Work Plan. HW. 557002. 1999-06-28. 001 Work Plan

WRS INFRASTRUCTURE & ENVIRONMENT, INC.

OPERABLE UNIT 1 WORK PLAN
FOR

YORK OIL SUPERFUND SITE
Town of Moria
Franklin County, New York

Prepared for:

ALUMINUM COMPANY OF AMERICA
Massena Operations, P.O. Box 150
Massena, NY 13662

Reviewed by:

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290 Elmwood Davis Road, Suite 312
Liverpool, NY 13088

Prepared by:

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6049 Corporate Drive
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WRS Project Number 995151

June 28,1999

Revision 0

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1. INTRODUCTION

1.1. General

WRS Infrastructure and Environment, Inc. (WRS) has been selected by Aluminum Company of America (ALCOA) to implement remedial activity for Operable Unit 1 (OU-1) at the York Oil Superfund Site in the Town of Moria, New York. Parsons Engineering Science, Inc. of Liverpool, New York will serve as the ENGINEER for this project.

This document is the **Work Plan** for the York Oil Superfund Site (hereinafter the Site), prepared by WRS according to the Specifications and accompanying documentation (hereinafter the Specifications) for review by ALCOA and the ENGINEER.

This plan was prepared by Messrs. Daniel DeCarlo, John Peake and Andrew Likos. The plan was reviewed by Mr. Alton Hobbs, WRS Corporate QA/QC Officer in accordance with the internal review requirements of WRS.

1.2. Purpose of this Document

This **Work Plan** has been prepared by WRS to satisfy provisions of the Technical Specifications for the Site and to outline the procedures and methods to be utilized in the performance of work on the Site. These provisions require submittal of appropriate deliverables prior to and during implementation of remediation activity.

1.3. Scope of the Work

WRS' understanding of this project is based upon its review of the project documents provided with the Specifications, participation in a pre-bid meeting at the Site and our familiarity of the required elements of work based upon experience at similar sites. As summarized in the documentation provided with the Specifications, the principal elements of work associated with this project consist of the following:

- Work area preparation;
- Establishment of temporary facilities and roads;
- Construction of erosion control structures;
- Placement of temporary storm water controls;
- Excavation of contaminated soils and sediment;
- Solidification/stabilization of contaminated soils and sediment;
- Backfilling of excavations and placement of solidified/stabilized soils;
- Construction of a landfill cover system;
- Construction of permanent surface water management controls for the entire Site;
- Installation of a long-term groundwater treatment system;
- Management and treatment of any construction water generated during the above; and,
- Site grading and revegetation.

WRS will strictly enforce the **Site-Specific Health and Safety Plan (SSHASP)** as it pertains to all Site activities. Stormwater and erosion controls will be constructed, checked and maintained throughout the duration of the project. In addition, strict dust-control measures will be implemented and adjusted as needed. Details of the WRS approach to erosion control, storm and surface water control, construction water management, and dust control follow later in this document.

1.4. Project Documentation

This **Work Plan**, with its supporting plans, and the **SSHASP** comprise the required pre-mobilization deliverables for this project. These documents are a series of design and planning documents that make up the pre-mobilization submittals required of WRS. The **Work Plan**, and the **SSHASP** will require approval by ALCOA and the ENGINEER. The **SSHASP** is submitted under separate cover. All the project deliverables are detailed in **Section 5.2**.

1.5. Schedule

Implementation of remedial activities at the Site is currently scheduled to start in July 1999. Construction activities are currently scheduled to be completed by November 1999.

The **Project Schedule** identifies the anticipated timing for initiation and completion of significant tasks. The actual construction schedule following mobilization will be periodically updated to reflect the actual progress of construction activities. The **Project Schedule** and scheduling considerations are discussed in detail in **Section 5.5.2**. The **Project Schedule** is presented in **Appendix B** to this document.

1.6. Project Meeting

Throughout the project, WRS will meet with ALCOA and the ENGINEER. At a minimum there will be a Pre-Construction Meeting, Progress Meetings, and Pre-Installation Meetings. These meetings are detailed in **Section 5.6**.

1.7. Permits

The only known required permit is a building permit for construction of the long-term groundwater treatment facility building on the Site. This is the only known permit that must be obtained by WRS for the completion of the construction activity tasks.

1.8. Document Organization

The remainder of this document is organized as follows:

Section 2 presents information regarding the background for the project;
Section 3 highlights information on the operational approach to the construction activity;
Section 4 presents details regarding waste generation and disposal; and,
Section 5 presents construction activity and management techniques.

The appendices to this document provide relevant additional information regarding operations at the Site.

Appendix A presents the **Schedule of Values**;
Appendix B presents the **Project Schedule**;
Appendix C presents the **Cash Flow Diagram**;
Appendix D presents the **Schedule of Submittals**;
Appendix E contains the **Erosion and Sediment Control Plan and Schedule**;
Appendix F contains the **Construction Water Management Plan**;
Appendix G contains the **Solidification/Stabilization Work Plan**; and,
Appendix H presents the Project Specifications.

2. PROJECT BACKGROUND

2.1. Overview

This section presents information regarding the background and history of the Site. Much of the following description of the Site location and the development of this project is reproduced from the Specifications.

2.2. Site Location and History

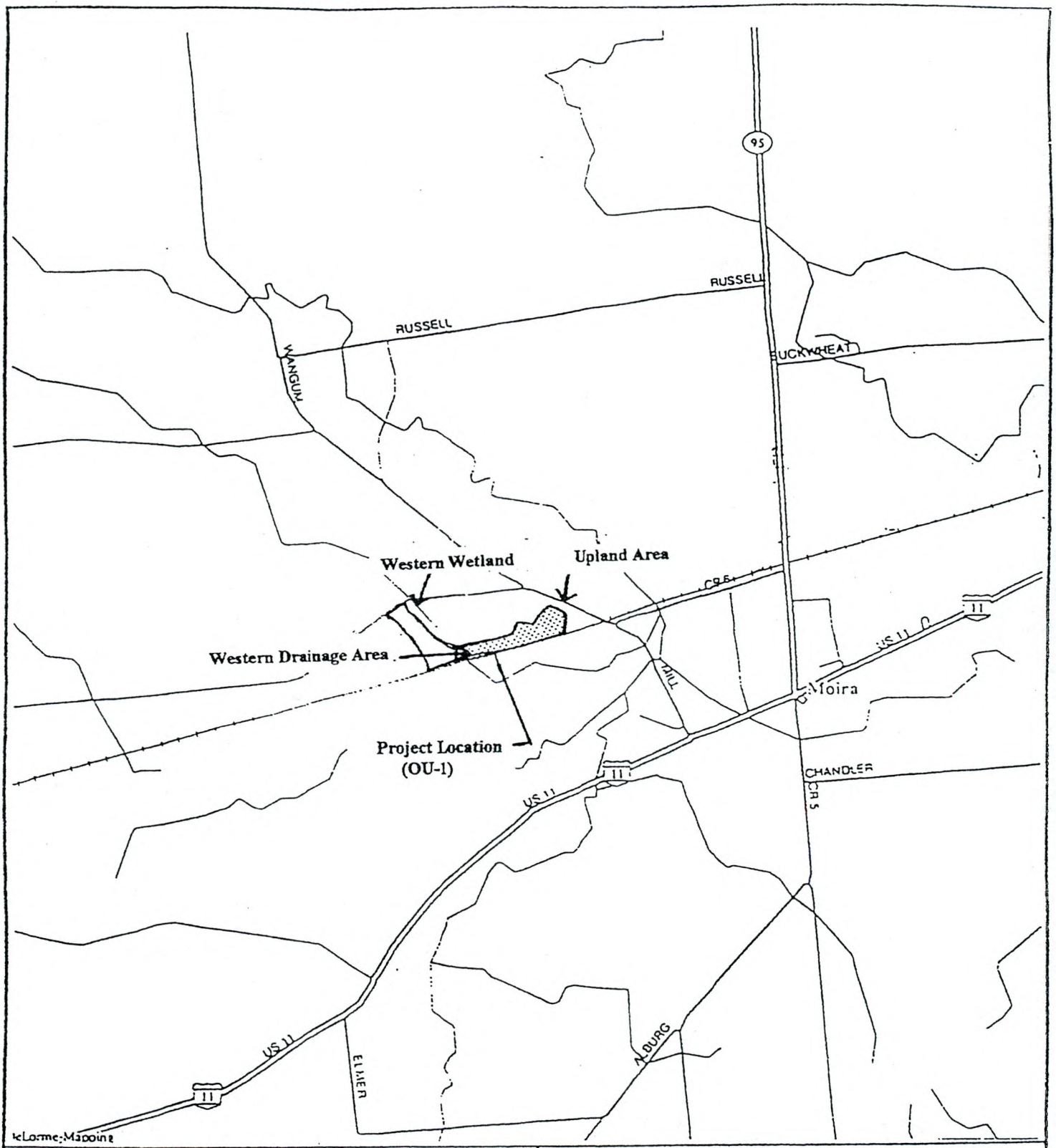
The York Oil Superfund Site is located in Franklin County, in northeastern New York, approximately one mile northwest of the Hamlet of Moria. The site is approximately 20 miles southeast of Massena, New York and 10 miles west of Malone, New York. OU-1 is approximately 17 acres in size, including a 1,000 by 200 foot strip of land referred to the Western Drainage Area (WDA) located west of the upland portion of the site. OU-1 is located in the drainage area of Lawrence Brook, a tributary to the Deer River, which in turn discharges to the St. Regis River and ultimately to the St. Lawrence River. All of OU-1, with the exception of the WDA is enclosed by a six-foot high chain-link fence.

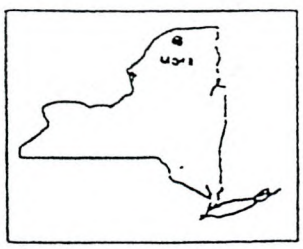
The fenced portion of OU-1 slopes to the southwest and has generally sparse to moderate vegetative cover that has been in place since the early 1980s. Within the fenced portion of OU-1 is the area of Former Lagoons 1 and 2, which is now a large mound created by consolidation and stabilization activities conducted in the early 1980s. The area of Former Lagoon 3, located down slope (southwest) of Former Lagoons 1 and 2, is also within the fenced portion of OU-1.

The Site was first used in 1954 by the York Oil Company, which recycled used oils collected from service stations, car dealers, certain federal facilities, and a variety of industrial facilities. The oil was processed with heat and a silica-based substance to remove impurities and then resold to a number of businesses. The operation was discontinued in or around 1962. From 1962 to 1977, Pierce Brothers Oil Service , Inc., stored and processed used oils within the fenced portion of the Site.

Some oils accepted by the site contained polychlorinated biphenyls (PCBs) and other constituents. Oil was stored in storage tanks and in Former Lagoons 1, 2, and 3. Residuals that settled in the lagoons were separated from light oils that were decanted and sold as fuel oil.

Investigation work at OU-1 was conducted during the mid-1980s by consultants working for the Government (EAA, 1985 and EAA, 1987). The Addendum Feasibility Study for OU-1 was completed in 1987. EPA also conducted additional investigation work at OU-1 in 1994 and 1995 (EPA, 1995b) prior to the 1996 predesign investigation effort conducted by ALCOA and the ENGINEER.





NEW YORK
QUADRANGLE LOCATION

N

Scale 1:31,250 (at center)

2000 Feet

1000 Meters

FIGURE 2-1

YORK OIL SUPERFUND SITE
MOIRA, NEW YORK

SITE VICINITY MAP

PARSONS ENGINEERING SCIENCE, INC.

DESIGN • RESEARCH • PLANNING

3. OPERATIONAL APPROACH TO REMEDIATION ACTIVITIES

3.1. Project Approach

Based upon the information presented in the Specifications, information acquired during two site walks, and our experience with similar sites, WRS has prepared the following Project Approach which is summarized in **Table 3-1**. The following sections describe the Project Approach in detail.

Table 3-1 Project Approach Summary

	Principal Activities
Pre-Construction	Pre-Construction Submittals
	Pre-Construction Meeting
	Sub-Contractor Pre-Construction Meeting
Mobilization	Project Management Mobilization
	Project Operations Team Mobilization
Site Preparation	Support Zone Set-up
	Initial Site Survey and Layout
	Install Erosion, Dust and Stormwater Controls
	Clearing and Grubbing
	Construction of Access Roads
	Install Temporary Fencing and Security Measures
	Construct Soils Staging Area(s)
	Decon Pad and CRZ Setup
Long-term Groundwater Treatment Facility	Install Extraction Wells
	Abandon Existing Monitoring Wells
	Construction of Pre-fabricated Building
	Installation of Groundwater Treatment System
	Start-up and Demonstration
	Operation of Facility
	Training and Transfer of Facility
Earthwork and Solidification/Stabilization	Set-up and Pilot Study of Mobile Fixation/Stabilization Unit (MFSU)
	Excavation and Staging of Contaminated Soils
	Backfilling to High Groundwater Table
	Operation of MFSU
	Placement of Treated Soils and Debris in Cap Area
	Construction Water Management and Treatment
Cap Construction	Placement of Cushion Geotextile
	Installation of Geomembrane
	Installation of Drainage Layer
	Placement of Protective Soil Cover
	Installation of Permanent Drainage Controls
Site Restoration	Site Grading and Placement of Topsoil
	Revegetation and Wetlands Restoration
	Establish Long-term Erosion Controls
	Removal of Temporary Facilities and Controls
Project Completion	Final Survey
	Demobilize Personnel and Equipment
	Post Completion Submittals

3.2. Pre-Construction Activities

The pre-construction activities to be conducted within this Project Approach include the following:

- Preparation of Submittals;
- Pre-construction Conference; and,
- Subcontractor Procurement and Coordination.

3.2.1. Preparation of Submittals

Upon receipt of Notice to Proceed, WRS will prepare the required pre-construction submittals. Within WRS, the Project Manager has sole accountability for the successful completion of work. On this job, the Project Manager will coordinate with the designated Site Supervisor, Site Health and Safety Officer, and Project Quality Control Manager to prepare the required submittals.

WRS will submit these documents in draft to ALCOA and the ENGINEER in compliance with both the Project Schedule and Technical Specifications of the project. All documentation will be reviewed internally prior to submission. In particular, the **SSHASP** will be reviewed by appropriate members of WRS Corporate Department of Health and Safety before it is submitted to ALCOA or the ENGINEER. The WRS Project Manager will also review these documents as well as act as the primary reviewer for all of the other deliverables. The purpose of this intensive internal review is to ensure that procedures, products, and materials will meet all Specification requirements.

Refer to the **Schedule of Submittals** in **Appendix D**, for a complete listing of all required submittals .

The Pre-Construction deliverables include the following plans.

- Work Plan

  WRS will develop a **Work Plan** detailing the required operational procedures to complete the required tasks. Included in the **Work Plan** will be the **Progress Schedule**, the **Schedule of Submittals**, the **Schedule of Values** and **Cash Flow Diagram**, the **Erosion Control Plan and Schedule**, the **Construction Water Management Plan**, and the **Solidification/Stabilization Work Plan.**

- Site Specific Health and Safety Plan

  WRS will prepare the **SSHASP** for this project. WRS has well-established standard safe operating procedures which have developed through our extensive experience performing environmental remedial actions and emergency response actions. All WRS personnel employed in hazardous or non-hazardous Site operations are required to complete a five-day, forty-hour training program in compliance with OSHA 29 CFR 1910.120, and all personnel are responsible for performing their job assignments with due regard to safety.

- Method Statement (Task 1-Mobilization), Method Statement (Task 2-Site Preparation), and Shop Drawings: Temporary Facilities and Field Offices

  These are submittals which will be required prior to mobilization to the Site. These are not included in this **Work Plan** and will be prepared by WRS and submitted separately in accordance with the **Schedule of Submittals**.

3.2.2. Pre-Construction Conference

The WRS Project Management Team attended a pre-construction conference scheduled by ALCOA on June 21, 1999. Topics discussed during the conference include procedures for field decisions, submittals, change orders, testing, document maintenance and proposal request, surveying, security, housekeeping and scheduling. WRS will also tour the Site to determine and document Site conditions existing prior to mobilization. The Pre-construction Conference is further detailed in **Section 5.6.1**.

3.3. Mobilization

WRS will commence mobilization after the completion of all pre-construction activities and upon approval of the pre-construction submittals by ALCOA and the ENGINEER. The Project Manager will coordinate the mobilization and scheduling of the required equipment and crews. The Project Management Team will mobilize first to prepare the Site for the arrival of the crew and equipment.

Equipment mobilization will commence following the establishment of the support zone and equipment staging areas. Full mobilization will involve the procurement and transfer of equipment to be utilized for Site preparation activities and installation of the access road. Additional equipment will be brought on site as needed and maintained in the designated staging area.

3.4. Site Preparation

The following activities will be undertaken prior to full-scale remediation activities.

- Support Zone Set-up;
- Initial Site Survey and Layout;
- Implement Erosion, Dust and Stormwater Controls;
- Install Temporary Fencing, Signage, and Security Measures;
- Clearing and Grubbing;
- Construction of Temporary Access Roads;
- Construction of Soils Staging Area(s); and
- Contamination Reduction Zone (CRZ) Delineation and Facilities Set-up;
- Decontamination Pad Refurbishment and Set-up.

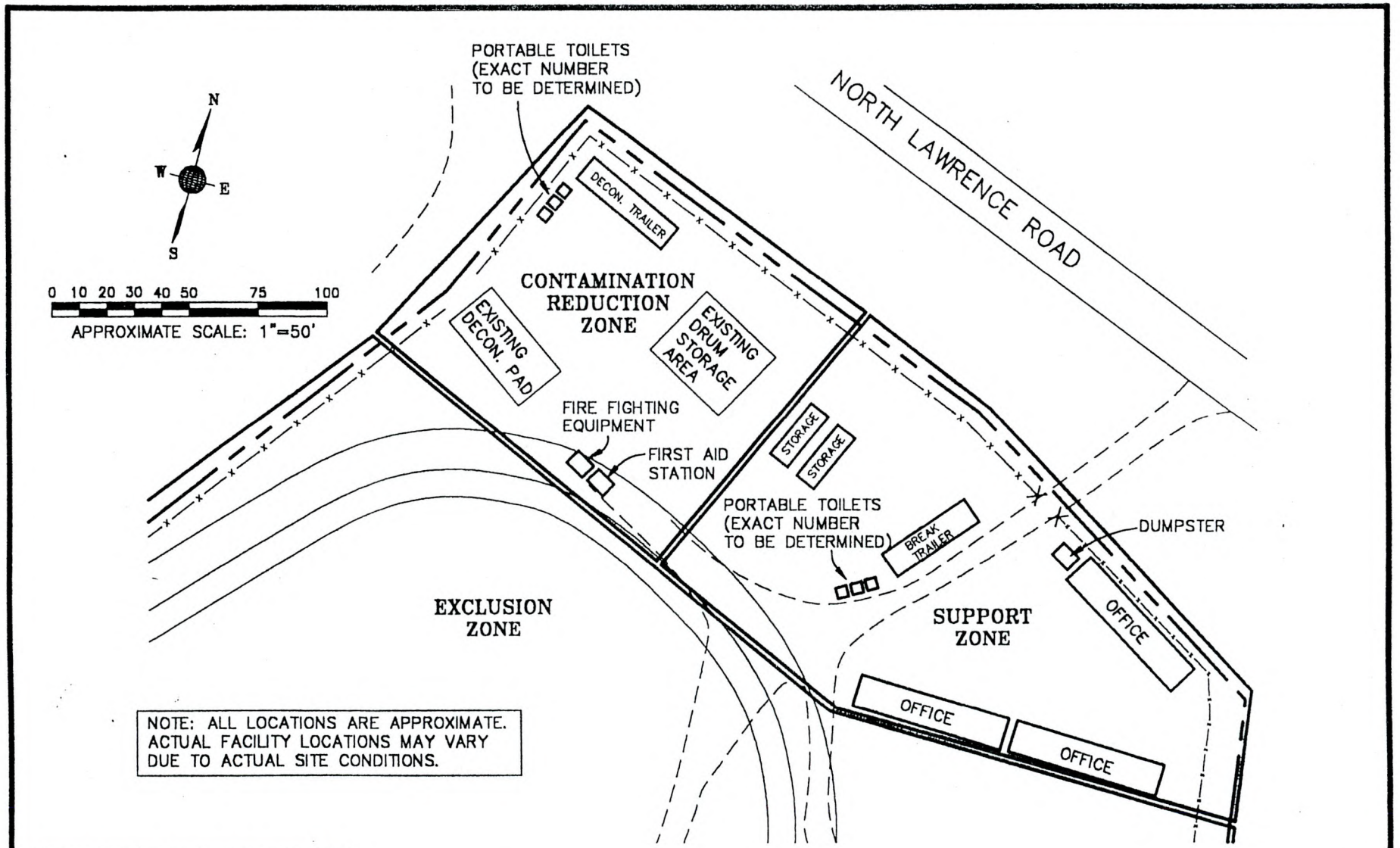
Each of these activities are detailed in the sub-sections that follow.

3.4.1. Support Zone Set-up

WRS will establish a Support Zone and provide sufficient facilities and equipment to support all Site activities. The specific Support Zone facilities and equipment to be mobilized for this project are shown on Figure 3-1 (note: actual facility locations may vary) and listed in **Table 3-2**.

Trailers provided for use by USEPA and the ENGINEER will be equipped as required in the Specifications. Temporary power will be required for the office, break, and personnel decontamination trailers.

WRS will place on site three 12-foot by 56-foot (at least 500 square-foot) mobile trailers. One trailer will be used as an office trailer by WRS and the other two for use by the USEPA and the ENGINEER. The trailers will be located in the Support Zone. WRS will also set up 10 foot by 36 foot trailer for WRS crew personnel breaks. The trailers will be located in accordance with **Drawings: Temporary Facilities and Field Offices** submittal to be provided by WRS in accordance with the **Schedule of Submittals.**



DRAWING STATUS	DRAFT		FINAL	X
PROJECT NO. : 995151				
PROJECT MANAGER: DAN DECARLO				
SCALE: APPROXIMATELY 1"=50'				
REVISION NO.: 0	REV DATE:			
CADD ID: 995151-002	PLOT DATE:	6/25/99		
DRN BY: D.C.F.	DRN DATE:	6/25/99		
CHK BY: D.D.	CHK DATE:	6/25/99		
APPVD BY: D.D.	APPVD DATE:	6/25/99		

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111 KELSEY LANE, SUITE B, TAMPA, FLORIDA 33619
PH: (813) 620-1432 FAX: (813) 620-3649

FIGURE 3-1
TEMPORARY FACILITIES LOCATIONS
YORK OIL SITE
MASSENA, NEW YORK

Table 3-2 Support Zone Facilities

Support Zone Facilities	Requirements
ENGINEER Office Trailer (1 - 12' x 56')	as per Specifications 01500-3.02 A
USEPA Office Trailer (1 - 12' x 56')	as per Specifications 01500-3.02 A
WRS Office Trailer (1 - 12' x 56')	as Required by WRS
Storage Trailers/Facilities	as Required
Portable Toilets	as Required
Dumpster	as Required

The Support Zone area is not currently supplied with power, potable water or sanitary facilities. WRS will install a metered power supply on a temporary basis to the office, break trailers and S/S Area, and permanently to the groundwater treatment system. Water tanks will be used for decontamination purposes and bottled water will be provided for potable needs. WRS will use portable toilets and wash stations as necessary for the duration of the project. Utilities will be installed in accordance with Specifications 1500-3.01.

WRS intends to utilize a cellular phone only for mobile operations coordination and for emergency notification purposes. Temporary phone lines and a facsimile line will be installed in the office trailers.

A 15 kilowatt generator will be mobilized to the site to provide power for the MFSU.

3.4.2. Initial Site Survey and Layout

WRS will provide the name, address, and telephone number of the New York State licensed Professional Land Surveyor prior to starting any surveying work. All surveying will be carried out in accordance with Specifications 01051. A **Letter of Certification** will be submitted to the ENGINEER upon completion of all surveys. WRS will first confirm in the field the topographical map provided by the ENGINEER. After the initial topographical map is completed, ALCOA, the ENGINEER, and WRS will compare this map to the previous aerial topographical map to see if any design changes are required. The survey crew may help identify additional critical grades or survey points at the Site.

3.4.3. Implementation of Temporary Stormwater Controls

WRS will implement site-wide storm and surface water control measures as shown in **Figure 3-2 Remediation Action Site Layout**. Site-wide storm and surface water control measures include the construction of a temporary one foot high diversion dike along the northern and eastern edges of the site and maintenance of the existing drainage ditches along the western and southern edges of the site (which flow into the Western Drainage Area, WDA). WRS will also utilize the existing interceptor trench with sump(s) for surface water collection. WRS will also maintain site grading which promotes runoff of surface water. Disturbed areas will be rolled and sealed at the end of each working day (if applicable) or in the anticipation of a rainfall event.

WRS will also employ drainage controls on a case-by-case basis during excavation. Such controls will include temporary berms, diversion ditches, and interceptor trenches. Excavations will be covered with 10 millimeter poly sheeting as applicable. Open excavations will be backfilled in a timely manner, pending approval by the ENGINEER. Any surface water which does find its way into an open excavation will be considered as construction water and will be managed in accordance with the **Construction Water Management Plan** in **Appendix F** of this **Work Plan**.

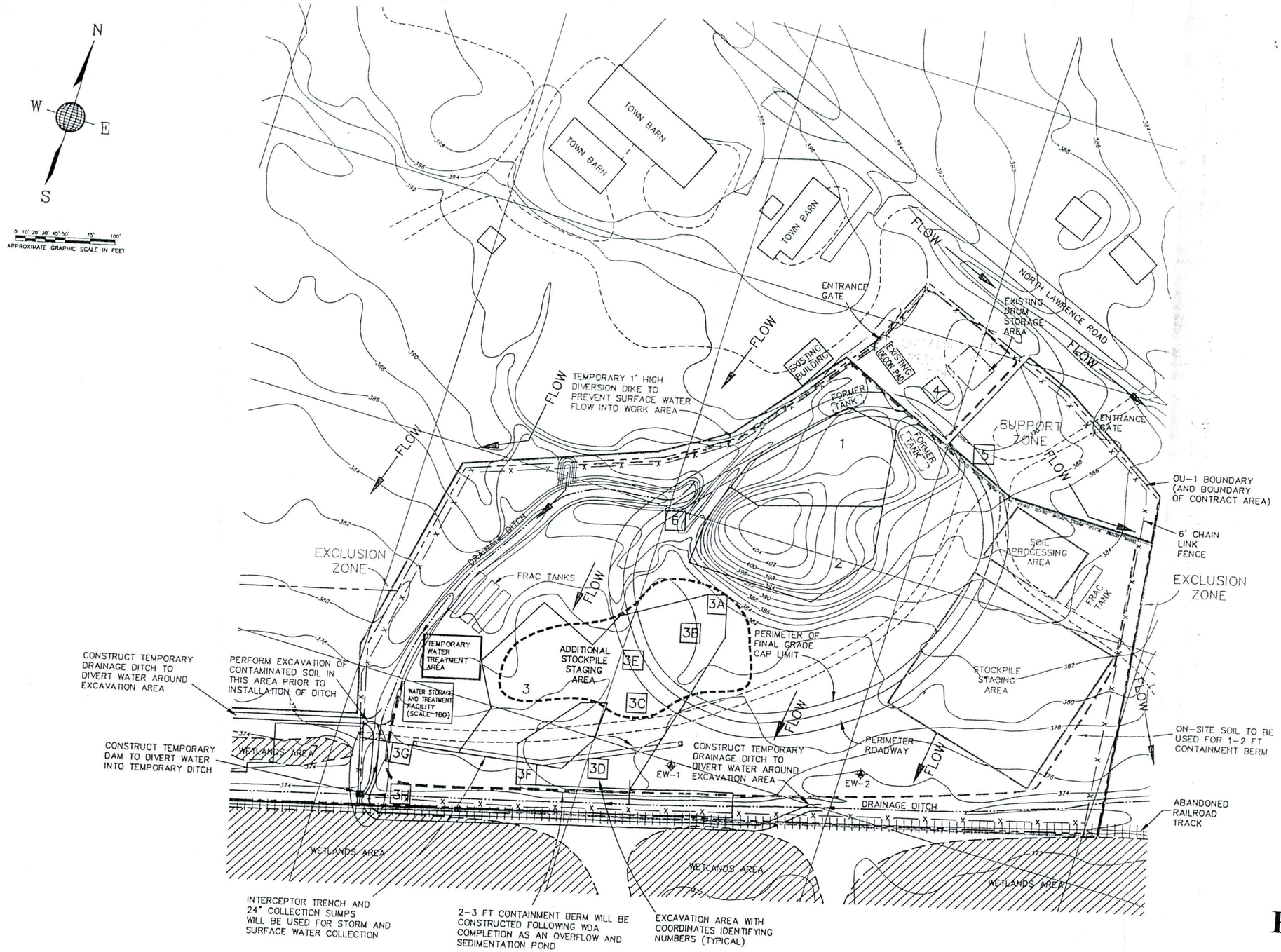


FIGURE 3-2

WRS Infrastructure & Environment, Inc.

SITE WORK AREAS AND
SURFACE WATER MANAGEMENT PLAN
YORK OIL SITE
MASSENA, NEW YORK

CADD ID: 997022-004

WRS will maintain a stockpile of backfill material for use in the repair of existing berms and/or the construction of additional berms as necessary. Storm and surface water control measures will be implemented at the same time as erosion and sediment control measures are put in place.

3.4.4. Implementation of Erosion and Sediment Controls

Erosion and Sediment Controls will be implemented in accordance with **Appendix E: Erosion and Sediment Control Plan and Schedule.**

3.4.5. Implementation of Dust/Vapor Controls.

This section documents the procedures to monitor and control airborne contaminant migration during removal activities at the Site. Control of vapors, odors, and dust is important to protect the work force and the public. Although vapors and odors are not anticipated to be a health concern during this project, an efficient perimeter monitoring program will enable quick response to potentially adverse concentrations of airborne contaminants. The perimeter monitoring program will consist of:

- Weather station; and,
- Air monitoring stations

Real-time and documentation perimeter air monitoring will be conducted utilizing at least four exclusion zone perimeter air monitoring locations (twelve will be designated) including one upwind (background) and three downwind locations. A background reading will be established daily during all intrusive activities at the beginning of each work shift. If the wind changes direction during the course of the day, a new background reading will be made. Downwind readings at the exclusion zone perimeter will be made when action levels have been exceeded at the excavation, or a minimum of twice daily. If the level of VOCs at any downwind perimeter site is 5 ppm above background levels, then further engineering controls must be implemented.

Personnel and/or work area air monitoring will be implemented as directed in the **SSHASP**.

The appropriate dust/vapor control procedures will be determined based on site conditions. Additional measures will be implemented as warranted by perimeter, area, or personnel air monitoring. Available dust/vapor controls include:

- Application of fine water mist to haul roads and areas which may generate dust;
- Wetting equipment and excavation faces;
- Use of vapor suppressants (as 3M biodegradable vaporization suppressant foam);
- Covering excavated areas and materials after excavation activity ceases;
- Reducing excavation size and/or number of excavations;
- Reducing vehicle speeds to 10 mph; and,
- Hauling materials in properly tarped or watertight containers.

WRS will have available the means to implement any of the above controls as necessary.

3.4.6. Clearing and Grubbing

Existing vegetation, pavements, and boulders at the Site will be cleared and grubbed as necessary to allow for access, surveying, facilities set-up, staging areas set-up, fencing, excavation and sediment removal, pugmill setup and operation, cap construction, groundwater treatment facility construction, permanent drainage control construction, and access road construction. Any removal of Site vegetation, pavements, or structures, will proceed only with prior ALCOA approval. Any trees or shrubs to remain will, where applicable, be trimmed as to avoid removal or damage. The roots of trees to remain will be protected to the maximum extent possible. No herbicides will be used. Any holes or craters resulting from clearing efforts will be backfilled with suitable materials.

The above-ground portions of all materials resulting from clearing efforts will be chipped, mulched, or otherwise processed. These materials will be set aside on-site. The below-ground portions of materials resulting from clearing will be chipped, ground, or otherwise processed. Such materials will be processed with Portland cement as part of the S/S process and placed beneath the cap. No burning of materials on-site is permitted.

3.4.7. Construction of Site Access Roads

WRS will establish Site access/haul roads and parking areas for the duration of the project. These roads will be graded and prepared for heavy truck traffic. For existing roadways, this will involve repair of washouts and addition of base gravel where needed. Engineering controls will be implemented if deemed necessary to ensure roadways and structures are not overloaded during operations.

Construction of new access roads will involve clearing, grading, and rolling of the subbase and placement of a granular surface layer. This granular layer will consist of crushed rock and well-graded, free-draining gravel. Reinforcement-type geotextiles will be utilized as necessary.

To the extent practical, the roads should allow for easy two-way traffic, nominally about 30 feet wide. All roads will be maintained by WRS throughout the project to ensure unimpeded access for both construction and passenger vehicles. Roads will be watered as required to reduce dust.

In addition, signs will be provided limiting traffic to authorized construction site personnel only and indicate road closings when required. Vehicular traffic, which will include principally truck traffic, will be controlled on-site by implementing and enforcing traffic routes for all vehicles. These routes will be clearly marked, and drivers will be informed of the traffic plan in writing prior to performing any work at the Site. All traffic will be restricted to defined routes. Equipment operators who are handling hazardous waste in an exclusion area will be prohibited from leaving their equipment/cabs while in the exclusion zone and will be so instructed. Radios will be used on-site to control traffic entering and exiting the Site.

Route markers (e.g., traffic cones and traffic signs) will be placed as necessary to mark Site access and routes of travel. WRS will also coordinate as necessary with any other Site activities which may occur during the conduct of these work activities.

3.4.8. Fencing, Signage, and Site Security

The Site already has a secure perimeter fence that will serve to keep unauthorized personnel from intruding. WRS may subcontract with a security service to provide non-working hours security of the site from an on-site office trailer. WRS will maintain Hi-Viz™ security fencing around the external EZs, lock permanent fence gates, and will lock and secure storage trailers and offices that are not being used during non-working hours. Appropriate signage will be placed at strategic locations around the site perimeter and at all site entrances.

WRS will provide a Site Sign, as requested by ALCOA, posted at the entrance to the site (along North Lawrence Road). The sign will include the title "York Oil Remediation Project - Federal Superfund Program," a project description, a list of sponsors ("York Oil Site PRP Group"), a listing of funding sources ("The PRP Group and the Federal Government"), and the name an phone number of the EPA contact. The sign will be legible from North Lawrence Road.

3.4.9. Construction of Soils Staging Areas

During site preparation, WRS will construct a bermed and lined soils staging area (SSA) to stage contaminated materials that will be treated in the solidification/stabilization process. The location, description and construction of the SSA are detailed in the **Solidification/Stabilization Work Plan** in **Appendix G** of this **Work Plan**. Additional staging areas for uncontaminated (excavated) soils, clean backfill, stone, debris from clearing and grubbing, etc. will be constructed as needed. The location of and the construction of (if applicable) additional stockpile areas will be determined on a case-by-case basis and subject to approval by the ENGINEER.

3.4.10. Contamination Reduction Zone Set-up and Construction of Decontamination Facilities

WRS will make any necessary improvements to the existing operational on-site decontamination pad. The location of the existing decontamination pad is illustrated on **Figure 3-2**. Improvements to the existing pad will include:

- Removal of debris in the collection trench and sump;
- Install sidewalls (minimum of 6' in height) to prevent overspray;
- Provision of decontamination water supply tank;
- Provision of decontamination water collection tank(s);
- Coating/sealing of the pad and sump with non-shrinking cement or epoxy grout; and,
- Dedication of pumps, flexible hose, and pressure washer

The decontamination pad improvements and provisions will be made in accordance with Specifications section 02131

A personnel decon trailer, or trailers, will be located in the contamination reduction zone (CRZ). Additional CRZs will be established adjacent to the work areas as operations proceed. These zones will be cordoned off to prohibit unauthorized personnel entry, and all zone transfer procedures will be monitored. Drums will be stationed for the dropping and temporary storage of Personnel Protective Equipment (PPE).

WRS will establish decontamination facilities for personnel and equipment sufficient to support all Site activities.

3.4.10.1. *Overview*

Decontamination of personnel, equipment, and materials will be performed in accordance with applicable USEPA and OSHA guidance documents. Decontamination protocols are specified in the WRS Health and Safety Program Manual and the **SSHASP**. This section overviews decontamination methods and facilities for the following:

- personnel decontamination;
- support equipment decontamination; and,
- process equipment decontamination.

Decontamination facilities will include the personnel decontamination facilities and the equipment decontamination pad. This pad will provide for mist control and containment and collection of decontamination wash water. One high-pressure water cleaner will be provided, as well as an adequate supply of brushes, tubs, basins, hoses, tables, and soaps. Proper zone transfer procedures will be performed between the exclusion zone and the decontamination pad.

3.4.10.2. *Personnel Decontamination*

An area for personnel protective equipment (PPE) removal and personnel decontamination will be staged within the contamination reduction zone. The PPE removal area will include:

- boot wash tubs;
- disposal containers to allow the segregation of PPE into various groups;
- boot racks to facilitate drying and organization;
- hand wash buckets;
- first aid kit to provide immediate first aid supplies;
- two portable eye-wash solution application containers;
- two fire extinguishers readily available to handle decontamination area emergencies;
- adequate and replenished supply of miscellaneous small tools and materials; and
- toilet facilities placed in close proximity to the PPE area.

A decontamination facility will be positioned in the support zone for the duration of the project. This facility, described in the **SSHASP**, will comply with the requirements of OSHA 29 CFR 1910.141.

3.4.10.3. *General Equipment Decontamination*

All vehicles, equipment, and tools that have been in a designated contaminated (exclusion) zone will be thoroughly and properly decontaminated when leaving the contamination reduction zone. Vehicles and equipment will not leave the Site without decontamination, authorized visual inspection, and proper documentation of decontamination.

High pressure water/steam will be used on the decontamination pad to clean equipment, vehicles, and tools, as detailed in the **SSHASP**.

3.5. Long-term Groundwater Treatment Facility

3.5.1. Installation of Extraction Wells

WRS will install two extraction wells, EW-1 and EW-2, for the purpose of groundwater extraction for (long-term) groundwater treatment. The approximate location of these wells is shown on Figure 3-2. The wells will be constructed using appropriate equipment to advance the borehole to its completion depth and to install well materials. This equipment will include: an appropriate drill rig to drill 10-inch diameter boreholes, 8-inch diameter steel outer casing through the shallow groundwater zone, 6-inch stainless steel well screen and riser, properly sized sand filter pack, a bentonite seal, cement/bentonite grout, well boxes, and covers. Additionally a monitoring well will be installed at a midway point between the two groundwater extraction wells. The specified

requirements for the construction of the extraction and monitoring wells are summarized in Table 3-3. Product data for the items summarized in Table 3-3 will be submitted in accordance with the Schedule of Submittals.

Table 3-3 Well Construction Requirements

Item	Extraction Wells	Monitoring Well
Well Depth (below GS)	20 feet	20 feet
Outer Casing Diameter (ID)	8 inch	6 inch
Outer Casing Construction	Sch. 40 carbon steel pipe	Sch 40 carbon steel pipe
Riser/Sump Pipe Diameter (ID)	6 inch	2 inch
Riser/Sump Pipe Construction	Sch. 10, 304 stainless steel	Sch. 10, 304 stainless steel
Riser Stick-up Height	1 to 2 feet	1 to 2 feet
Sump Length	5 feet	5 feet
Well Screen Diameter (ID)	6 inch	2 inch
Well Screen Construction	wire wound, 304 stainless steel	wire wound, 304 stainless steel
Slot Size	0.03 inches (30 slot)	0.03 inches (30 slot)
Screen Interval Length	minimum 10 feet	minimum 10 feet
Sand Pack	silica >.01 inches (Morie #0 or equivalent)	silica >.01 inches (Morie #0 or equivalent)
Bentonite Seal	3/8 inch diameter pellets	3/8 inch diameter pellets
Grout Mix	94 lbs.Type I Portland Cement to 3 lbs. minus no. 200 sieve bentonite to 7 gals. water	94 lbs.Type I Portland Cement to 3 lbs. minus no. 200 sieve bentonite to 7gals. water

Drilling logs will be maintained by the ENGINEER. The vertical and horizontal coordinates of the newly installed groundwater extraction wells will be determined by survey from a permanent measuring point scribed onto each well riser.

