to ensure proper alignment with the well (i.e., the drill string must be aligned with the monitoring well).

7.0 REMOVING THE PROTECTIVE CASING

7.1 GENERAL

Removal of the protective casing of a well must not interfere with or compromise the integrity of decommissioning activities performed at the well.

The procedure for removing the protective casing of a well depends upon the decommissioning method used. When a well is decommissioned by the overdrilling or casing pulling method, the protective casing may be removed either before or after the casing is removed. When the decommissioning procedure requires casing perforation or grouting

in-place, the protective casing should be removed after grout is added to the well. The protective casing handling and disposal must be consistent with the methods used for the well materials, unless an alternate disposal method can be employed (e.g., steam cleaning followed by disposal as nonhazardous waste).

7.2 PRIOR TO SEALING THE WELL BORE

When overdrilling, the protective casing must be removed first, unless the drilling tools have an inside diameter larger than the protective casing. The variety of protective casings available preclude developing a specific removal procedure. In all cases, however, the specific procedure used must minimize the risk of:

- breaking the well casing off below ground and
- allowing foreign material to enter the well casing.

If the decommissioning method used is casing pulling, the decision of when to remove the protective casing is not critical.

An acceptable protective casing removal method involves breaking up the concrete seal surrounding the casing and jacking or hoisting the casing out of the ground. A check should be made during pulling to insure that the inner well casing is not being hoisted with the protective casing. If this occurs, the well casing should be cut off after the base of the protective casing is lifted above the land surface.

7.3 AFTER SEALING THE WELL

If the decommissioning method used allows well casing to remain in the ground, the protective casing should be removed after the well has been properly filled with grout. This will insure that the well is properly sealed regardless of problems with protective casing removal. During grouting in-place, the well casing must be removed to a depth of five feet below the land surface. The upper five feet of casing and the protective casing can be removed in one operation if a casing cutter is used. If the height of the protective casing

makes working conditions at the well awkward, the casing can be cut off at a lower level. However, the inner well casing must remain aboveground and cannot be damaged in any way that prevents the well from being filled with grout.

8.0 DECOMMISSIONING OF SCREEN AND RISER

After setting up on the well and removing the protective casing (if necessary), the well screen and riser are decommissioned in accordance with the appropriate procedure and methodology as discussed in Section 2.0 (i.e., if the wells are overdrilled or pulled, the casing and riser are removed. Otherwise, they are perforated and/or grouted in-place). During the decommissioning activities the requirements of the site-specific health and safety plan, materials handling and disposal plan and equipment decontamination plan will be followed to ensure maximum protection of human health and the environment.

9.0 SELECTING, MIXING, AND PLACING GROUT

9.1 SELECTING GROUT MIXTURE

There are two types of grout mixes that may be used to seal wells: a standard mix and a special mix. Both mixes use Type 1 Portland cement and four percent bentonite by weight. However, the special mix uses a smaller volume of water and is used in situations where excessive loss of the standard grout mix is possible (e.g. highly-fractured bedrock or coarse gravels).

9.1.1 Standard Grout Mixture

For most boreholes, the following standard mixture will be used:

- One 94-pound bag Type I Portland cement
- 3.9 pounds powdered bentonite
- 7.8 gallons potable water

This mixture results in a grout with a bentonite content of four percent by weight, and will be used in all cases except in boreholes where excessive use of grout is anticipated. In these cases a special mixture will be used (see Section 9.1.2).

See Section 9.2 for grout mixing procedures.

9.1.2 Special Mixture

In cases where excessive use of grout is anticipated, such as high permeability formations and highly fractured or cavernous bedrock formations, the following special mixture will be used:

- One 94-pound bag type I Portland cement
- 3.9 pounds powdered bentonite
- 1 pound calcium chloride
- 6.0-7.8 gallons potable water (depending on desired thickness)

The special mixture results in a grout with a bentonite content of four percent by weight. It is thicker than the standard mixture because it contains less water. This grout is expected to set faster than the Standard Grout Mixture. The least amount of water that can be added for the mixture to be readily pumpable is six gallons per 94-pound bag of cement.

See Section 9.2 for grout mixing procedures.

9.1.3 Alternate Special Grout

In cases where the penetration of the sandpack is critical, such as bedrock wells with screens that transect multiple water-bearing zones, the following alternate mixture will be used:

- One 94 pound bag Type III Portland Cement.
- 3.9 pounds powdered bentonite.
- 7.8 gallons potable water.

Refer to Section 9.2 for grout mixing procedures. It should be noted that this grout is expected to set faster than the standard grout mixture.

9.2 GROUT MIXING PROCEDURE

To begin the grout-mixing procedure, calculate the volume of grout required to fill the borehole. If possible, the mixing basin should be large enough to hold all of the grout necessary for the borehole. Tall cylindrical and long shallow basins should not be used as it is difficult to obtain a homogeneous mixture in these types of basins.

Mix grout until a smooth, homogeneous mixture is achieved. No lumps or dry clots should be present. Grout can be mixed manually or with a mechanized mixer. One acceptable type of mixer is a vertical paddle grout mixer. Colloidal mixers should not be used as they tend to excessively decrease the thickness of the grout for the above recipes.

9.3 GROUT PLACEMENT

Grout will be placed in the borehole from the bottom to the top using a tremie pipe of not less than 1-inch diameter. Grout will then be pumped into the borehole until the grout appears at the land surface (when grouting open holes in bedrock, the grout level only needs to reach above the bedrock surface). Any groundwater displaced during grout placement will be pumped via suction lift to a 55-gallon drum for proper disposal.

At this time the rate of settling should be observed. When the grout level stabilizes, casing or augers will be removed from the hole. As each section is removed, grout will be added to keep the level between 0-feet and 5-feet below land surface. If the grout level drops below the land surface to an excessive degree, an alternate grouting method must be used. One possibility is to grout in stages; i.e., the first batch of grout is allowed to partially cure before a second batch of grout is added.

Upon completion of grouting, insure that the final grout level is approximately five feet below land surface. A ferrous metal marker will be embedded in the top of the grout to indicate the location of the former monitoring well.

10.0 BACKFILLING AND SITE RESTORATION

The uppermost five feet of the borehole at the land surface will be filled with a material appropriate to the intended use of the land. The materials will be physically similar to the natural soils. No materials will be used that limit the use of the property in any way. The surface of the borehole will be restored to the condition of the area surrounding the borehole. For example, concrete or asphalt will be patched with concrete or asphalt of the same type and thickness, grassed areas will be seeded, and topsoil will be used in other areas. All solid waste materials generated during the decommissioning process will be disposed of properly.

11.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

This section describes the quality control/quality assurance (QA/QC) procedures necessary for monitoring and ensuring the Contractor's adherence to the Monitoring Well Decommissioning Project procedures, plans and specifications, prepared by the Engineer. This section will discuss the minimum inspection and documentation requirements necessary to facilitate proper well decommissioning procedures and also will:

- Review the general requirements specified in the Contract Documents.
- Define roles and responsibilities of all parties.
- Establish the key tasks to be monitored by the on-site construction inspector and the appropriate inspector forms and logs to be used for recording the Contractor's activities.
- Establish procedures for communicating change orders, field modifications and variations from the Contract Documents to the Owner.
- Establish scheduled meetings and briefings during the construction phase.

The overall goal of the project QA/QC program is to ensure that proper well decommissioning techniques and procedures are used in accordance with the requirements

of the Contract Documents. The QA/QC procedures herein should be followed by QA personnel including: Construction Contractor personnel, the Contractor's subcontracted laboratory and field personnel, and the Engineer's on-site construction inspector.

11.1 RESPONSIBILITY AND AUTHORITY

The principal organizations involved in developing, designing and conducting well decommissioning activities are the Owner, Engineer, and the Construction Contractor.

11.1.1 Owner

The Owner will be responsible for reviewing the well decommissioning procedures to determine whether the documents meet their requirements, and to obtain approval of the procedures from the appropriate regulatory agencies. The Owner will have the responsibility and authority to review and accept or reject any design or procedural revisions or requests. The Owner also has the responsibility and authority to review and approve the Construction Monitoring Report and all QA documentation collected during well decommissioning activities.