Drilling cuttings will be mixed with cement and disposed of beneath the cap.

Submersible pumping equipment will be installed in each of the groundwater extraction wells which meets the requirements in Specifications section 02674. Appropriate pumps will be selected to operate at 10 gpm flow rate at a TDH of 43 (EW-1) to 46 (EW-2) feet. The pumps will be equipped with start and stop float switches activated by changes in water level. The pumps and motors will be rated for continuous duty and shall be capable of pumping the specified flow range without surging, cavitation, or vibration. The pumps will be warrantied by the manufacturer for a one-year period (wear items may be prorated). Each pump will have a stainless steel name plate permanently attached to the pump frame. Name plates will contain

the following information: manufacturer's name, pump size, serial number, impeller diameter, capacity, head rating, and speed.

Shop drawings, installation drawings, performance data, construction materials data, wiring diagrams, O&M manuals, etc. for the selected pumps will be submitted in accordance with the Schedule of Submittals.

Power to the recovery well pumping equipment will be provided from the groundwater treatment facility. Influent lines from the well pumps to the facility will be buried to a depth adequate to protect the pipes from freezing or may be installed above grade and will be heat traced and insulated.

3.5.2. Abandonment of Existing Groundwater Monitoring Wells

WRS will properly decommission the existing groundwater monitoring wells indicated in the Specifications or as directed by the Engineer. A review of existing monitoring well logs and construction diagrams, location, and proposed decommissioning procedure will take place prior to the abandonment of each well. Information from the review; well location, identification, and depth, will be verified in the field before decommissioning.

Wells will be abandoned by pulling the casing and grouting the well. Wells will be abandoned by overdrilling where specified or where pulling of the well casing does not result in the withdrawal of all well materials (at the discretion of the ENGINEER). Pulling and overdrilling procedures are listed in Specifications section 02085 3.02. The grout mixture required for the abandonment of existing monitoring wells is listed in Specifications section 02085 2.01.

Information regarding the drilling contractor, equipment, methods, and grout mixes will be provided by WRS in accordance with the **Schedule of Submittals**.

The State does not require Well Abandonment Records

3.5.3. Construction of Prefabricated Building

WRS will subcontract the erection of a prefabricated building to house the prefabricated (long-term) groundwater treatment system. The building will be a metal prefabricated building with approximate size of 40' by 40' by 14'3" high at eave, sized to accommodate the prefabricated groundwater treatment system components and continuous room (20' by 20') for future treatment equipment. The building will have a 12' by 12' door frame with steel roll-up door and two 3' by 7' man doors with locksets. The building will be equipped with two wall openings to accommodate influent and effluent piping. The building will have a finished concrete floor (with sump) with epoxy coating.

The prefabricated building will have adequate insulation and heating system to maintain an indoor temperature of 60^0 F to 80^0 F during the heating months for any outdoor temperature. Adequate ventilation will be provided in accordance with New York State and Local code for an occupied building. Permanent electrical power to the building will be from a 120/240 Volt (200 Amps) service already established for site. WRS will provide all the necessary transformers, distribution panels, breakers, and switches as required for the operation and control of the building and treatment system. The building will have a separate area or room to house any such electrical equipment. The building will be grounded, bonded, and provided with lightening protection. The building will be provided with adequate interior lighting. Exterior area lighting (on each of the exterior walls) will be controlled by a single on/off switch and a single photo-electric eye. The building will be equipped with telephone service.

The groundwater treatment facility building will have a desk, a potable water storage tank and pump system that serves a safety shower and eyewash station.

A building permit from the Town of Moria Department of Codes for construction of the long-term groundwater treatment facility building on the Site property is required. WRS will obtain this permit prior to the erection of the prefabricated building.

All submittals required for the prefabricated building will be provided by WRS in accordance with the **Schedule of Submittals**.

3.5.4. Installation of Groundwater Treatment System

WRS will install a system for treating groundwater to be pumped from two recovery wells for a period of up to 25 years. The bench-scale groundwater treatability work (Parsons ES, 1997b) provides the basis for the design of the groundwater treatment system. The system is designed to remove volatile organic compounds (VOCs), iron, and semi-volatile organics based on groundwater samples obtained following a 72 hours of pumping during the November 1996 pump test and maximum historical concentrations found in groundwater from deep wells along the southern edge of OU-1. This information is presented in Table 3.1 of the February 1999 95% Design Report (Parsons ES). The groundwater characteristics presented in this table are assumed to correspond to treatment influent characteristics. The design is also based on removing constituents as needed to meet Class C(t) water quality criteria in accordance with state discharge limits established for the site. WRS intends to discharge treated effluent (following storage as needed to monitor water quality) to the existing ditch along the north side of the railroad embankment which in turn empties through the Western Wetland and eventually into Lawrence Brook. The design is based on treating groundwater pumped from two recovery wells pumping at 10 gpm each.

WRS has selected a groundwater system design based as above and on the Specifications presented in section 13290. The design incorporates the following components:

- Influent Equalization with Air Sparging (including GAC Vapor Phase Adsorption);
- Pre Filtration;
- Air Stripping;
- Filtration;
- Granular Activated Carbon;
- Post Filtration;
- Effluent Flow Meter; and,
- Effluent Flow Sampler.

These components are summarized in **Table 3-4**, presented below.

Table 3-4 Groundwater Treatment System Components

System	Quantity	Component Specifications
SVE	1	Air Compressor Motor Belts/sheaves/pulleys OSHA Belt Guard Discharge check valve
	1	Equalization/Sparging Vessel 2500 gallon capacity Seamless linear polyethelyne construction 16" top manway Coarse Bubble Diffuser Manifold Continuous Level Transmitter All fittings as required
	1	Recirculation Pump Motor 5 gpm spray nozzle (de-foaming)
	1	Vapor Phase GAC
Pre-filtration	4 (8)	Bag Filter qty 35, 10 micron high differential pressure switch inlet/discharge pressure gauges
Water treatment	4	Transfer Pumps Motors 1.5" inlet, PVC, schd 40, ball valve 1" discharge, PVC schd. 40, ball/check valve 18" by 24" base plates
	1	Shallow Tray Air Stripper blower motor 4 HDPE trays HDPE base sump clear site tube 1" manual drain valve polypropylene de-mister pad sump pressure gauge 3 stage level sensing probe flow switch base support ring
	2 (4)	Bag Filters qty 35, 10 micron high differential pressure switch inlet/discharge pressure gauges
	3	200 lb. Liquid-Phase GAC cells polyglass pressure vessels PVC distributor system inlet/discharge pressure gauges
Post-Filtration	1	Bag Filter qty 35, 10 micron high differential pressure switch inlet/discharge pressure gauges

TABLE 3-4 Continued

System	Quantity	Component Specification
Effluent Flow	1	Magnetic Insertion Flowmeter
Effluent Sampler	1	Refrigerated Composite Sampler
Control Panel	1	Automated Control Panel wall mounted enclosure remote, WINDOWS based customer interface ProView remote telemetry on-site LCD display and keypad automatic fax reporting alphanumeric/numeric page on alarms data logging hour meters remote communication modem red fault light for alarm conditions fully programmed

Provisions will be made to accommodate additional future treatment units to remove iron and manganese. These provisions are listed in Specifications section 13290 2.01C. The system will also have built-in provisions for winterization.

All technical information, drawings, details, manufacturer's information, etc. will be provided by WRS prior to starting installation of the groundwater treatment system, in accordance with the **Schedule of Submittals**.

3.5.5. System Start-up and Demonstration

Following installation, the groundwater treatment system will be tested at the design operating flow to insure proper operation. Testing will be conducted for a period of one week (continuous). A holding tank for treated water will be utilized during the start-up period. The ENGINEER (or O&M Contractor) is responsible for sampling during the start-up period for parameters specified in the State discharge limits. Treated water will be retained during start-up until analytical results prove that discharge limits have been met.

WRS will provide any information required in Specifications section 01650 in accordance with the **Schedule of Submittals** prior to start-up. WRS will also hold a Pre-Startup Conference.

After the successful completion of the demonstration period and prior to the transfer of the facility, WRS will clean, lubricate, and service the system components and facility.

3.5.6. WRS Operation of Facility

WRS will operate the groundwater treatment facility during the start-up period and until training and transfer of the facility takes place.

3.5.7. Training and Transfer of Facility

WRS will instruct up to three individuals representing ALCOA or ALCOA's O&M Contractor in the use and maintenance of all equipment. WRS will give to ALCOA a formal written notice of the proposed instruction period at least one week prior to the commencement of the instruction period. The facility will be cleaned, lubricated, and serviced to a "like-new" condition prior to transfer.

3.6. Earthwork and Solidification/Stabilization

3.6.1. Set-up and Pilot Study

Refer to **S/S Work Plan, Appendix G.**

3.6.2. Excavation and Staging

The excavations for this project will be accomplished utilizing PC200 or equivalent excavators and, at times, a extenda-hoe backhoe. Excavations will begin from the defined contamination limits and cover all Excavation Areas (EAs) including any additional soil suspected to be contaminated, if directed by the ENGINEER. Where possible, soils contaminated with greater than 10 ppm PCBs will be excavated and directly loaded to dump trucks for transport to the S/S Stockpile Area. Suspected PCB contaminated soil will be excavated and placed in the dump truck for transfer to the temporary S/S area. Every precaution will be taken during transportation of soils and stockpile creation to prevent soil spillage and cross contamination of clean roadways. If spillage occurs on the clean roadway, the soil and any affected gravel will be removed and placed with the source soil stockpile, and the roadway will be restored with clean stone.

The areas requiring excavation has been delineated based on previous sampling and analyses. The final excavation dimensions are not definitely known at this time. However, the final depths are not expected to extend deeper than 26 feet in the deepest area of excavation. Where an excavation is required to penetrate deeper than four feet and the excavation area must be entered for any reason, sloping of excavation sidewalls will be completed in accordance with OSHA guidelines.

3.6.3. Backfilling

WRS will import clean, granular, material to be used as unclassified backfill for backfilling of excavations to an elevation two feet higher than that of the maximum recorded groundwater table. Unclassified backfill material will be selected in accordance with Specifications section 02223 2.02. Backfill of excavations will proceed upon confirmatory sampling and testing of the excavation sides and bottom by the ENGINEER. Backfill of excavations will proceed only with prior approval of the ENGINEER.

Backfilling will be placed and compacted in a method consistent with Specifications section 02228.

3.6.4. Full Scale Production

Refer to **S/S Work Plan, Appendix G.**

3.6.5. Placement of S/S Soils and Debris

Refer to **S/S Work Plan, Appendix G.**

3.6.6. Construction Water Management

Refer to **Construction Water Management Plan, Appendix F.**

3.7. Cap Construction

This plan describes the measures that will be taken by WRS to properly install the landfill cap.

The cap will be placed in its designed location, proceeding from bottom to top as follows:

- Regrade and prepare landfill surface;
- Install gas vents, if required;
- Place cushion geotextile;
- Place 40 mil LLDPE geomembrane liner;
- Placement of a drainage layer;
- Placement of protective soil cover;
- Placement of topsoil; and,
- Establishment of vegetative cover.

3.7.1. Subgrade Preparation

The surface of the area to be capped will be finish graded to the lines and grades as shown on the construction drawings. At a minimum, 2 feet of clearance between the maximum recorded groundwater elevation(s) and the treated materials will be maintained. Imported unclassified clean backfill will be placed (See **Section 3.6.3;** Backfill) from the bottom of the excavations to an elevation two feet above the maximum recorded groundwater level.

The surface for placement of the cushion geotextile and geomembrane will be rolled smooth using a 20 ton vibratory smooth-drum compactor (or equivalent). The ENGINEER may observe the proof-rolling and may make determinations of unsuitable subgrades. Unsuitable subgrade areas will be undercut and backfilled with suitable materials. The subgrade will be cleared of any protruding debris, vegetative matter, or stones which may damage the geotextiles. Any standing water will be removed. The subgrade will be certified by WRS as acceptable prior to commencing installation of geosynthetic materials. The geomembrane installer will also inspect the soils subgrade prior to commencing work. The installer's acceptance of the soils subgrade (as well as the soil material to be placed directly above the geomembrane) is a submittal in accordance with the Specifications (listed in **Table 3-6** and the **Schedule of Submittals**).

3.7.2. Gas Vents

WRS will install gas vents, if required, as shown on final drawing C-6; refer to **Section 3.7.4.17;** Geomembrane Penetrations.

3.7.3. Cushion Geotextile

A separation/cushion geotextile will be installed between the soils subgrade and the geomembrane. This geotextile will also serve (as needed) as a gas venting layer. The cushion geotextile will be a needle-punched, non-woven geotextile specifically designed for this application. The cushion geotextile will be composed of polyester and/or polypropylene polymers and meet the criteria listed in **Table 3-5**.

Geotextiles will be stored out of the elements and protected from abrasion or tearing. The protective wrapping on geotextile rolls will be maintained as possible. Handling of geotextiles will be based on manufacturer's recommendations. All geotextile rolls will be clearly marked showing type of fabric and name of manufacturer. At a minimum, all geotextiles will be

identified, handled, and stored in accordance with ASTM D4873. The soils subgrade will be prepared and inspected as described in **Section 3.7.1**. Construction equipment is not permitted to operate directly on a deployed geotextile (12 inches minimum of soil cover will be maintained for tracked vehicles).

Table 3-5 Cushion Geotextile Specifications

Property	Value	Test Method	Units	Value
Mass per Unit Area	minimum	ASTM D5261	oz/sy	12
Puncture Resistance	minimum	ASTM D4833	lb.	175
Thickness	minimum	ASTM D5188	mils.	145

3.7.4. Geomembrane

A textured 40-mil linear low density polyethylene (LLDPE) geomembrane will be the second geosynthetic placed to construct the cap . This material will be placed directly on cushion geotextile. The geomembrane will be placed in accordance with the Specifications section 02405. The following sub-sections detail the requirements for the product, placement, testing, and inspection of the geomembrane.

3.7.4.1. *Geomembrane Submittals*

WRS will submit the deliverables as required in the Specifications section 02405 and as detailed in **Table 3-6**. Geomembrane Submittals are also identified in the **Schedule of Submittals.**

3.7.4.2. *Pre-Installation Conference*

WRS will hold a pre-installation conference with ALCOA representative, the ENGINEER, the installer, the geomembrane manufacturer's representative, and the independent testing laboratory representative (if applicable).

Table 3-6 Geomembrane Submittals

Submittal Submittal Time	Description
10 Days Prior to Geomembrane Installation	Name of intended geomembane manufacturer and geomembrane type to be supplied
	Manufacturers quality control program or descriptive documentation
	Test results indicating typical minimum average roll values which meet or exceed those in Table 3-7
	The origin and identification of raw materials used to manufacture geomembrane
	Samples of the geomembrane (4 @ 8 X 10 inch)
	Copies of quality control certificates issued by producer of raw materials
	Copies of quality control certificates for each roll
	Copies of destructive seam test results (2 per blanket)
	Certification that geomembrane permeability does not exceed 1 X 10 -11 cm/s for LLDPE
	Compatibility report (with wastes in landfill)
	Name of intended installer
	Installer project list (at least 10 projects)
	Installer's foreman project list (at least 5 projects)
	Installer's seaming foreman project list (at least 3 projects)
	Shop drawings showing layout of panels, seams, vents; seam details; dissimilar materials joint details
	Installation schedule
	Manufacturer's installation instructions
	Quality control requirements and procedures
	Qualifications of independent testing lab to perform QC
During Installation	Copies of seaming quality assurance records
	Installers' acceptance of soil materials above and below the geomembrane
	Copies of quality assurance and test results from testing lab
	Archive samples of material from destructive seam test locations
At Geomembrane Installation Completion (within 2 weeks of installer demobilization)	Record drawings showing layout of panels (including roll identification), destructive sample locations, repairs or patches, and deviations from previous submittals
	Summary logs of quality assurance testing performed, ambient temperature during seaming, geomembrane surface temperature, and seam wedge temperature

3.7.4.3. *Geomembrane Product*

The geomembrane will be a 40 mil LLDPE material, textured on both sides, that meets the requirements of the Specifications (section 02405). The geomembrane will be free of holes, blisters, undispersed raw materials, and contamination by foreign matter. The geomembrane will not contain fillers or extenders. The material will be certified by the manufacturer to meet or exceed the requirements as detailed in **Table 3-7**.

Table 3-7 LLDPE Geomembrane Roll Material Properties

Property	Test Method	Units	Value	Remarks
Thickness	ASTM D5199	mils	40	average
			36	minimum
Sheet Density	D1505	g/cm^3	0.910	minimum
			0.935	maximum
Tensile Properties (principal directions)	ASTM D638			
Stress at Break	D638*	lb/in	60	2.0" gage length
Strain at Break	D638*	percent	700	2.0" gage length
Elongation at Break	D638*	percent	300	2.5" gage length
Tear Strength	D1004 (C)	lb	20	minimum
Low Temperature Impact	D746	F	-94	maximum
Puncture Resistance	FTMS 101 2065	lb	56	minimum
Carbon Black Content	D1603	percent	2 to 3	allowable range
Carbon Black Dispersion	D2663 (B) and D3015	N/A	A1, A2 or B1	acceptable levels
Environmental Stress Crack	D1693	hrs	200	minimum
Dimensional Stability (each direction)	D1204	percent change	± 2	maximum
Seam Requirements				
Seam Strength (Shear)	D4437 (3)	lb/in	53	minimum
Seam Peel (Peel)	D4437 (4)	lb/in	44	minimum

3.7.4.4. *Geomembrane Resin*

Any resin used for extrusion welding of sheets and/or sheet penetrations shall be LLDPE produced from the same material as the sheet resin. The material will have the same physical properties as those of the resin used in the manufacture of the geomembrane material.
"Regrind" or "trim" material may be used as long as the material does not contain greater than 2% by weight.

3.7.4.5. *Inspection Upon Delivery*

The geomembrane sheet rolls will be visually inspected by the ENGINEER for possible damage in transit upon delivery to the jobsite. The ENGINEER will further inspect each sheet as it is unrolled. The geomembrane will be brushed or washed, at the discretion of the ENGINEER, if the presence of dust or mud inhibits inspection. If, in the opinion of the ENGINEER, a roll is found to be unsatisfactory and not suitable for repair, the roll will be rejected and removed from the jobsite.

3.7.4.6. *Delivery, Storage, and Handling*

Geomembrane materials will not be delivered to the jobsite until all of the appropriate submittals listed in **Table 3-6** have been approved by the ENGINEER.

Storage and handling of the geomembrane materials will conform to the manufacturer's recommendations and will be done in a manner as to prevent damage or deterioration to any part of the geomembrane. Rolls will be stored on a prepared surface with no protrusions greater than 1/2 inch. Rolls will not be stacked. Rolls will be protected from puncture, abrasion, dirt, excessive heat, light, and other damage. Any damage to the protective wrapping will be repaired immediately. Rolls will be transported in a manner so as to avoid damaging the geomembrane. Once deployed, no vehicular equipment shall be driven directly on the membrane. A minimum of three feet of soil for wheeled vehicles and one foot of soil for tracked vehicles will be maintained over installed geomembranes at all times. No smoking will be allowed on the deployed geomembrane.

3.7.4.7. *Placement of the Geomembrane*

The membrane panels will be placed in accordance with the proposed panel layout which will be submitted to the ENGINEER for review prior to installation. The proposed layout will include at a minimum the location of seams, panels, and sequential order of placement. Each roll will be readily identifiable with a label indicating the manufacturer, batch number, product model number, roll number, thickness, and dimensions

WRS will not deploy more geomembrane panels than can be reasonably seamed in the same day. Westinghouse may temporarily secure the panels with sandbags as required. The material will be deployed in a controlled manner as not to damage the geomembrane. Panels will be placed in a fashion which will minimize or prevent surface water from flowing beneath an in-place geomembrane.

Lap joints will not be laid out or prepared for welding further ahead than one day's welding time. Prepared joints that have laid out overnight will be recleaned and/or reground prior to welding.

Field seams will be orientated parallel to the line of maximum slope. Seams will be minimized in corners or irregularly shaped locations. No seams will be less than five feet from the edge of the cover.

The geomembrane will be installed with an adequate amount of slack to allow for future temperature shrinkage to occur with minimal stretching and tightening of the geomembrane. Tenting of the geomembrane in corners or at the toes of slopes will be avoided.

3.7.4.8. *Seaming Method*

WRS will provide a qualified installation supervisor and seaming technicians as required in the Specifications. The geomembrane will be seamed using a dual-track fusion

welder. Extrusion welding will be used for repairs to the geomembrane or when use of the dual track machine is impractical. The limiting seam length for fusion or extrusion welding will be discussed during the Pre-Construction Meeting. Single track fusion welding equipment will only be used after written approval by the ENGINEER.

The seam numbers will be minimized and will be oriented parallel to the line of the slope. No cross seams will be placed on slopes steeper than 4 horizontal to 1 vertical. The seams will be overlapped a minimum of 4 inches for fusion welding and a minimum of 3 inches for extrusion welding.

3.7.4.9. *Seaming Conditions*

Seam welding will not be performed in adverse weather conditions that might impair the quality of the geomembrane or the weld. Field seaming will not be permitted when winds are in excess of 20 miles per hour. Seam welding operations will be conducted when the ambient temperature is between 40°F and 100 °F.

3.7.4.10. *Trial Seams*

WRS will require that all welding technicians perform quality control testing using each type of welding equipment prior to initiating seaming work at the Site. In addition, all welding technicians will be required to perform start-up tests at the beginning of each work shift.

Trial seams will be conducted on pieces of the geomembrane that are nominally 12 inches wide by 10 feet in length for fusion welding and 3 feet in length for extrusion welding, with a minimum of 4 inch overlap. WRS will cut six specimens from the completed trial seam. The specimens will be die or template cut into one inch wide strips. Three samples will be tested for peel, and three samples will be tested for shear. All specimens will be required to meet the seam standards as presented in **Table 3-7**. All specimens must pass before production welding will be allowed.

The remaining portion of the trial seam will be labeled with the following information and delivered to ALCOA for archiving.

- Unique Seaming Test Sample Number (STSN);
- The STSN will be sequentially numbered as follows: 5151-ST-0001, 5151-ST-0002, 5151-ST-0003, etc..
- Technician (the technician will be labeled by his/her initials);
- Welding Machine Number and operating temperature;
- Date and time tested; and,
- Test results.

3.7.4.11. *Non-Destructive Continuity Testing*

The geomembrane will be 100% tested in-place using non-destructive test method as described in the Specifications. WRS plans to use pressure testing where applicable or vacuum or air lance testing as required. Documentation of the testing will be maintained detailing the results of the tests.

3.7.4.12. *Destructive Testing*

Samples for destructive testing will be obtained at a minimum average frequency of 1 per 500 linear feet of weld, after every two hours of continuous welding, or, if welding is stopped less than 500 feet, for that section of seam completed. The location of these samples will be random and determined by the ENGINEER.

Six specimens will be die cut from the samples and field tested using an electric tensiometer. Three specimens will be tested for peel in accordance with ASTM D4437. Three specimens will be tested for shear in accordance with ASTM D4437. All specimens will be required to meet the seam standards as presented in **Table 3-7.** The result of the tests will be documented in the **Geomembrane Installation Logs**.

The remainder of the sample will be submitted to the ENGINEER for archiving. The archive sample will contain enough material for one set of destructive tests. All samples will be labeled with the following information:

- Unique Destructive Test Sample Number (DTSN);
- The DTSN will be sequentially numbered as follows: 5151-DT-001-A, 5151-DT-002-A, 5151-DT-003-A, etc.;
- Each third will have a unique DTSN: "A" will be the portion delivered to the engineer for testing, "B" will be the portion delivered to the ENGINEER for archiving, and "C" will be the portion retained by WRS;
- Seam Number;
- Technician (s);
- Welding Machine Number and operating temperature; and
- Date and time tested.

3.7.4.13. *Seam Evaluation Criteria*

All specimens for field testing will be die cut into one inch wide strips and tested using an electric tensiometer. The tensiometer will be capable of testing the seams at a cross-head separation rate of 2.0 inches per minute. If any one of the specimens fail, the entire seam is considered to have failed.

The shear test specimen will, at a minimum, meet a strength of 95% of the rated tensile strength of the geomembrane in yield. The specimens will be required to have a strength and elongation equal to or grater than the properties listed in **Table 3-7** and equal to or greater that the seam shear properties values submitted by the Geomembrane Manufacturer.

The peal test specimen will, at a minimum, meet a strength of 65% of the rated tensile strength of the geomembrane in yield. The specimens will be required to have a strength equal to or greater than the properties listed in **Table 3-7** and equal to or greater that the seam shear properties values submitted by the Geomembrane Manufacturer.

Both the shear and peel tests must fail in the geomembrane sheet rather than in the weld area. This is known as "film tear bond" (FTB). The specimen will be defined as failing in the weld if any portion of the weld exhibits separation across more than 10% of the one inch width. Each track of the dual track fusion seam shall be considered to be a separate weld for the purposes of calculating the percentage separation.

3.7.4.14. *Failed Destructive Sample Procedure*

WRS will reconstruct any deficient seam once the extent has been determined. All reconstructed seams are bound by passing tests. WRS will be responsible for determining the extent of any deficient seam. This extent will be determined by obtaining destructive samples in 10 foot increments in both directions along the weld. After WRS has determined the extent of the failed seam, the ENGINEER will obtain a complete destructive sample for testing. If the destructive test fails, WRS will obtain additional samples to again determine the extent of the failed seam. Weld seams designated for repair will be done by capping the seam.

3.7.4.15. *Repairs*

WRS will repair any damaged spot or area as determined by the ENGINEER. Each repair spot will be assigned a unique number and the repair tracked and documented. The repair will be tested according to the Specifications.

Each repair will be labeled with the following numbering system:

- Unique Repair Number (RN); 5151-RN-001, 5151-RN-002, 5151-RN-003, etc..
- Surveyed location;
- Panel location; and
- Date and time repaired.

3.7.4.16. *Patching*

Patches will be used to repair defects in the geomembrane. All patches will be circular in nature and will extend a minimum of 6 inches beyond the extent of the damage. Cutting out of patch pieces will not take place directly on an already installed geomembrane sheet. All patch seams are subject to non-destructive and destructive testing as previously described.

3.7.4.17. *Penetrations*

Penetrations through the geomembrane for the gas vents will be sealed using factory fabricated seals. A geomembrane reinforcement overlay of thickness equal to that of the geomembrane will be placed around the opening the opening in the overlay will be the same size and configuration as the opening in the geomembrane. The overall minimum dimensions of the overlay shall be related to the geomembrane opening in accordance with Specifications section 02405 3.05K. The outside edge of the overlay will be welded to the geomembrane. The factory fabricated seals will not be installed until after the placement of the drainage layer for 50 feet in all directions from the penetration to allow for shifting of the geomembrane. The area immediately surrounding the penetration will be left open until the seal is installed and tested.

3.7.4.18. *Geomembrane Wrinkles*

Any wrinkles in the geomembrane will be captured rather than being cut. Geomembrane sheets will be placed to lay smooth and allowed time to relax and smooth out prior to welding.

3.7.5. Drainage Layer

A 12 inch thick (minimum) drainage layer will be placed on top of the geomembrane. The drainage layer material will meet the requirements of the Specifications section 02260 2.01. A material sample, quality control test results (independent laboratory), a list of compaction equipment to be used, and written acceptance of the material by the geomembrane installer will be submitted and approval obtained prior to placement of the drainage layer.

The drainage layer will be placed in a manner so as not to damage the geomembrane. A minimum of one foot of material will be maintained between the geomembrane and tracked vehicles or compaction equipment during the placement of the drainage layer. Low ground pressure (LGP) vehicles may be employed as necessary, or if deemed appropriate by the ENGINEER. The soil cover will not be placed if the ambient temperature is outside of the acceptable temperature range of 40 °F to 100 °F.

Compaction of the drainage material will be achieved in accordance with the Specifications section 02228. The ENGINEER will perform in-place density testing to confirm that compaction (90% minimum, 95% maximum of ASTM D698 "Standard Maximum Density") is achieved. The required frequency of compaction testing is tabulated in the Specifications Table 02269-2 .

The ENGINEER will also perform Quality Control testing on the drainage layer materials in accordance with Specifications Table 02269-1

3.7.6. Barrier Protection Layer

A 12 inch thick (minimum) cover soil layer (barrier protection layer) will be placed on top of the drainage layer. The cover soil layer material will meet the requirements of the Specifications section 02260 2.02. A material sample and quality control test results (independent laboratory) will be submitted and approval obtained prior to placement of the cover soil.

Compaction of the cover soil will be achieved in accordance with the Specifications section 02228. The ENGINEER will perform in-place density testing to confirm that compaction (90% minimum of ASTM D698 "Standard Maximum Density") is achieved. The required frequency of compaction testing is tabulated in the Specifications Table 02269-2

The ENGINEER will also perform Quality Control testing on the cover soil materials in accordance with Specifications Table 02269-1

It is the intent of WRS to use unclassified backfill material (**Section 3.6.3**) as soil cover provided that the unclassified backfill material meets the specifications for soil cover material.

3.7.7. Topsoil and Seeding

Topsoil will be required following the final grading of all general fill areas surrounding the cap and as the final component requirement prior to vegetation of the cap area. Imported topsoil will be certified clean by the supplier and soils will consist of non-deleterious materials. Compaction and grading of topsoil will be accomplished with existing heavy equipment and/or a 10-ton vibratory roller. Seed will be hydro-seeded and mulched or erosion control fabric placed per Specification requirements. Silt fencing will remain in-place until all restorative controls are installed and a vegetative cover properly established.

3.7.8. Installation of Permanent Drainage Controls

Permanent drainage controls will be constructed in accordance with the Stormwater Pollution Prevention Plan (Parsons ES). The site will be graded to the lines shown on the Drawings. A cap perimeter drainage ditch, a swale along the north edge of OU-1, a culvert from the cap perimeter ditch to the existing ditch along the western edge of OU-1, and a culvert from the cap perimeter ditch to the existing ditch along the railroad tracks at the southern edge of the site will be constructed to the grades, lines, and levels per the Drawings and Specifications. The existing drainage ditches along the western and southern edges of OU-1 will be maintained. All of the drainage controls are designed to direct surface runoff through the WDA to the beaver pond.

Riprap will be placed at the locations shown on the Contract Drawings. The subgrade will be properly graded and prepared prior to the placement of the riprap material. A separation geotextile will be placed between the soils subgrade and the riprap. Riprap material will be sized and placed according to Specifications section 02275. The Separation geotextile will be in accordance with Specifications section 02421. Appropriate submittals for the riprap material and the separation geotextile will be submitted prior to placement in accordance with the **Schedule of Submittals**.

Culverts will be constructed as required in Specifications section 02727. The culvert pipe will be laid to the lines, grades, and inverts as shown on the Contract Drawings. Drainage culvert pipe will be 12 or 18 inches in diameter smooth bore corrugated HDPE (AASHTO Designation M294-90 Type S).

3.7.9. Gravel Access Road

A permanent gravel access road will be constructed to the lines and grades as shown in the Contract Drawings. This road will be 16 feet wide and will consist of 12 inches of crushed aggregate. A reinforcement geotexitle will be placed between the crushed aggregate and the soils subgrade.

The soils subgrade will be properly graded, compacted, proof-rolled, and prepared. Subgrade materials will consist of native soils and/or properly compacted borrow materials. The ENGINEER may conduct in-place density testing as required in the specifications. Proof-rolling may be performed using a loaded 25 ton off-road (rubber-tired) truck to best identify soft or rutting areas in the subgrade surface. Any soft areas located during the proof-rolling will be repaired at the discretion of the ENGINEER.

Following the preparation of the soils subgrade, a reinforcement geotextile fabric will be placed. The reinforcement geotextile will have at a minimum the characteristics presented in **Table 3-8** presented below.

Table 3-8 Reinforcement Geotextile Specifications

Property	Qualifier	Test Method	Units	Value
Mass per Unit Area	minimum	ASTM D5261	oz/sy	8
Puncture Resistance	minimum	ASTM D4833	lb.	150
Grab Strength	minimum	ASTM D4632	lb.	400
Trapezoidal Teaming Strength	minimum	ASTM D4533	lb./in.	130X150
Burst Strength	minimum	ASTM D3786	psi	800

The geotextile will be stored, handled, and placed as required in Specifications section 02405. Vehicular traffic will not be permitted on the deployed geotextile prior to the placement of the crushed aggregate road material.

The road material will consist of crushed aggregate conforming to NYSDOT specifications for Type 2 (Item No. 304.03) material. Road materials will be stored, handled, and placed in accordance with Specifications section 02501.

3.8. Site Restoration

Site restoration will include the required site grading, replacement of topsoil, revegetation, wetlands restoration, and the placement of biodegradable erosion control measures. Site restoration will also include the removal of temporary roads, drains, culverts, erosion control measures, debris, rubbish, and other items, to the extent required in the Project Specifications, incidental to the project. WRS will attempt, at a minimum, to restore the Site to its original condition.

3.8.1. Topsoil Replacement and Grading

Topsoil will be required following the final grading of all general fill areas of the site prior to revegetation. Imported topsoil will be certified clean by the supplier and soils will consist of non-deleterious materials. Compaction and grading will be accomplished with existing equipment and/or a 10-ton vibratory roller. Topsoil will adhere to Specifications presented in section 02990.

3.8.2. Revegetation

Seed will be hydro-seeded and mulched per Specification requirements. Silt fencing will remain in-place until all restorative controls are installed and a vegetative cover properly established. Seed, fertilizer and mulch will adhere to Specifications presented in section 02990.

3.8.3. Biodegradable Erosion Control Fabric

Refer to **Erosion Control Plan, Appendix E.**

3.8.4. Removal of Temporary Facilities and Controls

WRS will remove all temporary facilities and controls prior to demobilization from the site. The temporary water construction water treatment system will be decontaminated and removed from the site. The decontamination pad will be decommissioned only after all equipment has been decontaminated. Temporary storm and surface water controls will be removed during site grading only after permanent site drainage controls have been established. Erosion and sediment controls will be removed as indicated in the Erosion and **Sediment Control Plan**, in **Appendix E.**

3.9. Demobilization and Project Completion

A final survey will be conducted by a New York State licensed Professional Land Surveyor. The survey will document the condition of the site at the conclusion of work. This **Final Survey** will include as-built sections defining cut and fill limits and as-built records of the actual cap and drainage structures. **Letters of Certification** will be provided to the ENGINEER for all of the site surveys (initial, intermediates, and final) for use in the Certification Report.

Demobilization will begin as soon as possible after the field work has been completed. Demobilization will include the decontamination of all equipment which has been in contact with contaminated soils or liquids, including decontamination and return to vendors of all rental/subcontracted equipment, and the removal of the break trailer, decontamination trailer, and office trailers.

A Site walk will be performed with ALCOA and the ENGINEER representatives to ensure that the Site has been satisfactorily restored and to address areas that may need further work. WRS will not complete demobilization procedures until the aforementioned representatives are satisfied that the work is complete and the Site conditions have been restored.

Any and all **Warranties**, **O&M Manuals**, **Record Drawings,** and other deliverables will be prepared by WRS and submitted at this time, in accordance with the **Schedule of Submittals**.

4. WASTE MANAGEMENT

WRS provides the following sections as procedures for disposal of contaminated materials.

4.1. Solid Waste Management

Oversized debris encountered during excavation, any wood debris/mulch from the clearing and grubbing effort and any other solid waste materials deemed by the Engineer as appropriate will be disposed of beneath the landfill cap. All such materials will be mixed, if applicable, with the proper amount of Type 1 Portland Cement to ensure that no leaching of PCBs occurs. Such materials will be placed between layers of processed soil in the landfill area. A dumpster will be provided for office refuse generated from the support zone. Refuse will be disposed of off-site at a sanitary landfill.

Used PPE may be disposed of beneath the landfill cap between layers of processed soil.

4.2. LNAPL Management

Light non-aqueous phase liquid (LNAPL) will be properly collected, containerized, and transported off-site for disposal. The disposal facility will be selected in accordance with our procurement procedures and policies in compliance with FAR regulations. All applicable DOT/UN requirements will be adhered to for transportation and disposal. Certificates of Disposal (CDs) will be obtained.

4.3. Construction Water Management

The management of construction water, water that has been in contact with impacted soils or equipment, will be stored, treated with a temporary water treatment system, and discharged on-site in accordance with the **Construction Water Management Plan** in **Appendix F** of this **Work Plan**.

4.4. Transportation and Disposal

Properly containerized wastes will be tracked and managed through on-site use of Microsoft Excel™ software.

For necessary disposal, WRS will subcontract transportation of all waste materials to transportation firms that are properly licensed and permitted for the type of materials to be accepted, and are approved by ALCOA. WRS Site Manager will coordinate all subcontractors and interface with the ENGINEER's on-site representative.

WRS will provide completed hazardous waste manifests to ALCOA's on-site representative for signature prior to shipment. We will also track the progress of all transport vehicles and immediately inform ALCOA of any irregularities in the delivery schedule.

WRS will ensure that all bulk containers are properly lined with polyethylene sheeting prior to loading, and that sheeting is draped over the side of the container while loading to shield the outside of containers from contamination. Dust suppression methods will be employed as required to minimize the amount of fugitive dust. All bulk containers will be inspected for proper function and integrity upon acceptance. Transport vehicles loading out during the project will be inspected for obvious deficiencies and for general road worthiness.

WRS will insure that transport vehicles do not become contaminated. A clean road surface will be available to access the material loadout area. Clean stone will be available on-site and will be used to construct additional clean road surfaces for the transport vehicles where required.

5. CONSTRUCTION ACTIVITY MANAGEMENT TECHNIQUES

5.1. Overview

Construction and management techniques that will be implemented by WRS to provide for a successful project are discussed below.

5.2. Project Documentation

The **Work Plan**, with its supporting plans, and the **SSHASP** comprise the required pre-construction deliverables for this project. These documents are a series of design and planning documents that make up the pre-mobilization submittals required of WRS. The **Work Plan** and the **SSHASP** will require approval by ALCOA and the ENGINEER. The **SSHASP** is submitted under separate cover.

5.2.1. Work Plan

The **Work Plan** describes the activities to be performed the remediation activities at the Site per the Specifications provided to WRS. The **Work Plan** is comprised of the **Work Plan** itself and other plans included as appendices to this document. Supporting plans are outlined below.

5.2.1.1. *Schedule of Values*

The required **Schedule of Values** will be used to calculate the payments due to WRS in each monthly invoice. The **Schedule of Values** is included as **Appendix A.**

5.2.1.2. *Project Schedule*

The **Project Schedule**, in the form of a Gantt Chart, is provided as **Appendix B**. The **Project Schedule** will be revised and updated as necessary.

5.2.1.3. *Cash Flow Diagram*

The **Cash Flow Diagram** is presented in **Appendix C**. The **Cash Flow Diagram** is dependent on the **Project Schedule** and will be updated upon revisions to the **Project Schedule.**

5.2.1.4. *Schedule of Submittals*

The **Schedule of Submittals** is presented in **Appendix D**. The **Schedule of Submittals** is dependent on the **Project Schedule** and will be updated upon revisions to the **Project Schedule**.

5.2.1.5. *Erosion and Sediment Control Plan and Schedule*

The Erosion and Sediment Control Plan and Schedule describes WRS's plans for the control of soil erosion during construction activities. This plan is included as **Appendix E** to the **Work Plan**.

5.2.1.6. *Construction Water Management Plan*

The **Construction Water Management Plan** is presented in **Appendix F.**

5.2.1.7. *Solidification/Stabilization Work Plan*

The Solidification/Stabilization Work Plan is presented in Appendix G.

5.2.2. Site Specific Health and Safety Plan

The **Site Specific Health and Safety Plan** details the necessary protocols for the recognition, evaluation, and control of all hazards associated with each task required for the completion of this project. This submittal is a stand alone document.

5.2.3. Project Submittals

Various technical submittals, record drawings, materials samples, daily reports, logs, and otherwise will be required throughout the duration of the project. These will be submitted in accordance with the **Schedule of Submittals**.