11.1.2 Engineer

The Engineer will be responsible for reviewing and approving any engineering design changes, construction monitoring and quality assurance in accordance with this QA Plan. The Engineer will inform all parties involved with construction of their responsibilities, lines of communication, lines of authority, and QA/QC procedures. The Engineer's construction inspector (QA Engineer) will monitor decommissioning activities and will be assigned specific responsibilities and tasks. Most of the waste sample collection and testing will be conducted by the contractor at a frequency and manner specified in the site specific Materials Handling and Disposal Plan.

The person filling the construction inspector (QA Engineer) position will be trained and certified to operate an HNu organic vapor photoionization detector (PID), will be OSHA 40-hour Hazardous Waste Worker trained and will have a working knowledge of documents

pertaining to well decommissioning activities, including this plan. The Engineer's field personnel will be instructed to contact the construction inspector (QA Engineer) in the event well decommissioning requirements are not being met, QA procedures are not being implemented, or construction problems have been encountered.

11.1.3 Construction Contractor

In addition to performing the monitoring well decommissioning in accordance with the design documents, the Contractor will be required to obtain the services of a qualified testing laboratory to perform the analytical testing of the waste materials and will also be responsible for procuring transportation and disposal/treatment services.

11.2 PROJECT MEETINGS

The Engineer's management of the monitoring well decommissioning project will include conducting periodic project meetings as described below:

11.2.1 Pre-construction Meeting

The Engineer will schedule and attend one (1) pre-construction meeting for the purpose of discussing the project approach and answering contractor questions. The Engineer will also prepare and distribute meeting minutes. The meeting will also:

- Provide each party (organization) with relevant QA documents and supporting information.
- Familiarize each organization with the QA Plan and its role relative to the well decommissioning criteria and construction documents.
- Review the responsibilities of each organization and review the lines of authority and communication for each organization.
- Discuss the established procedures for observations and tests including waste sampling.

- Discuss the established procedures for handling construction deficiencies, repairs, and/or retesting.
- Review methods for documenting and reporting inspection data.

11.2.2 Monthly Progress Meetings

Monthly project meetings will be held during the course of the work to discuss the project schedule and work performed to date, and to address and resolve any existing or anticipated problems.

A special meeting will be held when and if a major QA problem or deficiency is present or likely to occur. At a minimum, the meeting shall be attended by the Construction Contractor and the Engineer's on-site inspector (QA Engineer). The purpose of the meeting will be to define and resolve the problem(s) or deficiencies encountered. The meeting minutes will be documented by the Engineer.

11.3 KEY TASKS

The key tasks that the Engineer will conduct during the well decommissioning project are briefly summarized below.

11.3.1 Review of Contractor Submissions

Prior to well decommissioning activities, all written submissions required by the contract documents will be evaluated and forwarded to the Owner, together with written submissions regarding their suitability. The Engineer will also obtain and review all necessary shop drawings, material tests and as-built drawings submitted throughout the construction and will make recommendations for acceptance/rejection to the Owner. The contractor's progress will be continuously monitored during the construction period, and Owner will be informed of the schedule and any corrective measures planned or implemented.

Throughout the project, payment requests by the contractor will be reviewed for accuracy and completeness prior to making recommendations relative to payment. Review

will involve comparing actual notes of field personnel to items contained in the payment request. Discrepancies will be discussed with the contractor and will be amended if necessary.

11.3.2 Construction Inspection

The Engineer will provide full-time inspection of the contractor during all critical well decommissioning activities at each of the sites. This will be accomplished by providing an experienced on-site inspector(s) to document the contractor's adherence to the contract specifications and monitoring the contractor's progress. The Engineer will notify the Owner in the event that the contractor fails to perform the decommissioning work as specified in the contract and recommend to the Owner the acceptance, conditional approval/disapproval or rejection of the contractor's work. The Engineer will issue instructions, field orders, interpretations and clarification of contract language to the contractor as required. In the event that a change order is necessary, the Engineer will submit the change order with a detailed cost estimate to the Owner. The Engineer will also document, evaluate and recommend a course of action for all disputes and claims with the contractor.

In addition, the Engineer will inspect, evaluate and document the monitoring well condition after the well has been removed.

11.4 DOCUMENTATION

The Engineer's on-site construction inspector will document all monitoring well decommissioning activities. Such documentation will include, at a minimum, daily reports of construction activities, photographs, and sketches as necessary. Field investigation reports will be completed by the construction inspector when major questions arise at the site. Forms to be used for this purpose are presented in Appendix C.

The Engineer will maintain complete and detailed records associated with all construction and related activities during the duration of the project. These records will be maintained at the Engineer's office(s) and will include but not be limited to the following:

- Daily work completed and important conversations.
- Contractor's daily use of personnel, material and equipment.
- Records documenting the contractor's deviation from work as specified in the contract documents, and any instructions issued regarding deviations.
- Unusual circumstances (weather conditions, labor disputes, environmental problems, health and safety hazards encountered, etc.).
- General files including correspondence and other documentation related to the project.
- Job meeting minutes with documentation on resolution of issues raised.
- Records of contractor's submittals including shop drawings, modifications/change orders, soil tests, material tests and action taken (e.g.,Owner approval/disapproval, further information needed).
- Construction photos.
- Telephone conversation

In addition, the Engineer will submit monthly Project Summary Reports to the Owner. These reports will identify the work which has been accomplished and will document the status of each monitoring well at each site where decommissioning work has occurred.

Upon substantial completion of the decommissioning activities at each site, the Engineer will prepare a detailed list of any work remaining unfinished. The Engineer will then prepare and submit a written notice to the Owner which will include a determination as to whether the completed work meets the requirements of the contract documents. Following satisfactory completion of the work, the Engineer will perform a final inspection of the site and submit a notice to the Owner that decommissioning activities were performed in accordance with the contract documents as revised by any approved change orders or modifications to the scope of work.

Documentation on the condition of the removed wells with respect to the impacts of hazardous waste, minerals and other pertinent environmental factors, or discernable through

direct observation, will be presented to Owner along with any recommendations for future well installation techniques and materials.

12.0 REFERENCES

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APPENDIX F

NYSEC TAGM HWR-89-4031, FUGITIVE DUST SUPPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

HWR-89-4031
October 27, 1989

New York State Department of Environmental Conservation

MEMORANDUM

TO: Regional Hazardous Waste Remediation Engrs., Bur. Directors & Section Chiefs
FROM: Michael J. O'Toole, Jr., Director, Division of Hazardous Waste Remediation
SUBJECT: DIVISION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM--FUGITIVE DUST SUPPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES
DATE: OCT 2 7 1989

1. Introduction

Fugitive dust suppression, particulate monitoring, and subsequent action levels for such must be used and applied consistently during remedial activities at hazardous waste sites. This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2. Background

Fugitive dust is particulate matter--a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles, liquid droplets or solids, over a wide range of sizes--which becomes airborne and contributes to air quality as a nuisance and threat to human health and the environment.

On July 1, 1987, the United States Environmental Protection Agency (USEPA) revised the ambient air quality standard for particulates so as to reflect direct impact on human health by setting the standard for particulate matter less than ten microns in diameter (PM_{10}); this involves fugitive dust whether contaminated or not. Based upon an examination of air quality composition, respiratory tract deposition, and health effects, PM_{10} is considered conservative for the primary standard--that requisite to protect public health with an adequate margin of safety. The primary standards are 150 ug/m^3 over a 24-hour averaging time and 50 ug/m^3 over an annual averaging time. Both of these standards are to be averaged arithmetically.

There exists real-time monitoring equipment available to measure PM_{10} and capable of integrating over a period of six seconds to ten hours. Combined with an adequate fugitive dust suppression program, such equipment will aid in preventing the off-site migration of contaminated soil. It will also protect both on-site personnel from exposure to high levels of dust and the public around the site from any exposure to any dust. While specifically intended for the protection of on-site personnel as well as the public, this program is not meant to replace long-term monitoring which may be required given the contaminants inherent to the site and its air quality.