5.2.3.1. *Daily Reports*

WRS will submit on a daily basis a **Daily Operations and Health & Safety Report,** detailing work performed, level(s) of protection, air monitoring results, weather and wind direction/velocity observations, safety related problems, and corrective actions implemented; and a **Daily Solidification/Stabilization Report** detailing soils source area(s), quantities treated, batch identification numbers, batch proportions, mixing QC data, and batch placement location.

5.3. Project Management Team

The WRS project organization key team members were selected based on education, experience, and expertise in the designated area of responsibility. The following paragraphs describe the responsibilities of key project team members and the qualifications of the selected personnel to serve in these roles. The WRS project organization is shown in **Figure 5-1**.

The WRS project team members include:

- Project Manager;
- Site Superintendent;
- Site Health and Safety Officer (SHSO);
- Staff Engineer, QA/QC Officer;
- Solidification/Stabilization Supervisor;
- Excavation and Materials Handling Supervisor; and,
- Project Accountant.

5.3.1. Project Manager

The Project Manager is the person ultimately responsible for all elements of the project. Mr. Daniel DeCarlo will be the Project Manager for the York Oil project. He will be directly

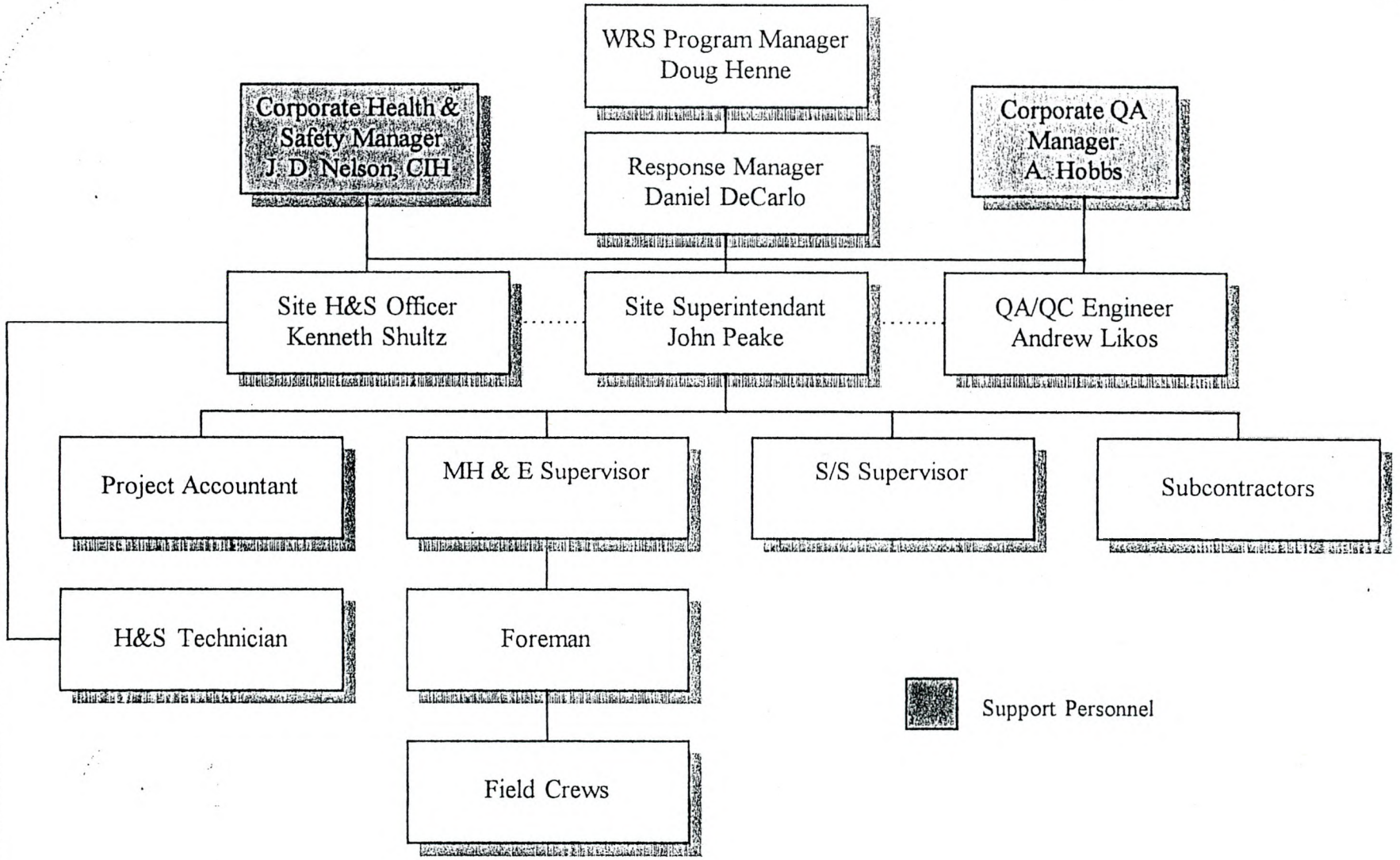


Figure 5-1

YORK OIL SITE STAFFING

responsible for employee, environmental, Health and Safety, and general project quality assurance. He has the authority and responsibility to coordinate and implement the technical procedures and work activities prescribed by the project's scope of work. He is also responsible for insuring project compliance with federal, state, and local codes and regulations. This individual will be the main point-of-contact with ALCOA and will be responsible for cost estimates, schedule projections, and the reporting of all data collected during the project.

5.3.2. Site Superintendent

The Site Superintendent is the person responsible for the daily operations of the project. Mr. John Peake will be the Site Superintendent for the York Oil project. Mr. Peake will mobilize at project start and will remain as WRS' full-time on-site project representative. He will organize and execute the project day to day activities and will report directly to the WRS Project Manager. All lower tier WRS project members will report to Mr. Peake. He will schedule personnel, equipment and supplies to accomplish planned site tasks and will provide regular updates to ALCOA/Parsons site representatives. He will be responsible for maintaining the highest standards of quality of all site work and ensuring that work activities occur the way they are planned. He has the authority and responsibility to coordinate and implement the work activities prescribed by the project's scope of work.

5.3.3. Site Health and Safety Officer

The WRS corporate Health and Safety Officer will appoint a Site Health and Safety Officer for this project who will report directly to the Project Manager and corporate Health and Safety Officer. Mr. Kenneth Shultz will be the Site Health and Safety Officer for the West End Landfill project. The Site Health and Safety Officer will manage and implement the **Site-Specific Health and Safety Plan** for the project at the job Site. The Site Health and Safety Officer will work closely with the Project Manager to ensure that all areas of the Site-specific Health and Safety Plan are fully implemented at all times. The Site Health and Safety Officer, in performing safety and quality verification activities, will have the responsibility, authority, and organizational freedom to identify any safety/quality deficiencies and to approve corrective actions. Furthermore, he will have authority to stop work for significant adverse conditions in his assigned areas of responsibility.

5.3.4. Engineer, Project QA/QC Officer

The Project QA/QC Officer will report directly to the Project Manager and assist him in ensuring all operations, plans, and methods are in compliance with project Specifications as well as applicable federal, state and local regulations. Mr. Andrew Likos has been assigned this responsibility for the York Oil project. He will oversee all engineering aspects of the project including survey, stakeout, horizontal and vertical accuracy of all earthwork, placement of synthetics and other appurtenances required by the Specifications. He will also conduct field inspections, take samples, coordinate both field and laboratory testing and procedures, and generate reports as required.

5.3.5. Solidification/Stabilization Supervisor

WRS will designate a competent employee as the Solidification/Stabilization Supervisor. As a field supervisor this individual will work directly with Mr. Peake and be responsible for all aspects of the MFSU operations, maintenance and report logs.

5.3.6. Excavation and Materials Handling Supervisor

WRS will designate a competent employee as the Excavation and Materials Handling Supervisor. As a field supervisor this individual will work directly with Mr. Peake and be responsible for all aspects of the field operations, excavations and staging activities.

5.3.7. The Project Accountant

WRS will assign a Project Accountant to track project revenues and costs. Labor, equipment and material usage, field purchases, and any subcontractor services are accumulated daily by task as specified in the contract bid. The Project Accountant calculates budget variances on a regular basis for each individual project task, based on revenue generated and costs incurred for the task. All variances are reviewed by the Project Manager. Revenue variances resulting from project scope changes are made available for client review. The Project Accountant also develops and maintains WRS purchase order procedures in order for project-committed costs to be accurately determined at any point in time.

5.4. Subcontractors

The WRS team includes selected subcontractors to provide support in specified areas. The principal anticipated subcontract items are listed below. Additional subcontracted services will include water delivery and provision of construction materials. All WRS subcontractors will be appropriately licensed to perform the contracted work. All subcontractor personnel who perform work within the exclusion or contamination reduction zones must be properly trained and certified regarding health and safety measures in accordance with OSHA 29 CFR 1910.120.

Prior to mobilization the Project Manager will coordinate the scheduling of the subcontractors and vendors to be utilized. He will be assisted by the QA/QC Officer and the Site Superintendent. Procurement activities will be carried out in compliance with FAR Regulations. Required submittals will be forwarded directly to ALCOA and the ENGINEER. Each subcontractor will be subject to the same standards, rules and regulations required of WRS.

WRS intends to self perform most of the services required for performance of OU-1. Upon award of the contract and receipt of notice to proceed, WRS will initialize procurement and will finalize the need for subcontracting. At this time, WRS anticipates subcontracting the following services:

- Cement Supplier for guaranteed delivery schedule and specifications
- Drilling and Well Abandonment
- Electrician
- Geomembrane (liner) installation for the cap in OU-1
- Material Testing Laboratory
- Analytical Laboratory
- Prefabricated Building installation for water treatment
- Security
- Surveying
- Revegetation
- Waste disposal

5.5. Project Control

The WRS project team is supported by proven procedures and techniques for planning, budgeting, scheduling, and controlling work tasks. WRS computerized systems are used to manage all project data, including cost and schedule data, analytical data, and physical data. The systems provide the project manager and project team access to accurate up-to-date information on all facets of the work progress.

5.5.1. Cost Control

WRS will use our proven internal cost tracking system to manage the accounting for this project.

5.5.2. Schedule Control

The project management software which will be used to schedule and track this project will be Microsoft Project (Version 4.0). Microsoft Project provides tools to help schedule tasks, manage resources, and monitor costs. WRS will track the progress of the project by activity. The activity progress will be updated weekly on site by the Project Engineer. As may be necessary, activities on the current schedule may be further broken down into sub activities to allow detailed tracking. Intensive schedule control will be maintained throughout the project. Schedules will be updated in monthly reporting.

The current **Project Schedule** is presented in **Appendix B** of this document.

5.6. Project Meetings

Throughout the project, WRS will meet with ALCOA and the ENGINEER. At a minimum there will be a Pre-Construction Meeting, Progress Meetings, and Pre-Installation Meetings. These meetings are detailed below.

5.6.1. Pre-Construction Meeting

WRS attend a Pre-Construction Meeting at a location at the ENGINEER's office in Syracuse, NY on June 21, 1999 to discuss project start-up procedures including Site layout, schedules, submittals, safety, environmental protection and any additional pertinent items. In addition, responsibilities and personnel assignments were reviewed. Lines of communication and reporting between the various project team members were established. ALCOA, ALCOA's on-site representative, WRS, and the ENGINEER attended this meeting. ALCOA was responsible for preparing the meeting agenda, presiding at the meeting, recording minutes per **Section 5.6.4.**

The agenda for this meeting was as follows:

- Introductions and responsibilities of each party;
- Task sequencing and Specification modifications based on EPA's final review;
- Project Schedule;
- Submittals;
- Permits;
- Notifications; and,
- OU-2 update.

5.6.2. Progress Meeting

Progress meetings will be held at the Site regularly. For the first month of the project, Progress Meetings will be held weekly. Thereafter, Progress Meeting will be held at least twice a month. General Site progress and other related issues will be discussed at this time. Also discussed will be health and safety issues, activities of previous and upcoming weeks, and any problems that may have been encountered. ALCOA, ALCOA's on-site representative, the ENGINEER, and WRS will attend these meetings. ALCOA will be responsible for preparing the meeting agenda, presiding at the meeting, recording minutes per **Section 5.6.4**.

The agenda for these meetings will be as follows:

- Submission of updated **Schedule of Values** and **Progress Schedule**;
- Review of minutes of previous meetings;
- Review of Work in progress;
- Field observations, problems, and decisions;
- Identification of problems which impede planned progress;
- Review of submittals schedule and status of submittals;
- Review of off-Site fabrication and delivery schedules;
- Maintenance of Progress Schedule;
- Corrective measures to regain projected schedules;
- Planned progress during succeeding work periods;
- Coordination of projected progress;
- Maintenance of quality and work standards;
- Effect of proposed changes on progress schedule and coordination; and,
- Other business relating to Work.

5.6.3. Pre-Installation Meetings

Pre-Installation Meetings will be held at the Site as required by the project specifications. The purpose of these meetings is to review the conditions of installation, preparation and installation procedures, and coordination with related work. WRS will be responsible for preparing the meeting agenda and presiding over the meetings. ALCOA will be responsible recording minutes per **Section 5.6.4**.

5.6.4. Meeting Minutes

Minutes from all meetings are the responsibility of ALCOA. These minutes will be typed and copies provided within 2 days after the meetings to the appropriate parties. As part of the routine project management activities, WRS will document action items and corrective actions and track each to satisfactory completion.

5.7. Construction Equipment

WRS is responsible for providing all materials, labor, and equipment necessary to accomplish the work and meet the Specifications for completion of the construction activity tasks. Equipment for this work has been selected and sized by WRS to perform the designated tasks associated soil excavation and related material handling and loading activities. The principal equipment to be used for this project are presented in **Table 5-1**.

Table 5-1 Heavy Equipment

Four or More Pick-up Trucks, Passenger Vans
Two PC 220 Excavators (one with Grappler attachment)
One Cat D5 or D41P Komatsu Dozer (or larger)
One 4 Yard Rubber-Tired Loader
One 25 Ton Off-Road Truck w. Dump
Mobile Fixation Stabilization Unit (MFSU) with Conveyors
Power Grid Shaker
Tractor with a Bush Hog Attachment (if necessary)
20 Ton Vibratory Smooth Drum Roller
Water Truck (if necessary)
Temporary Water Treatment System
Pressure Washer, Pumps, Pipe, Hose, Valves, Water Storage Tanks
Generators (as necessary)

Note: All equipment listed above may be replaced by "equivalent" equipment.

In addition to the equipment listed above, WRS will mobilize hand tools, health and safety equipment, expendable items (PPE, poly sheeting, empty drums, etc..), office equipment in accordance with **Section 3.4.1**, storage facilities, decontamination trailers, etc. as necessary to complete all remediation activities according to the **Project Schedule**, The **SSHASP**, and the Project Specifications.

5.8. Health and Safety

WRS is committed to establishing and to maintaining safe and healthy work conditions on all company work sites which will preclude the occurrence of accidents or harmful exposures to hazardous substances.

All WRS personnel employed in hazardous or non-hazardous Site operations are required to complete a five-day, forty-hour training program in compliance with OSHA 29 CFR 1910.120 to ensure that they are capable of performing their job assignments with due regard to safety. This training is updated with an eight-hour review program on an annual basis. Topics covered in the safety training program include safety administration, Site organization and control, chemical and physical hazards of Site operations, respiratory protection, protective clothing, decontamination procedures, ambient air monitoring, field sampling, safety planning and emergency response procedures, and hydrocarbon recovery safety protocol.

In addition, Site-specific health and safety training is required prior to the mobilization of personnel to each Site. Documentation of health and safety training is maintained in the respective service centers and duplicated in the Corporate Health and Safety Office. Record audits are conducted bi-annually by the Corporate Health and Safety Office to ensure that appropriate documentation is in place. Daily tailgate safety meetings are held at the start of each day and prior to the start of new or critical tasks. Attendance

at these meeting is mandatory for all Site personnel. Representatives from the ENGINEER and ALCOA are also invited to attend.

WRS management takes the steps necessary to recognize, to evaluate, and to control those situations likely to produce exposure to hazardous materials. Frequent health and safety audits are performed by corporate personnel. We strive to exceed, or, at a minimum, to comply with federal, state, local, and plant health and safety regulations. WRS's Health and Safety Program consists of six basic elements:

- The WRS Corporate Health and Safety Statement of Policy and General Health and Safety Plan;
- Health and Safety Training Programs;
- Medical Surveillance Program;
- Site-Specific Health and Safety Plans and meetings that meet or exceed the requirements of the client;
- Daily Safety Meetings; and
- Incident Investigation/Communication.

Appendix A

Schedule of Values

SCHEDULE OF VALUES / REQUISITION FOR PAYMENT

Project:	York Oil Superfund Site
Project Number:	995151
Performance Period:	

SCHEDULE OF VALUES						REQUISITION FOR PAYMENT				
Bid Item	Description	Qty NTE	Unit	Unit Price	Total	%/Units Comp.	%/Units Prev.	%/Units Invoice	Amount Billable	Amount Remaining
1	**Bonds & Insurance**	**0**	**L.S.**	**$ -**	**$ -**					
2	**Mobilization**	**0**	**L.S.**	**$ 372,233.00**	**$ -**					
2A	Work Plan Submitted[1]	1	L.S.	$ 18,611.65	$ 18,611.65					
2B	Health & Safety Plan Submitted[1]	1	L.S.	$ 7,444.66	$ 7,444.66					
2C	Initial Survey Submitted[1]	1	L.S.	$ 39,084.47	$ 39,084.47					
2D	Alcoa Trailer Set-up & Furnished[2]	1	L.S.	$ 18,611.65	$ 18,611.65					
2E	Government Trailer Set-up & Furnished[2]	1	L.S.	$ 18,611.65	$ 18,611.65					
2F	WRS Trailer(s) Set-up[5]	1	L.S.	$ 27,917.48	$ 27,917.48					
2G	Office Waste Dumpster Delivered	1	L.S.	$ 1,861.17	$ 1,861.17					
2H	Toilet Facilities Delivered	1	L.S.	$ 2,233.40	$ 2,233.40					
2I	WRS Personel On-site[3]	1	L.S.	$ 67,001.94	$ 67,001.94					
2J	WRS Equipment On-site[4]	1	L.S.	$ 37,223.30	$ 37,223.30					
2K	Site Entrance Complete	1	L.S.	$ 3,722.33	$ 3,722.33					
2L	Soils Staging Area Constructed	1	L.S.	$ 44,667.96	$ 44,667.96					
2M	Decon Pad Operational	1	L.S.	$ 1,861.17	$ 1,861.17					
2N	Pugmill Onsite	1	L.S.	$ 44,667.96	$ 44,667.96					
2O	Phone Lines Hookup Office Facilities	1	L.S.	$ 18,611.65	$ 18,611.65					
2P	Electric Hookup Office Facilities	1	L.S.	$ 18,611.65	$ 18,611.65					
2Q	Weather Station	1	L.S.	$ 1,488.93	$ 1,488.93					
2R	Utilities Usage Over/Under[6]	1	LS/mo.	$ -	$ -					
3	**Erosion Control**	**1**	**L.S.**	**$ 24,607.00**	**$ 24,607.00**					
4	**Clearing**	**1**	**L.S.**	**$ 45,404.00**	**$ 45,404.00**					
5	**Clean Fill (Offsite)**	**10500**	**Tons**	**$ 6.16**	**$ 64,680.00**					
6	**Excavation/Backfill**	**23500**	**C.Y.**	**$ 7.30**	**$ 171,550.00**					
7	**S/S Areas 1-6**	**31000**	**Tons**	**$ 16.73**	**$ 518,630.00**					
7	**S/S Area 7**	**3800**	**Tons**	**$ 26.63**	**$ 101,194.00**					
8	**Landfill Cap**	**9800**	**S.Y.**	**$ 27.76**	**$ 272,048.00**					
9	**Erosion Control Fabric**	**6700**	**S.Y.**	**$ 3.05**	**$ 20,435.00**					
10	**Drainage Ditch**	**1400**	**L.F.**	**$ 19.66**	**$ 27,524.00**					
11	**Gravel Paving**	**2300**	**S.Y.**	**$ 9.72**	**$ 22,356.00**					
12	**Revegetation**	**7300**	**S.Y.**	**$ 4.79**	**$ 34,967.00**					
13	**Wetlands Restoration**	**6100**	**S.Y.**	**$ 6.45**	**$ 39,345.00**					

SCHEDULE OF VALUES						REQUISITION FOR PAYMENT				
Bid Item	Description	Qty NTE	Unit	Unit Price	Total	%/Units Comp.	%/Units Prev.	%/Units Invoice	Amount Billable	Amount Remaining
14	**Abandon Wells**	**475**	**L.F.**	**$ 69.00**	**$ 32,775.00**					
15	**Extraction Wells**	**150**	**L.F.**	**$ 216.00**	**$ 32,400.00**					
16	**GW Treatment Building**	**0**	**L.S.**	**$ 103,868.00**	**$ -**					
16A	Permits Secured	1	L.S.	$ 2,077.36	$ 2,077.36					
16B	Finished Floor	1	L.S.	$ 18,696.24	$ 18,696.24					
16C	Building Delivered	1	L.S.	$ 51,934.00	$ 51,934.00					
16D	Building Erected Weathertight	1	L.S.	$ 20,773.60	$ 20,773.60					
16E	Utilities Hook-up	1	L.S.	$ 5,193.40	$ 5,193.40					
16F	Facility Furnished	1	L.S.	$ 5,193.40	$ 5,193.40					
17	**GW Treatment System**	**0**	**L.S.**	**$ 143,955.00**	**$ -**					
17A	Delivery of System Components	1	L.S.	$ 64,779.75	$ 64,779.75					
17B	Well Pumps Delivered	1	L.S.	$ 5,758.20	$ 5,758.20					
17C	System Installed	1	L.S.	$ 43,186.50	$ 43,186.50					
17D	Tie-in to Wells	1	L.S.	$ 8,637.30	$ 8,637.30					
17E	Transfer of Facilitiy	1	L.S.	$ 7,197.75	$ 7,197.75					
17F	3 Months Operation	1	L.S.	$ 14,395.50	$ 14,395.50					
18	**Demobilization**	**0**	**L.S.**	**$ 87,498.00**	**$ -**					
18A	Final Survey Submitted[1]	1	L.S.	$ 13,124.70	$ 13,124.70					
18B	Pugmill Demobilized	1	L.S.	$ 17,499.60	$ 17,499.60					
18C	WRS Equipment Demobilized[4]	1	L.S.	$ 37,624.14	$ 37,624.14					
18D	WRS Personell Demobilized[3]	1	L.S.	$ 10,499.76	$ 10,499.76					
18E	Erosion Controls Removed	1	L.S.	$ 8,749.80	$ 8,749.80					
UC1	**Erosion Control Fence**	**0**	**L.F.**	**$ 1.25**	**$ -**					
UC2	**Security Fence**	**0**	**L.F.**	**$ 2.00**	**$ -**					
UC3	**Portland Cement**	**0**	**Tons**	**$ 80.00**	**$ -**					
TOTALS					**$ 2,115,469.00**					

TOTAL DUE THIS INVOICE _____

Contractor's Repsentative _____

Owner's Representative _____

Assumptions:

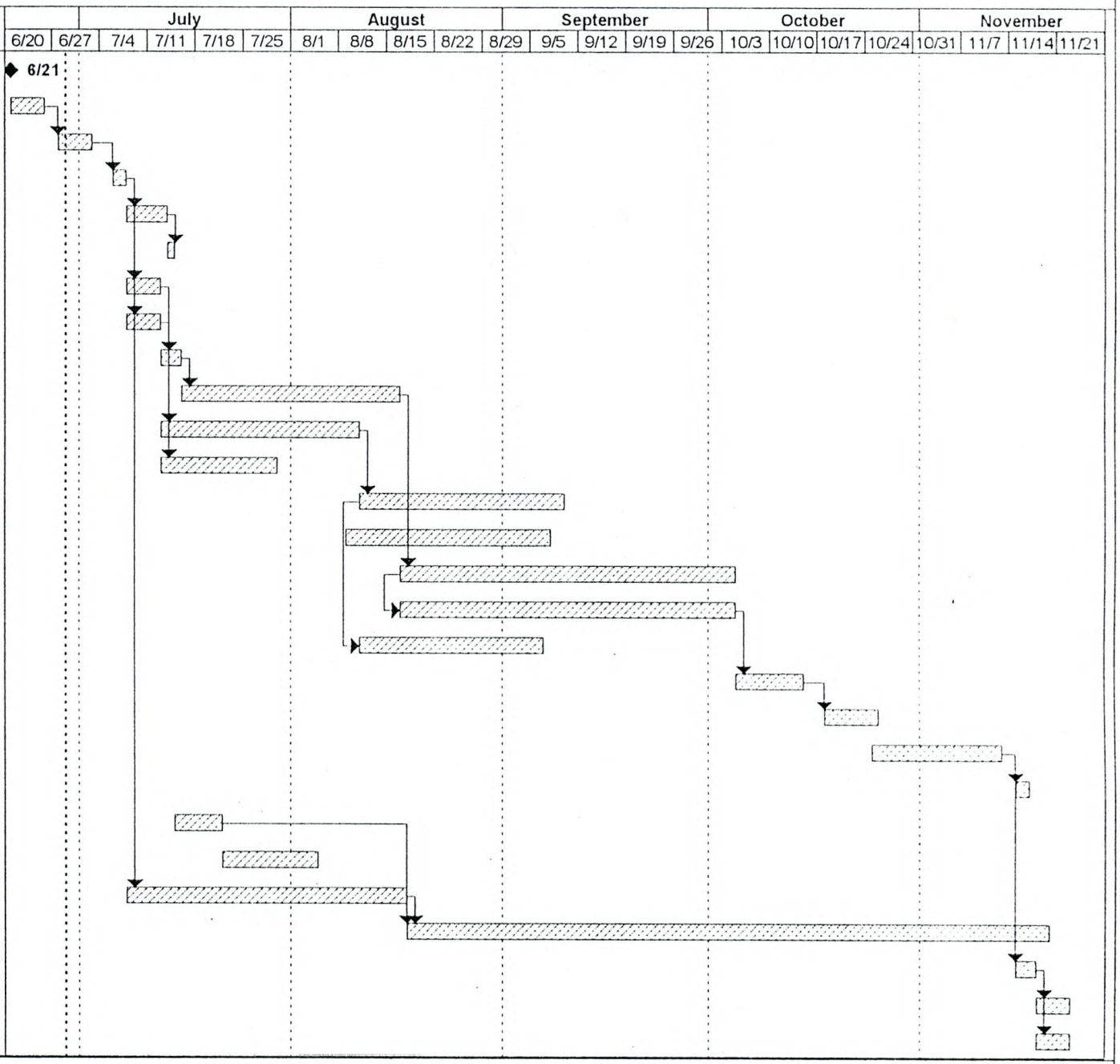
1: Includes revisions, payment on final approval
2: As per Specifications, payment does not include phone or electric service.
3: Includes, travel, perdiem, lodging, and overhead for duration of mobilization and site setup
4: Includes mobilization costs, maintenance, overhead, opportunity costs
5: Includes WRS office trailer, crew break trailer, decon trailer. Weighted 50%,30%,20% respectively for payment purposes
6: Overages/underages of $600/mo. for each Alcoa/Parsons and Government utility usage ($1200/mo.)

Appendix B

Project Schedule

YORK OIL OU Revised 6/22/99
Moria, NY

ID	Task Name	Start	Finish
1	Contractor Award	6/21/99	6/21/99
2	Initial Submittals	6/21/99	6/25/99
3	Review & Approval Submittals	6/28/99	7/2/99
4	Mobilization	7/6/99	7/7/99
5	Install Temp Facilities	7/8/99	7/13/99
6	Site Entrance Improvement	7/14/99	7/14/99
7	Erosion & Sediment 1: OU-1	7/8/99	7/12/99
8	Pugmill Setup	7/8/99	7/12/99
9	Pilot Pugmill	7/13/99	7/15/99
10	Pilot Plant Study	7/16/99	8/16/99
11	Clear & Grubb: OU-1	7/13/99	8/10/99
12	Erosion & Sediment 2: OU-1	7/13/99	7/29/99
13	Excavation of Soils: OU-1	8/11/99	9/9/99
14	Temp GW Treatment	8/9/99	9/7/99
15	Solidification: OU-1	8/17/99	10/4/99
16	Placement of S/S Soil	8/17/99	10/4/99
17	Backfill - Clean Fill	8/11/99	9/6/99
18	Topsoil/Swales/Site Contour	10/5/99	10/14/99
19	Revegetation	10/18/99	10/25/99
20	Cap	10/25/99	11/12/99
21	Revegetation Cap Area	11/15/99	11/16/99
22	Extraction Wells	7/15/99	7/21/99
23	Abandon Wells OU-1	7/22/99	8/4/99
24	GW Treatment Plant	7/8/99	8/17/99
25	Operation of GW Plant	8/18/99	11/19/99
26	Final Survey	11/15/99	11/17/99
27	As Builts	11/18/99	11/22/99
28	Demobilization	11/18/99	11/22/99



Project:YORK OIL
Delayed Award of
6/21/99 Revision

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

Appendix C

Cash Flow Diagram

CASH FLOW DIAGRAM

Bid Item	Description	Qty NTE	Unit	Unit Price	July %	July Units	July Amount	August %	August Units	August Amount	September %	September Units	September Amount	October %	October Units	October Amount	November %	November Units	November Amount
1	**Bonds & Insurance**	0	L.S.	$ -	100%	-	$ -	100%	$ -	$ -	100%	-	$ -	100%	-	$ -	100%	-	$ -
2	**Mobilization**	0	L.S.	$ 372,233.00	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2A	Work Plan Submitted[1]	1	L.S.	$ 18,611.65	100%	1.0	$ 18,611.65	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2B	Health & Safety Plan Submitted[1]	1	L.S.	$ 7,444.66	100%	1.0	$ 7,444.66	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2C	Initial Survey Submitted[1]	1	L.S.	$ 39,084.47	100%	1.0	$ 39,084.47	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2D	Alcoa Trailer Set-up & Furnished[2]	1	L.S.	$ 18,611.65	100%	1.0	$ 18,611.65	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2E	Government Trailer Set-up & Furnished[2]	1	L.S.	$ 18,611.65	100%	1.0	$ 18,611.65	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2F	WRS Trailer(s) Set-up[5]	1	L.S.	$ 27,917.48	100%	1.0	$ 27,917.48	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2G	Office Waste Dumpster Delivered	1	L.S.	$ 1,861.17	100%	1.0	$ 1,861.17	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2H	Toilet Facilities Delivered	1	L.S.	$ 2,233.40	100%	1.0	$ 2,233.40	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2I	WRS Personel On-site[3]	1	L.S.	$ 67,001.94	100%	1.0	$ 67,001.94	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2J	WRS Equipment On-site[4]	1	L.S.	$ 37,223.30	100%	1.0	$ 37,223.30	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2K	Site Entrance Complete	1	L.S.	$ 3,722.33	100%	1.0	$ 3,722.33	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2L	Soils Staging Area Constructed	1	L.S.	$ 44,667.96	100%	1.0	$ 44,667.96	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2M	Decon Pad Operational	1	L.S.	$ 1,861.17	100%	1.0	$ 1,861.17	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2N	Pugmill Onsite	1	L.S.	$ 44,667.96	100%	1.0	$ 44,667.96	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2O	Phone Lines Hookup Office Facilities	1	L.S.	$ 18,611.65	100%	1.0	$ 18,611.65	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2P	Electric Hookup Office Facilities	1	L.S.	$ 18,611.65	100%	1.0	$ 18,611.65	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2Q	Weather Station	1	L.S.	$ 1,488.93	100%	1.0	$ 1,488.93	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
2R	**Utilities Usage Over/Under[6]**	1		$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
3	**Erosion Control**	1	L.S.	$ 24,607.00	100%	1.0	$ 24,607.00	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
4	**Clearing**	1	L.S.	$ 45,404.00	65%	0.65	$ 29,512.60	35%	0.35	$ 15,891.40	0%	-	$ -	0%	-	$ -	0%	-	$ -
5	**Clean Fill (Offsite)**	10500	T	$ 6.16	0%	-	$ -	75%	7,875	$ 48,510.00	25%	2,625	$ 16,170.00	0%	-	$ -	0%	-	$ -
6	**Excavation/Backfill**	23500	C.Y.	$ 7.30	0%	-	$ -	75%	17,625	$ 128,662.50	25%	5,875	$ 42,887.50	0%	-	$ -	0%	-	$ -
7A	**S/S Areas 1-6**	31000	T	$ 16.73	2%	450	$ 7,528.50	28%	8,520	$ 142,539.60	62%	19,550	$ 327,071.50	8%	2,480	$ 41,490.40	0%	-	$ -
7B	**S/S Area 7**	3800	T	$ 26.63	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
8	**Landfill Cap**	9800	S.Y.	$ 27.76	0%	-	$ -	0%	-	$ -	0%	-	$ -	33%	3,234	$ 89,775.84	67%	6,566	$ 182,272.16
9	**Erosion Control Fabric**	6700	S.Y.	$ 3.05	0%	-	$ -	0%	-	$ -	0%	-	$ -	10%	670	$ 2,043.50	90%	6,030	$ 18,391.50
10	**Drainage Ditch**	1400	L.F.	$ 19.66	0%	-	$ -	0%	-	$ -	0%	-	$ -	100%	1,400	$ 27,524.00	0%	-	$ -
11	**Gravel Paving**	2300	S.Y.	$ 9.72	5%	115	$ 1,117.80	0%	-	$ -	0%	-	$ -	95%	2,185	$ 21,238.20	0%	-	$ -
12	**Revegitation**	7300	S.Y.	$ 4.79	0%	-	$ -	0%	-	$ -	0%	-	$ -	78%	5,694	$ 27,274.26	22%	1,606	$ 7,692.74
13	**Wetlands Restoration**	6100	S.Y.	$ 6.45	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
14	**Abandon Wells**	475	L.F.	$ 69.00	60%	285	$ 19,665.00	40%	190	$ 13,110.00	0%	-	$ -	0%	-	$ -	0%	-	$ -
15	**Extraction Wells**	150	L.F.	$ 216.00	100%	150	$ 32,400.00	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
16	**GW Treatment Building**	0	L.S.	$ 103,868.00	100%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
16A	Permits Secured	1	L.S.	$ 2,077.36	100%	1.0	$ 2,077.36	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
16B	Finished Floor	1	L.S.	$ 18,696.24	100%	1.0	$ 18,696.24	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
16C	Building Delivered	1	L.S.	$ 51,934.00	100%	1.0	$ 51,934.00	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
16D	Building Erected Weathertight	1	L.S.	$ 20,773.60	100%	1.0	$ 20,773.60	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
16E	Utilities Hook-up	1	L.S.	$ 5,193.40	100%	1.0	$ 5,193.40	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
16F	Facility Furnished	1	L.S.	$ 5,193.40	100%	1.0	$ 5,193.40	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
17	**GW Treatment System**	0	L.S.	$ 143,955.00	0%	-	$ -	85%	-	$ -	5%	-	$ -	0%	-	$ -	10%	-	$ -
17A	Delivery of System Components	1	L.S.	$ 64,779.75	0%	-	$ -	100%	1.0	$ 64,779.75	0%	-	$ -	0%	-	$ -	0%	-	$ -
17B	Well Pumps Delivered	1	L.S.	$ 5,758.20	0%	-	$ -	100%	1.0	$ 5,758.20	0%	-	$ -	0%	-	$ -	0%	-	$ -
17C	System Installed	1	L.S.	$ 43,186.50	0%	-	$ -	100%	1.0	$ 43,186.50	0%	-	$ -	0%	-	$ -	0%	-	$ -
17D	Tie-in to Wells	1	L.S.	$ 8,637.30	0%	-	$ -	100%	1.0	$ 8,637.30	0%	-	$ -	0%	-	$ -	0%	-	$ -
17E	Transfer of Facility	1	L.S.	$ 7,197.75	0%	-	$ -	0%	-	$ -	100%	1.0	$ 7,197.75	0%	-	$ -	0%	-	$ -
17F	3 Months Operation	1	L.S.	$ 14,395.50	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	100%	1.0	$ 14,395.50
18	**Demobilization**	0	L.S.	$ 87,498.00	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	100%	-	$ -
18A	Final Survey Submitted[1]	1	L.S.	$ 13,124.70	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	100%	1.0	$ 13,124.70
18B	Pugmill Demobilized	1	L.S.	$ 17,499.60	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	100%	1.0	$ 17,499.60
18C	WRS Equipment Demobilized[4]	1	L.S.	$ 37,624.14	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	100%	1.0	$ 37,624.14
18D	WRS Personell Demobilized[7]	1	L.S.	$ 10,499.76	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	100%	1.0	$ 10,499.76
18E	Erosion Controls Removed	1	L.S.	$ 8,749.80	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	100%	1.0	$ 8,749.80
UC1	**Erosion Control Fence**	0	L.F.	$ 1.25	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
UC2	**Security Fence**	0	L.F.	$ 2.00	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
UC3	**Portland Cement**	0	T	$ 80.00	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -	0%	-	$ -
	TOTALS			$ 2,115,469.00			$ 590,931.90			$ 471,075.25			$ 393,326.75			$ 209,346.20			$ 310,249.90
	TTD						$ 590,931.90			$ 1,062,007.15			$ 1,455,333.90			$ 1,664,680.10			$ 1,974,930.00

Assumptions:

A: The Cash Flow Diagram is based on current Project Schedule and is subject to revision upon revisions to the Project Schedule

B: The Cash Flow Diagram is based on the current Schedule of Values and is subject to revision.

B: % complete/units complete each month are extrapolated evenly from task durations by month, no attempt is made to weigh % completed or units completed across the duration of the tasks.

C: Items 7A (S/S Area 7) and Item 13 (Wetlands Restoration) are not calculated into this Cash Flow Diagram.