3. Guidance

A program for suppressing fugitive dust and monitoring particulate matter at hazardous waste sites can be developed without placing an undue burden on remedial activities while still being protective of health and environment. Since the responsibility for implementing this program ultimately will fall on the party performing the work, these procedures must be incorporated into appropriate work plans. The following fugitive dust suppression and particulate monitoring program will be employed at hazardous waste sites during construction and other activities which warrant its use:

(1) Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

(2) Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Such activities shall also include the excavation, grading, or placement of clean fill, and control measures therefore should be considered.

(3) Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM_{10}) with the following minimum performance standards:

Object to be measured: Dusts, Mists, Aerosols
Size range: <0.1 to 10 microns
Sensitivity: 0.001 mg/m^3
Range: 0.001 to 10 mg/m^3
Overall Accuracy: $\pm$10% as compared to gravimetric analysis of stearic acid or reference dust

Operating Conditions:
Temperature: 0 to 40°C
Humidity: 10 to 99% Relative Humidity

Power: Battery operated with a minimum capacity of eight hours continuous operation

Automatic alarms are suggested.

Particulate levels will be monitored immediately downwind of the working site and integrated over a period not to exceed 15 minutes. Consequently, instrumentation shall require necessary averaging hardware to accomplish this task; the P-5 Digital Dust Indicator as manufactured by MDA Scientific, Inc. or similar is appropriate.

(4) In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the entity operating the equipment to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

(5) The action level will be established at 150 ug/m^3 over the integrated period not to exceed 15 minutes. While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m^3, the upwind background level must be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 ug/m^3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see Paragraph 7). Should the action level of 150 ug/m^3 be exceeded, the Division of Air Resources must be notified in writing within five working days; the notification shall include a description of the control measures implemented to prevent further exceedences.

(6) It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM_{10} at or above the action level. Since this situation has the potential to migrate contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

(7) The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

1. Applying water on haul roads.
2. Wetting equipment and excavation faces.
3. Spraying water on buckets during excavation and dumping.
4. Hauling materials in properly tarped or watertight containers.
5. Restricting vehicle speeds to 10 mph.
6. Covering excavated areas and material after excavation activity ceases.
7. Reducing the excavation size and/or number of excavations.

Experience has shown that utilizing the above-mentioned dust suppression techniques, within reason as not to create excess water which would result in unacceptable wet conditions, the chance of exceeding the 150 ug/m^3 action level at hazardous waste site remediations is remote. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

(8). If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (that is, below 150 ug/m^3 and no visible dust), work must be suspended until appropriate corrective measures are approved to remedy the situation. Also, the evaluation of weather conditions will be necessary for proper fugitive dust control--when extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended.

There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require appropriate toxics monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

cc: E. Sullivan
D. Markell
A. DeBarbieri
C. Goddard
R. Tramontano
E. McCandless
A. Fossa
J. Kelleher
J. Colquhoun
M. Keenan
D. Ritter
Regional Directors
Regional Engineers
RSHWE
Reg. Citizen Participation Specs.

APPENDIX G

NYSDEC PERMIT FOR WATER DISCHARGE

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Eastern Remedial Action, Room 242
50 Wolf Road, Albany, New York 12233-7010
Phone: (518) 457-4349 FAX: (518) 457-4198

John P. Cahill
Commissioner

December 16, 1998

Mr. Christopher Kane
Roy F. Weston, Inc.
One Wall Street
Manchester, NH 03101-1501

Dear Mr. Absolom:

Re: Application for Discharge Criteria
Open Burning Grounds Remediation
Seneca Army Depot, Site ID No. 850006

The New York State Department of Environmental Conservation (NYSDEC) has reviewed your submittal of October 8, 1998 regarding an application for SPDES "substantial equivalent" effluent criteria for remedial activities at the Open Burning Grounds. Please find attached the applicable effluent criteria as well as the enclosed General Conditions and Additional Conditions.

If you have any comments or questions on this matter, please contact me by telephone at (518)457-3976 or by e-mail at jaquinn@gw.dec.state.ny.us.

Sincerely,

James A. Quinn
Bureau of Eastern Remedial Action
Division of Environmental Remediation

c: C. Struble
D. Geraghty
M. Peachey
S. Absolom

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning May 1999

and lasting until October 2000

the discharges from the treatment facility to Reeder Creek, water index number Ont 66-12P 369-6, Class C , RECEIVING WATER shall be limited and monitored by the operator as specified below:

Outfall Number and Parameter	Discharge Limitations		Units	Minimum Monitoring Requirements	
	Daily Avg.	Daily Max		Measurement Frequency	Sample Type
Outfall 001 - Treated Groundwater Remediation Discharge:					
Flow	Monitor	300,000	GPD	Continuous	Meter
pH (range)	6.5 to 8.5		SU	Weekly	Grab
RDX	Monitor	Monitor	µg/l	Monthly	Grab
2,6 Dinitrotoluene	Monitor	Monitor	µg/l	Monthly	Grab
Total Dissolved Solids	Monitor	500	mg/l	Weekly	Grab
Aluminum	Monitor	4000	µg/l	Weekly	Grab
Cadmium	Monitor	6	µg/l	Weekly	Grab
Chromium	Monitor	182	µg/l	Weekly	Grab
Cobalt	Monitor	5	µg/l	Weekly	Grab
Copper	Monitor	46	µg/l	Weekly	Grab
Iron	Monitor	300	µg/l	Weekly	Grab
Lead	Monitor	30	µg/l	Weekly	Grab
Manganese	Monitor	300	µg/l	Weekly	Grab
Mercury	Monitor	0.8	µg/l	Weekly	Grab
Nickel	Monitor	132	µg/l	Weekly	Grab
Selenium	Monitor	4.6	µg/l	Weekly	Grab
Silver	Monitor	27	µg/l	Weekly	Grab
Vanadium	Monitor	14	µg/l	Weekly	Grab
Zinc	Monitor	210	µg/l	Weekly	Grab
Cyanide	Monitor	5.2	µg/l	Weekly	Grab

Additional Conditions:

(1) Discharge is not authorized until such time as an engineering submission showing the method of treatment is approved by the Department. The discharge rate may not exceed the effective or design treatment system capacity. All monitoring data, engineering submissions and modification requests must be submitted to:

Chief - Operation Maintenance and Support Section
Bureau of Hazardous Site Control
Division of Environmental Remediation
NYSDEC
50 Wolf Road
Albany, N.Y. 12233-7010

With a copy sent to:

Tom Pearson, RWE, R-8
NYS Dept. Of Env. Conservation
6274 East Avon-Lima Road,
Avon, NY 14414-9519
716-226-2466

(2) Only site generated wastewater is authorized for treatment and discharge.

(3) Authorization to discharge is valid only for the period noted above but may be renewed if appropriate. A request for renewal must be received 6 months prior to the expiration date to allow for a review of monitoring data and reassessment of monitoring requirements.

(4) Both concentration (mg/l or µg/l) and mass loadings (lbs/day) must be reported to the Department for all parameters except flow and pH.

(5) Any use of corrosion/scale inhibitors or biocidal-type compounds used in the treatment process must be approved by the department prior to use.

(6) This discharge and adminstration of this discharge must comply with the attached General Conditions.

APPENDIX H

WELL INSTALLATION

WELL INSTALLATION PROCEDURES

taken from

APPENDIX A

FIELD SAMPLING AND ANALYSIS PLAN

GENERIC INSTALLATION RI/FS WORK PLAN

SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

The following information is taken from sections of the Generic Installation RI/FS Work Plan, which have been renumbered here. These sections are to be used for the installation of wells at Seneca Army Depot Activity. The sections are as follows:

1. Soil Borings
2. Monitoring Well Installation
3. Monitoring Well Development
4. Surveying
5. Investigation-Generated Derived Waste
6. Equipment and Material Decontamination
7. Record keeping

1 SOIL BORINGS

1.1 Objectives

The objectives of the soil borings are to collect soil samples and provide a mechanism to install permanent groundwater monitoring points.

1.2 Boring Techniques

Hollow stem augers (4.25 or 6.25 inch I.D.) will be used to drill each boring. The borings will be advanced to "refusal" which will represent the depth of the "competent" bedrock. Penetration through the till and upper few feet of the weathered shale can be easily documented by split spoon sampling and the augering rate. However, the determination at auger "refusal" in competent shale will be somewhat subjective as the hollow stem augers can generally penetrate through the shale, although at a very slow rate. For the purposes of these studies, auger "refusal" in "competent" shale will be defined as the depth (after penetrating the weathered shale) when augering becomes significantly more difficult and auger advancement is slow.

Soil samples will be collected continuously during the boring using a standard two- or three-inch diameter, two-foot long carbon steel split spoon barrel. Soil samples will be screened for volatile organic compounds using a PID or OVM.

All borings will be logged using a standardized boring log form (Figure A-2). Soil samples will be classified according to the Unified Soil Classification System (USCS). In addition,

a lithologic description will be provided according to the Burmiester system. Each boring log will record:

1. Boring identification and location:
2. Type of and manufacturer s name of drilling equipment:
3. Type and size of sampling and drilling equipment:
4. Starting and ending dates of drilling;
5. Length and depth of each sampled interval:
6. Length of each recovered sample:
7. Depth of all stratigraphic changes;
8. Lithologic description according to the Burmiester system and soil classification using standard USCS nomenclature:
9. Depth at which groundwater is first encountered:
10. Depths and rates of any water losses:
11. Depth to static water level:
12. Depths at which drilling problems occur and how the problems are solved:
13. Total boring depth:
14. Reason for terminating borehole;
15. Surface elevation: and
16. VOC readings of split spoon samples.

After the boring is completed, it will be filled to the ground surface with lean grout containing at least 3% bentonite powder by volume. The cement/bentonite grout seal will be placed from the bottom of the boring to approximately 3 feet below the land surface by pouring the mixture into the hole. The grout mixture will consist of Portland cement (ASTM C 150-86) and water in the proportion of not more than 7.0 to 8.0 gallons (gal) of clean water per bag of cement [1 cubic foot (ft^3) or 94 pounds (lb)]. Additionally, 3 percent by weight of bentonite powder will be added to help reduce shrinkage of the grout mixture. The grout will be allowed to set a minimum of 48 hours. If the borehole is greater than 15 feet and groundwater is present in the borehole, the grout will be pumped through a tremie pipe to the bottom of the boring. Grout will be pumped in until undiluted grout discharges from the bore hole at the ground surface. A bentonite backfill consisting of bentonite pellets will be placed from the top of the cement/bentonite grout seal to the ground surface and allowed to hydrate.

Split spoon barrels will be decontaminated as described in Section 6 of this specification. Drilling augers will be steam cleaned along with other drilling equipment between boring locations.

1.3 Health and Safety Procedures

All soil boring and sampling will be performed in accordance with the health and safety procedures described in Appendix B of the Generic Work. At SWMUs where there is a potential for UXOs and explosives, access routes and sampling work areas will be searched by UXO personnel prior to soil sampling operations. The boundaries of the access routes will be marked with orange survey flags. All UXOs located during the search operation will be flagged with yellow survey markers.

Remote drilling and test pitting by UXO personnel will be performed at locations deemed advisable by the Project Manager and UXO personnel.

All samples collected during the soil sampling operations at potentially UXO SWMUs will be inspected by UXO personnel for small UXO components prior to on-site testing or shipment for off-site laboratory testing. In areas heavily contaminated by UXOs or UXO components, samples will be collected by UXO personnel.

2 MONITORING WELL INSTALLATION

This section outlines the installation of stainless steel overburden monitoring wells. A 4 1/4-inch or 6 1/4-inch hollow-stem auger will be used to drill the borings and install the overburden wells.

All activities described in this procedure will be overseen by a qualified geologist.

2.1 Objectives

The objectives of this task are to install monitoring wells that will provide long term monitoring points for collection of representative samples of groundwater and accurate determinations of piezometric head in the till/weathered shale (i.e., overburden) aquifer. The wells will have a maximum screen length of ten feet and will be screened across the water table and through the entire till/weathered shale aquifer if possible. Based on depth to water measurements and boring logs from previous reports on the Seneca Army Depot Facility, the water table occurs within the till.

2.2 Decontamination of Equipment

Every appropriate precaution must be taken during drilling and construction of monitoring wells to avoid introducing contamination into the borehole. All equipment to be placed into the boring will be decontaminated before use at the site and between boreholes using EPA Region II and NYSDEC protocols (Section 6 of this specification). Equipment must be steam-cleaned between holes and only non-chlorinated potable water may be used during drilling operations, unless otherwise approved by the NYSDEC. Stainless steel well materials must be steam cleaned prior to being installed.

2.3 Well Installation

This section provides information on installation of overburden monitoring wells.

Proper design, construction, and installation of the proposed monitoring wells are essential for accurate interpretation of the groundwater data. The program to be implemented is consistent with the USEPA Region II CERCLA QA Manual and the NYSDEC Technical and Administrative Guidance Manuals (TAGMS) regarding design, installation, development and collection of groundwater samples. Further, the program is in compliance with all requirements described in the NYSDEC, 6 NYCRR Part 360, Solid Waste Management Facilities Regulations, Section 360-2.11, which details groundwater monitoring well requirements.

The installation of each monitoring well will begin after the boring has been completed. Only one well will be installed in each boring. Installation will begin within 48 hours for fully cased boreholes. Once installation has begun, no breaks in the installation process will be made until the well has been grouted and the drill casing removed.

Overburden wells will be installed using hollow-stem augers. These wells will be constructed of stainless steel and screened from 3 feet above the water table to the top of competent bedrock. Figures A-5 and A-8 illustrate the typical overburden monitoring well details. Water table variations, site stratigraphy, expected contaminant flow will also be considered in determining the screen length and position. Previous well logs and current fieldwork suggest these wells will not be more than 20 feet deep with well screen lengths of 10 feet or less. Soil split spoon samples will be collected continuously as the auger penetrates the formation. Soil samples will be collected as described in the soil boring program. The monitoring wells will be constructed of new 2-inch stainless steel, wire-wrapped screens as

required by NYSDEC and USEPA Region II with an expected screen slot size of 0.010" and threaded, flush joints that contain a rubber gasket. No solvents, glues, or other adhesives will be used to connect the stainless steel casing. A silt sump "point" will be placed at the bottom of each well. A locking cap will be paced on the end of the riser pipe.

Several methods for sizing filter materials and well screen openings are available in the literature. The methods are cited in Aller et al., (1989), Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells, Environmental Monitoring Systems Laboratory Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada, EPA 600/4-89/034, and Driscoil, F.G. (1988) Groundwater and Wells. Most methods are similar in concept and do not differ appreciably in their results. The first step in designing the filter pack is to obtain sieve analyses on the sample of the formation intended to be monitored. The filter pack material size is selected on the basis of the finest formation materials present.

A sand pack will be placed by pouring sand from the surface into in the annular space between the well screen and the hollow stem auger. If the well is greater than 15 feet deep, a tremie pipe will be used to place the sand pack. The sand pack will not extend more than 2 feet (but at least 6 inches) above the top, or 6 inches below the bottom of the screen. A finer grained sand pack material, 6 inches thick, will be placed at the top of the sand pack, between the sand pack and the bentonite seal to prevent infiltration of the bentonite into the sand pack around the well screen. A layer of bentonite pellets, between 1 and 2 feet thick, will be used to seal the well and will be poured within the annular space. Potable water will be poured on the pellets periodically during their installation to ensure they are hydrated properly. Then, the remaining annular space will be completely filled with a lean cement grout containing at least 3% by weight bentonite to cement. The grout mixture will be placed in the annular space by pouring it from the surface.