Appendix D

Schedule of Submittals

Schedule of Submittals

Section	Submittal	Specification Reference	Schedule
Measurement & Payment	*Schedule of Values*	01025 1.05A	5-Jul[4]
Measurement & Payment	*Cash Flow Diagram*	01025 1.05B (addendum 2)	5-Jul[4]
Grade, Lines & Levels	*Initial Survey*	01051 3.01(3)	27-Jul[1]
Grade, Lines & Levels	*Intermediate Surveys*	01051 3.01(4)	As required[2]
Grade, Lines & Levels	*Final Survey*	01051 3.01(5), 01720 1.02B	1-Dec[3]
Grade, Lines & Levels	*Letters of Certification*	01051 1.01(5)	1-Dec[3]
Health & Safety	*Health & Safety Plan*	01105 2.01	5-Jul
Health & Safety	*Daily Health & Safety Reports*	01105 2.06A	Daily
Health & Safety	*Monthly Health & Safety Reports*	01105 2.06B	14th of ea mo.
Submittals	*Schedule of Submittals*	01300 1.02	5-Jul[4]
Progress	*Progress Schedule*	01310 1.02	21-Jun
Progress	*Progress Reports*	01310 1.03	With ea. invoice
Progress	*Method Statement Task 1 (Mobilization)*	01310 1.04	21-Jun
Progress	*Method Statement Task 2 (Site Preparation)*	01310 1.04	23-Jun
Progress	*Method Statement Task 3 (Earthwork)*	01310 1.04	25-Jul
Progress	*Method Statement Task 4 (Capping)*	01310 1.04	12-Sep
Progress	*Method Statement Task 5 (Groundwater Treatment)*	01310 1.04	23-Jun
Progress	*Method Statement Task 6 (Demobilization)*	01310 1.04	13-Oct
Field Office/Facilities	*Shop Drawings*	01500 2.01	1-Jul
Erosion Control	*Product Data*	01564 1.04A	2-Aug
Erosion Control	*Methods (Erosion Control Plan)*	01564 1.04 B	2-Aug[4]
Erosion Control	*Erosion Control Schedule*	01564 1.03	2-Aug[4]
GW Treatment Facilities Startup	*Foreman Qualifications*	01650 1.03A	11-Aug
Treatment Facilities Startup	*Regulatory Requirements*	01650 1.03B	11-Aug
GW Treatment Facilities Startup	*Conference Agenda*	01650 1.03 D	29-Aug[5]
GW Treatment Facilities Startup	*Facilities Startup Schedule*	01650 1.04	11-Aug
Closeout	*Warranties*	01700	If needed
Closeout	*O & M Manuals*	01700 1.04B, 01730	If needed
Closeout	*Record Drawings*	01700 1.04A, 01720	22-Nov
Well Abandonment	*Methods*	02085 1.03A	15-Jul
Well Abandonment	*Mixes*	02085 1.03B	15-Jul
Well Abandonment	*Equipment*	02085 1.03C	15-Jul
Well Abandonment	*Drilling Contractor*	02085 1.03D	15-Jul
Decon Pad & Equipment	*Shop Drawings*	02131 1.03	1-Jul
Dewatering	*Shop Drawings*	02140 1.04	Jul-27
Dewatering	*Construction Water Management Plan*	02140 1.04	5-Jul[4]
Backfilling	*Structural Backfill Samples/Tests*	02223 1.02	N.A.[6]
Backfilling	*Unclassified Backfill Samples/Tests*	02223 1.02	28-Jul, 4-Aug
Compaction	*Equipment/Methods*	02228 1.03A	4-Aug
Soil Cover	*Drainage Layer Samples/Tests*	02260 1.03A, 02269 1.02	11-Oct
Soil Cover	*Cover Soil Samples/Tests*	02260 1.03A, 02269 1.02	11-Oct
Soil Cover	*Compaction Equipment*	02260 1.03B	18-Oct
Soil Cover	*Geomembrane Installer Acceptance*	02260 1.03C	18-Oct
Soil Cover	*Project List*	02260 1.03D	18-Oct
Riprap	*Material Source*	02275 1.02A	28-Sep
Riprap	*Test Reports (ea. size)*	02275 1.02B	28-Sep
Geomembrane	*Type and Manufacturer*	02405 1.02A1a	18-Oct
Geomembrane	*Manufacturer QC Program*	02405 1.02A1b	18-Oct
Geomembrane	*Roll Test Results*	02405 1.02A1c	18-Oct
nembrane	*Samples*	02405 1.02A1d	18-Oct
nembrane	*Raw Material Orgin & Identification*	02405 1.02A2a	18-Oct

Geomembrane	*Raw Material QC Certifications*	02405 1.02A2b	18-Oct
omembrane	*Raw Material Test Rpts.*	02405 1.02A2c	18-Oct
eomembrane	*Roll QC Certifications*	02405 1.02A2d	18-Oct
Geomembrane	*Destructive Seam Testing*	02405 1.02A2e	18-Oct
Geomembrane	*Certification of Permeability*	02405 1.02A2f	18-Oct
Geomembrane	*Compatibility Report*	02405 1.02A2g	18-Oct
Geomembrane	*Installer Name/Crew*	02405 1.02A3a	18-Oct
Geomembrane	*Company Project List*	02405 1.02A3b	18-Oct
Geomembrane	*Foreman Project List*	02405 1.02A3c	18-Oct
Geomembrane	*Seamer Project List*	02405 1.02A3d	18-Oct
Geomembrane	*Layout Drawing*	02405 1.02A4a	18-Oct
Geomembrane	*Seam & Weld Details*	02405 1.02A4b	18-Oct
Geomembrane	*Dissimilar Material Joint Details*	02405 1.02A4c	18-Oct
Geomembrane	*Pipe Penetration Detalis*	02405 1.02A4d	18-Oct
Geomembrane	*Installation Schedule*	02405 1.02A4e	18-Oct
Geomembrane	*Manufacturer Installation Instructions*	02405 1.02A5	18-Oct
Geomembrane	*QC Program*	02405 1.02A6	18-Oct
Geomembrane	*Test Lab Qualifications*	02405 1.02A7	18-Oct
Geomembrane	*Seam QA Records*	02405 1.02Ba	25-Oct to 12-Nov
Geomembrane	*Acceptance of Soil Materials*	02405 1.02Bb	25-Oct to 12-Nov
Geomembrane	*Lab Test Results*	02405 1.02Bc	25-Oct to 12-Nov
Geomembrane	*Archive Seam Samples*	02405 1.02Bd	25-Oct to 12-Nov
Geomembrane	*Record Drawings*	02405 1.02C1a-b	26-Nov
Geomembrane	*Summary Logs*	02405 1.02C2a-d	12-Nov
Geomembrane	*Report of Work*	02405 3.08	19-Nov[7]
Geotextiles-Cushion (Cap)	*Product Data*	02421 1.04A	18-Oct
Geotextiles-Cushion (Cap)	*Samples*	02421 1.04A	18-Oct
Geotextiles-Cushion (Cap)	*Certifications*	02421 1.04B	18-Oct
textiles-Reinforcement (Road)	*Product Data*	02421 1.04A	1-Jul[8]
Geotextiles-Reinforcement (Road)	*Samples*	02421 1.04A	1-Jul[8]
Geotextiles-Reinforcement (Road)	*Certifications*	02421 1.04B	1-Jul[8]
Geotextiles-Separation (Rip-Rap)	*Product Data*	02421 1.04A	28-Oct
Geotextiles-Separation (Rip-Rap)	*Samples*	02421 1.04A	28-Oct
Geotextiles-Separation (Rip-Rap)	*Certifications*	02421 1.04B	28-Oct
Solidification/Stabilization	*Work Plan*	02421 1.04A	5-Jul[4]
Solidification/Stabilization	*Daily Reports*	02421 1.04B	17-Aug to 4-Oct
Solidification/Stabilization	*Test Results*	02421 1.04C	17-Aug to 4-Oct
Solidification/Stabilization	*Field Demonstration Report*	02421 1.04D	9-Aug
Solidification/Stabilization	*Reagent Certifications*	02421 1.04E	9-Aug
Geotextiles-Cushion (SSA)	*Product Data*	02445 3.01A	1-Jul
Geotextiles-Cushion (SSA)	*Samples*	02445 3.01A	1-Jul
Geotextiles-Cushion (SSA)	*Certifications*	02445 3.01A	1-Jul
Soils Staging/Processing Area	*40 mil Liner Specifications*	02445 3.01A	1-Jul
Gravel Acess Road	*Granular Materials*	02501 1.06B, 02223 1.02A	1-Jul[8]
Extraction Wells	*Product Data Well Box*	02671 1.02A	8-Jul
Extraction Wells	*Product Data Outer Casing*	02671 1.02A	8-Jul
Extraction Wells	*Product Data Well Screen*	02671 1.02A	8-Jul
Extraction Wells	*Product Data Sand Pack*	02671 1.02A	8-Jul
Extraction Wells	*Product Data Bentonite Seal*	02671 1.02A	8-Jul
Extraction Wells	*Product Data Grout*	02671 1.02A	8-Jul
Extraction Wells	*Installer*	02671 1.02B	8-Jul
Well Pumps/Equipment	*Shop Drawings/Data*	02674 1.02	13-Jul
Drainage Piping	*Shop Drawings/Data*	02727 1.04B, 01300	28-Sep
Drainage Piping	*Manufacturer Certification*	02727 1.04C	28-Sep
tland Restoration	*Product Data Topsoil*	02910 1.02A	N.S
and Restoration	*Seed Vendor Certification*	02910 1.02B	N.S

Wetland Restoration	*Fertilizer*	02910 1.02C	N.S
tland Restoration	*Hydroseeder*	02910 1.02D	N.S
etland Restoration	*Material Certificates*	02910 1.03A	N.S
Topsoil & Seeding	*Topsoil*	02990 1.02A1, 02290 2.01	28-Sep
Topsoil & Seeding	*Seed Vendor Certification*	02990 1.02A2	11-Oct
Topsoil & Seeding	*Fertilizer*	02290 1.02A3	11-Oct
Topsoil & Seeding	*Hydroseeder*	02290 1.02A4	11-Oct
Topsoil & Seeding	*Erosion Control Fabrics*	02290 1.02A5	11-Oct
Topsoil & Seeding	*Material Certificates*	02290 1.02C	11-Oct
Topsoil & Seeding	*Installer*	02290 1.02B	11-Oct
Long-Term GW Treatment System	*Prefab Building Information*	13290 1.02A1	8-Jun[9]
Long-Term GW Treatment System	*Foundation Plans*	13290 1.02A2	8-Jun[9]
Long-Term GW Treatment System	*Manufacturer Data for Treatment System*	13290 1.02A3	3-Jul[9]
Long-Term GW Treatment System	*Installation Diagrams*	13290 1.02A4	3-Jul[9]
Long-Term GW Treatment System	*Equipment Layout Plans*	13290 1.02A5	3-Jul[9]
Long-Term GW Treatment System	*P&ID Diagrams*	13290 1.02A6	3-Jul[9]
Long-Term GW Treatment System	*Electrical Requirements*	13290 1.02A7	3-Jul[9]
Long-Term GW Treatment System	*System Sequence of Operations*	13290 1.02A8	3-Jul[9]
Long-Term GW Treatment System	*Spare Parts List*	13290 1.02A9	3-Jul[9]
Long-Term GW Treatment System	*Operator Training Program*	13290 1.02A10	3-Jul[9]
Long-Term GW Treatment System	*Warranties*	13290 1.02A11	3-Jul[9]
Long-Term GW Treatment System	*Maintenence Data*	13290 1.02A12	3-Jul[9]
Long-Term GW Treatment System	*Sampling Plan for Startup*	13290 1.02A13, 13290 3.03	3-Jul[9]
Long-Term GW Treatment System	*O&M Manuals*	13290 1.02B1	17-Aug
Long-Term GW Treatment System	*Building Plans*	13290 1.02B2	1-Jul
Temporary GW Treatment System	*Specifications*	13290 1.02A3	2-Aug

es and Assumptions:

1: Initial Survey will be completed prior to clearing and grubbing,allow two weeks allowed for preparation of Initial Survey
2: Initial surveys will be performed as necessary
3: Final survey scheduled to be completed 11/17/99,allow two weeks for preparaton of Final Survey
4: Is submitted as attachment to Work Plan
5: Training to behin 9/8 (after one-week start-up plus two weeks WRS operation)
6: (WRS does not anticipate the use of structural backfill)
7: Allow one week for preparation of Report
8: WRS intends to construct the gravel access road (partially) during site preparation.
9: The prefabricated building will be constructed 7/8/99 to 8/2/99; the installation od GW treatment components will start 8/3/99

N.S. Not Scheduled

Note: Unless otherwise specified, technical submittals are given a one week lead time, soil samples a two week lead time.

Appendix E

Erosion and Sediment Control Plan and Schedule

WRS INFRASTRUCTURE & ENVIRONMENT, INC.

EROSION AND SEDIMENT CONTROL PLAN

OPERABLE UNIT 1
YORK OIL SUPERFUND SITE

Town of Moira
Franklin County, New York

Prepared for:

ALUMINUM COMPANY OF AMERICA
Massena Operations, P.O. Box 150
Massena, NY 13662

Reviewed by:

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WRS Project Number 995151

June 28,1999

Revision 0

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1.0 INTRODUCTION

WRS Infrastructure & Environment, Inc. (WRS) will establish erosion and sediment control measures during remediation activities at the York Oil Site. At a minimum, these measures will be established as shown on the Contract Drawings, as required in the Project Specifications (section 01564), as presented in the StormWater Pollution Prevention Plan, and in accordance with the New York State Guidelines for Urban Erosion and Sediment Control.

A distinction can be made between storm & surface water controls and erosion & sediment controls. Storm and surface water controls are designed to prevent, divert, or minimize surface storm water sheet flow from contacting disturbed areas which can be prone to erosion, and to expedite and control the drainage of surface storm water that may collect on site. Erosion and sediment controls, on the other hand, are designed to prevent the removal and transportation of soils that could be caused by such waters entering and flowing over disturbed or denuded areas of the site. As such, storm and surface water controls, in that they are designed to minimize contact of surface waters with soils prone to erosion, serve as a first line of defense in the implementation of erosion and sediment control. Furthermore, because storm and surface water control measures promote and control the drainage of storm waters that enter the site, they allow erosion and sediment controls to be established at strategic locations. The scope of this Erosion and Sediment Control Plan, then, includes storm and surface water management controls. Storm and surface water controls, however, are detailed in the Work Plan, and, as such, will only be discussed briefly here.

2.0 EROSION AND SEDIMENT CONTROL PLAN

2.1 STORM AND SURFACE WATER CONTROL MEASURES

WRS will implement site-wide storm and surface water control measures as indicated in the Work Plan . Site-wide storm and surface water control measures include the construction of a temporary one foot high diversion dike along the northern and eastern edges of the site and maintenance of the existing drainage ditches along the western and southern edges of the site which flow into the Western Drainage Area (WDA). WRS will also utilize the existing interceptor trench with sump(s) for surface water collection. WRS will maintain site grading to promote runoff of surface water. Disturbed areas will be rolled and sealed at the end of each working day (if applicable) or in the anticipation of a rainfall event.

WRS will maintain a stockpile of backfill material for use in the repair of existing berms and/or the construction of additional berms as necessary. Storm and surface water control measures will be implemented at the same time as erosion and sediment control measures are put in place.

2.2 EROSION AND SEDIMENT CONTROL MEASURES

Temporary erosion and sediment control measures will be installed as the first step in construction, and will be continuously maintained. Erosion control measures will not be removed until permanent drainage control measures are in place, permanent cover is completely established and stabilized, and only with approval of the Engineer.

The purpose of the erosion and sediment control measures is to prevent the removal and transportation of soils which would cause the following (undesirable) effects:

- The stripping of soils valuable to the site for slope stability, soil cover, and the establishment of vegetation;
- The possible spread of contamination;
- The deposit of soils in, and fouling of, culverts, drains, sumps; and,
- The loss of integrity of trenches and drainage ditches.

Methods for preventing the above effects constitute the erosion and control plan for the York Oil Site. For the purposes of this document, erosion control measures will be divided into erosion controls and erosion control practices.

2.2.1 Erosion Controls:

WRS will establish erosion and sediment controls during remediation activities at the York Oil Site. At a minimum, these measures will be established as shown on the Contract Drawings, as required in the Project Specifications, as presented in the StormWater Pollution Prevention Plan, and in accordance with New York State Guidelines for Urban Erosion and Sediment Control. Erosion and sediment controls will consist of the following:

- Silt Fence;
- Geotextiles;
- Hay bales;
- Sorbent Boom/Socks;
- Clean Stone;
- Energy Dissipation/Diffusers; and,
- Erosion Control Fabric and Mulch.

Erosion controls will be provided with materials which meet or exceed the materials requirements of the Project Specifications and the New York State Guidelines for Erosion Control and Sediment. If a discrepancy is found to

exist between the two standards. WRS will provide materials that conform to the more stringent of the two, or at the discretion of the Engineer. Methods for deployment and maintenance of erosion control materials will follow the same guidelines. All of the technical product data submittals will be provided by WRS prior to delivery to the site.

2.2.1.1 Silt Fence:

The purpose of silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Silt fence is a temporary barrier of geotextile fabric used to intercept runoff from drainage areas of disturbed soil. Silt fence will be provided as per the Project Specifications and deployed, at minimum, per the Contract Drawings. Additional silt fence will also be deployed as deemed necessary by WRS or as per Bid Item UC-1 if done so at the discretion of the Engineer. WRS will have available on site or on short order additional silt fence materials for repair, replacement, or augmentation of the silt fence established as per the Contract Drawings.

WRS will provide prefabricated silt fence material of Mirafi "Envirofence" or equivalent. Posts will be at least 36 inches in length and spaced every 10 feet along the fence. Posts will be firmly fastened to geofabric fence material. Posts will be embedded at least 16 inches, along with at least 6 inches of filter cloth, below the ground surface. WRS will use a mechanical trenching tool (Ditch Witch or equivalent) to accomplish embedding of the filter cloth. Adjoining sections of fence will be overlapped by 6 inches and folded.

The New York State Guidelines for Erosion and Sediment Control standard for silt fence are attached to this document.

2.2.1.2 Hay Bales:

WRS will use hay bales to construct dikes to effect deposition of and prevent transported sediment from entering inlets, catch basins, drains, and sumps.

Hay bales will be securely tied and measure, at a minimum, 14 inches by 18 inches by 30 inches. Each bale will be staked with two #3 rebar or two 2 inch by 2 inch hardwood stakes per bale. Stakes will be driven 18 inches into ground and flush with the top of the bale. Hay bales will be anchored by another method as required in areas where staking may damage a liner or geotextile.

2.2.1.3 Clean Stone:

Clean stone piles may be used alternately or in conjunction with hay bales for sediment control at inlets, drains, and sumps.

2.2.1.4 Filter Fabric:

Filter cloth cut from fence material, or from separation/filtration-type geotextiles used in the construction of the riprap lined channel, may be used to supplement hay bales or clean stone piles at inlets, drains, and sumps.

2.2.1.5 Sorbent Booms/Socks:

Oil sorbent boom and socks will be deployed as per the Contract Drawings to contain oil sheens emanating from waste materials. Oil sorbent boom will be New Pig Spaghetti Boom or equivalent. Oil sorbent socks will be New Pig Skimmer Socks or equivalent. Oil sorbent boom and sock will be firmly linked and fastened across the spans shown on the Drawings. The boom/sock chain will be securely anchored at both end points and at mid span where appropriate.

2.2.1.6 Energy Dissipaters:

Energy dissipaters, such as rip rap material, will be placed where appropriate. Point of discharge for treated or otherwise containerized water is an example of an appropriate energy dissipation need.

2.2.1.7 Erosion Control Fabric:

Biodegradable erosion control fabric (or synthetic erosion control fabric), straw mulch, or hydromulch will be placed as indicated in the Project Specifications and Drawings. Erosion control fabric or mulch will be placed immediately after the application of fertilizer and seed. Mulch will be used on areas that have a slope of less than 15 percent. Erosion control fabric will be used in areas that have a slope of greater than 15 percent or as indicated on the Contract Drawings.

Mulch can consist of straw mulch or hydromulch. Mulch materials and placement will be consistent with the Project Specifications materials and placement requirements for mulch (02990 2.05).

Erosion control fabric will be a machine produced mat of 100 percent biodegradable material. The fabric material and placement will be consistent with the Project Specifications section (02990 2.06)

2.2.1.8 Inspection and Maintenance:

Deployed erosion controls (and storm and surface water controls) will be routinely inspected, especially in the anticipation of a significant rainfall event. Replacement or repair of damaged controls will be effected immediately. WRS will have on site, or on short order, necessary tools and materials to repair or replace damaged controls.

2.2.1.9 Completion:

Erosion control measures will not be removed until permanent drainage control measures are in place, permanent cover is completely established and stabilized, and only with approval of the Engineer.

2.2.2 Erosion Control Practices

WRS will practice various techniques and practices to minimize the amount of erosion during remediation activities at the York Oil Site. WRS will also enforce prohibition of certain activities or practices which compromise the objectives of this Erosion Control and Sediment Control Plan

WRS practices will include:

- Land disturbance will be kept to a minimum; WRS does not intend to denude any more area than necessary for the completion of remediation activities. Denuded or disturbed areas will be compacted with a smooth drum roller to reduce susceptibility to erosion. The number of open excavations will be kept to a minimum at any one time. Excavations may be bermed or covered.
- Earthmoving activities shall be conducted in such a manner as to prevent accelerated erosion and sedimentation.
- Maintenance of storm and surface water controls

Prohibited practices include:

- Clearing, grubbing, or excavation in any area where erosion control measures have not yet been deployed;
- Dumping of any spoil material into any stream corridor, wetlands, or drainage channel;
- Indiscriminate or careless operation of equipment in any stream corridor or wetlands;
- Pumping of silt-laden water from trenches or excavations into any stream corridor, wetlands, or drainage channel;
- Disposal of debris in any stream corridor;
- Unspecified alteration of the flow line of any stream; and
- Open burning of construction project debris.

3.0 ADJUSTMENT OF EROSION CONTROLS AND PRACTICES

If planned measures do not result in effective control of erosion and sediment runoff to the satisfaction of the regulatory agencies having jurisdiction over the project, WRS will adjust its erosion control program and/or institute additional measures so as to eliminate excessive erosion and sediment runoff. Provisions are made for such adjustments or additions to the Erosion and Sediment Control Plan in Bid Item UC-1: Erosion Control Fence. Any such out-of-scope adjustments or additions resulting in additional costs will submitted to the Engineer for approval prior to implementation.

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition

A temporary barrier of geotextile fabric (filter cloth) used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used.

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence are:

Slope Steepness	Maximum Slope Length (Ft)
2:1	50
3:1	75
4:1	125
5:1	175
Flatter than 5:1	200

2. Maximum drainage area for overland flow to a silt fence shall not exceed 1/2 acre per 100 feet of fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required. All silt fences shall be placed as close to the area as possible, and the area below the fence must be undisturbed or stabilized.

A detail of the silt fence shall be shown on the plan, and contain the following minimum requirements:

1. The type, size, and spacing of fence posts.
2. The size of woven wire support fences.
3. The type of filter cloth used.
4. The method of anchoring the filter cloth.
5. The method of fastening the filter cloth to the fencing support.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. See Figure 5A.9 on page 5A.20 for details.

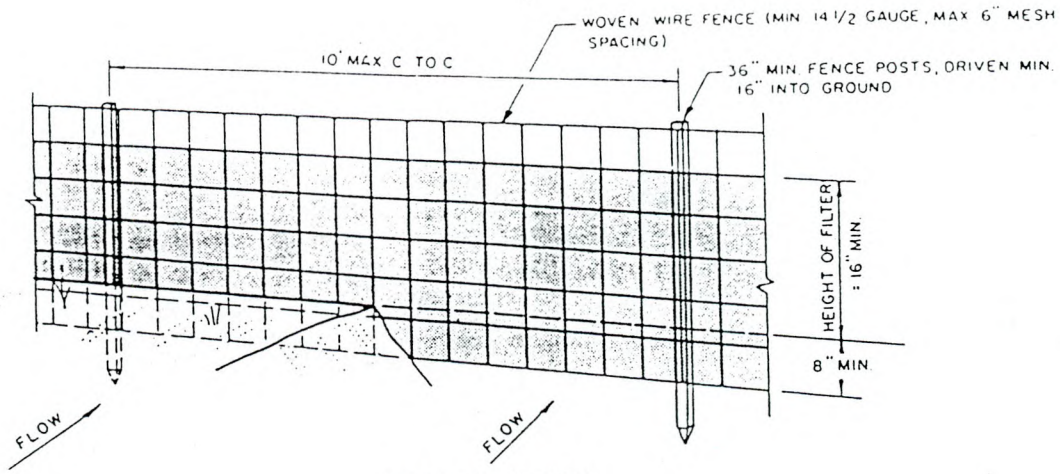
Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance. Statewide acceptability shall depend on in field and/or laboratory observations and evaluations.

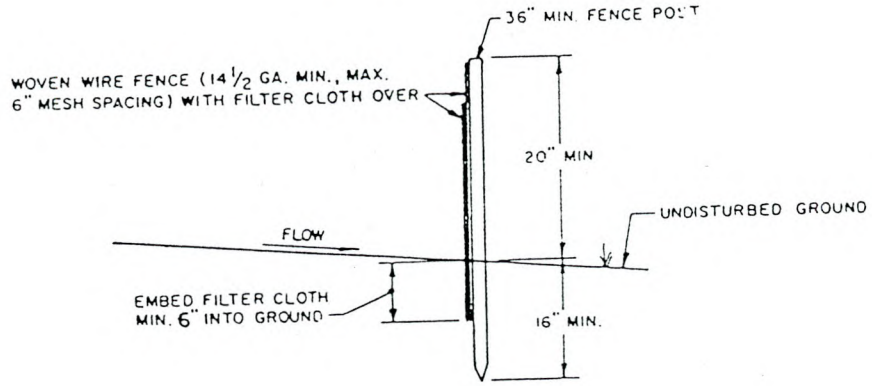
Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.
3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14-1/2 gage with a maximum 6 in. mesh opening, or as approved.
4. Prefabricated Units: Envirofence or approved equal may be used in lieu of the above method providing the unit is installed per details shown in Figure 5A.9.

Figure 5A.9
Silt Fence Details



PERSPECTIVE VIEW



SECTION

CONSTRUCTION NOTES FOR FABRICATED SILT FENCE

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE

POSTS: STEEL EITHER "T" OR "U" TYPE OR 2" HARDWOOD

FENCE: WOVEN WIRE, 14 1/2 GA. 6" MAX. MESH OPENING

FILTER CLOTH: FILTER X, MIRAFI 100X, STABILINKA T140N OR APPROVED EQUAL.

PREFABRICATED UNIT: GEOFAB, ENVIROFENCE, OR APPROVED EQUAL.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE SYRACUSE, NEW YORK	SILT FENCE	STANDARD SYMBOL

STANDARD AND SPECIFICATIONS FOR STRAW BALE DIKE

Definition

A temporary barrier of straw or similar material used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a bale dike is to reduce runoff velocity and effect deposition of the transported sediment load. Straw bale dikes have an estimated design life of three (3) months.

Conditions Where Practice Applies

The straw bale dike is used where:

1. No other practice is feasible.
2. There is no concentration of water in a channel or other drainage way above the barrier.
3. Erosion would occur in the form of sheet erosion.
4. Length of slope above the straw bale dike does not exceed these limits.

Constructed Slope	Percent Slope	Slope Length (ft.)
2:1	50	25
2 -1/2:1	40	50
3:1	33	75
3-1/2:1	30	100
4:1	25	125

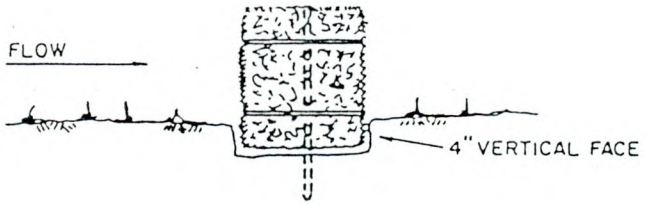
Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

The practice may also be used for a single family lot if the slope is less than 15 percent. The contributing drainage area in this instance shall be less than one acre and the length of slope above the dike shall be less than 200 feet.

Design Criteria

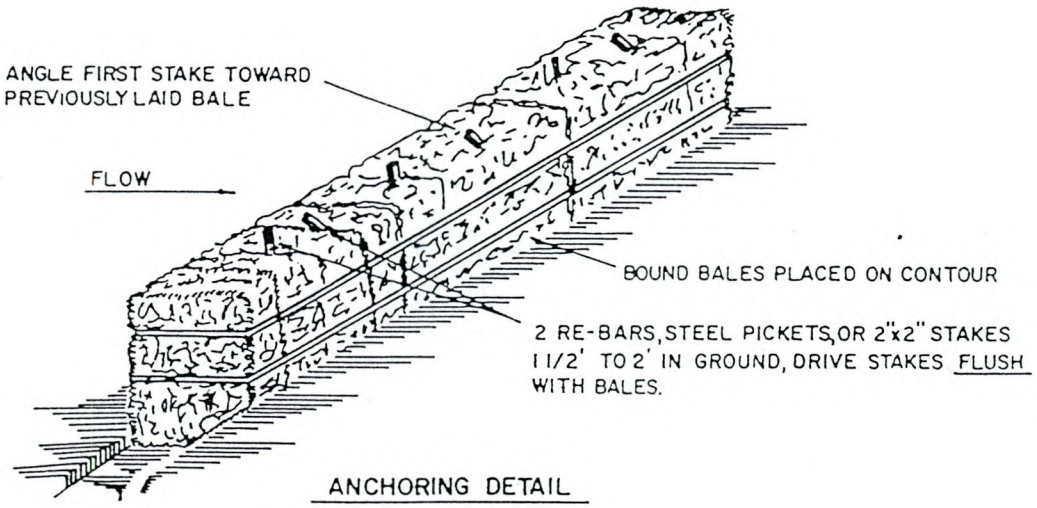
A design is not required. All bales shall be placed on the contour with cut edge of bale adhering to the ground. See Figure 5A.8 on page 5A.18 or details.

Figure 5A.8
Straw Bale Dike Details



BEDDING DETAIL

DRAINAGE AREA NO MORE THAN 1/4 ac. PER 100 FEET OF STRAW BALE DIKE FOR SLOPES LESS THAN 25%



ANCHORING DETAIL

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE SYRACUSE, NEW YORK	STRAW BALE DIKE	STANDARD SYMBOL SBD

Appendix F

Construction Water Management Plan

WRS INFRASTRUCTURE & ENVIRONMENT, INC.

CONSTRUCTION WATER MANAGEMENT PLAN

OPERABLE UNIT 1
YORK OIL SUPERFUND SITE

Town of Moira
Franklin County, New York

Prepared for:

ALUMINUM COMPANY OF AMERICA
Massena Operations, P.O. Box 150
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Reviewed by:

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WRS Project Number 995151

June 28,1999

Revision 0

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1.0 INTRODUCTION

The purpose of the Construction Water Management Plan is to describe methods and procedures for managing construction water on the York Oil Superfund Site (Site). Construction water is defined as any water that comes in direct contact with excavated (or otherwise disturbed) and impacted soils or potentially contaminated equipment. Water that has come in contact with excavated soil or sediment must meet the discharge limits established for the Site by the State of New York prior to discharge from the Site.

WRS Infrastructure & Environment, Inc. (WRS) will comply with applicable federal, state, and local codes, ordinances, regulations, statutes, and standards, including, but not limited to, the following:

1. 6 NYCRR Part 750-757 - State Pollutant Discharge Elimination System (SPDES);
2. 6 NYCRR Part 364 - Waste Transporter Permits (for any water transported offsite);
3. 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (for any water transported offsite);
4. 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities (for any water transported offsite); and
5. 6 NYCRR Part 373 - Hazardous Waste Treatment, Storage, and Disposal Facility Requirements (for any water transported offsite).

WRS will containerize all construction water onsite and perform one of the following actions:

1. Treat the construction water to the concentration limits specified by the SPDES discharge permit and discharge to the onsite surface water drainage ditch.
2. Use untreated construction water within the solidification/stabilization (S/S) process.
3. Transport construction water offsite for treatment.

It is the intent of WRS to treat all or most of the construction water onsite using a temporary water treatment facility and/or use untreated construction water in the S/S process (options 1 & 2 above). WRS does not anticipate the transportation of construction water for offsite treatment.

For the purpose of this Construction Water Management Plan, "construction water" is defined as any water that has come into direct contact with excavated (or otherwise disturbed) and impacted soils or potentially contaminated equipment.

2.0 CONSTRUCTION WATER GENERATION

2.1 GENERATION POINTS

WRS has identified specific locations where construction water may be generated, including, but not limited to, the following:

1. Excavations: During the dewatering of excavations
2. Soils Staging Area: From gravity draining of excavated, stockpiled soils awaiting S/S
3. Decontamination Pad: Water used in the decontamination of equipment that has been in contact with impacted soils.
4. Rain water that comes into contact with any contaminated materials.

Standing surface waters, water trapped in a diversion or interceptor trench, or other such waters that have not been in contact with impacted soil or equipment, are not considered here to be construction water, and are, therefore, not subject to collection or treatment. However, the status of such waters may be determined on a case-by-case base and are at the discretion of the Engineer.

2.1.1 Excavations

It is anticipated that the bulk of construction water will be generated during the dewatering of excavations. The Pre-Final (95%) Design Report (Report) indicates that excavations in the former lagoon areas may extend as much as four feet below the level of the historical maximum groundwater table. The Report also states that the groundwater level fluctuates over a wide range.

Excavations must be dewatered (and remain dewatered) for the following reasons:

1. For stability and workability of the excavation;
2. For accuracy of confirmatory sampling (sides and bottom) and analysis (PCBs) of the excavation; and,
3. To avoid contamination of clean backfill below the groundwater table during backfilling.

Any water removed from excavations of impacted soil will be considered as construction water and therefore subject to treatment.

2.1.2 Soils Staging Area

The soils staging area will consist of a bermed and lined (40-millimeter polyethylene liner), divided into separately bermed cells (each sized to encompass a 500 cubic yard stockpile of impacted soil), an access road, and lechate collection sump. Impacted soils will be stockpiled and allowed to gravity drain towards the lechate collection sump. Any water collected at the lechate collection sump will be considered as construction water since this water has been in contact with impacted soils.

2.1.3 Decontamination Pad

The decontamination pad is a source of construction water.

2.2 VOLUME MINIMIZATION

WRS will employ various techniques to minimize the generation of construction water.

To reduce the amount of construction water generated during excavation (2.1.1 above), WRS will employ the following:

1. Drainage control measures: To reduce the amount of non-impacted surface water/rain water that comes into contact with impacted soils in open excavations, WRS intends to berm and cover, especially if a rainfall event is anticipated, any open excavations. WRS will have a stockpile of backfill material readily available to construct berms around the excavations when the need arises. WRS also intends to limit the number of open excavations at any one time as much as feasible. Other, more general, measures are part of our storm and surface water management plan which include diversion/interceptor trenching, and the construction of site-wide berms and dikes.

2. Expedited extraction well/long-term treatment system installation: WRS' strategy, as reflected in the Progress Schedule, is that an expedited installation and operation of the two extraction wells will provide a drawdown effect on the groundwater in the areas to be excavated.

3. Care during pumping of excavations: Excavations will not be overpumped. Pumping will continue only until the excavation is dry enough for workability purposes. Workability of the excavation will be maintained by pumping only as much as necessary.

Construction water generated at the soils staging area (2.1.2 above) will be minimized by implementing similar site-wide storm and surface water management measures as described above. The soils staging area will be bermed. Each stockpile will be covered with 10-millimeter polyethylene sheeting. The stockpiles will remain covered except during staging or removal of material. Care will also be taken in the shaping and sloping of each stockpile to maintain run-off of water.

At the decontamination pad, construction water (decon water) will be reused to the maximum extent possible. Effort will be made to reduce the amount of times any particular piece of equipment requires decontamination. This will be accomplished through efficient use/allotment of WRS equipment.

3.0 HANDLING AND STORAGE

3.1 COLLECTION

Construction water will be collected in a sump and transferred to storage tanks by means of a submersible pump or a trash pump. For the soils staging area and the decontamination pad, the sump will be a "permanent" fixture. For these areas the sump pit will be lined and the pad will be graded toward the sump. If necessary, the sump pits for the soils staging area and the decontamination pad will be bermed on the off-gradient sides to prevent overflow of the sump pit. An appropriate pump will be selected for each of these areas based on flow capacity and head requirement. The pump will remain dedicated to its assigned area. The pumps will be maintained as required and immediately repaired or replaced if not functioning properly or if found to be inadequate.

Both the soils staging area and the decontamination pad will have dedicated construction water storage tanks in their immediate proximity. Construction water will be transported directly from the collection point (sump) to the dedicated tank.

For the dewatering of excavations, one or more (if necessary) submersible and/or trash pumps will be utilized. Sump pits, if utilized, will be dug pits located at a strategic point in the excavation. The methods of dewatering the excavations will be determined on a case by case basis and will depend on the size and shape of the excavation, the amount of water in or flowing into the excavation, and the proximity of the appropriate construction water storage container(s).

3.2 TRANSPORTATION

Construction water that is to be treated will be transported from its collection point (excavation, soils staging area storage tank, or decontamination pad storage tank) to the temporary treatment plant pre-treatment storage containers via the methods to be discussed in this section. It should be noted, however, that not all collected construction water will be treated. Decontamination water may be first reused for further decontamination. Water collected from the soils staging area, if appropriate, will likely be used in the S/S process. Water collected in either the decon pad storage tank or the soils staging area storage tank may be discharged without treatment if, based on analytical results, it meets SPDES permit requirements. It should also be noted that water collected in the pre-treatment storage tank(s) may also be used in the S/S process, for decontamination, or may also be discharged without treatment if it meets SPDES requirements.

Transportation of construction water to the pre-treatment storage tank(s) at the temporary treatment facility will be either by direct pumping from the excavation or decon/staging storage tank or by transport via tanker truck.

During the transport of construction water (by either method described above), spill prevention protocol will be strictly observed.

3.3 PRE-TREATMENT STORAGE

WRS anticipates the mobilization of two to four 20,000 gallon temporary water storage tanks to the York Oil site. WRS also recognizes the possibility of the cleaning of (if necessary), evaluation, and reuse of large capacity storage currently onsite. These tanks will be used for the pre-treatment storage and the post-treatment storage of collected construction water. WRS anticipates the mobilization (or reuse of containers currently onsite) of smaller tanks for collected decontamination water storage, and collected soils staging area water storage.

4.0 TREATMENT AND DISCHARGE

4.1 PRE-TREATMENT DISCHARGE

Water is demonstrated to meet SPDES requirements for Class C(t) Surface Water may be discharged prior to treatment.

Refer to section 4.5 for WRS' discharge plan.

4.2 USE OF UNTREATED WATER IN S/S PROCESS

Construction water which does not contain significant concentrations of oil, acid, salt, alkali, organic matter, or other deleterious substances which would be detrimental to the successful execution of the S/S treatment process may be used in the S/S process.

4.3 TREATMENT AND DISCHARGE

The purpose of the temporary water treatment system is to treat the construction water to the required performance criteria for SPDES discharge requirements for Class C(t) Surface Water discharges. Water that meets the SPDES requirements may be discharged prior to treatment.

Treatment of construction water will be accomplished through the use of equalization, pre-filtration, air stripping, filtration, granular activated carbon (GAC), and post-filtration. The equalization tank will dampen the hydraulic fluctuation which occurs while pumping and will allow an air sparger to oxidize the iron within the water stream. Pre-filtration will remove oxidized iron prior to the air stripper. The air stripper will remove volatile organics from the groundwater. Additional filtration will occur to prevent fouling of the GAC. The GAC will remove the VOCs, SVOCs and PCBs which remain in the groundwater stream. The final filtration is to remove any carbon fines prior to discharge. WRS anticipates the mobilization of a temporary groundwater treatment system, as described above, sized and powered to operate at a capacity of 50 gpm.

Technical specifications regarding the temporary water treatment system will be provided by WRS in accordance with the Project Specifications and the Schedule of Submittals prior to on-site use.

4.4 POST-TREATMENT STORAGE

Following treatment by the temporary water treatment facility, treated water will be held in one or more post-treatment storage containers pending laboratory analysis to demonstrate dischargability under SPDES requirements for Class C(t) Surface Water. Items such as flow rates and water quality will be compared to the performance criteria established in the discharge permit.

4.5 DISCHARGE

The treated water will be discharged to the surface drainage ditch in OU-1 which leads to the wetlands area. Erosion control measures will be implemented at this point. An energy dissipater, consisting of rip rap, will be constructed at the discharge point in the drainage ditch.

Appendix G

Solidification/Solidification Work Plan

WRS INFRASTRUCTURE & ENVIRONMENT, INC.

SOLIDIFICATION/STABILIZATION WORK PLAN

OPERABLE UNIT 1
YORK OIL SUPERFUND SITE
Town of Moira
Franklin County, New York

Prepared for:

ALUMINUM COMPANY OF AMERICA
Massena Operations, P.O. Box 150
Massena, NY 13662

Reviewed by:

PARSONS ENGINEERING SCIENCE, INC.
290 Elmwood Davis Road, Suite 312
Liverpool, NY 13088

Prepared by:

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6049 Corporate Drive
East Syracuse, NY 13214
WRS Project Number 995151

June 28,1999

Revision 0

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1.0 INTRODUCTION

WRS will process contaminated soils at the York Oil Superfund Site by Solidification and Stabilization and disposal beneath a landfill cap. The Solidification/Stabilization (S/S) at the site is designed to address site soil and sediment containing 10 ppm or more of total PCBs. The decision to use S/S at the York Oil Site is based on bench-scale soil treatability work (Parsons ES and Kiber Environmental Services) completed in 1997. WRS has reviewed the bench-scale study and intends to use its Mobile Fixation and Stabilization Unit to process the contaminated soils.

2.0 EQUIPMENT SET-UP

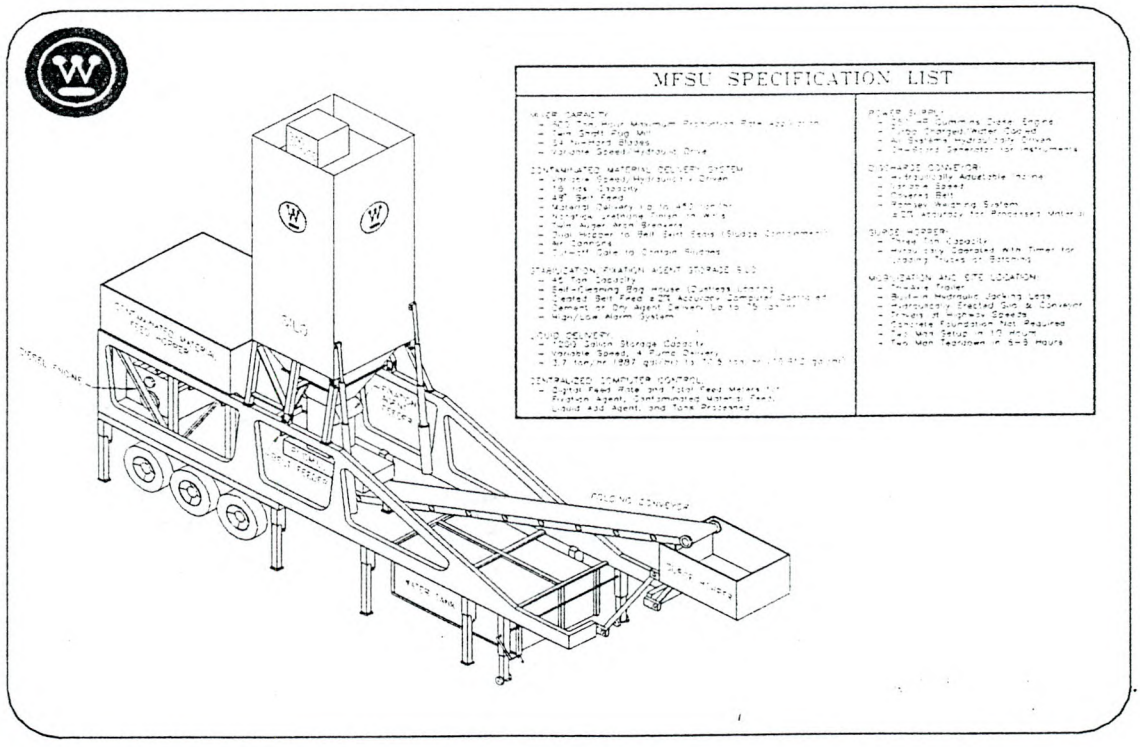
2.1 The Mobile Fixation and Stabilization Unit

The Mobile Fixation and Stabilization Unit (MFSU) was manufactured by ARAN of Sidney, Australia. This unit was made specifically for the remediation industry.

WRS has used the MFSU to stabilize and fixate a wide variety of soils and sludges at numerous sites. The WRS MFSU is one of a few systems in the country to be prequalified by the USEPA for on-site fixation projects. The system consists of a mixing unit with fully integrated electronic controls mounted on an over-the-road semi-trailer. Feed systems for liquids and solids are logic controlled to assure accurate and consistent blend rates and retention times. The system can achieve treatment rates of up to 600 feed tons per hour. Recent WRS projects have proven to be exceptionally cost-effective as compared with other treatment and disposal options.

The physical characteristics and handling requirements of contaminated materials vary widely, dictating a corresponding variation in the necessary treatment. The MFSU can accommodate a wide range of materials, including those that are dry or sticky, fine or coarse, or soil-like. The unit is equipped to provide a highly controlled feed of a wide variety of stabilization/fixation additives, including Portland cement, lime, and fly ash. The additive feed rate is metered and the feed rate of the untreated waste is measured by the loose volume passing over the feed belts.

Because the MFSU is mounted on an over-the-road semi trailer, the unit is highly mobile, traveling safely at highway speeds. The unit includes full trailer lighting in compliance with DOT regulations. The specifications and dimensions of the MFSU are presented below.



The self-contained MFSU can be prepared quickly for use without the need for cranes or special foundations. Once on site, the machine is leveled using built-in hydraulic jacking legs on each corner. Swing down support legs are pinned in place to provide working load support. The silo and conveyor are erected using hydraulic cylinders and locking connections.

The MFSU has its own power supply, with power matched to throughput. Power is provided by a Cummins LT10C diesel engine. This engine is a 10 liter (610 cubic inches), turbo-charged, water-cooled unit, rated at 250 horsepower at 2200 rpm. All systems, including the mixer, metering feeders, discharge conveyor, and discharge hopper gates are hydraulically driven from the power unit.

The two-shaft variable speed mixer for the MFSU is based on a series of extended length, bladed screws which optimize the mixing of finer materials through multiple blade interactions. The MFSU has clean face, studless, one-piece blades originally developed for clay mixers. The blade angle is adjustable to suit materials to be mixed.

The MFSU is equipped with a 45-ton silo with self-cleaning bag house. Reagent feed is by a computer controlled, cleated belt feed capable of delivering up to 75 tons of cement or dry agent per hour.

The liquid delivery system includes 1200 gallon capacity storage tank with a 4 pump delivery system capable of delivering up to 70.5 tons per hour (16,912 gallons per hour).

The MFSU discharge conveyor is a one-piece unit with a folding head section which allows its incline to be adjusted for handling high slump materials. Adjustable conveyor speed helps to compensate for slippage of over-moist materials. The discharge conveyor is equipped with a Ramsey belt scale.

2.2 Staging Area

WRS will construct a Soils Staging Area (SSA) for storing contaminated material prior to treatment. The SSA will be constructed of a 40 mil HDPE overlain by a cushion-type geotextile. The liner will be placed on a prepared subgrade which will be graded to drain to a lined sump pit. The subgrade will be smooth rolled prior to liner placement. Any soft areas or protrusions which could cause excessive deformation of the liner will be removed prior to liner installation. The SSA will be divided into discrete areas or cells for the storage of individual soils stockpiles. Soil berms, measuring a minimum of 12 inches in height, will be constructed around the perimeter of the SSA and partially surrounding each 500 cubic yard stockpile cell. The berms surrounding each cell are designed to prevent cross-contamination of soils stockpiles. The HDPE liner will be placed over the soil berms. Geomembrane seams will be welded by an experienced seam welder provided by, or approved by, the geomembrane manufacturer. Seam testing will not be performed. The access road into the SSA will consist of a traffic layer (well-graded stone) placed over the geomembrane and cushion geotextile. The location of the SSA is detailed in the Work Plan. The layout of the SSA is detailed in Figure 2-1 of this document.

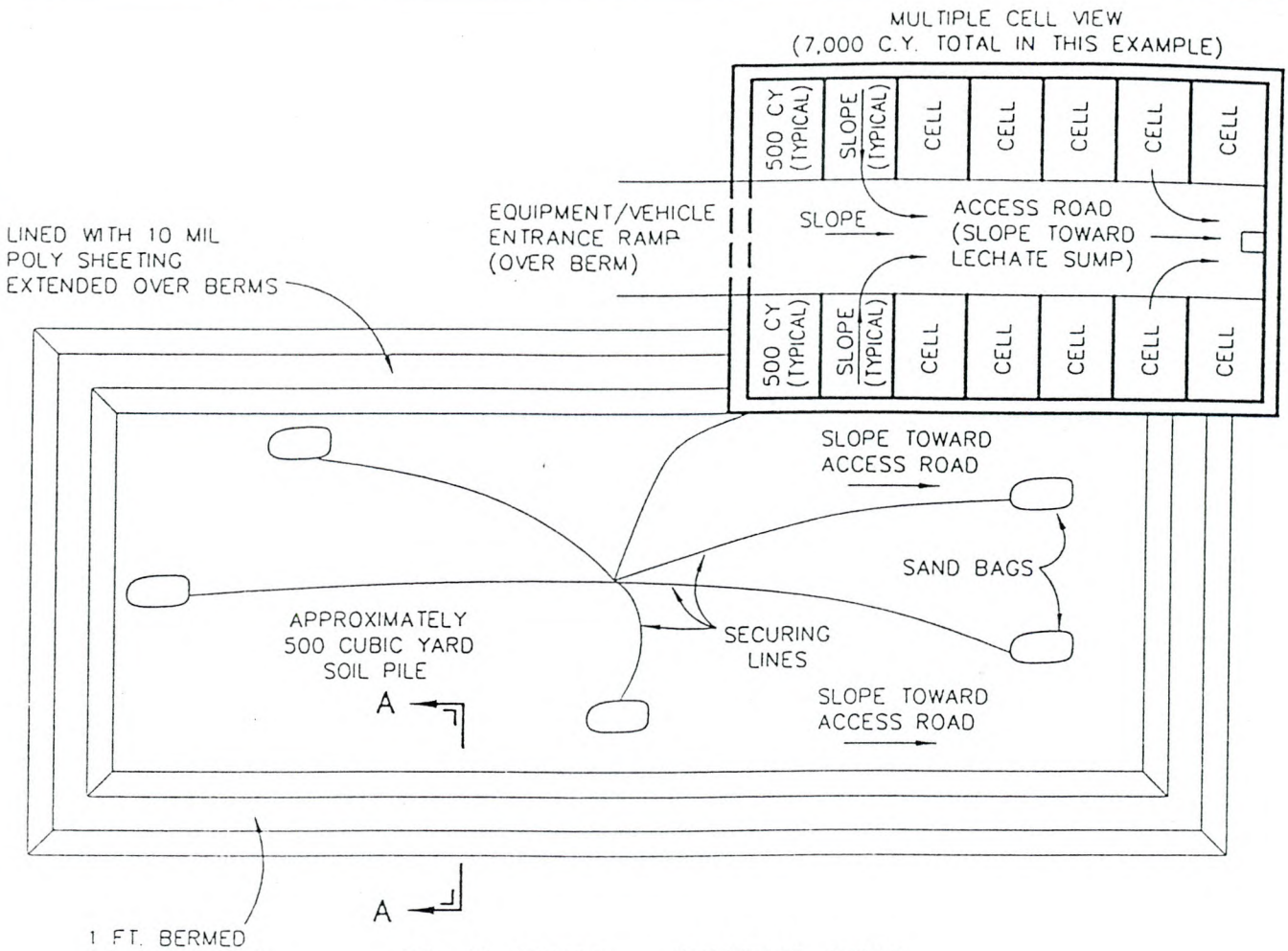
The SSA will have as ancillary a water storage tank, sump pump, hose, and fittings for the collection of construction water gravity draining from contaminated materials stockpiles. The management of this water is detailed in the Construction Water Management Plan.

Only materials to be treated in the S/S process (materials with greater than 10 ppm PCBs) will be staged in the SSA.

The soils beneath the SSA liner will be sampled upon the decommissioning of the SSA. A discussion on this matter is presented in Section 3.2.6 of this document.

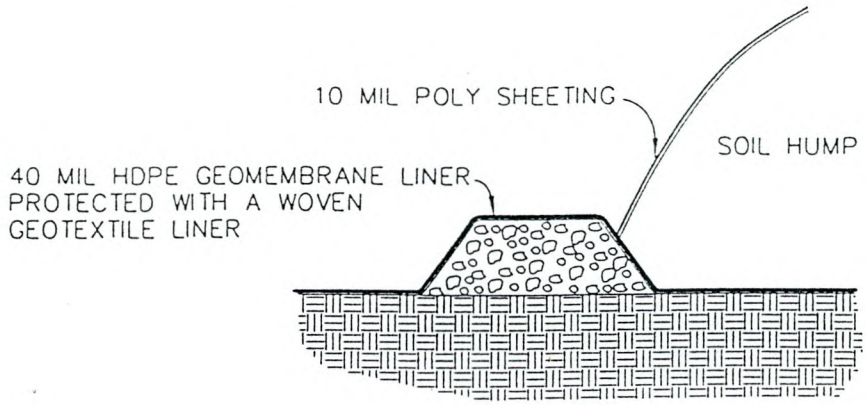
2.3 Soil Processing Area

The Soils Processing Area will be underlain by a 40 mil HDPE liner constructed in the same manner as that in the SSA.



PLAN VIEW – SINGLE CELL

N.T.S.



SECTION A–A

N.T.S.

DRAWING STATUS	DRAFT		FINAL ☒

PROJECT NO. : 1001-8P-1226			PROJECT MANAGER: DAN DECARLO		
SCALE: NOT TO SCALE		CADD ID: 8P122601	PLOT DATE: 12/18/98	CHK BY: M.B.	CHK DATE: 12/18/98
REVISION NO.: 0	REV DATE:	DRN BY: D.C.F.	DRN DATE: 12/15/98	APPVD BY: D.D.	APPVD DATE: 12/18/98

WRS Infrastructure & Environment, Inc.
346 SOUTH WARMINSTER ROAD, HATBORO, PENNSYLVANIA 19040
PH: (215) 441-9266 FAX: (215) 441-9249

FIGURE 2-1
TEMPORARY STOCKPILE STAGING AREA
YORK OIL SUPERFUND SITE
MOIRA, NEW YORK

3.0 OPERATION

3.1 Pilot-Scale Production

In the bench -scale treatability study report, Kiber Environmental Services, Inc. and Parsons Engineering Science, Inc. recommend a pilot study prior to initiating full-scale treatment.

3.1.1 Objectives

The objectives of the pilot study are:

- To verify, refine, or modify the proposed admixture formulations;
- To determine the optimal mixing and placement methods of material being treated;
  To access the effectiveness of the mobilized, full-scale equipment to meet the treatment performance objectives;
- To establish working curves for processed soil. Performance curves will be used to correlate one to three day cure time UCS results with passing 28 day UCS and TCLP PCB test results during full scale production;
- To estimate volume increases in the treated soil;
- To assess dust, vapor, off-gas emissions and implement engineering controls as warranted; and,
- To address any other potential problems associated with full-scale treatment.

3.1.2 Materials to be Used in the Pilot Study

Contaminated material used for the pilot testing will be obtained from each of the following soil types:

- Silty sand from excavation area 7 (Western Drainage Area);
- Oil-stained silty sand from excavation areas 3 through 3I (Former Lagoon 3) and the oil-stained soil from excavation areas 1 and 2 (Former Lagoons 1 and 2); and,
- Oily sludge from excavations area 1 and 2 (Former Lagoons 1 and 2).

Soil from excavation areas 4, 5, and 6 will not be included in the pilot test

WRS will obtain soils samples of the types indicated above for use in the pilot test. Soils samples of 150 cubic yards for each type of soil will be excavated and staged in the Soils Staging Area. The untreated materials used in the pilot test will be tested to verify that they contain contaminants of concern at high enough concentrations to verify proper S/S treatment. Only materials verified to contain greater than 10 ppm PCBs will be selected for the pilot study. The materials will be prepared in the same manner as proposed for full-scale treatment (see section 3.2.3).

3.1.3 Preliminary Design Mixes

Preliminary mix designs for the indicated soil types have been selected based on the Bench-Scale Soil Treatability Studies Report prepared by Parsons ES, Inc. of Liverpool, New York and Kiber Environmental Services, Inc. of Atlanta, Georgia. WRS proposes to use the following preliminary mix designs for the soil types identified in Section 3.1.2:

SOIL TYPE	KIBER/PARSONS ID	WRS ID	CEMENT ADD RATE	WATER ADD RATE
WDA EA 7	WDA-01	WDA	23%	0%
Oil-Stained Soil EA 3-3I, 1 and 2	LAG-01	LAG	7%	0%
Oily Sludge EA 1 and 2	MOUND-1	MOUND	16%	8%

WRS will conduct the pilot-scale testing with three separate reagent mixes (optimum, optimum plus 5%, optimum minus 5%) for each material presented above. The demonstration mixes are presented here:

DEMONSTRATION MIX	CEMENT ADD RATE	WATER ADD RATE
WDA, Optimum	23%	0%
WDA, Minus 5%	18%	0%
WDA, Plus 5%	28%	0%
LAG, Optimum	7%	0%
LAG, Minus 5%	2%	0%
LAG, Plus 5%	12%	0%
MOUND, Optimum	16%	8%
MOUND, Minus 5%	11%	8%
MOUND, Plus 5%	21%	8%

Each demonstration mix will produce 50 cubic yards of treated material or the amount processed in one hour of continuous processing, whichever is greater.

The reagent selected for the solidification and stabilization is Type I Portland cement. Reagent standards are discussed in detail in Section 3.2.4. Reagents used during the pilot study will be the same as those used during full-scale production.

3.1.4 Soil Performance Standards

During full-scale production, the final product of the treatment operation shall be a stabilized matrix. The chemical stability and the physical integrity of the matrix will be documented by monitoring the S/S process for conformance to the mix design established during pilot-scale testing. The ENGINEER will be responsible for verification testing on the material treated during the pilot-scale study. The pilot-scale treated materials will be tested for Unconfined Compressive Strength (UCS) at 1, 2, 3, 4, 5, 7, 10, 14, 21, and 28 days curing time. The treated materials will also subject to TCLP PCB analysis at 28 days curing time. Provided that the 28-day UCS and TCLP analysis results meet the performance standards, as defined in the Project Specifications and presented later in this section, the pilot-scale design mix is validated. The UCS values from the pilot-scale testing will be used to establish performance curves to correlate full-scale production UCS test results (one to three day UCS values) to validated pilot-scale 28-day UCS and TCLP results.

Soil treatment performance standards are based on Unconfined Compressive Strength and TCLP PCB analysis results at 28 days curing time. Required 28-day criteria are presented here:

PARAMETER	PERFORMANCE CRITERIA	TEST METHOD
UCS	100 psi minimum at 28 days	ASTM D 1633 Method B
TCLP PCBs	0.5 ug/l maximum at 28 days	EPA SW-846 Methods 1311, 3510A/8080/8082

During full-scale production, performance criteria will be bases on correlation of treated materials' one to three day UCS results to curves established during pilot-scale UCS testing. TCLP analysis of the full-scale production treated materials will not be performed but inferred from the correlation between early UCS test results and UCS performance curves established during pilot-scale testing.

Mixing speeds, times, and procedures will be determined based on conditions during the pilot study. Mixing parameters will be optimized during pilot testing. Once optimized, these parameters will be maintained throughout the full-scale S/S process. In any case, the mixing parameters in effect during the successful verification of design mixes (passing 28 day tests) and the establishment of UCS performance curves will be carried over and maintained throughout the full-scale S/S treatment process.

3.1.5 Consistency with Full-Scale Production

The full-scale processing equipment will be used during the pilot study. Mix times, procedures and speeds will be consistent unless modified based on the pilot study. Reagents utilized, water sources, and materials preparation and handling procedures will be identical for the pilot study as in full-scale treatment. Reagents, water, and

materials preparation and handling procedures are discussed in section 3.2. Mixing speeds, times, and procedures will be established during the pilot study.

3.1.6 Calibration

The MSFU is factory calibrated yearly. The MFSU was last factory calibrated in February 1999. The feed rate monitoring equipment and outloading conveyor scale will be field calibrated during the start-up period of the pilot study. Calibrations will be checked periodically throughout the pilot-scale and the full-scale S/S process. Calibration checks and any necessary recalibrations will be documented by the MFSU operator in the Daily MFSU Operators Log.

3.1.7 Emissions

During the pilot study, off gas, vapor, dust and noise emissions will be monitored using real time air monitoring. A PDM-3, a PID, and a noise dosimeter will be utilized. Engineering controls will be established as warranted by the air and noise monitoring results. Air and noise monitoring will be done periodically throughout the full-scale S/S process. All monitoring and monitoring results will be documented in the Daily MFSU Operators Log

3.1.8 Volume Increase

The estimated increase in volume resulting from treatment will be determined and reported with field demonstration test results. Volume increase will be determined by comparing the volume of in situ contaminated material to be treated to the volume of treated material.

3.2 Full-Scale Production

Full-scale solidification and solidification will commence upon pilot-scale test results verification that the treated material meets the physical and chemical criteria presented in Section 3.1.4 . A Field Demonstration Report will be submitted by WRS prior to full-scale treatment.

3.2.1 Design Mixes and Methods

The mix designs used during full-scale production will be based on the mix designs presented in the pilot-scale study. The full-scale mix designs will be modified or revised as necessary per the pilot-study test results. A Field Demonstration Report will be submitted by WRS seven days prior to full-scale S/S which will include "finalized" mix proportions, mixing time, and mixing speeds.

3.2.2 Operating Conditions and Practices

S/S will not take place in ambient air temperature below 32^{0}F. Provisions such as concrete blankets, salamanders, or straw cover will be made to maintain the temperature of the treated material above freezing while curing. S/S will not be performed during periods of heavy rainfall that would result in the addition of excess water to the mixing process.

3.2.3 Materials Preparation

The S/S process will be based on batches corresponding to distinct, labeled, and documented soils stockpiles. A Stockpile Tracking Log will be utilized to track the soils stockpile source location(s), contamination concentration, staging location(s), and ultimately S/S treatment data, test results, and placement location. A separate Stockpile Tracking Log will be completed for each stockpile. The Stockpile Tracking log is presented in Section 4.X. Stockpile size will be limited to 500 cubic yards.

Untreated materials which contain greater than 10 ppm PCBs will be stockpiled in the SSA and allowed to gravity drain. The SSA is constructed to prevent cross-contamination of separate soils stockpiles. Stockpiles will be covered with 10 mil poly sheeting in the SSA.

Soil types, for which testing has indicated the need of different mix ratios, will not be mixed at prior to or during the S/S process or during placement.

Untreated soils will be screened to 3 inch minus before entering the MSFU raw materials hopper. Screening will be conducted with a Power Shaker equipped with a 6-inch top screen and a 3-inch bottom screen. Oversize material will be rescreened at least once. Reject material will be ultimately mixed with bulk cement and placed under the cap.

3.2.4 Reagents and Water

The reagent selected for the S/S process is Type I Portland cement. Reagents will be shipped in properly labeled containers with instructions for handling and storage. These instructions will be adhered to. Certificates of analysis verifying reagent composition will be submitted prior to use.

Water used in the S/S process will be construction water, impounded surface water, water delivered to the site, or a combination thereof. Water supply decisions for the S/S process will be based on site conditions during remediation activities. In any case, the water will not contain significant concentrations of oil, salt, alkali, organic matter, or other substances which would be detrimental to the successful execution of the S/S treatment process. WRS will provide a tank for water collection and storage (in addition to the MFSU water tank) as dictated by production needs and site conditions.

3.2.5 Placement of Treated Materials

Treated material will be placed directly into the onsite area to be capped. Treated material will be placed such that the material from specific batches can be defined and removed if the material fails post-treatment testing. The placement location of discrete batches (stockpiles) will be noted on the Stockpile Tracking Logs and in the Solidification/Stabilization Daily Reports.

Treated materials (and untreated materials with less than 10 ppm PCBs) will be placed on clean, imported fill that has been placed to an elevation no less than two feet higher than that of the maximum recorded groundwater elevation. Treated material will be placed in lifts not exceeding 36 inches in thickness. Each lift will be compacted with a 20 plus ton vibratory roller making a minimum of three passes. Processed soil cells will not be covered until approval of the ENGINEER is obtained. The ENGINEER's approval consists of signing off on the Stockpile Tracking Log.

3.2.6 Demobilization

Upon demobilization of the MFSU and ancillary equipment, the Soils Proscessing Area lined pad and the Soils Staging Area lined pad will be decommissioned. The liner materials will be placed under the cap. Sampling of the soils beneath the lined areas will be conducted in accordance with Section E4, Confirmatory Sampling, of the Sampling and Analysis Plan (Parsons ES). Samples will be collected from the top six inches of soil for field and/or laboratory analysis. Sampling will be conducted under a composite strategy acceptable to the ENGINEER. WRS retains the right to conduct soils sampling in the liner areas prior to remediation activities.

The MFSU and ancillary equipment will be decontaminated, prior to removal from the site, in accordance with the decontamination procedures outlined in the SSHASP and in the Work Plan.

4.0 REPORTING

WRS will maintain a number of logs related to the S/S process. These logs will consist of the following:

- Stockpile Tracking Logs
- Daily MFSU Operators Logs
- Reagent Delivery Records
- MFSU Calibration Records

Stockpile Tracking Log is presented in Figure 4.1 of this section. The Stockpile Tracking Log is an action based form to be completed by the Materials Handling and Excavation Supervisor (MH&E Supervisor). One Stockpile Tracking Log will be created for each and every soils stockpile excavated on site. The log will track the stockpile from excavation, through field PCB testing, staging, placement (if no treatment is required), treatment, placement under the cap, UCS testing, and retesting or reprocessing (if necessary). The Tracking Log also incorporates S/S specific data (if applicable) such as batch number, and mixing speeds and proportions. The log also serves as documentation of the ENGINEER's approval to cover treated materials. Stockpile Tracking Logs will be quality control checked by the QA/QC Engineer.

The Daily MFSU Operators Log is presented in Figure 4.2 in this section. The Operators Log is a daily operating log to be completed by the MFSU operator. The Daily MFSU Operators Log documents the daily production quantities of raw materials and reagents processed, start and stop times, stockpiles treated, mixing times and speeds, and placement locations on a batch-by-batch basis. The log also documents calibrations and calibration checks, emissions monitoring results, any engineering controls implemented, weather, temperature, breakdowns, and any other problems or conditions encountered during daily production. The Daily MFSU Operators Logs will be quality control checked by the QA/QC Engineer.

WRS will also maintain records of reagent orders, deliveries and rejections.

Calibration records for the MFSU will also be maintained by WRS.

A Solidification/Stabilization Daily Report package will be delivered to the ENGINEER. This package will contain a summary of all pertinent MSFU Operators Log information including calibration and emissions monitoring results. Daily totals and totals-to-date of all production values will be presented. Any Stockpile Tracking Logs completed that day, MFSU Operators Logs, and any other pertinent logs or records will be included in the Daily Report package. All of the logs and records associated with the S/S process will also be maintained separately by WRS.

Figure 4.1 STOCKPILE TRACKING LOG

STOCKPILE NO: _____ PROJECT: York Oil (OU-1)

STOCKPILE SIZE: _____ PROJECT NO: 995151

STOCKPILE SOURCE AND DISPOSITION							
SOURCE			SAMPLES				
DATE	LOCATION	DEPTH	DATE	TEST	RESULT	BY	COMMENT
Soil Description:			Soil Disposition (circle one): <1 <10 >10				

STAGING AREA		
DATE	LOCATION	NOTES

STOCKPILE DESTINATION (if other than treatment)		
DATE	LOCATION	NOTES

SOLIDIFICATION/STABILIZATION (if applicable)								
BATCH INFORMATION				MIX PROPORTIONS				
DATE	BATCH	MIX TIME	MIX SPEED	MATERIAL	CEMENT	WATER	OTHER	TOTAL
NOTES:								

FIELD UCS TEST RESULTS								
DAY	1	2	3	4	7	14	21	28
UCS(psi)								
LAB QA TESTED: Y or N (if Y attach results)								
SAMPLES PASSING Y or N (if N then: RETESTED or REPROCESSED (circle one, attach new log)								

PLACEMENT OF TREATED SOIL		
DATE	CELL NO	NOTES

SIGNATURE OF WRS QA/QC ENGINEER _____

Andrew Likos, WRS QA/QC Officer

SIGNATURE OF ENGINEER (APPROVAL TO COVER) _____

Lou Liberatorie, Parsons ES

Figure 4.2 DAILY MFSU OPERATORS LOG

DATE:	
OPERATOR:	
TIME START:	
TIME STOP:	

PROJECT :	York Oil Superfund Site
PROJECT NO:	99-5151

WEATHER	
TEMPERATURE	

		MIX DESIGN			TIME		MIXING		AMOUNTS OF MATERIALS PROCESSED					PLACEMENT	
BATCH NO	STOCKPILE NO	DESIGN ID	% CEMENT	% WATER	BATCH START	BATCH STOP	TIME (sec)	SPEED	REJECT	MATERIAL	CEMENT	WATER	OUTLOAD	CELL NO	TESTING NOTES
							DAILY TOTALS								

NOTES (indicate calibrations, breakdowns, problems, emissions testing performed, etc.):

Signature of MFSU Operator: _____

MFSU Operator

Appendix H

Project Specifications

SPECIFICATIONS

TABLE OF CONTENTS

YORK OIL SUPERFUND SITE
REMEDIAL ACTION FOR OU-1

END OF TABLE OF CONTENTS

SECTION 01010

SUMMARY OF THE WORK

PART 1 - GENERAL

1.01 IDENTIFICATION

The work shall be performed at the York Oil Site located on County Route 6 (North Lawrence Road) about one mile northwest of the Hamlet of Moira, in the Town of Moira, Franklin County, New York.

1.02 CONTRACT DOCUMENTS

A. Requirements of the work are contained in the Contract Documents, and include cross-references herein to published information, which is not necessarily bound therewith.

B. Included in the general contract are site grading, excavation, soil/sediment removal, wastewater treatment, landfill cover construction, general construction, electrical, mechanical, and all other operations and work required to complete the remedial construction according to the intent of the Contract Documents.

1.03 SITE BACKGROUND

The York Oil facility was constructed in the 1950s by the York Oil Company, which processed used oils collected form service stations, car dealers, and industrial facilities. The oils, some of which contained polychlorinated biphenyls (PCBs) were processed to remove impurities and resold to other businesses. The oil recycling operation was discontinued in the mid-1960s; the property was then used by Pierce Brothers Oil Services, Inc. for used oil storage. The collected oils were stored or processed in eight aboveground storage tanks, three earthen-dammed settling lagoons, and at least once underground storage tank. The recycled oil either was sold as No. 2 fuel oil or was used in dust control for the unpaved roads in the vicinity of the site.

During heavy rains and spring thaws, the oil-water mixture from the lagoons would often overflow onto surrounding lands and into adjacent wetlands, which Pierce Brothers Oil Services, Inc. purchased in 1964. Contamination at the site first was reported by a state road crew in 1979. In 1982, the County assumed title because of unpaid property taxes.

In 1980, EPA began emergency cleanup activities at the site. It secured the property to limit access and to reduce the threat of direct contact with hazardous substances, and it removed oil and contaminated water from the lagoons, which then were filled with a concrete by-product and sand. The top three feet of the oil-soaked soil were excavated from the neighboring wetlands. Contaminated oil was transferred to aboveground storage tanks, and contaminated soil was contained onsite. Contaminated water from one of the lagoons was treated and discharged into the wetlands. An interceptor trench was dug to alter the flow of surface water and groundwater. In 1983, EPA conducted additional emergency actions including the collection of oil seeping into drainage ditches, the installation of a new filter fence system, and the posting of warning signs.

An RI/FS associated with the Site Proper was completed in November 1987 by Erdman, Anthony, Associates on behalf of the New York State Department of Environmental Conservation (NYSDEC). In February 1988, EPA signed a first operable unit ROD, selecting a remedy for controlling the source of the contamination. Initiation of the first operable unit remedial design and remedial action was delayed due to protracted negotiations between EPA and the Potentially Responsible Parties (PRPs).

In late 1994, EPA issued a Unilateral Administrative Order (UAO) to Alcoa to perform several components of the selected remedy, including removing the contaminated tank oils and incinerating them at an EPA-approved facility and cleaning and demolishing the empty storage tanks. Under the UAO, 9,654 gallons of PCB-contaminated debris were removed from the site.

In December 1995, Alcoa also installed another interceptor trench to collect oil seeping into the wetlands. A settlement with the PRPs in the form of a consent decree was finalized in August 1996, which provided for the design and implementation of the selected remedy. Since 1996, pre-design investigation and bench scale soil and groundwater treatability evaluations have been conducted by Parsons Engineering Science, Inc. of Liverpool, New York.

1.04 SUMMARY OF WORK

A. The work consists of furnishing all labor, materials, supervision, equipment, and services necessary to complete the scope of work detailed in the Specifications and Contract Drawings. The work includes, but is not limited to, the following:

1. Preparation of Contractor plans;
2. Mobilization to the site and installation of temporary facilities and equipment;
3. Performing preconstruction survey to document preconstruction grades and conditions;
4. Installation of surface water diversion system and erosion and sedimentation control devices;
5. Clearing of the work areas;
6. Removal of stored drums and in-ground weirs and drainage structures;
7. Excavation of soils/sludges and pilot scale solidification/stabilization (S/S) testing;
8. Excavation and S/S of contaminated materials along with backfill, compaction, and grading;
9. Intermediate surveys as needed to document quantities and performance of the work;
10. Construct the site cap and associated drainage system;
11. Construction of access roads and permanent installations;
12. Construction of a groundwater extraction and treatment system including connecting piping;
13. Well abandonment;
14. Removal of buildings and interceptor trench appurtenances;
15. Restoration of disturbed areas including wetlands;
16. Final site survey to document final site conditions;
17. Attend post construction meeting and final inspection;
18. Perform punch list items identified during final inspection;
19. Demobilization from the site; and
20. Prepare final submittals including final site drawings and O&M manual;

1.05 USE OF SITE

The Contractor shall limit his use of the premises to the work indicated.

A. Use of the Site: Confine operations at the site to the areas permitted. Portions of the site beyond areas on which work is indicated are not to be disturbed.

B. Keep existing driveways and entrances serving the premises clear and available at all times. Do not use for parking or storage of materials.

C. Do not encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated or as directed by the Engineer.

D. Lock automotive type vehicles and other mechanized or motorized construction equipment, when parked and unattended. Do not leave vehicles or equipment unattended with the motor running or ignition key in place.

E. Contractor to provide employee parking onsite, not on or adjacent to public roadways.

1.06 SITE SECURITY

The Contractor shall install 5-foot, high-strength polyethylene orange plastic fencing to provide site security where a permanent fence has not been installed or has been temporarily removed as shown on the Contract Drawings. Temporary plastic fencing shall be Tenax Alpi or equal with 7-foot minimum length posts set at a maximum of 10-feet apart. Fencing shall be installed prior to beginning construction of other work items, shall fully enclose the work area and shall be repaired in an expeditious manner as necessary. One main entrance/exit gate shall be established, with an optional gate for delivery.

1.07 ACCESS ROADS

Access roads shall be maintained for use by the Contractor and the Owner for the duration of the contract. The contractor shall repair ruts and/or weak spots in the roads as necessary. Proper drainage shall be maintained on all access roads. Gravel or crushed stone for use in road construction or repair shall be approved by the Engineer prior to use.

1.08 SIGNS

The Contractor shall post the work zone with signs reading "Warning, Hazardous Work Area, Do Not Enter Unless Authorized". Warning signs shall be posted at a minimum of every 500 feet along the perimeter fencing.

1.09 DUST CONTROL

An erosion/dust control agent can be used with approval of Engineer. Accomplish dust control by water sprinkling or by other methods approved by the Engineer. The use of petroleum products for dust control shall not be permitted.

END OF SECTION 01010

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 Description

A. This section covers the methods and procedures that the OWNER will use to measure the Contractor's work and to provide payment. This general outline of the measurement and payment features will not in any way limit the responsibility of the Contractor for making a thorough investigation of the Contract Documents to determine the scope of the work included in each bid task.

B. Payment will be made to the Contractor in accordance with the specified methods of measurement and the unit or lump sum prices stipulated in the accepted bid. Payment will constitute complete compensation for all work required by the Contract Documents including all costs of accepting the general risks, liabilities and obligations, expressed or implied. Payment under all tasks will include, but not necessarily be limited to, compensation for furnishing all supervision, labor, equipment, overhead, profit, material, services, applicable taxes, and for performing all other related work required. No other payment will be made.

C. No payment shall be made for work performed by the Contractor to replace defective work, work which is not required by the Contract Documents, work outside the limits of the Contract and additional work necessary due to actions of the Contractor, unless ordered by the Engineer in writing.

1.02 Incidental Items

A. Except for the items designated hereunder for measurement and payment, the costs of items necessary to complete the work as specified are considered incidental to the items specified for measurement and payment. The costs of incidental items shall be included in the prices of items specified for measurement and payment.

1.03 Quantities

A. The estimated quantities indicated in the Bid Schedule are the quantities estimated for the evaluation of bids. The actual quantities of items to be paid for on a unit price basis may vary from the quantities indicated in the Bid Schedule.

1.04 Related Provisions Specified Elsewhere

A. Payment to Contractor: Refer to General Conditions and Contract Agreement.

B. Changes in Contract Price: Refer to General Conditions and Contract Agreement.

1.05 Submittals

A. Schedule of Values: Submit two copies of the Schedule of values to the Engineer for approval at least 20 days prior to submitting the first application for payment. Revise and resubmit the Schedule of Values as required. The Schedule of Values shall show a breakdown of labor, materials equipment and other costs for each bid item, when appropriate. When requested by the Engineer, support values with data that will substantiate the submitted costs.

PART 2 - MEASUREMENT

2.01 Total Job Basis

A. Measurement of all lump sum items will be on a total job basis.

2.02 Volume Basis

A. Where items are specified to be measured on a volume basis, the volume will be determined on an in-place basis (prior to excavation for excavation or after placement and compaction for imported fill) between the existing and final ground surfaces or grade lines shown on the drawings.

B. Over-excavation, defined as excavation beyond the specified or approved limits, will not be measured for payment.

2.03 Weight Basis

A. Where items are specified to be measured on a weight basis, the weight will be determined by the sum of printed certified truck scale tickets. Scale tickets must be cross-referenced with the number of trucks and must be signed by the Engineer or his appointed representative once per day.

B. Lost scale tickets may be replaced by the vendor invoice only upon approval by the Engineer.

2.04 Area Basis

A. Where items are specified to be measured on an area basis, the area will be determined by a field survey of the quantity installed. The area will be calculated on a plan view with no adjustment for grade changes.

B. Quantities installed beyond the specified or approved limits will not be measured for payment.

C. No adjustments will be made for the required overlap of materials.

2.05 Length Basis

A. Where items are specified to be measured on a length basis, the length will be determined by a field survey of the length installed along the centerline. The length will be calculated on a plan view with no adjustment for grade changes.

B. Quantities installed beyond the specified or approved limits will not be measured for payment.

C. No adjustments will be made for the required overlap of materials.

2.06 Unit Basis

A. Where items are specified to be measured on a unit basis, excluding unit price items measured on a volume, area or length basis, measurement will be of each particular unit as specified.

PART 3 - BID ITEMS

A. Item 1 - Bonds and Insurance

1. Work Included: Furnish all required bonds and insurance in accordance with the Contract requirements.

2. Measurement: Separate lump sum payments for bonds and insurance based on the approved Schedule of Values.

3. Payment: Payment shall be lump sum after receipt of proper bonds and insurance.

B. Item 2 - Mobilization

1. Work Included. Furnish all materials, equipment and labor for all other work specified in the Contract Documents that is not included in other bid items, inclusive, but not limited to all permits; work plans; project photographs; preliminary testing of materials; surveying; temporary field offices and facilities including but not limited to temporary utilities, temporary access roads, security, staging areas, and collection and disposal of miscellaneous wastes; health and safety items including but not limited to related monitoring, analysis, clothing, equipment, PPE disposal, facilities, required personnel, medical surveillance program including physical examinations and all project records and documents as specified in Section 01105, Health and Safety; project record drawings; construction of soil processing pads; and mobilizing construction crews and equipment. Include all labor and equipment to make the stabilization/solidification and temporary construction water treatment systems operational.

2. Measurement. Lump Sum payments for each mobilization item based on the approved Schedule of Values.

3. Payment: Payment shall be made on a progress basis, based on the

percentage of mobilization completed, in accordance with the approved Schedule of Values. No payment shall be made until:

a. The Contractor has physically occupied the site;

b. Temporary utilities and lighting are connected and operational;

c. Staging areas are established;

d. Decon pad is operational;

e. Work Plans have been submitted; and

f. Sufficient equipment is available to start clearing and excavation work.

C. Item 3 - Erosion Control

1. Work Included: Provide, install and maintain erosion control and surface water diversion structures, excluding the integral drainage ditch and toe drain at the cap perimeter, and remove all temporary measures following establishment of permanent measures.

2. Measurement: Lump Sum.

3. Payment: Payment shall be made on a progress basis, based on the percentage of erosion control completed.

D. Item 4 - Clearing

1. Work Included: Clear the site work zones of all trees, brush, miscellaneous debris and material above the ground surface and dispose of the material in accordance with the Contract Documents. The work also includes any incidental clearing as required to facilitate construction activities.

2. Measurement: Lump Sum.

3. Payment: Payment shall be made on a progress basis, based on the percentage of the clearing completed.

E. Item 5 - Clean Fill (Off-site)

1. Work Included: Provide off-site clean fill for use as backfill. Such work shall include, but not be limited to, procuring, transporting, backfilling, and compacting the off-site clean fill in accordance with the Contract Documents.