In all instances, wells will be protected with a steel casing, at least 4 inches in diameter in untrafficed areas. This protective steel casing will extend 3 ½ feet below the ground surface to prevent heaving by frost. The depth of the protective casing may be reduced to allow for better well construction in shallow bedrock situations. However, in this instance the casing should be shortened so that no more than 2.5 feet stick up above the ground surface. The protective casing will have a locking cap and a brass, weather resistant padlock. Duplicate keys will be obtained. A cement collar will surround the well. A weep hole will be drilled at the base of the protective steel casing above the cement collar to allow drainage of water. A locking expandable cap will also be placed in the top of the well casing. This cap will

provide protection from inappropriate filling of the well, should the protective casing lock be broken. To allow the water in the well to equilibrate when the expandable cap is tightened, a small slot shall be cut in the PVC well pipe 1-inch below the base of the expandable well cap. A permanent well identification marker will be attached to the steel protective casing.

Three protective ballards will be placed around each monitoring well that has a steel-protective casing. The boilards will be placed 3 feet from the well. At each bollard location, from 2 to 2.5 feet of the bollard shall be cemented below the ground surface and at least 2.5 feet shall be exposed above the ground surface. Care should be taken to ensure that the ballard is not cemented at depth that corresponds with the screened section of the well.

The monitoring well protective casings will be marked with the well number using metal stamps, a metal plate pop riveted to the steel casing, not to the cover, or paint on the pipe, not the cover. The details of well installation will be recorded.

3 MONITORING WELL DEVELOPMENT

3.1 Objectives

The purpose of this task is to remove sediment and fines from the well and surrounding soil so that a representative sample of the groundwater can be obtained.

3.2 Monitoring Well Development

The development of monitoring wells will be performed 2 to 7 days after well installation and at least 7 days before well sampling and water elevation monitoring activities.

If necessary, access routes and sampling work areas where UXOs are potentially present will be searched by UXO personnel prior to monitoring well development and sampling operations (boundaries of the access routes will have been previously marked with orange survey flags). All UXOs located during the search operation will be flagged with yellow survey markers. In areas heavily contaminated by UXOs or UXO components, well development and groundwater sampling could be performed by UXO personnel.

Development of wells will be accomplished by light surging and removal of water with a bailer or surge block followed by pumping with peristaltic pump. Water will not be added

to the well to aid in development. All development equipment will be decontaminated prior to use in each well. The decontamination procedures for downhole development equipment and the bailer are provided in Section 6 of this specification.

As the wells may be slow to recharge due to the low permeability of the formation, surging and overpumping may need to be performed numerous times on each well, with complete recharge between each episode. Every attempt will be made to remove excessive turbidity from the wells because high turbidity can result in elevated metal concentrations detected in the groundwater. A well development report will be completed, as shown on Figure A-12, Well Development Report.

Note: the fined-grained nature of aquifer material means that it is unlikely that all of the "fines" will be removed from the area around the well during development. To reduce turbidity of the ground water for successive sampling events, end the well development procedure will low flow purging using a peristaltic pump.

3.3 Development Criteria

Each monitoring well will be developed to assist in ensuring the collection of representative groundwater samples. The criteria for determining if the well has been properly developed is based upon the guidance provided by the NYSDEC, TAGM #HWR-88-4015. This guidance document specifies an upper level of allowable levels of turbidity in groundwater from monitoring wells which is considered acceptable for determining the water quality of metals in the aquifer. This policy does not apply to surface waters.

The development procedure consists of light surging with a surge block for 2 to 5 minutes, with periodic removal of water using a bailer. The light surging is performed to remove any silt and clay "skin" that may have formed on the borehole wall during drilling. After surging, the water in the well is to be removed using a peristaltic pump (or similar pump) at a rate of between 1.5 and 3 liters per minute. The relatively low flow rate of water removal from the well is to allow for development of the well and the surrounding formation by removing some silt and clay, while not creating an influx of large amounts of silt and clay, which are major components of the till.

Prior to the beginning of well development, any water lost during the drilling process will be removed. Development operations shall be performed until the following primary conditions

are met:

1. Water samples will have the lowest possible NTUs (preferably < 50 NTUs); and
2. The temperature, specific conductivity and pH of the well water vary by no more than 10 percent over 2 consecutive readings. Readings will be conducted for each well volume.

In addition to meeting the above primary conditions, removal of at least three well volumes of water from the well is a secondary condition that should be met if the well will allow. If not, remove as much water as necessary to meet the primary conditions, but at least one well volume.

Temperature, specific conductivity and pH will be measured in the field. A nephelometer will be used to measure turbidity. The instruction manuals for these instruments will be kept with the instruments in the field.

3.4 Well Survey

The locations and elevations of all existing and newly installed monitoring wells must be surveyed to obtain their location which is then plotted on a map in the hydrogeologic report. The location of each well will be tied to the New York State coordinate system. The ground surface elevation, the top of the monitoring well riser pipe and the top rim of the protective steel casing (with the top open) must be accurately measured to the nearest one-hundredth of a foot. The elevation of the riser pipe will be made at a notch cut into the lip of the pipe. The plug or cap covering the well will be removed for this measurement.

4 SURVEYING

Any surveying performed at SEDA will provide accurate site base maps which will be used for the following purposes:

1. Map the direction and compute the velocity of groundwater movement.
2. Locate all the environmental sampling points.
3. Serve as the basis for volume estimates of impacted soils and sediments which may require a remedial action, and
4. Map the extent of any impacted groundwater above established ARAR limits.

Additional surveying will conform to the specifications cited below. The survey will involve photogrametric mapping, followed by a field survey. By having an aerial photographic survey performed for the site, the site topographic data can be electronically inputted to the software on AutoCad System. This approach will produce more accurate site maps and since the software stores the data as a 3-dimensional file, it will facilitate a great deal more flexibility in its future use. Typical examples of what this software can produce automatically are stormwater run-off calculations, cut and fill calculations, and graphical cross-section through any part of the site. The field control will establish horizontal and vertical control and will serve as the basis for relating the photogrametric information to actual land elevations and the New York State Plane Coordinate System.

4.1 Field Surveying

During the field survey, plastic or wooden hubs shall be used for all basic control points. A minimum of two (2) concrete monuments with 3.25-inch domed brass or aluminum alloy survey markers (caps) and witness posts will be established at the site. The concrete monuments will be located within the project limits and will be set 50 feet from the edge of any existing roads in the interior of the project limits and will be a minimum of 500 feet apart. The placement of all monuments, hubs, etc., shall be coordinated with SEDA. Witness posts, etc., shall be durable and brightly colored to preclude damage due to normal landscaping activities. Concrete monuments shall be constructed so as to preclude damage due to frost action. Horizontal control (1:10,000) and vertical control (1:5,000) of third-order or better shall be established for the network required for all the monuments. The caps for new monuments shall be stamped in a consecutively numbered sequence (e.g., SEAD-#-year, USAED-Huntsville).

The dies for stamping the numbers and letters into these caps shall be of 1/8 inch in size. All coordinates will be to the closest 0.01 foot and will be referenced to the State Plane Coordinate System and all elevations are to be referenced to the 1929 North American Vertical Datum. Elevations to the closest 0.10 foot shall be provided for the ground surface at each soil boring. Elevations to the closest 0.01 foot shall also be established for the survey marker and the top of casing (measuring point) at each monitoring well.

The location, identification, coordinates and elevations of all the control points recovered and/or established at the site and all of the geophysical survey areas, soil borings, monitoring wells (new and existing) and all surface water sampling points will be plotted on a

topographic map (at a scale of 1 inch = 50 feet) to show their location with respect to surface features within the project area. A tabulated list of the monuments, the soil borings and the surface water sample points including their coordinates and elevations, a Description Card" for each monument established or used for this project, the 1 inch = 50 feet map and all field books and computations will be prepared. The tabulation shall consist of the designated number of each boring, monument or surface water sampling point, the X- and Y-coordinates and all the required elevations. The Description Card shall show a sketch of each monument; its location relative to reference marks, buildings, roads, towers, etc.; written description telling how to locate the monument from a known point; the monument name or number and the adjusted coordinates and elevations.

During the field survey, level circuits will close on a benchmark whose elevation is known (other than the starting benchmark is possible). The following criteria will be met in conducting the survey:

- Instruments will be pegged regularly;
- Rod levels will be used;
- Foresight and backsight distances will be reasonably balanced; and,
- Elevation readings will be recorded to 0.01 foot.

Temporary monuments will be set and referenced for future recovery. All monuments will be described in the field notes. Sufficient description will be provided to facilitate their recovery.

Traverses will be closed and adjusted in the following manner:

- Bearing closures will be computed and adjusted, if within limits;
- Coordinate closures will be computed using adjusted bearings and unadjusted field distances;
- Coordinate positions will be adjusted if the traverse closes within the specified limits. The method of adjusting shall be determined by the surveyor;
- Final adjusted coordinates will be labeled as "adjusted coordinates." Field coordinates will be specifically identified as such; and
- The direction and length of the unadjusted error of closure, the ratio of error over traverse length, and the method of adjustment will be printed with the final adjusted coordinates.

Level circuits will be closed and adjusted in the following manner:

- For a single circuit, elevations will be adjusted proportionately, provided the raw closure is within the prescribed limits for that circuit; and
- In a level net where the elevation of a point is established by more than one circuit, the method of adjustment will consider the length of each circuit, the closure of each circuit, and the combined effect of all the separate circuit closures on the total net adjustment.

For this project, all surveys shall be third-order plane surveys as defined by the following standards and specifications:

Traverse

Standard error of the mean for length measurements	1 in 10,000
Position closure per loop in feet after azimuth adjustment	1:5,000 checkpoint or 3.34 M** (whichever is smaller)

Leveling

Levels error of closure per loop in feet	0.05 M**

M** is the square root of distance in miles.

Third-order plane surveys and horizontal angular measurements will be made with a 20-second or better transit. Angles will be doubled, with the mean of the doubled angle within 10 seconds of the first angle. Distance measurements will be made with a calibrated tape corrected for temperature and tension or with a calibrated electronic distance meter instrument (EDMI). When using EDMI, the manufacturer's parts per million (ppm) error is applied, as well as corrections for curvature and refraction.

Site surveys will be performed in accordance with good land surveying practices and will conform to all pertinent state laws and regulations governing land surveying. The surveyor

shall be licensed and registered in New York. Upon completion of the project, all original field notebooks, computations, and pertinent reference materials will be available at the surveyor's office. Photostatic copies of these materials will be kept in the project files.

All field note reduction will be checked and marked in such a way that a visual inspection of the field notes will confirm that checks have been made. All office entries in field notebooks will be made in colored pencil. The office worker who reduces or checks field notes will initial each page worked on in the color used on that page.

Monitoring well locations will be surveyed only after the installation of the tamperproof locking cap guard pipe or road box, which will be set in concrete. The following elevations will be measured:

- Top of the outer protective casing at the point opposite the lock or bolt on the guard pipe or road box;.
- Top of the inner PVC riser pipe (on the lip, not the cap); and
- Finished concrete pad adjacent to the outer well casing.

5 INVESTIGATION-GENERATED WASTE MANAGEMENT

All soil and water generated during drilling and well development and purging will be collected on-site. All drill cuttings, well development water, purge water generated during sampling, and decontamination liquids will be contained in approved 55-gallon drums. All drums will be labeled as to contents and origins using commercially available, all-weather labels. Investigation derived waste information for each SWMU will be recorded on Figure A-25. At the end of each phase of drilling, documentation lists of the required chemical analyses, evaluation of site conditions and knowledge of regulatory requirements) will be provided which will recommend the disposition for each drum. For each drum considered to contain contaminated material, a specific optimum method of disposal will be recommended, along with a price for disposal. The material will be disposed under manifest, using the SEDA RCRA disposal permit. SEDA is the generator and ultimate signatory of transport and disposal manifests.

In the case of soil excavated from test pits, the Army has been granted a written exemption from USEPA allowing test pit soil to be backfilled in lieu of testing and possible management as a waste. Please refer to the exemption letter from EPA to the U.S. Army, dated September 16, 1991, attached at the end of this appendix.

6 EQUIPMENT AND MATERIAL DECONTAMINATION

All equipment used during the collection, preparation, preservation, and storage of environmental samples must be cleaned prior to their use and after each subsequent use. Frequently, sampling equipment must be cleaned between successive uses in the field to prevent cross contamination. When field cleaning is needed, it is essential that it be conducted diligently, to ensure that all parts of the field equipment that come in contact with the sample are properly decontaminated.

Supplies needed for cleaning or decontamination is dependent upon the materials and equipment to be cleaned. When small items require cleaning in the field, several small buckets and small containers of reagents or wash liquids are adequate. However, when major items, such as large pumps, require decontamination, it may be necessary to transport large wash basins and larger volumes of washing solutions. The following is a general equipment list for field decontamination operations.

1. Detergent, such as Alconox;
2. Potable water;
3. Demonstrated analyte free water;
4. Methanol;
5. Hexane and/or other suitable solvents to remove petroleum products;
6. Storage vessels to transport large volumes of water to the site;
7. Buckets for washing and rinsing equipment;
8. Paper towels, clean rags or chemwipes to remove excessive soil or petroleum products before the equipment is decontaminated;
9. Ultrapure HNO_3; and
10. Plastic squeeze bottles for rinsing equipment;

The following procedure will be used to decontaminate the sampling equipment (e.g., split spoons, syringes, bowls, scoops, bailers, soil gas sampling rods and points):

1. Wipe with rag, towel or chemwipes, or steam clean to remove excess soils or debris;
2. Wash and scrub with low phosphate detergent;
3. Tap water rinse;
4. Rinse with 10% HNO_3, ultrapure, on stainless steel equipment;
5. Tap water rinse;

6. Rinse with high-purity methanol followed by hexane rinse:
7. Rinse well with demonstrated analyte free water:
8. Air dry: and
9. Use equipment immediately or wrap in clean aluminum foil or teflon film for temporary storage.

When it is necessary to use split spoon sampling devices which are composed of carbon steel instead of stainless steel, the nitric acid rinse may be lowered to a concentration of 1% instead of 10% so as to reduce the possibility of leaching metals from the spoon itself.

Rinse water level tapes and slugs (slug testing) with tap water, followed by demonstrated analyte-free water. Place in a polyethylene bag to prevent contamination during storage or transit.

Clean submersible pumps used for purging the deep wells prior to use and between wells by pumping copious amounts of tap water through the pumps and associated hoses, followed by rinsing with demonstrated analyte-free water. Clean the exterior of the submersible pumps and hoses that contact formation water by washing with detergent/water solution, followed by a tap water rinse, and a final rinse with demonstrated analyte-free water. Dedicate all tubing to individual wells or dispose of it, i.e., do not reuse tubing. To prevent degradation of or damage to submersible pump seals, impellers, and electric motors, do not rinse with solvents and/or acids.

Drilling equipment, such as augers, mud tubs, downhole hammers and drill rods, and backhoe buckets will be steam cleaned before use at each location and at the end of the job before going off-site.

7 RECORD KEEPING PROCEDURES

Most of the sampling data and well installation information will be written on the forms presented in this appendix. Log books will be used to record the daily activities of each sampling team but they should also be used to record any data not entered into the standard forms.

7.1.1 Daily Inspector Report

Daily Inspector Report should be completed for each field team (Figure A-29). The

information on the form should provide an indication of the tasks activities performed by the field team during the course of the day. Information regarding non-productive time and waste management should also be included on this form. These forms shall be kept in the on-site files.

7.1.2 Daily Field Summary

A Daily Field Summary form should be completed by the site manager at the end of each day (Figure A-30). This form should provide an overall indication of the tasks/activities performed on a particular day. These forms shall be kept in the on-site files.