2. Measurement: The quantity will be based upon the weight of off-site clean fill delivered to the site.

3. Payment: Unit price per ton of off-site clean fill.

F. Item 6 - Soil Excavation, Handling and Backfilling

1. Work Included: Excavate, stockpile separately, place in the cap area, backfill and compact all on-site soils, including the clean fill, oil-stained soil and oily sludge, in accordance with the Contract requirements. The

stabilization/solidification of soil shall be paid under bid items 7a and 7b.

2. Measurement: The quantity will be based upon the in-place volume of soil prior to excavation based on a comparison of topographic surveys before and after excavation.

3. Unit price per cubic yard of soil.

G. Item 7a - Stabilization/Solidification - (Treatment of soil from all areas except the Western Drainage Area - excavation areas 1 through 6)

1. Work Included: All materials, equipment, labor and supplies for stabilization/solidification including material handling, reagents, water, processing, and testing. This bid item excludes the excavation, stockpiling, placement, backfilling and compaction of the soil already included in bid item 6.

2. Measurement: The quantity will be based upon the weight of oil-stained soil and oily sludge from excavation areas 1 through 6 successfully treated by stabilization/solidification. Include 300 cubic yards of material treated, both successfully and not successfully, during the field start-up demonstration. Payment for the re-treatment of failing pilot test batches will be made at the unit price provided the failure was not caused by mechanical problems, improper feed control or impurities of the reagents or water, contractor neglect, etc.

3. Payment: Unit price per ton of oil-stained soil and oily sludge stabilized/solidified.

H. Item 7b - Stabilization/Solidification - (Treatment of Western Drainage Area Soil - excavation areas 7 through 7F)

1. Work Included: All materials, equipment, labor and supplies for stabilization/solidification including material handling, reagents, water, processing, and testing. This bid item excludes the excavation, stockpiling, placement, backfilling and compaction of the soil already included in bid item 6.

2. Measurement: The quantity will be based upon the weight of soil from excavation areas 7 through 7F successfully treated by stabilization/solidification. Include 150 cubic yards of material treated, both successfully and not successfully, during the field start-up demonstration. Payment for the re-treatment of failing pilot test batches will be made at the unit price provided the failure was not caused by mechanical problems, improper feed control or impurities of the reagents or water, contractor neglect, etc.

3. Payment: Unit price per ton of soil stabilized/solidified.

I. Item 8 - Landfill Cap

1. Work Included: All materials, equipment, labor and supplies for the geotextiles, geomembrane, drainage layer, barrier protection layer, topsoil layer, seeding, fertilization and mulching, and incidental testing of materials for review and approval for the capped area.

2. Measurement: The quantity will be based upon the area capped as per the cap pay line shown on the drawings.

3. Payment: Unit Price per square yard of landfill cap installed.

J. Item 9 - Biodegradable Erosion Control Fabric

Work Included: Furnish and install biodegradable erosion control fabric on steep slopes in accordance with the specifications.

2. Measurement: The quantity will be measured based upon the actual number of square yards placed.

3. Payment: Unit price per square yard of biodegradable erosion control fabric placed.

K. Item 10 - Drainage Ditch, Toe Drain and Drainage Piping

1. Work Included: Prepare the subbase, furnish and install geotextile fabrics, riprap and drainage piping for the integral drainage ditch and toe drain at the cap perimeter.

2. Measurement: The quantity will be measured along the centerline of the drainage ditch based upon the actual linear feet placed.

3. Payment: Unit price per linear feet of drainage ditch and toe drain placed.

L. Item 11 - Gravel Paving

1. Work Included: Prepare the road subbase, furnish and install geotextile and aggregate paving.

2. Measurement: The quantity will be measured based upon the actual number of square yards installed as per the pay lines shown on the drawings.

3. Payment: Unit price per square yards of gravel paving installed.

M. Item 12 - Finish Grading, Topsoil and Seeding (Non-cap areas)

1. Work Included: All materials, equipment, labor and supplies for topsoil, seeding, fertilization and mulching in the non-cap areas.

2. Measurement: The quantity will be measured based upon actual area covered with topsoil.

3. Payment: Unit price per square yard covered by the topsoil.

N. Item 13 - Wetland Restoration

1. Work Included: All materials, equipment, labor and supplies for topsoil, seeding, fertilization and mulching in the wetland areas.

2. Measurement: The quantity will be measured based upon actual wetland restored.

3. Payment: Unit price per square yard of wetland restoration.

O. Item 14 - Abandon Wells

1. Work Included: Abandon existing monitoring wells.

2. Measurement: The quantity will be based upon the actual linear feet of wells abandoned.

3. Payment: Unit Price per linear feet of well abandoned.

P. Item 15: Extraction Wells

1. Work Included: Furnish and install complete extraction wells including drilling and installing well screens and casings, developing the wells, management of development waters, installing concrete vaults, pumps, piping, local control panels, wiring, termination with buried conduit wiring. sensors, valves, fittings, miscellaneous appurtenances, and testing of installed systems.

2. Measurement: The quantity will be based upon actual linear feet of extraction well installed.

3. Payment: Unit price per linear feet of extraction well installed.

Q. Item 16: Groundwater Treatment Building

1. Work Included: Furnish and construct the treatment building including securing construction permits, stamped pre-engineered building drawings, excavation and preparation of foundation areas, construction of foundation and floors, erection of the building framing installation of wall panels, roofing, insulation, doors, windows, hardware, heating/ventilation system, electric service and systems, lighting, telephone systems.

2. Measurement: Lump Sum.

3. Payment: Payment shall be made on a progress basis, based upon the percentage of the work completed for this item

R. Item 17: Groundwater Treatment System

1. Work Included: Furnish, construct, and test a fully functioning treatment system which meets the SPDES permit discharge requirements including all treatment equipment (acidification tank, oil/water separator, equalization tank, mixers, chemical feed pumps); lab sink and cabinets; safety shower; chemical tanks; chemical supplies; piping from the extraction wells to the

treatment plant including excavation, placement of isolation geotextile, bedding material, piping branch fittings, clean backfill, and testing of installed piping; testing/shakedown treatment equipment and systems; and spare parts and maintenance manuals.

2. Measurement: Lump Sum.

3. Payment: Payment shall be made on a progress basis, based upon the percentage of the work completed for this item. . Final payment shall be made following three months of operation that meets State discharge limits provided with these specifications.

S. Item 18 - Demobilization

1. Work Included. Furnish all materials, equipment and labor to demobilize and remove from the site including, but not limited to, all temporary field offices and facilities, temporary utilities, temporary access roads, security, staging areas, health and safety facilities, PPE disposal, waste disposal, soil processing pads and equipment. Included is the submission of all project closeout documents, including but not limited to, record drawings, surveys, well logs, operation and maintenance manuals, test results, disposal records, release of liens and warranties.

2. Measurement. Lump Sum payments for each demobilization item based on the approved Schedule of Values.

3. Payment: Payment shall be made on a progress basis, based on the percentage of demobilization completed, in accordance with the approved Schedule of Values.

THE FOLLOWING ALTERNATE BID ITEMS ARE FOR THE INCREMENTAL INCLUSION OF OU-2

T. Item 3A - Erosion Control

1. Work Included: Provide, install and maintain erosion control and surface water diversion structures and remove all temporary measures following establishment of permanent measures.

2. Measurement: Lump Sum.

3. Payment: Payment shall be made on a progress basis, based on the percentage of erosion control completed.

U. Item 4A - Clearing

1. Work Included: Clear the site work zones of all trees, brush, miscellaneous debris and material above the ground surface and dispose of the material in accordance with the Contract Documents. The work also includes any incidental clearing as required to facilitate construction activities.

2. Measurement: Lump Sum.

3. Payment: Payment shall be made on a progress basis, based on the percentage of the clearing completed.

V. Item 6A - Western Wetland Sediment Excavation, Handling and Backfilling (PCBs ≥1 ppm)

1. Work Included: Excavate, stockpile separately, place in the cap area, backfill and compact the Western Wetland sediment in accordance with the Contract requirements. The stabilization/solidification of sediment shall be paid under alternate bid item 7A. Such work shall include, but not be limited to, excavation, transporting, spreading, stockpiling and the handling of roots and stumps in accordance with the Contract Documents.

2. Measurement: The quantity will be based upon the weight of sediment stabilized/solidified under alternate bid item 7A.

3. Payment: Unit price per ton of sediment.

W. Item 7A - Stabilization/Solidification - (Treatment of sediment from the Western Wetland - excavation area 8)

1. Work Included: All materials, equipment, labor and supplies for stabilization/solidification including material handling, reagents, water, processing, and testing. This bid item excludes the excavation, stockpiling, placement, backfilling and compaction of the sediment already included in alternate bid item 6A.

2. Measurement: The quantity will be based upon the weight of sediment from the Western wetland, excavation area 8, successfully treated by stabilization/solidification. Include 300 cubic yards of material treated, both successfully and not successfully, during the field start-up demonstration. Payment for the re-treatment of failing pilot test batches will be made at the unit price provided the failure was not caused by mechanical problems, improper feed control or impurities of the reagents or water, contractor neglect, etc.

3. Payment: Unit price per ton of oil-stained soil and oily sludge stabilized/solidified.

X. Item 8A - Landfill Cap

1. Work Included: All materials, equipment, labor and supplies for the geotextiles, geomembrane, drainage layer, barrier protection layer, topsoil layer, seeding, fertilization and mulching, and incidental testing of materials for review and approval for the capped area.

2. Measurement: The quantity will be based upon the area capped as per the cap pay line shown on the drawings.

3. Payment: Unit Price per square yard of landfill cap installed.

Y. Item 9A - Biodegradable Erosion Control Fabric

Work Included: Furnish and install biodegradable erosion control fabric on steep slopes in accordance with the specifications.

2. Measurement: The quantity will be measured based upon the actual number of square yards placed.

3. Payment: Unit price per square yard of biodegradable erosion control fabric placed.

Z. Item 10A - Drainage Ditch, Toe Drain and Drainage Piping

1. Work Included: Prepare the subbase, furnish and install geotextile fabrics, riprap and drainage piping for the integral drainage ditch and toe drain at the cap perimeter.

2. Measurement: The quantity will be measured along the centerline of the drainage ditch based upon the actual linear feet placed.

3. Payment: Unit price per linear feet of drainage ditch and toe drain placed.

AA. Item 11A - Gravel Paving

1. Work Included: Prepare the road subbase, furnish and install geotextile and aggregate paving.

2. Measurement: The quantity will be measured based upon the actual number of square yards installed as per the pay lines shown on the drawings.

3. Payment: Unit price per square yard of gravel paving installed.

BB. Item 12A - Finish Grading, Topsoil and Seeding (Non-cap areas)

1. Work Included: All materials, equipment, labor and supplies for topsoil, seeding, fertilization and mulching in the non-cap areas.

2. Measurement: The quantity will be measured based upon actual area covered with topsoil.

3. Payment: Unit price per square yard covered by the topsoil.

CC. Item 13A - Wetland Restoration

1. Work Included: All materials, equipment, labor and supplies for topsoil, seeding, fertilization and mulching in the Western Wetland areas.

2. Measurement: The quantity will be measured based upon actual wetland restored.

3. Payment: Unit price per square yard of wetland restoration.

THE FOLLOWING MISCELLANEOUS BID ITEMS ARE SUBMITTED FOR USE WITH ADDITIONAL WORK

DD. Item UC-1 - Erosion Control Fence

1. Work Included: All materials, equipment, labor and supplies to install additional erosion control fence.
2. Measurement: The quantity will be measured based upon actual length of erosion control fence installed.
3. Payment: Unit price per linear foot of erosion control fence installed.

EE. Item UC-2 - Security Fence

1. Work Included: All materials, equipment, labor and supplies to install additional security fence.
2. Measurement: The quantity will be measured based upon actual length of security fence installed.
3. Payment: Unit price per linear foot of security fence installed.

FF. Item UC-3 - Type I Portland Cement

1. Work Included: Materials only for additional Type I Portland cement used in the stabilization/solidification process. This unit price will be used only if the actual field mix design requires (1) 5% more cement than anticipated by the pre-design bench-scale study and (2) the mix design is similar to the bench-scale mix design in reagents and reagent proportions.
2. Measurement: The quantity will be measured based upon actual weight of additional Type I Portland cement used for stabilization/solidification.
3. Payment: Unit price per ton of Type I Portland cement used.

--END OF SECTION 01025--

SECTION 01051

GRADES, LINES, AND LEVELS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes specifications for surveying required for execution of this work. The Contractor shall retain the services of a New York State licensed Professional Land Surveyor (Surveyor). The Surveyor shall establish survey control; perform preconstruction, intermediate, and post-construction surveys; check and verify thickness and elevations of the cover layers with those shown on the plans and as specified; and prepare record drawings of the construction. The Contractor is responsible for controlling lift thickness and cap component thickness such that the cap conforms to the specified dimension.

(1) Data generated by optical survey measurements shall be used for quality control.

(2) The Surveyor is required, as a minimum to provide the following survey data:
   A. Preconstruction site conditions and grades.
   B. The bottom and extent of all excavations following the removal of sediment and soil; including interim surveys for different soils.
   C. Calculate pay quantities.
   D. Topography following final sub-grade preparation including the top of all clean fill;
   E. Location of geomembrane, including coordinates of all seams (not elevation);
   F. Top of drainage layer with elevations and thicknesses;
   G. Top of barrier protection layer with elevations and thicknesses;
   H. Top of topsoil with elevations and thicknesses;
   I. Conveyance piping inverts;
   J. Miscellaneous details (e.g., drainage features, roads);
   K. Monitoring wells and extraction wells (locations and elevations), including bottom elevations of vaults (mark the inner casing for reference); and
   L. Final record drawings with all improvements shown.

(3) The data must be reduced and plotted in a form acceptable to the Engineer and provided to the Engineer, prior to proceeding to the next construction phase.

(4) The Contractor shall not proceed with placement of an overlying layer or with subsequent work phases until the Surveyor has completed survey measurements and the data have been reviewed by the Engineer.

(5) Upon completion of all services, the Surveyor shall provide to the Engineer a Letter of Certification for the surveys for use in the Certification Report.

1.02 ACCURACY

(1) Optical Survey, Tape Measurements, and Electronic Measurements: Minimum accuracy of ±0.01 feet in vertical measurements and ±0.1 feet in horizontal measurements.

1.03 TOLERANCES

(1) The Contractor shall place all soils and synthetic materials to the lines, grades, slopes, and thickness shown on drawings within the tolerances specified below.

Description	Tolerances
Cover Layers	- 0.00 feet to + 0.20 feet (Thickness)
Excavations	- 0.00 feet to + 0.20 feet (Thickness)

1.04 JOB CONDITIONS

(1) The Contractor shall be responsible for protecting and maintaining all horizontal and vertical control points during construction.

(2) The Contractor shall be responsible for restaking intermediate lifts of required cap system.

(3) Areas which fail to meet the thickness requirements of Paragraph 1.03(1) shall be reworked or replaced as directed by Engineer at no cost to the Owner. The Contractor shall pay for the costs of all additional survey on reworked or replaced areas.

PART 2: PRODUCTS

None

PART 3: EXECUTION

3.01 SURVEY MEASUREMENTS

(1) Prior to commencement of construction work, the Surveyor shall establish all necessary baselines, horizontal control points, and vertical control benchmarks in order to properly complete construction work and make quantity measurements. The Contractor shall establish a minimum of three vertical and horizontal control points with monuments. Survey control points shall be established such that any point within the job site can

accurately be re-established and elevations obtained to the required tolerances at any time during the course of construction. The Surveyor shall tie all his baselines, horizontal and vertical control benchmarks into survey information provided by the Owner.

(2) Where appropriate, an orthogonal grid system to reference topographical measurements shall be established on centers approximately 50 feet or less and at all breaklines, crests, slope toes etc., as necessary to accurately measure the work. All cross sections shall be performed at intervals of 50 feet or less. Cross section data shall include baseline station, offset, elevation, and material type.

(3) Initial Record Survey: Prior to performing any work at the site, the Contractor shall conduct a survey of the site within the project boundaries, up to and including the fenceline and including any area outside of the site boundary or fence where work is to be performed. The survey shall document the condition and preconstruction grades for the purposes of measurement and payment and restoration.

(4) Intermediate Record Survey: The Contractor shall perform surveys as needed throughout the progress of the work to determine pay quantities and document work that has been performed. Surveys to be made shall include, but shall not be limited to surveys of cut areas when cut is complete and prior to fill placement. Surveys of the area to be capped immediately prior to cap placement, and during cap placement, and surveys of the as-built locations of all fill material and cap materials.

(5) Final Record Survey: At the conclusion of the work, the Contractor shall perform a survey of the site within the project boundaries, up to and including the fenceline and including any area outside of the site boundary or fence where work was performed. The survey shall document the condition of the site at the conclusion of the work. The survey shall accurately locate features that are to be shown on the Final Record Survey Drawing. Included in this Final Record Survey will be preparation of as-built sections defining cut and fill limits and as-built records of the actual cap and drainage structures.

END OF SECTION 01051

SECTION 01105

HEALTH AND SAFETY

PART 1 GENERAL

1.01 DESCRIPTION

The Contractor shall develop and implement a Health and Safety Plan (HASP) to protect all site personnel including those of the Owner, Engineer, all site visitors, and the community. At a minimum, the Contractor can adapt the HASP developed by the Engineer (See site project plans).

This section describes the minimum health and safety requirements for this project including the requirements for the development of a written Health and Safety Plan (HASP) for the project site. The Contractor's HASP must comply with all applicable Federal and State regulations protecting human health and the environment from the hazards posed by activities during this site remediation. The Contractor's HASP must be approved by a licensed industrial hygienist. The HASP shall be submitted by the apparent low Bidder within 14 days from the date of Notice of Intent to Award letter. If the Contractor is awarded the contract, the HASP will be reviewed. The Contractor will resubmit the HASP, addressing all review comments. The Contractor shall not initiate onsite work in contaminated areas until an approved HASP addressing all comments has been issued.

All onsite workers must comply with the requirements of the HASP. Consistent disregard for the provision of these Health and Safety specifications shall be deemed just and sufficient cause for immediate stoppage of work and/or termination of the Contract or any subcontract without compromise or prejudice to the rights of the Owner.

Any discrepancies between this HASP and the specifications shall be resolved in favor of the more stringent requirements as determined by the Engineer.

1.02 BASIS

The Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (20 CFR 1910 and 1926) and subsequent additions and/or modifications, the New York State Labor Law Section 876 (Right-to-Know Law) and the Standard Operating Safety Guidelines by the United States Environmental Protection Agency (USEPA), Office of Emergency and Remedial Response provides the basis for the safety and health program. Additional specifications within this section are in addition to OSHA regulations and reflect the positions of both the USEPA and the National Institute for Occupational Safety and Health (NIOSH) regarding procedures required to ensure safe operations at abandoned hazardous waste disposal sites.

The safety and health of the public and project personnel and the protection of the environment will take precedence over cost and schedule considerations for all project work. Any additional

costs will be considered only after the cause for suspension of operations is addressed and work is resumed. The Engineer and the Contractor's Superintendent will be kept appraised, by the Safety Officer, of conditions which may adversely affect the safety and health of project personnel and the community. The Owner and the Engineer may stop work for health and safety reasons. If work is suspended for health and/or safety reasons, it shall not resume until approval is obtained from the Owner and the Engineer. The cost of work stoppage due to health and/or safety shall be borne entirely by the Contractor.

1.03 DEFINITIONS

The following definitions shall apply to the work of this Contract:

A. Project Personnel: Project personnel include the Owner, Engineer, Contractor, Subcontractors, and Federal and State Representatives working or having official business at the Project Site(s).

B. Authorized Visitor: Visitors shall be prepared by the Contractor. Authorized Federal and State visitors shall receive approval to enter the site. The Safety Officer has primary responsibility on determining who is qualified and may enter the site.

C. Health and Safety Coordinator (HSC): The HSC shall be a Certified Industrial Hygienist (CIH) or Certified Safety Professional (CSP) retained by the Contractor. The HSC will be responsible for the development and implementation of the HASP.

D. Safety Officer (SO): The SO will be the Contractor's onsite person who will be responsible for the day-to-day implementation and enforcement of the HASP. The SO cannot also perform as the Contractor's site superintendent.

E. Health and Safety Technicians (HST): The HST(s) will be the Contractors onsite personnel who will assist the SO in the implementation of the HASP, in particular, with air monitoring in active work areas and maintenance of safety equipment. One HST shall be present for each site. The HST cannot also perform as the Contractor's site superintendent.

F. Medical Consultant (MC): The Medical Consultant is a physician retained by the Contractor who will be responsible for conducting physical exams as specified under the Medical Monitoring Programs in this section.

G. Project Site: The area designated on the Drawings which includes the Contractor Work Area.

H. Contractor Work Area: An area of the project site including Support Zone, access road, staging area and Exclusion Zone.

I. Contractor Support Zone: An area of the Contractor Work Area outside the Exclusion Zone, accessible for deliveries and visitors. No persons, vehicles or equipment may enter these areas from the Exclusion Zone without having gone through specified decontamination procedures in the adjacent Contamination Reduction Zone.

J. Staging Areas: Areas within the Exclusion Zone for the temporary staging of contaminated soil and debris.

K. Exclusion Zone: An area within the Contractor Work Area which encloses the area of contamination. Protective clothing and breathing apparatus as specified in the health and safety requirements and in the Contractor's approved Health and Safety Plan must be worn.

L. Contamination Reduction Zone: An area at the Exit Point of the Exclusion Zone through which all personnel, vehicles and equipment must enter and exit. All decontamination of vehicles and equipment and removal of personnel protective clothing and breathing apparatus must take place in the Contamination Reduction Zone.

M. Monitoring: The use of direct reading field instrumentation to provide information regarding the levels of gases and/or vapor, which are present during remedial action. Monitoring shall be conducted to evaluate employee exposures to toxic materials and hazardous conditions.

1.04 RESPONSIBILITIES:

The Owner and the Engineer will review modifications to the HASP for the acceptability for its personnel and the impact on the site and human health.

Contractor:

The Contractor will perform all work required by the Contract Documents in a safe and environmentally acceptable manner. The Contractor will provide for the safety of all Project Personnel and the community for the duration of the Contract.

The Contractor shall:

A. Employ a Safety Officer for the project who shall be assigned full-time responsibility for all tasks described under the Health and Safety Plan. In the event the Health and Safety Officer cannot meet his responsibilities, the Contractor shall be responsible for obtaining the services of an "alternate" Health and Safety Officer meeting the minimum requirements and qualifications contained within these plans. No work will proceed on this project in the absence of an approved Health and Safety Officer.

B. Employ a Health and Safety Technician (HST) for the project who will assist the SO in implementing the HASP.

C. Ensure that all Project Personnel have obtained the required physical examination prior to and at the termination of work covered by the contract in accordance with OSHA 1910.120 regulations.

D. Responsibility for the pre-job indoctrination of all Project Personnel with regard to the Safety Plan and other safety requirements to be observed during work, including but not limited to: (1) potential hazard, (2) personal hygiene principles, (3) personal protection equipment, (4) respiratory protection equipment usage and fit testing, and (5) emergency procedures dealing with fire and medical situations.

E. Responsibility for the implementation of this Health and Safety Plan, and the Emergency Contingency Plan and Response Plan.

F. Provide and ensure that all Project Personnel are properly clothed and equipped and that all equipment is kept clean and properly maintained in accordance with the manufacturer's recommendations or replaced as necessary.

G. Alert appropriate emergency services before starting any hazardous work and provide a copy of the Emergency Contingency Plan to the respective emergency services.

H. Have sole and complete responsibility of safety conditions for the project including safety of all persons (including employees).

I. Be responsible for protecting the project personnel and the general public from hazards due to the exposure, handling, and transport of contaminated materials. Barricades, lanterns, roped-off areas, and proper signs shall be furnished in sufficient amounts and locations to safeguard the project personnel and public at all times.

J. Ensure all OSHA health and safety requirements are met.

K. Maintain a chronological log of all persons entering the project site. It will include organization, date, and time of entry and exit. Each person must sign in and out.

L. Post the work zone with signs reading "Warning, Hazardous Work Area, Do Not Enter Unless Authorized," and restrict access by the use of temporary and/or permanent fencing. Warning signs shall be posted at a minimum of every 500 feet along the perimeter fence.

M. Brief all approved visitors to the site on safety and security, provide with temporary identification and safety equipment, and escort throughout their visit.

PART 2 - HEALTH AND SAFETY PLAN

2.01 HEALTH AND SAFETY PLAN

The Health and Safety Plan (HASP) is a deliverable product of this project and shall be submitted within 14 days from the date of Notice of Intent letter. The Contractor shall prepare a HASP, have it approved by a licensed industrial hygienist. If awarded the contract, the Contractor's HASP will be reviewed. Agreed upon responses to all comments will be incorporated into the final copy of the HASP. The HASP shall govern all work performed for this contract.

2.02 PERSONNEL HYGIENE AND DECONTAMINATION

The Contractor shall provide a hygiene facility at each site. The hygiene facility shall include the following:

A. Hand washing facilities for project personnel complete with hot water, soap, paper towels, and mirror;

B. Areas for changing into and out of work clothing. Work clothing should be stored separately from street clothing;

C. Clean and "dirty" locker facilities;

D. Disposal of spent clothing material;

E. Portable "boot wash" decontamination equipment. Clean water shall be provided no less than twice per day; and

F. First aid kit including a portable eye wash station.

2.03 EQUIPMENT DECONTAMINATION

General:

1. All equipment and material used in this project shall be thoroughly washed down in accordance with established Federal and State procedures before it is removed from the

project. The cost for this element of work shall be incorporated in the lump sum bid for mobilization/demobilization or as otherwise directed on this project.

2. All vehicles and equipment used in the "Dirty Area" will be decontaminated to the satisfaction of the Safety Officer in the decontamination area on site prior to leaving the project. The Contractor will certify, in writing, that each piece of equipment has been decontaminated prior to removal from the site.

3. Decontamination shall take place within the designated equipment and materials decontamination area. The Contractor shall provide suitable wind barriers. The decontamination shall consist of degreasing (if required), followed by high-pressure, hot water cleaning, supplemented by detergents as appropriate. Wash units shall be portable high-pressure with a self-contained water storage tank and pressurizing system (as required). Each unit shall be capable of heating wash waters to 180 degrees and providing a nozzle pressure of 150 psi.

4. Personnel engaged in vehicle decontamination will wear appropriate protective clothing and equipment. If the Contractor cannot or does not satisfactorily decontaminate the tools or equipment at the completion of the project, the Contractor will dispose such and will bear the cost of such tools and equipment and its disposal without any liability to the Owner. At the completion of the project the Contractor shall completely decontaminate and clean the decontamination area.

2.04 AIR MONITORING PROGRAM

A. The Contractor shall develop as part of the HASP, an Air Monitoring Program (AMP) in accordance with the HASP developed by the Engineer. The purpose of the AMP is to determine the proper level of personnel protective equipment to be used, to document that the level of worker protection is adequate and to assess the migration of contaminants to offsite receptors as a result of site work.

B. The Contractor shall supply all personnel, equipment, facilities and supplies to develop and implement the Air Monitoring Program described in this section.

C. The Contractor's AMP shall include both real-time and documentation air monitoring.

1. The purpose of real-time monitoring will be to determine if an upgrade (or downgrade) of personnel protective equipment is required while performing onsite work and to implement engineering controls, protocols or emergency procedures if Contractor established action levels are encountered.
2. The Contractor shall also use documentation monitoring to ensure that adequate personnel protective equipment is being used and to determine if engineering controls are mitigating the migration of contamination to offsite receptors.
3. Documentation monitoring will also be used to assess if real-time monitoring equipment is adequate to detect the compounds identified to be present. Documentation monitoring results may indicate the need for alternative real-time monitoring devices.

D. During the progress of active remedial work, the Contractor will monitor the quality of the air in and around each active hazardous operation with real-time instrumentation prior to personnel

entering these areas. Sampling at the hazardous work site will be conducted on a continuous basis. Any departures from general background will be reported prior to personnel entering a confined area to the Safety Officer who will determine when and if operations should be shut down.

E. Air monitoring equipment will be operated by personnel trained in the use of the specific equipment provided and will be under the control of the Safety Officer. A log of the location, time, type and value of each reading and/or sampling will be maintained. Copies of log sheets will be provided on a daily basis to the Engineer.

F. Real-Time Air Monitoring:

1. Real-time air monitoring shall be conducted using the following equipment:
   - Volatile organics shall be measured using a photoionizaton detector, or equal. The instrument shall be calibrated twice daily using measures in the users manual.
   - Total particulates shall be measured using an MDA Model P5H digital dust indicator or equal. The instrument shall be calibrated daily according to the procedure in the users manual. The meter shall be capable of measuring dust concentrations down to 0.01 mg/m^3.
2. Real-time monitoring will also be conducted at the work area exclusion zone at a minimum of four locations including one upwind (background) and three downwind locations. A background reading will be established daily during all intrusive activities at the beginning of the work shift. If the wind direction changes during the course of the day, a new background reading will be made. Downwind readings at the exclusion zone perimeter will be made when action levels have been exceeded at the excavation, or a minimum of twice a day.
3. If the level of VOCs at the downwind site perimeter is 5 ppm above background levels measured upwind from the work area, then all work must be suspended and engineering controls must be implemented to bring concentrations back down to acceptable levels. If the organic vapor level decreased below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:
   - The organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background; and
   - More frequent intervals of monitoring, as directed by the Safety Officer, are conducted.
4. If the level of airborne particulates at the downwind site perimeter exceeds the action level of 150 ug/m^3 that is established in the NYSDEC Technical and Administrative Guidance Memorandum HWR.89-4031 entitled "Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Sites", then all work must be suspended and engineering controls such as water spray or dust suppressants must be implemented to bring concentrations back down to acceptable levels. No visible dust from exposed waste areas will be permitted.

G Documentation Monitoring:

Documentation monitoring will be conducted at the perimeter at a minimum of four (4) locations (one upwind and three downwind) for volatile organic compounds and dust. Documentation monitoring will be conducted during any work which exposes waste (i.e. waste relocation/excavation, gas vents, leachate collection, sediment removal, waste paper removal, etc.)

1. Total nuisance dust will be collected using a PVC collection filter and personnel sampling pump and analyzed gravimetrically according to NIOSH Method 0500.
2. Organic vapors will be collected using sorbent tubes and personnel sampling pumps and analyzed according to NIOSH Methods 1500, 1501, and/or 1503.
3. Documentation samples will be collected at four of eight established perimeter locations. The four locations will be chosen according to site activities and expected wind direction. At the end of the sampling period, meteorological data will be reviewed and one upwind and two downwind samples will be chosen to be analyzed. The fourth sample will be discarded.
4. The eight perimeter locations will be established and marked with high visibility paint or flagging at approximately equidistant points around the site. Samples will be collected at a height of 6 feet above ground surface.
5. In addition to the perimeter monitoring, documentation samples will be collected onsite. Onsite samples will be collected by choosing "high-risk" workers to wear appropriate collection media for dust. "High-risk" workers are those workers most likely to encounter contamination on a particular task.
6. Documentation samples will be collected twice a week at regularly scheduled intervals and at the initiation of a new phase of onsite work. Samples will be collected during the normal work hours when activities are occurring onsite.
7. The contractor shall install a meteorological station onsite which will be capable of continuously recording, at a minimum; wind velocity and direction and temperature.

H. Explosive Gas Monitoring:

The Contractor shall monitor for explosive gases in all enclosed spaces (i.e. manholes, tanks) prior to work in those areas.

2.05 SITE SPECIFIC INFORMATION

The Contractor is responsible for protection of project personnel and the community. A significant volume of site-specific analytical data are available in the Remedial Investigation/ Feasibility Study (RI/FS) and Pre-Design Investigation reports completed for the Site. This information will be supplied to the Contractor with the Notice of Intent to Award letter.

2.06 REPORTING

A. The Contractor shall maintain and submit to the Engineer on a daily basis, a health and safety report which summarizes the following:
   1. Work performed;

2. Level of protection;
3. Real-time air monitoring results;
4. Safety related problems; and
5. Corrective actions implemented.

B. The Contractor shall prepare a monthly report of all health and safety monitoring analysis and corrective measures. The monthly report will be provided tot he Engineer no later than two weeks after the end of each month during work involving exposure to wastes. The report shall include all analytical results and maps depicting sampling and work locations, wind direction/velocities, date and time of sampling and monitoring, and action limits. The report shall also include any information regarding the use/implementation of engineering controls to reduce emission and exposure levels.

END OF SECTION 01105

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Submittal procedures shall conform to requirements of General Conditions and as described in this Section.

1.02 SCHEDULE OF SUBMITTALS

A. Schedule of Submittals: The Contractor shall complete a schedule of submittals 14 days after award of contract. The schedule shall show necessary submission dates for all shop drawings, samples, product data, plans, schedules, etc.

1.03 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

The Contractor shall coordinate submittals with the progress schedule and actual work progress. Allow ~~TWO~~ ONE weeks for the Engineer's review. Provide additional copies as required by governing authorities:

A. Shop Drawings:
   1. The Contractor shall submit to the Engineer for his review, shop drawings, engineering information, product data, and samples, when requested, of all items of material and equipment as specified.
   2. Initial Submittal: Submit six opaque blue/black line prints. One will be returned.
   3. Final Submittal: After approval, submit three prints; with final submittal. Include additional prints as necessary for job use and distribution. Maintain one additional print as a mark-up copy for the record drawings.

B. Product Data: Mark each copy to indicate the actual product to be provided; show selections from among options in the manufacturer's printed product data. Submit three copies to the Engineer. Where the product data are required for maintenance manuals, submit two additional copies which will be returned. Maintain one additional copy; at the project site for reference purposes.

Do not proceed with the installation of manufactured products until final review by the Engineer and until a copy of related product is in the installer's possession at the project site.

C. Samples: Submit three sets of samples when requested, one set will be returned. Provide three or more samples in each set where variations in color, pattern or texture are observable; show average condition and extreme range of variations. Submit full documentation with each set. Sample submittals are for Engineer's observation of color, texture, pattern and "kind". Maintain returned set at project site for purposes of quality control comparisons.

1.04 MISCELLANEOUS SUBMITTALS

A. Provide copies of miscellaneous submittals as follows:
   1. Warranties: Submit two executed copies, plus additional copies as required for maintenance manual.
   2. Operation and Maintenance Manuals: Submit in accordance with Section 01730. Include information for all equipment and materials installed.
   3. Record Drawings: Submit in accordance with Section 01720 original maintained marked-up prints.

1.05 PROCEDURES

A. Submit Shop Drawings to the Engineer.

B. A letter of transmittal shall accompany each submittal. If data for more than one Section of the Specifications is submitted, a separate transmittal letter shall accompany the data submitted for each Section.

C. A the beginning of each letter of transmittal, provide a reference heading indicating the following:

1. Client Name Aluminum Company of America
2. Project Name York Oil Superfund Site (OU-1) Remediation Action
3. Contract No. _____
4. Transmittal No. _____
5. Section No. _____

D. If a submittal deviates from the requirements of the Contract Documents, contractor shall specifically not each variation in his letter of transmittal.

E. All submittals for approval shall have a title block with complete identifying information satisfactory to Engineer.

F. All submittals shall bear the stamp of approval and signature of Contractor as evidence that they have been reviewed by Contractor. Submittals without this stamp of approval

will not be reviewed by Engineer and will be returned to Contractor. The stamp shall contain the following minimum information:

Project Name: York Oil Superfund (OU-1) Remedial Action
Contractor's Name: _____
Date: _____
Item: _____
Specifications: _____
Section: _____
Page No.: _____
Para. No.: _____
Drawing No.: _____
Location: _____
Submittal No.: _____
Approved By: _____

G. A number shall be assigned to each submittal by Contractor starting with No. 1 and thence numbered consecutively. Resubmittals shall be identified by the original submittal number followed by the suffix "A" for the first resubmittal, the suffix "B" for the second resubmittal, etc.

H. Contractor shall initially submit to Engineer a minimum of six copies of all submittals.

I. After Engineer completes his review, submittals will be marked with one of the following notations:

1. Approved
2. Approved as Corrected
3. Revise and Resubmit
4. Not Approved

J. If a submittal is acceptable, it will be marked "Approved" or "Approved as Corrected". Two prints or copies of the submittal will be returned to Contractor.

K. Upon receipt of a submittal marked "Approved" or "Approved as Corrected", Contractor may order, ship, or fabricate the materials included on the submittal, provided it is in accordance with the corrections indicated.

L. If a submittal marked "Approved as Corrected" has extensive corrections or corrections affecting other drawings or Work, Engineer may require that Contractor make the corrections indicated thereon and resubmit for record purposes. Such drawings will have the notation, "Approved as Corrected - Resubmit".

M. If a submittal is unacceptable, 2 copies will be returned to Contractor with one of the following notations:

a. "Revise and Resubmit"
b. "Not Approved"

N. Upon return of a submittal marked "Revise and Resubmit", Contractor shall make the corrections indicated and repeat the initial approval procedure. The "Not Approved" notation is used to indicate material or equipment that is not acceptable. Upon return of a submittal so marked, Contractor shall repeat the initial approval procedure utilizing acceptable material or equipment.

O. Any related Work performed or equipment installed without an "Approved" or "Approved as Corrected" Shop Drawing will be at the sole responsibility of the Contractor.

P. Submittals shall be made well in advance of the need for the material or equipment for construction and with ample allowance for the time required to make delivery of material or equipment after data covering such is approved. Contractor shall assume the risk for all materials or equipment which are fabricated or delivered prior to the approval of submittals. Materials or equipment will not be included in periodic progress payments until approval thereof has been obtained in the specified manner.

Q. Engineer will review and process all submittals promptly, but a reasonable time should be allowed for this, for the submittals being revised and resubmitted, and for time required to return the approved submittals to Contractor.

R. It is Contractor's responsibility to review submittals made by his suppliers and Subcontractors before transmitting them to the Engineer to assure proper coordination of the Work and to determine that each submittal is in accordance with his desires and that there is sufficient information about materials and equipment for the Engineer to determine compliance with the Contract Documents. Incomplete or inadequate submittals will be returned for revision without review.

S. Contractor shall furnish required submittals with complete information and accuracy in order to achieve required approval of an item within three submittals. All costs to the Engineer involved with subsequent submittals will be backcharged to the Contractor by deducting such costs from payments due the Contractor for Work completed. In the event that the Contractor requests a substitution for a previously approved item, all of the Engineer's costs in the reviewing and approval of the substitution will be backcharged to the Contractor unless the need for such substitution is beyond the control of the Contractor or provide a significant cost savings to the Owner.