7.1.3 Photographs

Photographs of all sampling locations and operations are desirable, although they frequently will not be allowed. If photographs are taken, the photographer should record time, date, site location, and brief description of the subject on the back of the photo, (polaroid) or in a log book and then sign it. Photographic documentation that may be used as evidence should be handled in a way to ensure that chain-of-custody can be established.

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. CLIENT: BORING NO.:

PROJECT .

LOCATION :

JOB NO

EST. GROUND ELEV.

START DATE.

FINISH DATE.

CONTRACTOR.

DRILLER.

INSPECTOR.

CHECKED BY:

CHECK DATE.

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH FT	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL

DRILLING ACRONYMS

HSA	HOLLOW-STEM AUGERS	HMR	HAMMER	SS	SPLIT SPOON
DW	DRIVE-AND-WASH	SHR	SAFETY HAMMER	CS	CONTINUOUS SAMPLING
MRSLC	MUD-ROTARY SOIL-CORING	HHR	HYDRAULIC HAMMER	5I	5 FT INTERVAL SAMPLING
CA	CASING ADVANCER	DHR	DOWN-HOLE HAMMER	NS	NO SAMPLING
SPC	SPIN CASING	WL	WIRE-LINE	ST	SHELBY TUBE
				3S	3 INCH SPLIT SPOON

MONITORING EQUIPMENT SUMMARY

INSTRUMENT TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND READING	BACKGROUND TIME	BACKGROUND DATE	CALIBRATION TIME	CALIBRATION DATE	CALIBRATION WEATHER

MONITORING ACRONYMS

PID	PHOTO - IONIZATION DETECTOR	BGD	BACKGROUND	DGRT	DRAEGER TUBES
FID	FLAME - IONIZATION DETECTOR	CPM	COUNTS PER MINUTE	PPB	PARTS PER BILLION
GMD	GEIGER MUELLER DETECTOR	PPM	PARTS PER MILLION	MDL	METHOD DETECTION LIMIT
SCT	SCINTILLATION DETECTOR	RAD	RADIATION		

QA/QC:

QA/QC SAMPLES COLLECTED: YES or NO

Duplicate Sample Number:

MRD Sample Number:

QA/QC Rinsate Sample Number:

INVESTIGATION DERIVED WASTE:

AMOUNT OF SOIL DRUMMED:

DRUM NUMBER:

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. CLIENT: BORING #:

MONITORING INSTRUMENT	INTERVAL	BGD	TIME

COMMENTS:

DRILLER

INSPECTOR

DATE

DEPTH (FT)	SAMPLING BLOWS PER 6 INCHES	SAMPLING PENETRATION RANGE FEET	SAMPLING RECOVERY RANGE FEET	SAMPLE DEPTH INT FEET	SAMPLE NO	SAMPLE VOC	SAMPLE RADSCRN	SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, cementation, wetness, etc.)	USCS CLASS	STRATUM CLASS
5										
10										
15										
20										

FIGURE A-2 (cont.)

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. | CLIENT: | BORING #:

MONITORING

INSTRUMENT | INTERVAL | BGD | TIME | COMMENTS

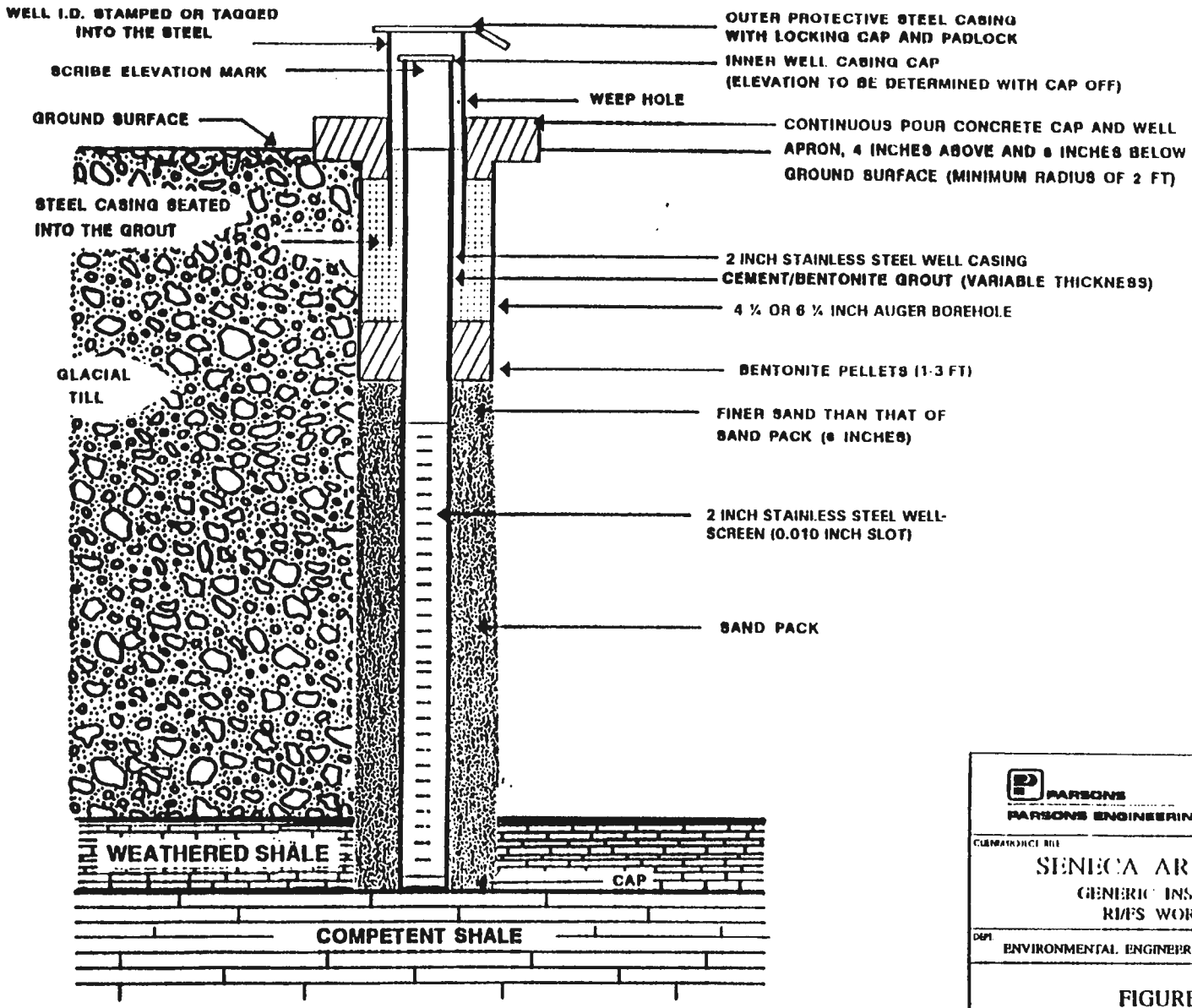
DRILLER

INSPECTOR

DATE

DEPTH (FT)	SAMPLING: BLOWS PER 6 INCHES	SAMPLING: PENETRATION RANGE (FEET)	SAMPLING: RECOVERY RANGE (FEET)	SAMPLE: DEPTH INT (FEET)	SAMPLE: NO.	SAMPLE: VOC EACH SCRN #	SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS

FIGURE A-2 (cont.)