SCHEDULE OF SUBMITTALS
TABLE 01300-1

Section	Title	Submittals	Schedule
01025	Measurement and Payment	Schedule of Values	20 days prior to first application for payment
01051	Grades, Lines and Levels	Surveys Letter of Certification	Prior to, during, and after site work Upon completion of final surveys
01105	Health and Safety	Health and Safety Plan (HASP) Daily Health and Safety Reports Monthly Health and Safety Reports	14 days after Notice of Award Daily Monthly
01300	Submittals	Schedule of Submittals Shop Drawings Product Data Samples Warranties Operation and Maintenance Manuals Record Drawings	14 days after award of Contract As needed As needed As needed At project completion (See 01700) At project completion (See 01700 and 01730) At project completion (See 01700 and 01720)
01310	Progress Schedule	Progress Schedule Progress Report Method Statements	15 days prior to start of work With each payment application 15 days prior to start of each work phase
01400	Quality Assurance and Quality Control Services	Independent Test Agencies Certified Reports	As needed As needed
01500	Temporary Facilities and Field Office	Shop Drawings	14 days after Notice of Award

SCHEDULE OF SUBMITTALS
TABLE 01300-1 (CONTINUED)

Section	Title	Submittals	Schedule
01564	Erosion Control	Product Data	Prior to excavation
		Methods	Prior to excavation
01630	Substitutions	Request for Substitutions	As needed
01650	Facilities Startup	Foreman's Qualifications	Prior to startup
		Pre-Startup Conference Agenda	10 days prior to training
01700	Project Closeout	Warranties	At project completion
		Operation and Maintenance Manuals	At project completion (see 01730)
		Record Drawings	At project completion (see 01720)
01720	Record Drawings	Record Drawings	At project completion
01730	Operation and Maintenance Data	Operation and Maintenance Data	At project completion
02085	Groundwater Monitoring Well Abandonment	Methods	As needed
		Mixes	As needed
		Equipment	As needed
		Drilling Contractor	As needed
02131	Decontamination Pads & Equipment	Shop Drawings	As needed
02410	Dewatering and Construction Water Management	Shop Drawings	15 days prior to dewatering
		Construction Water Management Plan	14 days after Notice of Award
02223	Backfilling	Structural Backfill/Crushed Aggregate	10 days prior to use
		Unclassified Fill or Backfill	10 days prior to use

SCHEDULE OF SUBMITTALS
TABLE 01300-1 (CONTINUED)

Section	Title	Submittals	Schedule
02228	Compaction	Equipment and Methods	As needed
		Material Samples	As needed
02260	Soil Cover Construction	QC Tests/Material Sample	
		- Drainage Layer	Prior to cover construction
		- Cover Soil	Prior to cover construction
		Compaction Equipment	Prior to cover construction
		Geomembrane Installer Acceptance	Prior to cover construction
		Project List	Prior to cover construction
02264	QA/QC of Soil Cover Materials	QC Tests - Drainage Layer - Cover Soil	Prior to material use
02275	RipRap	Material Source	Prior to material use
		Test Reports (each size used)	Prior to material use
02405	Polyethylene Geomembrane	Manufacturer Info	
		Geomembrane Type and Manufacturer	Prior to construction
		Manufacturer QC Program	Prior to construction
		Roll Test Results	Prior to construction
		Samples	Prior to construction
		Manufacturer QC	
		Raw Material Orgin and ID	Prior to construction
		Raw Material QC Certificates	Prior to construction
		Raw Material Test Reports	Prior to construction
		Roll QC Certificates	Prior to construction
		Destructive Seam Testing	Prior to construction
		Certificate of Permeability	Prior to construction
		Compatibility Report	Prior to construction

SCHEDULE OF SUBMITTALS
TABLE 01300-1 (CONTINUED)

Section	Title	Submittals	Schedule
02405 (cont.)	Polyethylene Geomembrane	Installer	
		Name/Crew	Prior to construction
		Company Project List	Prior to construction
		Foreman Project List	Prior to construction
		Seamer Project List	Prior to construction
		Shop Drawings	Prior to construction
		Layout Drawing	Prior to construction
		Seam and Weld Details	Prior to construction
		Dissimilar Material Joint Details	Prior to construction
		Pipe Penetration Details	Prior to construction
		Installation Schedule	Prior to construction
		Manufacturer Installation Instructions	Prior to construction
		QC Program	Prior to construction
		Test Laboratory Qualifications	Prior to construction
		Seam QA Records	During liner installation
		Acceptance of Soil Materials	During liner installation
		Laboratory Test Results	During liner installation
		Archive Seam Samples	During liner installation
		Record Drawings	2 weeks after liner completion
		Summary Logs	After liner completion
02421	Geotextiles	Product Data	As needed
		Samples	As needed
		Certifications	As needed

SCHEDULE OF SUBMITTALS
TABLE 01300-1 (CONTINUED)

Section	Title	Submittals	Schedule
02445	Stabilization/ Solidification	Work Plan	14 days after Notice of Award
		Daily Reports	Daily
		Test Results	Daily
		Field Demonstration Report	7 days prior to full scale S/S
		Reagent Certificates	Prior to use
02501	Gravel Access Road	Materials (see 02223 and 02421)	
02671	Extraction Wells	Product Data	
		- Well Box	Prior to well construction
		- Outer Casing	Prior to well construction
		- Well Screen	Prior to well construction
		- Sand Pack	Prior to well construction
		- Bentonite Seal	Prior to well construction
		- Grout	Prior to well construction
		Installer	Prior to well construction
02674	Recovery Well Pumping Equipment	Shop Drawings/Product Data	Prior to Installation
02727	Drainage Piping	Shop Drawings/Product Data	As needed
		Manufacturer Certification	As needed
02910	Wetland Restoration	Product Data	
		- Topsoil	As needed
		- Seed Vendors Certification	As needed
		- Fertilizer	As needed
		- Hydroseeder	As needed
		Material Certificates	As needed

SCHEDULE OF SUBMITTALS
TABLE 01300-1 (CONTINUED)

Section	Title	Submittals	Schedule
02990	Finish Grading, Topsoil and Seeding	Product Data	
		- Topsoil	As needed
		- Seed Vendors Certification	As needed
		- Fertilizer	As needed
		- Hydroseeder	As needed
		- Erosion Control Fabrics	As needed
		Material Certificates	As needed
		Installer	As needed
13290	Prefabricated Groundwater Treatment System (temporary and long term treatment systems if the two systems are to be different)	Prefabricated Building Information	At least 30 days prior to start of system installation
		Foundation Plans	At least 30 days prior to start of system installation
		Manufacturer's Data for Treatment System	
		Installer Diagrams	
		Equipment Layout	
		P&ID Diagrams	
		Electrical Requirements	
		System Sequence of Operations	
		Spare Parts List	
		Operator Training Program	
		Warranties	
		Maintenance Data	
		Sampling Plan for startup	
		Operation and Maintenance Manuals	After system completion and prior to startup
		Building Plans	Prior to erection

END OF SECTION 01300

SECTION 01310

PROGRESS SCHEDULE

PART 1 - GENERAL

1.01 SCOPE

A. This section covers requirements for submission, approval, and updating of progress schedules and related documents.

1.02 PROGRESS SCHEDULE

A. The Contractor shall submit a preliminary Progress Schedule with the bid.

B. Fifteen (15) days before the date established for "commencement of the work", submit five (5) copies of a comprehensive critical path method (CPM) progress schedule indicating an activity for each significant category of work to be performed. The Contractor shall submit two variations of the schedule, one schedule for the remediation of OU-1 only and one schedule for the remediation of both OU-1 and OU-2 (if OU-2 is added to the base contract). Arrange schedule to indicate required sequencing and to show time allowances for submittals, inspections, weather allowances, and similar time margins. The schedule shall indicate the estimated dates for the start and completion of the various stages of the work, dependencies between activities, critical path, float, and shall include information regarding man-loading and equipment-loading required to progress the work as shown. Following the initial review and revision of the schedule, print and distribute three (3) copies to the Engineer. The schedule shall be revised and redistributed as determined with each monthly pay requisition, subject to the Alcoa's approval, at intervals matching application for payment requests.

C. The Contractor shall revise and update his Method Statements and Progress Schedule whenever one of the following conditions apply:
   (1) When delays in completion of any work item or sequence of work items results in an indicated extension of the Project completion by 10 working days or more.
   (2) When delays in submittals or deliveries, or work stoppages are encountered which make replanning or rescheduling of the work necessary.
   (3) When the schedule does not represent the actual production and progress of the Project.

D. The Contractor shall submit five (5) copies of the Progress Schedule and each revision to the Engineer and Alcoa for review.

1.03 PROGRESS REPORT

A. The Contractor shall submit a progress report with each payment application. Each report shall include a description of the amount of progress during the past period in terms of

completed activities in the Plan of Operation and Progress Schedule currently in effect, a description of problem areas, current and anticipated delay factors and their estimated impact on performance of other activities and completion dates, and an explanation of corrective actions taken or proposed. The progress report shall also include plans for the next period.

B. Five (5) copies of each progress report shall be submitted for review and record purposes.

C. If at any time it appears to the Engineer that the rate of progress of the work being made is insufficient to insure completion of the Work by the scheduled completion date, the Engineer or Alcoa may require the Contractor to take such steps as are necessary to insure completion as scheduled. Any additional costs incurred shall be the sole obligation of the Contractor.

1.04 METHOD STATEMENTS

A. The Contractor shall submit for review by Alcoa and Engineer, method statements indicating the Contractor's intended procedure for accomplishing each feature of the work. Method statements shall address:

(1) Key personnel;
(2) Plans and equipment, including layout plans;
(3) Work sequences;
(4) Estimated rates of progress; and
(5) Levels of protection.

B. Method statements shall be submitted at least fifteen (15) days prior to commencement of each feature of the work. Work shall not commence on any feature until approval of the corresponding method statement has been received in writing. Approval of the Contractor's method statement shall not relieve the Contractor of his obligations to perform the work in accordance with the Contract provisions.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01310

SECTION 01400

QUALITY ASSURANCE AND QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Engineer will execute a quality assurance and quality control (QA/QC) program based on a Construction QA/QC Plan (prepared by the Engineer), a Storm Water Pollution Prevention Plan (prepared by the Engineer), an Analytical Quality Assurance/Quality Control Plan (prepared by the Engineer), a Sampling and Analysis Plan (prepared by the Engineer), and these specifications. The Contractor is responsible for assuring its work meets project QA/QC requirements and is overseen by a Construction Quality Assurance (CQA) Representative and CQA Field Monitors as needed in accordance with the Construction QA/QC Plan. The CQA Representative and CQA Field Monitors will be employed by the Contractor. All excavation and earthwork related construction must be performed in the presence of the Engineer. The Contractor shall cooperate with the Engineer with inspection, sampling, and testing as requested by the Engineer. The data generated as part of the quality assurance and quality control program shall govern over data generated from the Contractor's required quality control program and any other test data.

B. Related work specified in other sections:
   1. Section 01300 - Submittals
   2. Section 02228 - Compaction
   3. Section 02260 - Soil Cover Construction
   4. Section 02269 - QA/QC for Soil Cover Materials
   5. Section 02405 - Polyethylene Geomembranes
   6. Section 02445 - Solidification/Stabilization

1.02 TESTING

A. Engineer's Responsibilities: The Engineer shall provide and pay for QA/QC services for the following work items as described in the Engineer's Construction QA/QC Plan.
   1. Tests required for solidification/stabilization including initial testing of stockpiled material for PCBs.
   2. Confirmatory sampling of excavation areas.
   3. Compaction testing for all soil placement.
   4. Geotechnical testing for landfill cover soil materials.

B. Contractor's Responsibilities: The Contractor shall provide and pay for QC services for the following work items:
   1. Tests required for the initial submittal and approval of all materials at the site.
   2. Tests required for treatment or discharge of construction water.

3. Geomembrane testing.
4. Groundwater treatment system startup (excluding analyses of treated water during startup which will be handled by the Engineer or an O&M Contractor).

C. The Contractor shall pay for repeat tests performed by the Engineer required because of the Contractor's negligence or failure to meet specification requirements.

D. Testing laboratories shall meet the qualifications specified in the Construction QA/QC Plan for this project that are included with the Contract Documents.

1.03 SUBMITTALS

A. The Contractor shall submit the name and qualifications of independent test agencies to be used for this project.

B. The Contractor shall submit a certified written report of each inspection, test or similar service, in duplicate to the Engineer.

Report Data: Written inspection or test reports shall include:
1. Names of testing agency or test laboratory.
2. Dates and locations of samples, tests, or inspections.
3. Names of individuals present.
4. Complete inspection or test data.
5. Test results.
6. Interpretations.
7. Recommendations.

1.04 COORDINATION

A. The Contractor shall coordinate required tests with the Engineer and shall notify the Engineer a minimum of 24 hours in advance.

B. The Contractor shall allow a reasonable amount of time after time samples are taken to obtain results from the Engineer.

C. The Engineer shall provide copies of all test results to the Contractor.

D. The Contractor shall cooperate with the Engineer and the testing laboratory to provide access to the work and to assist in obtaining samples.

E. The Contractor shall schedule his work to allow the required testing and shall not cover up work for which acceptable test results have not been received.

F. Inspection, sampling, and testing shall be as specified in other sections.

1.05 MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made for work required under this section. All costs in connection therewith shall be considered incidental to the work under this Contract.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 EXECUTION

Upon completion of inspection or testing, repair damaged work and restore substrates and finishes to original form.

END OF SECTION 01400

SECTION 01500

TEMPORARY FACILITIES AND FIELD OFFICE

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. Provide the necessary field offices, ancillary structures, sheds, utility services, and facilities for the workers to carry out the project work as specified. Install the temporary facilities to be ready for use when first needed to avoid delays in the work. Do not remove the facilities until no longer needed and removal is authorized by the Alcoa Site Representative. Usage charges for temporary facilities are to be paid by the Contractor. Temporary services shall be provided at each site.

1.02 QUALITY ASSURANCE

A. Regulation: Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities.

B. Standards: Comply with the requirements of NFPA Code 241, "Building Construction and Demolition Operations", the ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and the NECA National Joint Guideline NJG-6 "Temporary Job Utilities and Services".

PART 2 - PRODUCTS

2.01 SUBMITTALS

The Contractor shall submit drawing(s) within ten days following Notice of Award and prior to commencing work to the Engineer for approval, showing the layout, furnishings,. and facilities of the field office trailer and information concerning how the Contractor proposes to furnish the required utilities.

PART 3 - EXECUTION

3.01 UTILITY INSTALLATION

Engage the local utility company to install temporary service or make connections to existing service, if available. Arrange with the Alcoa Site Representative for an acceptable time when service can be interrupted to make connections. The Contractor shall obtain and pay for permits and construction required to bring temporary utilities to each site.

A. Electric Power Service: Comply with applicable requirements of NEMA, NECA and UL standards and governing regulations.

B. Temporary Telephones: Install telephones for the Engineer's and Government's field offices. Separate telephone service shall be provided for Engineer, Government, and Contractor. Post a list of operational and emergency telephone numbers.

3.02 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Engineer's and Government's Field Offices: Provide standard prefabricated or mobile units, or the equivalent job-built field offices, of at least 500 square feet each for the Engineer and for the USEPA (Government) at the site.

1. The offices shall each be adequately heated, well lighted, suitably ventilated, and cooled with a refrigerated-type air conditioning unit, complete with all piping and electrical connections. An adequate supply of cold drinking water shall be furnished and maintained. Steps and landings shall be provided.
2. The offices shall each be provided with following items:

1 - fire extinguisher
1 - locking file cabinet (4-drawer)
1 - first aid kit
1 - conference table
(3 ft. x 5 ft. minimum)
2 - full size desks and chairs
2 - shelves (3' x 1' minimum)
2 - waste baskets
1 - paper towel dispenser with towels (to be replenished by Contractor)
8 - chairs (folding or stackable)
3 - phone jacks, including 2 separate phone lines and 1 separate fax line
2 - telephone answering machines with integral cordless phones
1 - plain paper facsimile machine
1 - plans table
1 - copier capable of copies up to 11"x17" in size (with all needed supplies)
1 - water dispenser with hot and cold water outlets, integral refrigerator, and paper cup dispenser to be replenished by Contractor (separate refrigerator acceptable)
1 - vertical plan rack (22" x 36" minimum)

B. Sanitary Facilities: Sanitary facilities must be provided and shall include temporary toilets, wash facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Contractor to empty waste baskets and perform general cleaning in and around the Engineer's and Government's Field Offices weekly.

C. Temporary Enclosure: Provide temporary enclosure of materials, equipment, to provide protection from exposure, foul weather, other construction operations, and similar activities.

D. The Contractor shall pay for all utilities, including up to a total of $600 per month in Engineer's and Government's phone charges. Phone charges over or under this amount

will be added or deducted at cost from the Demobilization pay item at the time of final payment.

3.03 COLLECTION AND DISPOSAL OF SANITARY WASTES

Establish a system for regular collection and disposal of sanitary waste materials. Dispose of waste material in a lawful matter. Burying or burning of waste materials on the site or washing waste material down sewers shall not be permitted.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

Provide a neat, uniform appearance in security and protection facilities acceptable to the Owner and the Engineer. Maintain site in a safe, lawful and publicly acceptable manner.

A. Temporary Fire Protection: Comply with recommendations of NFPA Standard 10.

B. Barricades, Warning Signs and Lights: Comply with recognized standards and code requirements for erection of substantial barricades where needed to prevent accidents.

C. Security Enclosure and Lockup: Install substantial temporary or permanent enclosures of partially completed areas of construction. Provide locking entrances adequate to prevent unauthorized entrance, vandalism, theft and similar violations of project security.

D. Anchor temporary facilities, as required, to prevent possible roll over or tipping by winds.

3.05 TERMINATION AND REMOVAL

Remove each temporary service and facility when need has ended and approval has been given by the Engineer.

At substantial completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

END OF SECTION 01500

SECTION 01564

EROSION CONTROL

PART - GENERAL

1.01 DESCRIPTION

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to accomplish erosion control measures during and following construction as described herein, shown on the Contract Drawings, or presented in the Storm Water Pollution Prevention Plan (prepared by the Engineer).

A. Work included in this section:
   1. Installation of sedimentation and erosion control barriers.
   2. Anchoring all topsoil stockpiles with straw mulch and ringing with hay bales.
   3. Inspection of all erosion control measures weekly, after each rainfall and at least daily during prolonged rainfall.
   4. Repairing immediately any failed sedimentation and erosion control barrier.
   5. Removing and disposing of sediment deposits in a manner that does not result in additional erosion or pollution.
   6. Removal of hay bales or silt fences after completion of construction and permanent stabilization is complete.
   7. Installing a diversion trench along the northern portion of the landfill.

B. Related work specified in other sections:
   1. Section 02222 - Excavation
   2. Section 02223 - Backfilling
   3. Section 02228 - Compaction
   4. Section 02275 - Rip-Rap
   5. Section 02421 - Geotextiles
   6. Section 02990 - Finish Grading, Topsoil and Seeding

1.02 PERFORMANCE REQUIREMENTS

A. Observe government policy established by United States Environmental Protection Agency (USEPA) Memorandum 78-1.

B. Conform to all erosion and sedimentation control measures of the State of New York.

C. Temporary erosion and sediment control measures shall be installed as the first step in construction, shall be continuously maintained, and shall not be removed until permanent cover is completely established and stabilized, with Engineer's approval.

1.03 SCHEDULE

A. Taking into account specific constraints or other criteria outlined herein, the Contractor shall prepare a detailed schedule which sets forth his program of operations to effectively control erosion and sediment-runoff at all times during construction and during the one-year guarantee period following completion of the work.
   1. Two copies of the schedule shall be filed with the Engineer.
   2. At least one copy shall be kept at the project site at all times, and shall be made available for examination by the Engineer.
   3. The schedule shall be arranged so as to include:
      a. Chronological completion dates for each temporary (and permanent) measure for controlling erosion and sediment.
      b. Location, type and purpose for each temporary measure to be undertaken.
      c. Dates when those temporary measures will be removed.

1.04 SUBMITTALS

A. Product Data. Provide product data for each component to be used in erosion and sediment control.

B. Methods. Provide a description of and a plan showing implementation measures.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Hay/Straw Bales
   1. Shall be securely tied and measure, at a minimum, 14 inches by 18 inches by 30 inches long (14" x 18" x 30") or greater.

B. Geotextile
   1. Mirafi "Envirofence" or equal shall be used.

C. Stakes and Fasteners
   1. Shall be two #3 rebar or two 2-inch by 2-inch wood stakes for each hay/straw bale.
   2. Shall be a 2-inch by 2-inch by 36-inch hardwood post or Standard T or U section steel posts weighing not less than 1.33 pounds per linear foot for silt fences.

D. Erosion Control Fabric
   1. North American Green Type SC150BN or equal shall be used.

E. Oil Sorbents
   1. Booms - New Pig Spaghetti Boom or equal shall be used.
   2. Socks - New Pig Skimmer Socks or equal shall be used.

2.02 METHODS

A. Sediment Barriers - Sediment barriers shall be hay or straw bales, stone, silt fences or other approved materials that will prevent migration of silts and sediment to receiving waters.

B. Diversion Trenches and Berms - Diversion trenches shall be installed on the uphill side of the disturbed areas to divert surface runoff away from the excavations. Place excavated material in a continuous berm on the downhill side of the diversion trenches.

C. Interceptor Channels - Interceptor channels shall be installed across disturbed areas where the slope is running parallel to the direction of trenches.

D. Oil Sorbent Booms/Socks. Oil sorbent booms/socks shall be installed to contain oil sheens emanating from waste materials.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. It is the Contractor's responsibility to implement and maintain erosion and sedimentation control measures which effectively prevent accelerated erosion and sedimentation.

B. Earthmoving activities shall be conducted in such a manner as to prevent accelerated erosion and sedimentation.

C. All erosion and sedimentation control measures shall be inspected by the Contractor immediately after each rainfall and at least daily during prolonged rainfall.
   1. Repair and/or maintenance of sedimentation and erosion control measures will be made as soon as needed.
   2. The Contractor shall be held responsible for the implementation and maintenance of all erosion control measures on this site.

D. Land disturbance shall be kept to a minimum.
   1. Restabilization shall be scheduled immediately after any disturbance.

E. Silt fences or hay bales shall be installed at the toe of all critical cut and fill slopes.

F. Catch basins (sumps) shall be protected with silt fences or hay bales throughout the construction sequence and until all disturbed areas are stabilized.

G. Erosion and sedimentation control measures shall be installed prior to all construction activities.

H. Sediment removal from temporary control structures and from permanent drainage facilities shall be the responsibility of the Contractor.

1. Sediment shall be disposed of in a manner which is consistent with overall intent of the plan and which does not result in additional erosion.

I. The erosion and sedimentation control measures described herein are intended as a general guide for the Contractor.

1. It is the Contractor's responsibility to provide any and all work necessary to prevent erosion of soil from the construction site and to provide silt fences, hay bales or other control measures as the need arises during construction at no additional cost to the Owner.

J. Remove all sedimentation and erosion control barriers after completion of construction and permanent stabilization of erosion.

3.02 DIVERSION TRENCH

A. A diversion trench shall be used as a permanent measure installed on the uphill side of the cap areas to divert surface runoff away from the excavations during construction and the cap following construction as shown on the Contracts Drawings.

B. A temporary diversion trench shall be installed on the uphill side of the western wetland to divert surface runoff away from the excavations during construction as shown on the Contracts Drawings.

3.03 INTERCEPTOR CHANNELS

A. Interceptor channels shall be used across disturbed areas where the slope is running parallel to the direction of trenches.

B. Interceptor channels reduce erosion by intercepting storm runoff and diverting it to outlets on the lower side of the disturbed area where it can be disposed of having minimum erosion impact.

3.04 TRENCH BARRIERS

A. Trench barriers shall be used where the disturbed area is sloped in the direction of required piping, when the slope exceeds 15 percent.

B. Trench barriers shall be earth-filled sacks or piled stone, stacked to the top of the trench after installation of piping and prior to backfill, if backfill is delayed.

C. Trench barriers shall act as an erosion check by preventing the washout of the trench.

3.05 SEDIMENT BARRIERS

A. Sediment barriers shall be used at storm drain sumps; across minor swales and ditches; and at other applications where the structure is of a temporary nature and structural strength is not required.

1. Sediment barriers are temporary berms, diversions, or other barriers that are constructed to retain sediment onsite by retarding and filtering storm runoff.

B. Recommended Materials and Dimensions shall be as specified in Section 2.01 of this specification.

3.06 OIL SORBENT BOOMS/SOCKS

A. Oil sorbent booms/socks shall be utilized to contain oil sheens emanating from waste materials.

3.07 SPECIAL CONDITIONS

Prohibited Construction Practices - Prohibited construction practices include but shall not be limited to the following:

1. Dumping of spoil material into any stream corridor, any wetlands, any surface waters or at unspecified locations.
2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or any surface waters.
3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.
4. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface water or at unspecified locations.
5. Permanent or unspecified alteration of the flow line of any stream.
6. Open burning of construction project debris.

3.08 ADJUSTMENT OF PRACTICES

1. If the planned measures do not result in effective control of erosion and sediment runoff to the satisfaction of the regulatory agencies having jurisdiction over the project, the Contractor shall immediately adjust his program and/or institute additional measures so as to eliminate excessive erosion and sediment-runoff.
2. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor.

END OF SECTION 01564

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Products

B. Preparation for Shipment

C. Packaging and delivery of spare parts and special tools

D. Shipment and handling

E. Inspection

F. Storage and protection

G. Inventory control

1.02 RELATED SECTIONS

Not Used.

1.03 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Materials and equipment to be provided under this contract shall be standard catalogue products of manufacturers regularly engaged in the manufacture of the products and shall duplicate material and equipment in satisfactory service for a 5 year minimum.

D. Material and equipment shall meet the requirements of the contract and shall be suitable for the installation. Where two or more units of the same equipment class are furnished, the equipment shall be from the same manufacturer and shall be interchangeable. Materials and equipment shall be new and free from defects.

E. Material and equipment shall be installed in accordance with the requirements of the contract drawings and approved recommendations of the manufacturers.

1.04 PREPARATION FOR SHIPMENT

A. When practical, equipment shall be factory assembled. The equipment parts and assemblies that are shipped unassembled shall be furnished with an assembly plan and instructions. The separate parts and assemblies shall be match-marked or tagged in a manner to facilitate field assembly.

B. Generally, machined and unpainted parts subject to damage by the elements shall be projected with an application of a strippable protective coating.

C. Equipment shall be packaged or crated in a manner that will provide protection from damage during shipping, handling, and storage.

D. The outside of the package or crate shall be adequately marked or tagged to indicate its contents by name and Equipment number, if applicable; approximate weight; any special precautions for handling; and the recommended requirements for storage prior to installation.

1.05 PACKAGING AND DELIVERY OF SPARE PARTS AND SPECIAL TOOLS

A. Spare parts and special tools shall be properly marked to identify the associated equipment by name, equipment, and part number. Parts shall be packaged in a manner for protection against damage from the elements during shipping, handling, and storage. Spare parts and special tools shall be shipped in boxes that shall be marked to indicate the contents. Delivery of spare parts and special tools shall be made prior to the time the associated equipment is scheduled for the initial test run.

1.06 SHIPMENT AND HANDLING

A. Shipments shall be addressed to the Contractor who shall be responsible for their receipt, unloading, handling, and storage at the site. The Owner will not accept deliveries on behalf of the Contractor or his subcontractors or assume responsibility for security of materials, equipment, or supplies delivered to the site.

B. Arrange deliveries of products in accord with construction schedules and in ample time to facilitate inspection prior to installation.

C. Coordinate deliveries to avoid conflict with Work and conditions at site and to accommodate the following:
   1. Work of other Contractors, or Owner.
   2. Limitations of storage space.
   3. Availability of equipment and personnel for handling products.
   4. Owner's use of premises.

D. Do not have products delivered to project site until related Shop Drawings have been approved by the Engineer.

E. Do not have products delivered to site until required storage facilities have been provided

F. Have products delivered to site in manufacturer's original, unopened, labeled containers. Keep Engineer informed of delivery of all materials to be incorporated in the Work.

G. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts, and to facilitate assembly.

H. Materials and equipment shall at all times be handled in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

I. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.

J. Provide additional protection during handling as necessary to prevent scraping, marring, or otherwise damaging products or surrounding surfaces.

K. Handle products by methods to prevent bending or overstressing.

1.07 INSPECTION

A. Immediately upon receipt of equipment and materials at the job site, the Contractor shall assure that products comply with requirements, quantities are correct, and products are undamaged. Should there appear to be any damage, the Engineer shall be immediately notified, and the Contractor shall be responsible for informing the manufacturers and the transportation company of the extent of damage. If the items or items require replacing, the Contractors shall take the necessary measures to expedite the replacement.

1.08 STORAGE AND PROTECTION

A. Store and protect materials in accordance with manufacturer's recommendations and requirements of Specifications.

B. Contractor shall make all arrangements and provisions necessary for the storage of materials and equipment. All excavated materials, construction equipment, and materials and equipment to be incorporated into the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility service company installations in the vicinity of Work. Materials and equipment shall be kept neatly and compactly stored in locations that will cause a minimum of inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants.

C. Areas available on the construction site for storage of material and equipment shall be as shown or approved by the Engineer.

D. Fields, grass plots, or other property shall not be used for storage purposes without written permission of the Owner, or other person in possession or control of such premises.

E. Materials and equipment which are to become the property of the Owner shall be stored to facilitate their inspection and insure preservation of the quality and fitness of the Work, including proper protection against damage by freezing and moisture. They shall be placed in inside storage areas unless otherwise acceptable to Owner.

F. Store products with seals and label intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

G. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

H. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

I. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

J. Contractor shall be fully responsible for loss or damage to stored materials and equipment.

K. Do not open manufacturers containers until time of installation unless recommended by the manufacturer or otherwise specified.

L. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
   1. State of storage facilities is adequate to provide required conditions.
   2. Required environmental conditions are maintained on continuing basis.
   3. Products exposed to elements are not adversely affected.

1.09 INVENTORY CONTROL

A. Equipment and materials shall be stored in manner to provide easy access for inspection and inventory control. The Contractor shall keep a running account of all materials in storage to facilitate inspection and to estimate progress payments for materials delivered but not installed in the work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01600

SECTION 01630

SUBSTITUTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Requests for review of a substitution shall conform to the requirements of the General Conditions and shall contain complete data substantiating compliance of proposed substitutions with Contract Documents.

1.02 CONTRACTOR'S OPTIONS

A. For materials or equipment (hereinafter products) specified only by reference standard, select product meeting the standard, by any manufacturer, fabricator, supplier or distributor (hereinafter manufacturer). To the maximum extent possible, provide products of the same generic kind from a single source.

B. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with Specifications.

C. For products specified by naming several products or manufacturers and stating "or equal", submit a request for a substitution for any product or manufacturer which is not specifically named.

D. For products specified by naming only one product or manufacturer and followed by words indicating that no substitution is permitted, there is no option and no substitution allowed.

E. Where more than one choice is available as a Contractor's option, select product which is compatible with other products already selected or specified.

1.03 SUBSTITUTIONS

A. No item listed on the Contract Drawings, Contractor's shop drawings, or the Detailed Specifications by trade name or by name of manufacturer may be substituted for without the prior approval of the Engineer. Any such substitution or refusal of substitution shall not cause delay or increased costs. In the event the Contractor claims the inability to obtain a specified or indicated item at the proper time, the Owner or Engineer may make inquiries at the Contractor's expense to establish such a claim.

B. During a period of 30 days after date of commencement of Contract Time, Engineer will consider written requests from Contractor for substitution of products or manufacturers, and construction methods (if specified).
   1. After end of specified period, requests will be considered only in case of unavailability of product or other conditions beyond control of Contractor.

C Submit 5 copies of request for substitution. Submit separate request for each substitution In addition to requirements set forth in the General Conditions, include in request the following:

1. For product or manufacturers:
   a. Product identification, including manufacturer's name and address.
   b. Manufacturer's literature with product description, performance and test data, and reference standards.
   c. Samples, if appropriate.
   d. Name and address of similar projects on which product was used, and date of installation.
2. For construction methods (if specified):
   a. Detailed description of proposed method.
   b. Drawings illustrating method.
3. Such other data as the Engineer may required to establish that the proposed substitution is equal to the product, manufacturer, or method specified.
4. All applications for substitutions shall be accompanied by statement of credit or extra cost attributed to the substitution.

D. In making request for substitution, Contractor represent that:
1. Contractor has investigated proposed substitution, and determined that it is equal to or superior in all respects to the product, manufacturer, or method specified.
2. Contractor will provide the same or better warranties or bonds for proposed substitution as for product, manufacturer or method specified.
3. Contractor waives all claims for additional costs or extension of time related to proposed substitution that subsequently may become apparent.

E. Proposed substitutions will not be accepted if:
1. Acceptance will require substantial revision of Contract Documents.
2. They will delay completion of the Work, or the work of other contractors.
3. They are indicated or implied on a Shop Drawing and ar not accompanied by a formal request for substitution from Contractor.

F. If the Engineer determines that a proposed substitute is not equal to that specified, Contractor shall furnish the product, manufacturer, or method specified at no additional cost to the Owner.

G. Approval of a substitution will not relieve Contractor from the requirement for submission of Shop Drawings as set forth in the Contract Documents.

H. Contractor shall carefully verify and shall be fully responsible for determining that the equipment it proposes to provide and install shall fit into the confines indicated on the Contract Drawings, Contractor's shop drawings or Detailed Specifications.

END OF SECTION 01630

SECTION 01650

FACILITIES STARTUP

PART 1 GENERAL

1.01 SUMMARY

A. This section and the Operation, Maintenance, and Monitoring Plan (prepared by the Engineer) governs the requirements for facilities and system startup associated with the long-term groundwater extraction and treatment system.

B. Exceptions in an individual technical Section modify only the individual Article and topic; other topics and Articles in this Section remain in force unless specifically deleted by the technical Section.

C. Related work specifies in other sections:
   1. Section 01310 - Progress Schedule
   2. Section 01400 - Quality Assurance and Quality Control
   3. Section 01700 - Project Closeout

1.02 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Design temporary connections and utility lines to meet the specified design requirements of the component, subsystem, and system to which they are connected.
   2. Include required restraints.
   3. Do not place structural loads on permanent facility elements beyond their design load capacity.
   4. Provide dielectric unions on temporary connections wherever dissimilar metals connect.
   5. Provide safety valves and similar safety devices on temporary connections wherever they would be required if the connections were permanent.
   6. Divide subsystems according to the P&ID ladder diagrams wherever practical.

B. Performance Requirements:
   1. Performance requirements for components, subsystems, and the system are specified in individual Sections.

1.03 QUALITY ASSURANCE

A. Qualifications:
   1. Provide complete foremen's qualifications for Owners approval, indicating 3 years of experience operating and maintaining this type of equipment, or academic and factory training to operate and maintain this type of equipment, or another acceptable combination of relevant training and experience. Owner reserves the right to reject foremen who, in their

sole opinion, are not qualified by experience and training to operate and maintain the equipment.

B. Regulatory Requirements:
   1. Include information relating to regulatory requirements for operation and maintenance of equipment.

C. Certifications: Provide certification required under other sections.

D. Pre-Startup Conference:
   1. Arrange for a pre-startup conference scheduled not less than 10 days prior to training.
   2. Conference to be attended by Alcoa, Engineer, Contractor, Contractor's startup and installation foremen, and other responsible parties.
   3. Prepare an agenda for approval prior to conference, to include as a minimum:
      a. Startup and demonstration schedule.
      b. Facilities examination.
      c. Problem resolution.

1.04 SEQUENCING AND SCHEDULING

A. Facilities Startup Schedule:
   1. Provide as a sub-schedule of the main project schedule.
   2. Include submittal, and approval of submittals required for components.
   3. Address each subsystem individually.

1.05 MAINTENANCE

A. Provide maintenance on components through completion of the Reliability Demonstration.

PART 2 PRODUCTS

2.01 TEMPORARY CONNECTIONS

Not Used.

2.02 CHEMICAL AND OPERATING FLUIDS

A. Provide chemicals and operating fluids required for validation and Reliability Demonstration. These are in addition to chemicals and fluids required to be provided to Owner separately under the Specifications.

B. Provide maintenance and replacement parts required during the Reliability Demonstration.

PART 3 - EXECUTION

3.01 COMPONENT VALIDATION

A. Validate each component by one or more of the following procedures, as approved:
   1. Testing to show compliance with specifications.
   2. Simulation of actual operation by a method certified as acceptable and valid by both the component manufacturer and the Engineer.
   3. Certification by an independent testing laboratory that the component type meets a specified industry standard.
   4. Where procedures are specified in individual Sections, substitute procedures will not be accepted without prior written approval.

B. Validate components at component or subsystem level prior to system startup and testing.

C. Component validation must include:
   1. Full range of operation of each component.
   2. Emergency procedures.
   3. Normal start-up and shutdown procedures.
   4. Out-of-parameter correction.
   5. Validate components individually and as part of a subsystem test.

3.02 EXAMINATION

A. Prior to validating components or subsystems, verify that:
   1. Startup submittals have been accepted.
   2. Manufacturers' have certified component installations wherever required.
   3. Coordination with manufacturers' representatives for required field services is completed.
   4. Facility is enclosed weather-tight.
   5. Auxiliary systems are in proper operation.
   6. No safety defects remain unresolved.
   7. Provisions have been made for disposal of solids and liquids generated.
   8. Both hand and automatic operation of equipment is operational.
   9. Equipment is lubricated and serviced, and is ready for continuous operation.

3.03 PREPARATION

A. Temporary connections:
   1. Provide temporary connections as indicated on approved submittals.
   2. Test temporary connections by the same method that would be required if the connections were permanent.

B. Effluent collection, removal, and disposal.

3.04 TESTING REQUIREMENTS

A. Conduct tests using non-process, clean fluids prior to process fluid testing.

B. Effluent from testing not meeting specified system effluent quality are the property of Contractor, who is responsible for legal disposal.

3.05 TESTING OF SYSTEM

A. Validate subsystems and components before beginning system validation.

B. Perform system tests only to certify system, not to certify components or subsystems.

C. System performance is based on specified component performance and system output boundary conditions.

3.06 RELIABILITY DEMONSTRATION

A. Operate and maintain the system for not less than 5 days continuously and at full capacity to demonstrate that the system performs according to specifications.

B. Any system operation outside of specified operating boundary conditions requires a restart of the Reliability Demonstration period for a time specified by the Engineer up to the original time period.

C. Document actions taken and procedures developed that are not covered in the operatio manuals, and provide as an appendix to the operating manuals.

D. Where required in individual specification Sections, at the end of the Reliability Demonstration, replace or clean filters, replace fluids, and perform other replacement and adjustment requirements.

3.07 FIELD QUALITY CONTROL

A. Tests:
   1. Calibrate test equipment used to validate compliance immediately prior to testing.
   2. Check calibration of testing equipment immediately after validation tests.
   3. Revalidation, including the requirements of this Article, is required whenever test equipment is out of calibration at the completion of the validation testing.

B. Inspection: Thoroughly inspect all aspects of the installation prior to startup.

C. Manufacturer's Field Service: Provide the assistance of the manufacturer's field service technicians, as needed, to assure proper operation.

3.08 ADJUSTING AND CLEANING

A. After the successful completion of the demonstration period, perform the following:
   1. Lubricate and service dynamic equipment in accordance with manufacturer's instructions.
   2. Clean facility surfaces to a "like-new" condition.
   3. Clean equipment inside and out to a "like-new" condition. Dynamic equipment in the process stream such as screw conveyors, pumps, and valves do not require the interior to be cleaned.
   4. Perform other cleaning, adjusting, and replacement requirements included in other sections of these specifications.

END OF SECTION 01650

SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

Provisions of this section apply to the procedural requirements for the actual closeout of the Work, not to administrative matters such as final payment. Closeout requirements relate to both substantial and final completion of the Work; they also apply to individual portions of completed work as well as the total Work. Specific requirements contained in other sections have precedence over the general requirements contained in this section.

1.02 PROCEDURES AT SUBSTANTIAL COMPLETION

A. Prerequisites: Comply with the General Conditions and complete the following before requesting inspection of the Work, or a designated portion of the Work, for certification of substantial completion. A representative of Alcoa, the Engineer and the Government will perform the substantial completion inspection.

1. Submit executed warranties, maintenance agreements, inspection certificates and similar required documentation for specific units of work, enabling unrestricted occupancy and use by Alcoa and the Government.
2. Submit record documentation, maintenance manuals, tools, spare parts, keys and similar operational items.
3. Complete final cleaning, and remove temporary facilities and tools.

B. Inspection Procedures: Upon receipt of Contractor's request, the Engineer, and Alcoa's representative will either proceed with inspection or advise the Contractor of prerequisites not fulfilled. Following initial inspection, the Engineer will either prepare the certificate of substantial completion, or advise the Contractor of work which must be performed prior to issuance of the certificate of completion. The Engineer and Alcoa representative will repeat the inspection when requested and assure that the Work has been substantially completed. Results of the completed inspection will form the initial "punch-list" for final acceptance.

1.03 PROCEDURES AT FINAL ACCEPTANCE

A. Reinspection Procedure: The Engineer and Alcoa's representative will reinspect the Work upon receipt of the Contractor's notice that the Work has been completed, including punch-list items from earlier inspections. Upon completion of reinspection, the Engineer will either recommend final acceptance and final payment, or will advise the Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, this procedure will be repeated.

1.04 RECORD DOCUMENTATION

A. Record Drawings: Maintain a complete set of either blue- or black- line prints of the contract drawings and shop drawings for record mark-up purposes throughout the Contract Time. Mark-up these drawings during the course of the work to show both changes and the actual installation, in sufficient detail to form a complete record. Give particular attention to work which will be concealed and difficult to measure and record at a later date, and work which may require servicing or replacement during the life of the project. Require the entities marking prints to sign and date each mark-up. Bind prints into manageable sets, with durable paper covers, appropriately labeled.