* 3 PROTECTIVE BOLLARDS WILL BE PLACED AROUND THE WELL

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT
GENERIC INSTALLATION
RI/FS WORK PLAN

DEPT: ENVIRONMENTAL ENGINEERING | DWG NO:

FIGURE A-5

OVERBURDEN MONITORING WELL DETAIL

SCALE: | DATE: AUGUST

R:\GRAPHICS\SENECA\D \D.CDR(CVM)

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT: WELL #:

PROJECT: _____ PROJECT NO: _____

LOCATION: _____ INSPECTOR: _____

CHECKED BY: _____

DRILLING CONTRACTOR: _____ POW DEPTH: _____

DRILLER: _____ INSTALLATION STARTED: _____

DRILLING COMPLETED: _____ INSTALLATION COMPLETED: _____

BORING DEPTH: _____ SURFACE COMPLETION DATE: _____

DRILLING METHOD(S): _____ COMPLETION CONTRACTOR/CREW: _____

BORING DIAMETER(S): _____ BEDROCK CONFIRMED (Y/N?) _____

ASSOCIATED SWMU/AOC: _____ ESTIMATED GROUND ELEVATION: _____

PROTECTIVE SURFACE CASING:

DIAMETER: _____ LENGTH: _____

RISER:

TR: _____ TYPE: _____ DIAMETER: _____ LENGTH: _____

SCREEN: SLOT

TSC: _____ TYPE: _____ DIAMETER: _____ LENGTH: _____ SIZE: _____

POINT OF WELL: (SILT SUMP)

TYPE: _____ BSC: _____ POW: _____

GROUT:

TG: _____ TYPE: _____ LENGTH: _____

SEAL: TBS: _____ TYPE: _____ LENGTH: _____

SAND PACK: TSP: _____ TYPE: _____ LENGTH: _____

SURFACE COLLAR:

TYPE: _____ RADIUS: _____ THICKNESS CENTER: _____ THICKNESS EDGE: _____

CENTRALIZER DEPTHS

DEPTH 1: _____ DEPTH 2: _____ DEPTH 3: _____ DEPTH 4: _____

COMMENTS:

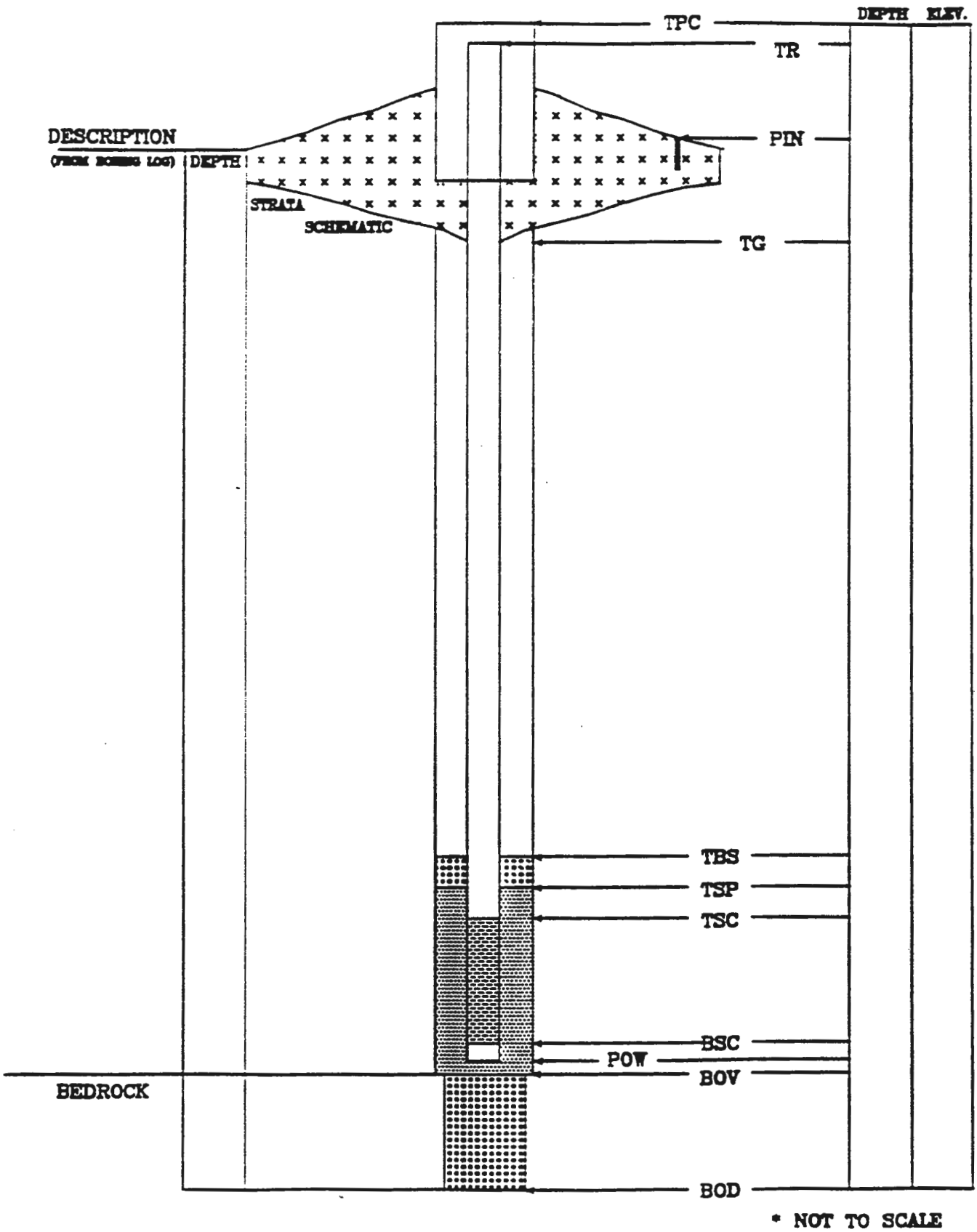
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING–SCIENCE, INC. CLIENT: | WELL #:

DATE: _____



* NOT TO SCALE

DAILY INSPECTOR REPORT

ENGINEERING - SCIENCE, INC. CLIENT: DATE:

PROJECT: _____ PROJECT NO.: _____

LOCATION: _____ INSPECTOR: _____

CONTRACTOR: _____

WEATHER: AM _____ START TIME: _____ TOTAL CREW: _____

PM _____ END TIME: _____ HOURS: _____ RIG #: _____

LOCATION	H & S LEVEL	METHOD/ ITEM	PROJECTED DEPTH	START DEPTH	END DEPTH	TOTAL FOOTAGE	SAMPLE INTERVAL	# ITEMS/ SAMPLES

NON-PRODUCTIVE TIME

LOCATION	REASON	ACTION TAKEN	TIME DOWN

WASTE MANAGEMENT INFORMATION

LOCATION	SPOIL TYPE ON SITE	DRUMS CONTAINERS FILLED	DRUMS / CONTAINERS USED	COMMENTS

COMMENTS: (visitors, general remarks, etc.)

INSPECTOR: _____

WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: WELL #:

PROJECT : _____ DATE: _____

LOCATION: _____ PROJECT NO. : _____

DRILLING METHOD (s): _____ INSPECTOR: _____

PUMP METHOD (s): _____ CONTRACTOR: _____

SURGE METHOD (s): _____ CREW: _____

INSTALLATION DATE: _____ START DEVELOPMENT DATE: _____

END DEVELOPMENT DATE: _____

WATER DEPTH (TOC): _____ ft INSTALLED POW DEPTH(TOC): _____ ft

WELL DIA. (ID CASING): _____ ft MEASURED POW DEPTH(TOC): _____ ft

BORING DIAMETER: _____ ft SILT THICKNESS: _____ ft

POW AFTER DEVELOPMENT: _____ ft

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	9	10	11	12
GALLONS/ FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	3.30	4.08	4.93	5.87

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = _____ GAL. = A

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR - WELL DIAM. FACTOR) X 0.3 = _____ GAL. = B

SINGLE STANDING WATER VOLUME = A + B = ... _____ GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C ..... _____ GALS.

ACTIVITY	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	OTHER
TOTALS/FINAL									

COMMENTS:

FIGURE A-12

DAILY FIELD SUMMARY

ENGINEERING-SCIENCE, INC. CLIENT: DATE:

CLIENT/PROJECT: _____ PROJECT NO.: _____

LOCATION: _____ CHECKED BY: _____

DRILLING SUMMARY

RIG	LOCATION	INSPECTOR	ACTIVITY METHOD	TOTAL FOOTAGE	NUMBER OF SAMPLES	EOD DEPTH	COMMENTS

OTHER ACTIVITIES

MAN/CREW	LOCATION	INSPECTOR	ACTIVITY	COMMENTS

COMMENTS: (general)

FIGURE A-30