These marked prints (Record Drawings) shall be kept current and available on the job site at all times. All changes from the contract plans which are made in the work, or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. The Record Drawings shall be jointly inspected for accuracy and completeness by the Engineer prior to submission of each monthly pay estimate. The drawings shall include but not be limited to the following:

1. Installations of any kind or description known to exist within the construction area. The locations shall include dimensions to permanent features.
2. The location and dimensions of any changes within the design features of any kind or description known to exist within the construction area. The locations shall include dimensions to permanent features.
3. Correct grade or alignment of roads, structures, utilities, or project components if any changes were made from contract drawings.
4. Correct elevations if changes were made in site grading.
5. Changes in details of design or additional information obtained from working drawings specified.
6. The topography and grades of all drainage structures installed or affected as part of the project construction.
7. All changes or modifications which result from authorized field changes.
8. Where contract drawings or specifications allow options, only the option selected for construction shall be shown on the record prints.
9. Additional work ordered by the Engineer or Alcoa.

B. Maintenance Manuals: Provide 3-ring vinyl-covered binders containing required maintenance manuals, properly identified and indexed. Include operating and maintenance instructions extended to cover emergencies, spare parts, warranties, inspection procedures, diagrams, safety, security, and similar appropriate data for each system or equipment item.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 OPERATOR INSTRUCTIONS

Require each installer of systems requiring continued operation and maintenance by Alcoa's operating personnel, to provide on-location instruction to Alcoa's personnel, sufficient to ensure safe, secure, efficient, non-failing utilization and operation of systems.

3.02 FINAL CLEANING

At the time of project close out, clean and return the Work area to its original condition. Complete the following operations before requesting the Engineer's inspection for certification of substantial completion:

A. Remove non-permanent protection and labels.

B. Clean exposed finishes and touch-up minor finish damage at the extraction wells and the groundwater treatment building.

C. Remove debris

D. Police yards and grounds.

E. Reinstall or replace with equivalent new fencing any permanent fencing removed during construction.

END OF SECTION 01700

SECTION 01720

PROJECT RECORD DRAWINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies the requirements for recording of field modifications made during construction, to be marked on the design Construction Drawings by the Contractor (Record Drawings) and for preparing Supplemental Record Drawings by the Surveyor to be submitted to Alcoa and the Engineer.

B. Maintenance of Documents

1. Maintain in Contractor's field office in clean, dry, legible condition complete sets of the following: Drawings, Specifications, Addenda, approved Shop Drawings, Samples, photographs, Change Orders, other modifications of Contract Documents, test records, survey data, Field Orders, and all other documents pertinent to Contractor's work.
2. Provide files and racks for proper storage and easy access. File in accordance with filing format of Construction Specification Institute (CSI), unless otherwise approved by the Engineer.
3. Make documents available at all times for inspection by the Engineer, Alcoa, and the Government.
4. Record documents shall not be used for any other purpose and shall not be removed from the Contractor's office without the Engineer's approval.

C. Related work specified elsewhere.

1. Section 01051 - Grades, Lines, and Levels

1.02 SUBMITTALS

A. Record Drawings

The Contractor shall clearly and neatly mark up in red ink one set of paper prints to show the record conditions. These record marked prints (Record Drawings) shall be kept current and available on the job site at all times. All changes from the contract plans which are made in the work, or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. The Record Drawings shall be jointly inspected for accuracy and completeness by the Engineer and a responsible representative of the Contractor prior to submission of each monthly pay estimate. The drawings shall include but not be limited to the following:

1. Installations of any kind or description known to exist within the construction area. The locations shall include dimensions to permanent features.

2. The location and dimensions of any changes within the design features of any kind or description known to exist within the construction area. The locations shall include dimensions to permanent features.
3. Correct grade or alignment of roads, structures, utilities, or project component.
4. Correct elevations.
5. Changes in details or dimensions.
6. The topography and grades of all drainage structures installed or affected as part of the project construction.
7. Additional information obtained from working drawings.
8. Where contract drawings or specifications allow options, only the option selected for construction shall be shown on the record prints.
9. Additional work ordered by the Engineer or Alcoa.
10. Depths of various elements of foundation in relation to datum.
11. Horizontal and vertical location of underground utilities and appurtenance referenced to permanent surface improvement.
12. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.

B. Supplemental Record Drawings

This section covers the preparation and submittal by the Surveyor retained by the Contractor of Supplemental Record Drawings. The Contractor will retain and coordinate with the independent Surveyor in obtaining field measurements necessary to prepare the supplemental drawings. The Supplemental Record Drawings shall include but not be limited to the following:

1. A topographic survey of the site following contaminated sediment and soil excavation, final subgrade preparation, the drainage layer, the barrier protection layer, and unclassified fill layer and topsoil placement. The survey should, as a minimum, show ground surface elevations on a 50 foot by 50 foot grid and at all grade changes and also indicate the thickness of the cover layers. The survey should adequately extend beyond the limits of work to properly overlap existing conditions (i.e; the railroad, etc.).
2. Preliminary Submittal
   The Contractor shall prepare two (2) copies of the Record Drawings and the Surveyor shall prepare the two (2) copies of the Supplemental Record Drawings. These drawings shall be submitted to the Engineer following completion of that phase of work (within 7 calendar days) for review and approval. These drawings shall be neat, legible, and accurate. The review by the Engineer shall be expedited to the maximum extent possible (expected to be within 7 calendar days). If upon review, the drawings are found to contain errors and/or omissions, they shall be returned to the Contractor and/or Surveyor for corrections. The Contractor and/or Surveyor shall complete the corrections and return the drawings to the Engineer within 10 calendar days for subsequent review.
3. Final Record Drawing Preparation
   a. Upon approval of the Record Drawings and Supplemental Record Drawings submitted, these drawings shall be modified by the Engineer, as necessary, to

add any additional information which is pertinent to the project. These drawings shall be part of the permanent records of this project.

b. Each drawing to be submitted by the Contractor shall be lettered or stamped with the words "RECORD DRAWING" in 1-inch high printed letters followed by the name of the Contractor and the Engineer. All original contract drawings shall be marked by the Engineer either "Record" denoting no revisions on the sheet, or "Revised Record" denoting one or more revisions.

c. The Supplemental Record Drawings to be submitted by the Surveyor shall:
   1. be stamped and signed by the Surveyor retained by the Contractor;
   2. be prepared on a 24" by 36" reproducible sheet with the same Alcoa Ledger and title block used for contract drawings.
   3. shall locate all work referenced to the limits of the project area; and
   4. have all locations referenced to the site horizontal coordinate system. The grid coordinate system shall be shown on all record drawings. Elevations shall be referenced to the vertical control established for the project.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01720

SECTION 01730

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 GENERAL

A. Provide operation and maintenance data to supplement the Operation, Maintenance, and Monitoring Plan (prepared by Engineer):
   1. All equipment and systems.
   2. All valves, gates, and related accessories.
   3. All instruments and control devices.
   4. All electrical gear.

B. Definitions:
   1. Operation and Maintenance Data:
      a. The term "Operation and Maintenance Data" includes all product related information and documents which are required for preparation of the plant operation and maintenance manual. It also includes all data which must accompany said manual as directed by current regulations of any participating government agency.
      b. Required operation and maintenance data includes, but is not limited to, the following:
         (1) Complete, detailed written operating instructions for each product or piece of equipment including: equipment function; operating characteristics; limiting conditions; operating instructions for startup, normal emergency conditions; regulations and control; and shutdown.
         (2) Complete, detailed written preventive maintenance instructions as defined below.
         (3) Recommended spare parts lists and local sources of supply for parts.
         (4) Written explanations of all safety considerations relating to operation and maintenance procedures.
         (5) Name, address, and phone number of manufacturer, manufacturer's local service representative, and Subcontractor or installer.
         (6) Copy of all approved Shop Drawings, and copy of warranty bond and service contract as applicable.
   2. Preventive Maintenance Instructions:
      a. The term "preventive maintenance instructions" includes all information and instructions required to keep a product or piece of equipment properly lubricated, adjusted, and maintained so that the item functions economically throughout its full design life.
      b. Preventive maintenance instructions include, but are not limited to, the following:
         (1) A written explanation with illustrations for each preventive maintenance task.
         (2) Recommend schedule for execution of preventive maintenance tasks.

(3) Lubrication charts.
(4) Table of alternative lubricants.
(5) Trouble shooting instructions.
(6) List of required maintenance tools and equipment.

C. Submittals:
1. General: Submit operations and maintenance data to the Engineer within 90 days after approval of Shop Drawings.
2. Number of Copies: Six of each item.
3. Letter of Transmittal: Provide a letter of transmittal with each submittal and include the following in the letter:
   a. Use 8-1/2 inch by 11 inch paper. Larger drawings or illustrations are acceptable if neatly folded to the specified size in a manner which will permit easy unfolding without removal from the binder. Provide reinforced punched binder tab. Or provide fly-leaf for each product.
   b. All text must be legible typewritten or machine printed originals or high quality copies of same.
   c. Each page shall have a binding margin of approximately 1-1/2 inches and be punched for placement in a three ring looseleaf or triple post binder. Provide binders. Identify each binder with the following:
      (1) Title "OPERATING AND MAINTENANCE INSTRUCTIONS".
      (2) Title of Project.
      (3) Identity of building or structure as applicable.
      (4) Identity of general subject matter covered.
   d. Use dividers and indexed tabs between major categories of information such as operating instructions, preventive maintenance instructions, or other. When necessary, place each major category in a separate binder.
   e. Provide a table of contents for each binder.
   f. Identify products by their functional names in the table of contents and at least once in each chapter or Section. Thereafter, abbreviations and acronyms may be used if their meaning is explained in a table in the back of each binder. Use of model or catalog numbers or letters for identification is not acceptable.

END OF SECTION 01730

SECTION 02085

GROUNDWATER MONITORING WELL ABANDONMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Abandonment of existing groundwater monitoring wells as noted in this section.

B. Related work specified elsewhere in other section.

1.02 APPLICABLE CODES, STANDARDS, AND SPECIFICATIONS

The publications listed below form a part of the specifications to the extent referenced. The publications are referred to in the text by basis designation only.

A. American Society of Testing and Materials (ASTM)
ASTM C150-89 Type I Portland Cement

B. New York State Department of Environmental Conservation (NYSDEC) Memorandum "Decommissioning Procedures", May 1995.

1.03 SUBMITTALS

A. Methods - Proposed drilling and abandonment methods.

B. Mixes - Grout mixes, bentonite mixture.

C. Equipment - Drill rig and related equipment.

D. Drilling Contractor - submit the name and address of the proposed well driller and a list of at least five completed projects of similar construction.

PART 2 - PRODUCTS

2.01 GROUT

A. Grout shall be a Portland Cement/bentonite grout mixture. The grout shall consist of a mixture of Portland Cement (ASTM C150 Type I), bentonite and water in the proportions of one 94 pound bag of Type I Portland Cement, 9 pounds of powdered bentonite, and 6 to 10 gallons of potable water.

2.02 BENTONITE

A. The bentonite seal shall consist of ½-inch diameter sodium bentonite pellets or chips (Baroid Ben Seal or Equivalent).

PART 3 - EXECUTION

3.01 GENERAL

A. No monitoring well abandonment activities shall commence without acceptance of the Engineer.

B. All monitoring well abandonment shall be performed in accordance with the requirements of this Section and to the satisfaction of the Engineer.

C. Review all available information concerning each well to be abandoned which may include a site map, well construction diagram, field inspection long, and proposed well decommissioning procedure.

D. Verify the depth of the well location with a weighted tape and compare measurements with the well construction log. (Refer to Existing Monitoring Well Logs).

E. Verify the well location and identification before proceeding with decommissioning.

F. Well materials and soil cuttings shall be disposed of within the limits of the proposed capped area with soils containing 0 - 10 ppm PCBs. No well materials to be disposed of within the limits of the capped area shall be greater than 15 feet in length.

G. The Contractor shall restore the area in the vicinity of each well location as directed by the Engineer.

H. Following drilling activities, the Contractor shall decontaminate equipment in accordance with the decontamination protocol in paragraph 3.03.

3.02 ABANDONMENT

A. Groundwater Monitoring Wells
   1. Wells are single cased, refer to Existing Monitoring Well Logs for construction details.
   2. Well casing pulling procedures include the following:
      a. The Contractor shall lower a drill rod down the well and perforate the bottom cap.
      b. The Contractor shall add the grout to the well casing and riser prior to pulling the casing.
      c. The Contractor shall pull the well by grappling the protective casing with appropriate devices and pulling the casing and well materials as a single unit.
      d. The Contractor shall add grout on an intermittent basis to ensure that the void spaces are adequately filled with grout as the casing and well are withdrawn. Grout is to be

added until the level is within five feet of existing ground surface. The balance of the borehole is to be backfilled with clean soil by the Contractor.

e. If all of the well materials are not withdrawn during the pulling process, overdrilling of the remaining portions may be required by the Contractor as directed by the Engineer.

3. The following wells will be removed by overdrilling procedures: OW-1, OW-2, PW-1, PW-2, RW-1, RW-3, SW-1, YO-3, YO-9, YO-9A, YO-16 (two wells), YO-17 (at least two wells), RW-2, YO-1R, YO-15, and YO-27 (two wells). Any other wells found within the excavation areas, or wells within an expanded excavation area, will also be removed by overdrilling as described in this section.

4. Well overdrilling procedures include the following:
   a. The Contractor shall remove the protective casing, if present, from each well in a manner which minimized disturbance to the well.
   b. The Contractor shall lower a drill rod down the well and perforate the bottom cap.
   c. The Contractor shall overdrill the well using hollow stem augers with outward facing cutting teeth to a minimum of 2 feet below the total depth of the original boring or reaming tool with a pilot bit approximately similar in size to the inside diameter of the well material.
   d. Following overdrilling, the Contractor shall withdraw the well materials from within the auger.
   e. The Contractor shall seal the borehole by pressure injection with cement bentonite grout by using a tremie pipe to fill the inside of the augers to ground surface.
   f. Additional grout shall be added as required as the augers are removed to maintain the level of grout at ground surface. Grout is to be added until the level is within five feet of the existing ground surface. The balance of the borehole is to be backfilled with clean soil by the Contractor.

3.03 DECONTAMINATION

A. All drilling equipment and materials shall be decontaminated prior to drilling, between bore-holes, and prior to leaving the site. The contractor will not use, reuse, or remove any equipment, materials, samples, or other goods at or from the site until it is certified to be uncontaminated. Decontamination will consist of washing and steam cleaning all equipment and materials that may be required as specified above or at the request of the Engineer. The drilling crew will undertake the decontamination of the given equipment or materials under the Engineer's supervision. The Contractor shall comply with all request and procedures of the Engineer regarding decontamination during the course of the work, close of the workday, and upon completion of the project. Anticipated requests and procedures for decontamination are outlined below:

B. General Decontamination Procedures and Requirements:
   1. All drilling equipment shall be inspected for integrity of hydraulic and oil fluid handling systems and general overall cleanliness. Leaking hoses, tanks, hydraulic lines, etc., shall be replaced or repaired prior to beginning work.

C. Initial Cleaning

1. All drilling equipment and associated tools shall be steam cleaned, upon arrival at the Site. Equipment will include at a minimum, but not be limited to:
    - drilling rods, bits;
    - augers (clips, pins, and associated hardware);
    - samplers (i.e. split spoon, hydropunch);
    - casing materials (both temporary and permanent);
    - wrenches;
    - hammers;
    - other hand tools and tool boxes;
    - hoses and tanks;
    - cable clamps and other holding devices in direct contact with drilling rods; and
    - drill rig and undercarriage, wheel wells, chassis.
2. During and following cleaning, equipment shall be handled only with clean gloves. A new set of gloves will be utilized between each location.
3. Cleaned materials shall be protected from contamination by such means as the Engineer deems necessary.

D. Onsite Cleaning
1. Following use, all equipment with the exception of the carrier truck and undercarriage, shall be steam-cleaned between borings.
2. Down hole sampling equipment must be washed in laboratory grade detergent and water, and rinsed in clean, clean potable municipal water between consecutive samples and/or each boring, as appropriate.
3. If immiscible products are encountered during drilling, the drilling and sampling equipment must be cleaned in a manner consistent with the equipment decontamination procedures) for the Site.

END OF SECTION 02085

SECTION 02100

SITE CLEARING

PART 1 - GENERAL

1.01 DESCRIPTION

Requirements specified in the Conditions of the Contract and Division 1 form a part of this Section. Remove all stumps, roots, and pavement within the limits designated on the Drawings.

A. Work Included in This Section. Principal items are:
   1. Selective removal to limits shown on the Drawings.
   2. Protection and preservation of trees and vegetation outside the clearing limits.
   3. Disposal off site of all debris, stumps, roots, pavement and other objectionable materials.

B. Related Work Specified in Other Sections.
   1. Section 01564 - Erosion Control
   2. Section 02222 - Excavation

1.02 CODE REQUIREMENTS AND ENVIRONMENTAL SAFEGUARDS

Accomplish disposal of material removed from site in accordance with applicable Federal, State, and local regulations. At all times, comply with regulations in force to prevent pollution of air and water.

1.03 SITE INVESTIGATIONS

The Contractor shall carefully examine the site to determine the full extent of the Work required to conform to the Drawings and Specifications. The Contractor shall satisfy himself as to the nature and location of the Work, conditions, the formation and condition of the existing ground surface and the character, equipment and facilities needed prior to and during prosecution of the Work. Contractor shall satisfy himself as to the obstacles to be encountered. Any inaccuracies or discrepancies between the Drawings and Specifications shall be brought to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

PART 2 - PRODUCTS. (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 CLEARING AND SITE PREPARATION.

A. Clearing and site preparation shall include, as needed, the removal from the site of all vegetation, including, but not limited to, weed growth, brush, shrubs, stumps, logs, roots and boulders within the site. Holes resulting from the removal of underground structures and roots that extend below the finished grade shall be cleaned and backfilled with suitable materials.

B. Contractor shall be responsible for all permits, lighting, temporary barricades, fencing, etc., required for Work on the site.

C. Removal of trees, shrubs, and vegetation shall occur only with prior Alcoa approval. Violation of this provision shall require the Contractor to bear all damages and consequences. The roots of trees to remain shall not be damaged by operations under this Section or any other Section. Herbicides for the control of woody plants shall not be used.

D. Trees and shrubs to remain shall be trimmed so as to avoid removal or damage. Trimmed or damaged trees shall be treated and repaired by persons with experience in this specialty who are approved by the Engineer. Trees and shrubs intended to remain which are damaged beyond repair or removed, shall be replaced by the Contractor at his own expense.

E. Any such item damaged by the Contractor shall be restored or replaced immediately at the Contractor's expense.

F. The above-grade portion of all materials from clearing shall be chipped and set aside onsite in an area outside the cap limits. This material shall not be placed beneath the cap.

G. The below-grade portion of all material from clearing including roots and stumps shall be chipped or ground, treated with cement separately or as part of solidification/stabilization, and placed beneath the cap.

H. The Contractor shall provide a chipper of sufficient size to handle all material expected from the cleared areas.

I. No trees, stumps, and other cleared and grubbed material may be used in backfills or structural embankments.

J. Burning onsite shall not be permitted.

3.02 TOPSOIL REMOVAL - NOT USED

3.03 GUARANTEE

A. Contractor shall guarantee that Work performed under this Section will not permanently damage trees, shrubs, turf, or plants designated to remain, or other adjacent work or facilities. If damage resulting from Contractor's operations appears during the period up to 12 months after completion of the project, he shall replace damaged items at his own expense.

END OF SECTION 02100

SECTION 02131

DECONTAMINATION PADS AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all work described herein or shown on the Contract Drawings.

A. Work included in this section: Modify the existing onsite decontamination pad, including providing the following equipment:
   1. Holding tanks
   2. Flexible hose
   3. Submersible pump
   4. Grout
   5. Pressure washers

B. Related work specified in other sections:
   1. 01105 - Health and Safety
   2. 01500 - Temporary Facilities and Field Office
   3. 02100 - Site Clearing

1.02 SYSTEM DESCRIPTION

A Contractor shall furnish and install all materials, equipment, controls, and incidentals required for modification of the existing operational on-site decontamination pad. The existing decontamination pad will be refurnished and retrofitted as described in paragraph 1.02 C of this section.

B. Performance Requirements
   1. All equipment furnished under this Section shall be suitable for the installation as shown and specified. The size, capacity and type of construction materials specified shall be understood to establish minimum requirements only.

C. Description: Existing Decontamination Pad
   1. Clean and remove debris in the collection trench and sump.
   2. Install sidewalls with a minimum height of six feet to prevent overspray from decontamination operations on the pad.
   3. Level the surface adjacent to the decontamination pad and add 8" of crushed gravel for installation of storage tanks.
   4. The tanks are to include all necessary flanged nozzles and gate valves for required appurtenances.

5. A submersible pump shall be installed within the new precast concrete sump. The existing concrete sump is to be coated with the same coating as that applied to the concrete decontamination pad.
6. All aboveground piping is to be flexible, as described herein.

1.03 SUBMITTALS

A. Shop Drawings: Furnish complete Shop Drawings showing the following minimum data:
   1. Manufacturer's literature, illustrations, specifications and engineering data including dimensions, materials, size, and weight for tanks, pressure washer, and submersible pump.
   2. Modification diagrams.
   3. Certified test and performance data.
   4. Detailed description of operation.
   5. List of spare parts furnished.
   6. Equipment guarantee.
   7. Concrete materials and mix designs.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications: The manufacturer shall have experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least five installations.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep all materials off the ground, using pallets, platforms, or other supports. Protect packaged materials from corrosion and deterioration.

PART 2 - PRODUCTS

2.01 HOLDING TANKS

Provide and install at least one (1) tank to store wastewater from the decontamination process and at least one (1) tank to store clean water for the pressure washer at the decontamination pad.

A. The tanks will be designed and manufactured by Nalgene of Nalge Co. of Rochester, New York or approved equal.

B. Each tank will have openings to accommodate venting ports, sample ports, and piping connections at several locations on the tank as specified.

2.02 FLEXIBLE HOSE

A. Hose shall be flexible, braided, 2-inch diameter to pump waste from the submersible sump to the waste tank.

2.03 SUBMERSIBLE PUMP

Furnish and install one (1) submersible non-clogging wastewater pump at each decontamination pad. The pump shall be equipped with a 1.5 HP, submersible electric motor connected for operation on 230 volts, 1 phase, 60 hertz, 3-wire service, with 7 feet of submersible cable suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards. The pump shall be supplied with a mating 2-inch discharge connection and be capable of delivering 30 GPM at 11 feet total dynamic head (TDH). The pump shall be fitted with 13 feet of lifting chain or steel cable. The working load of the lifting system shall be 50 percent greater than the pump unit weight. The liquid to be pumped consists of decontamination wastewater.

2.04 GROUT

A. Grout, Non-Shrinking
   1. Manufacturer must provide engineering and technical support.
   2. Certified by independent laboratory as non-shrinking.
   3. Contractor's option of the following:
      a. Cement grout
      b. Epoxy grout

2.05 PRESSURE WASHER

A. Manufacturer - Furnish and install one (1) pressure washer at the decontamination pad.

B. The pressure washers shall be specifically designed, constructed and installed in conformance with the following conditions.

Operating Flow Rate:	6 gpm
Operating Pressure:	1800 psi
Operating Temperature:	180°F
Electrical Supply Required:	240V, Single Phase
Pump Sizing:	7.5 Hp, Direct Drive
Mobility:	Temporary, Non-Rollable
Hose Length:	100 ft. (min.)
Shell Material of Construction:	Heavy Gauge Steel, Angle Iron Frame
Dimensions	64-inch L x 35-inch W x 55-inch H

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

A. Posted Operating Instructions
   1. Provide for submersible pump and high pressure washer.

B. Field Performance Testing: Test equipment in the presence of the Engineer prior to use. Equipment shall be free of excess vibration and over-heating; and safety devices shall be demonstrated to perform as specified by the manufacturer. Immediately correct discrepancies encountered between the specified performance and field performance.

END OF SECTION 02131

SECTION 02140

DEWATERING AND CONSTRUCTION WATER MANAGEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

Water in contact with excavated soil or sediment shall not be permitted to leave the site without meeting the discharge limits established by the state of new York for the York Oil site. Provide all labor, equipment, materials and perform all work of design, construction, operation and maintenance of effective dewatering of excavation areas and provide effective construction water management of generated construction water from dewatering activities. Remove equipment from site when no longer required.

A. Work Included in This Section:

1. Furnish and install well-points, headers, sand or gravel packing and make necessary connections.
2. Furnish, install and connect pumps and discharge lines.
3. Drill wells and install pumps and discharge lines.
4. Service and operate systems effectively.
5. Install and operate surface pumping equipment in conjunction with surface channels and conduits to prevent the entry of surface water into the works.
6. Removal of dewatering facilities when no longer required.
7. Development of an acceptable Construction Water Management Plan detailing the handling, storage, treatment (if necessary), and disposal of all construction water (including groundwater and rain water contacting excavations or excavated materials) and associated sludge generated during construction in accordance with all applicable local, state, and federal regulations.
8. The Contractor is to obtain (if necessary) and operate within all required local, state, and federal permits.
9. Provide all labor, materials, and equipment required for handling, testing, storage, treatment, and disposal of construction water.
10. Perform all specified and necessary sampling and analyses to insure compliance with required permits and applicable laws and regulations.

B. Related Work Not Included in This Section:

1. Earthwork, backfill and compaction work as specified in Sections 02222, 02223, and 02228, respectively.
2. Drainage Piping (Section 02727).
3. Erosion Control (Section 01564).
4. Solidification/Stabilization (Section 02445).

1.02 QUALITY ASSURANCE

A. Qualifications. Furnish the services of an experienced, qualified, and equipped Dewatering Subcontractor to design and operate the dewatering (and groundwater recharging systems) required for the Work. In lieu of the above, the General Contractor may do the dewatering in accordance with a system approved by Owner and designed by a Civil Engineer who is registered in the State of New York and who has proven experience in this type of work.

B. Data Available for Examination. Reports of subsurface investigations made by Alcoa for design purposes will be made available to the Contractor for examination, including a study of the range of normal groundwater level fluctuation.

1.03 APPLICABLE CODES, STANDARDS, AND SPECIFICATIONS

A. The Contractor shall comply with applicable federal, state, and local applicable codes, ordinances, regulations, statutes, and standards, including, but not limited to, the following:
   1. 6 NYCRR Part 750-757 - State Pollutant Discharge Elimination System;
   2. 6 NYCRR Part 364 - Waste Transporter Permits (for any water transported offsite);
   3. 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (for any water transported offsite);
   4. 6 NYCRR Part 372 Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities (for any water transported offsite); and
   5. 6 NYCRR Part 373 - Hazardous Waste Treatment, Storage, and Disposal Facility Requirements (for any water transported offsite).

1.04 SUBMITTALS

For record purposes only and not for review or approval, submit shop drawings and data showing the intended plan for dewatering and construction water management. Include locations and capacities of dewatering wells, well points, pumps, sumps, collection and discharge lines, standby units, water recharge system, water disposal methods, monitoring and settlement measuring equipment, and data collection and dissemination. Submit not less than 15 days prior to start of dewatering operations.

Submit a Construction Water Management Plan shop drawings and test results used in the design of the method of handling construction water within 14 days of Contract award for review and approval.

1.05 JOB CONDITIONS

The descriptions of job conditions under Section 02222, "Earthwork," form a part of this sub-section.

PART 2 - PRODUCTS

2.01 GENERAL

A. Components of the Dewatering System. Provide units of standard manufacture and in good working order. Unserviceable parts and equipment shall be removed from the jobsite. Major equipment for which repair parts are unavailable from local suppliers shall be considered obsolete and therefore not acceptable.

B. Construction Water Management Plan

1. The Contractor shall submit his plan for handling construction water. The plan shall include, but not be limited to, the Contractor's proposed method of handling, sampling and analyses (if required), methods for minimizing the volume of construction water and associated sludges, storage (if necessary), treatment (if necessary), and disposal of construction water generated during construction.
2. Acceptable methods of handling construction water include, but are not limited to, the following:
   a. Collection, onsite treatment as needed, and discharge in accordance with applicable regulations and requirements including, but not limited to, a State Pollutant Discharge Elimination System (SPDES) requirements provided with Section 13290.
   b. Collection and use in the S/S process.
   c. Collection, transport, offsite treatment, and disposal.
3. Other methods must be submitted to and approved by the Engineer prior to use.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. The Contractor shall minimize construction water to the extent practicable and still maintain dry excavation.

B. The Contractor shall containerize construction water onsite and conduct one or a combination of the following actions:

1. Treat the construction water to the concentration limits specified by the SPDES discharge permit and discharge to the onsite surface water drainage ditch.
2. Use the construction water (untreated) within the solidification/stabilization process.
3. Transport the construction water offsite for treatment.

3.02 TREATMENT OF CONSTRUCTION WATER

A. The Contractor shall be solely responsible for any temporary onsite construction water treatment system (if used) set-up, debugging, operation, testing, shut-down, decontamination, dismantling

and removal subsequent to completion of work, including removal of all materials incidental to treatment system operations.

B. The Contractor shall store treated water onsite until laboratory analytical results demonstrate that the treated water meets SPDES requirements.

C. Treated water that meets SPDES requirements shall be discharged to an onsite surface water drainage ditch which ultimately leads to the Beaver Pond.

3.03 USE OF CONSTRUCTION WATER WITHIN THE SOLIDIFICATION/STABILIZATION PROCESS

A. The Contractor shall bear all costs and responsibility for preparing the untreated construction water to be used in the S/S process. The quality of water to be used in the S/S process is specified in Section 02445.

3.04 OFFSITE DISPOSAL OF UNTREATED CONSTRUCTION WATER

A. No Contractor proposed facility for offsite disposal shall be utilized without prior acceptance by the Owner. For all wastes disposed of offsite, Contractor is responsible for characterization of such material and arranging for proper temporary storage, transportation, and disposal in accordance with all applicable federal, state, and local regulations at no additional costs to Alcoa.

B. Contractor shall dispose of water designated for offsite disposal within 30 days of collection.

C. Contractor shall mark, label, placard, package, and manifest wastes in accordance with applicable codes, regulations, and statutes.

D. Remove equipment when no longer required for dewatering or water controlling operations. Maintain operation of monitoring and settlement measurement systems until their removal is approved.

E. It shall be the responsibility of the Contractor to investigate and comply with all applicable federal, state, and local laws and regulations governing the handling, storage, and disposal of construction water. All construction water shall be disposed of in a manner that meets applicable permit requirements, laws, and regulations.

F. Except for those obtained by Alcoa as indicated in the Special Provisions, the Contractor shall obtain all required permits, manifests, and required for the handling, storage, transport, treatment, and disposal of construction water.

G. Any sampling and analyses necessary to protect the health and welfare of the Contractor's employees and/or agents and/or characterize collected water or treated water shall remain the sole responsibility of the Contractor.

H. Construction water shall be handled using equipment compatible with anticipated contaminants which may be present.

3.05 LNAPL MANAGEMENT

A. The Contractor shall properly containerize, store and dispose of any LNAPL recovered during the handling or treatment of construction water.

END OF SECTION 02140

SECTION 02222

EXCAVATION

PART 1 - GENERAL

1.01 DESCRIPTION

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all excavation as described herein or shown on the Contract Drawings.

A. Work included in this section:
   1. Excavation of soils whether contaminated or not.
   2. Excavation for drainage ditches, swales, culverts, piping, etc.
   3. Excavation for site structures.

B. Related work specified in other sections:
   1. Section 01500 - Temporary Facilities and Field Office
   2. Section 01564 - Erosion Control
   3. Section 02100 - Site Clearing
   4. Section 02223 - Backfilling
   5. Section 02228 - Compaction
   6. Section 02260 - Soil Cover Construction
   7. Section 02501 - Gravel Access Road
   8. Section 02727 - Drainage Piping
   9. Section 02990 - Finish Grading, Topsoil, and Seeding

1.02 QUALITY ASSURANCE

A. Field Measurements

Verify that survey benchmark, monuments and intended elevations for the work are as shown on the Drawings or as provided by the Engineer.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum. Review subsurface investigation reports and other available site information.

B. Protect plants, lawns, wetlands, and other features which have been designated on the Contract Drawings to remain as a portion of final landscaping.

C. Protect control points, bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic. Damaged items shall be promptly repaired at the Contractor's expense.

D. Prior to start of construction, notify the appropriate organizations, and have staked or marked all underground utilities. Utilities include water, gas, electrical, telephone, cable, storm sewer, sanitary sewers, laterals, and services. In the event such locations indicate a possible interference, or when needed to locate points of connection to existing facilities, perform exploratory excavations to determine the utilities' location and elevation. Provide the utility owner with the results of the exploratory excavations for his review. Allow the Engineer sufficient time to determine any changes required as a result of such exploratory excavations prior to start of construction.

E. Maintain existing manholes, catch basins, and other utility structures above and below grade which are to remain in their pre-work condition. Any material or debris entering same due to the operation shall be promptly removed.

F. Areas to receive compacted fill shall be graded to prevent surface runoff and ponding.

3.02 SOIL EXCAVATION AND HANDLING PROCEDURE

A. All soil excavated from the designated soil excavation areas will be excavated and handled according to the following procedures:

1. Use visual identification to segregate clean cover soil, where applicable. The visually identified clean top cover soil will be stockpiled in an area which does not interfere with the progress of the work either inside or outside the cap area on the ground in such a manner which protects the stockpiled soil from accumulating excessive moisture. Stockpile material in accordance with Specification 02445.
2. Excavate visually stained soil and stockpile on prepared soil storage pad in approximately 300 to 500 CY piles. The Engineer shall take samples from each pile and composite them for analysis for total PCBs (3 day laboratory turnaround for sample results or onsite PCB test kits used). If the analytical results show the soil to contain less than 10 PPM total PCBs, the soil will be removed from the pad and stockpiled on the ground inside the area to be capped for storage while awaiting backfill or immediately used as backfill within the area to be capped. If the soil shows PCB's greater than 10 PPM, the soil will be taken to the soil processing area for Soil Solidification/Stabilization (S/S) Treatment.
3. Once in the soil processing area, soil will be solidified/stabilized according to the procedures established in the Pilot Scale Testing (Section 02445) and then immediately placed in the proposed cap area and compacted.
4. The Engineer shall perform confirmatory sampling of the excavation bottom and sides for total PCBs and excavate additional sludge/soil, if necessary, as directed by the Engineer in accordance with the Sampling and Analysis Plan.
5. If the Contractor plans to backfill a portion of excavation areas 1 and 2, as shown on the Contract Drawings, prior to excavating all of areas 1 and 2, the Contractor shall submit for the Engineer's approval a plan to keep clean backfill placed below the water table from becoming recontaminated.

B. Equipment used for the excavation of contaminated material shall be decontaminated prior to its reuse on clean material. Equipment shall also be decontaminated between distinct areas of contamination regardless of the type of contamination.

C. The Contractor shall excavate to the lines and grades shown on the Contract Drawings. The final extent of excavation shall be determined by confirmatory sampling performed by the Engineer. The Contractor shall allow a minimum of 24 hours for results of confirmatory sampling performed by the Engineer. The extent and depth of additional excavation, if required, shall be determined by the Engineer.

D. The Contractor shall establish exclusion zones for each work area in accordance with the health and safety requirements.

E. Transportation of excavated materials shall be performed in a manner that will prevent spills and the spread of contamination. Containers used for transportation shall be lined to prevent spillage of liquids.

F. Excavation shall be performed in a manner that prevents migration of contaminants from one area to another. Contamination that spreads beyond the existing contamination limits shall be removed at the Contractor's expense.

G. The Contractor shall not over-excavate any area without prior approval of the Engineer. Excavation, disposal, and backfilling costs due to unapproved over-excavation shall be at the Contractor's expense.

H. Conduct excavation operations to provide continuous drainage and minimal ponding. Direct surface water away from the excavation areas. Surface water and groundwater seepage which collect in the excavation areas shall be removed, treated if needed, and properly disposed in accordance with New York State discharge limits.

3.03 CLASSIFICATION OF EXCAVATED MATERIAL

A. Classifications of excavated materials are as follows:

1. Common Excavation - "Common excavation" shall include all excavation except "rock excavation." All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered "common excavation." All boulders and detached pieces of solid rock, concrete, or masonry less than 1 cubic yard in volume shall be classified as "common excavation."

3.04 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.

B. Excavate subsoil required to accommodate access roads, construction operations, and culverts.

C. Excavate as required to accommodate access roads, ditching, site structures, construction operations, and piping.

D. Banks are to be shored or machine-sloped to an angle which is safe for the specific material in which the excavation is made.

E. Excavations shall not interfere with the normal 45 degree bearing splay of foundations. Undercutting of excavation faces will not be permitted.

F. Grade the top perimeter of excavations to prevent surface water from draining into the excavation.

G. Hand trim excavations to the required undisturbed subgrade. Remove loose matter.

H. Remove lumped subsoil, boulders, and rock under 1 cubic yard. Refill voids with concrete or compacted gravel/crushed stone.

I. Notify the Engineer of unexpected subsurface conditions, or of questionable soils encountered at required subgrade elevations, and discontinue work in the area until notified to resume work.

J. Should the Contractor, through negligence or otherwise, carry his excavation below the designated subgrade, structural backfill or unclassified backfill (material type dependent on the nature of work), shall be furnished and placed as backfill in sufficient quantities to reestablish the designated subgrade surface. Refer to Section 02223 - Backfilling for backfill materials. Granular material used for backfilling shall be spread and compacted in conformance with the requirements of Section 02228, and to the percentage compaction outlined therein. The cost of this over excavation and refilling operation, including any tests associated therewith, shall be borne by the Contractor.

K. Stockpile excavated material in areas designated by the Contractor and approved by the Engineer in advance.

3.05 TRENCH EXCAVATION

A. Trenches for drainage, utilities, piping shall be excavated and maintained as shown on the Drawings and specified in this Section. As specified in this section, trench widths shall be held within the minimum and maximum limits shown on the Drawings. If a prefabricated, mobile shield is utilized in lieu of conventional sheeting and bracing in pipe trenches, the bottom of the shield shall be maintained as high as possible (preferably above the spring line of the pipe) so as to prevent disturbance of the pipe foundation material and to avoid forces which would tend to pull pipe joints apart when the shield is dragged forward. Gouged openings or troughs left by the shield shall be filled with additional pipe foundation material and thoroughly compacted. Installation of sheeting and bracing and use of mobile shields shall be in complete accordance with all details of applicable codes, rules and regulations including all applicable local, State and Federal regulations including the Occupational Safety and Health Act (OSHA).

B. Excavation shall be such that a flat bottom trench of allowable width is established at the required subgrade elevation for subsequent installation of pipe foundation material.

C. If indicated on the Drawings or when required as a result of unsuitable soil conditions, trench excavation shall be carried below the required subgrade and a special pipe foundation installed in conformance with the Contract Documents. In any event, operations shall result in stable trench walls and a stable base free from standing water, consistent with trench width requirements.

D. Bedrock, boulders and cobbles greater than 6 inches shall be trimmed back or removed on each side of the trench so that no rock protrudes within 6 inches of the installed pipe. Rock shall also be trimmed back across the bottom of the trench so that no rock, boulder or cobble protrudes within 4 inches of the installed pipe.

E. In general, trenches shall not be opened for more than 50 feet in advance of installed pipe. Excavation of the trench shall be fully completed at least 5 feet in advance of pipe laying operations. No more than 40 feet of trench shall be left open overnight.

3.06 DISPOSAL OF MATERIAL

A. All excavated material shall be classified as surplus material and disposed in an onsite location approved by the Engineer.

B. Reuse of excavated material as onsite fill shall conform with Section 02223.

3.07 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

B. Provide for visual inspection of bearing surfaces.

3.08 PROTECTION OF EXCAVATIONS

A. Protect excavations by methods required to prevent cave-ins or loose soil from falling into excavation.

B. All excavations shall be properly and legally maintained while they are open and exposed. Sufficient and suitable barricades, warning lights, flood lights, signs, etc., to protect life and property shall be installed and maintained at all times until the excavation has been backfilled and graded to a safe and satisfactory condition.

C. Protect the bottom of excavations and soil adjacent to, and beneath, foundations from freezing.

D. Exposed subgrade surfaces shall remain undisturbed, drained, and maintained as uniform areas shaped to receive the foundation components of the structure.

END OF SECTION 02222

SECTION 02223

BACKFILLING

PART 1 - GENERAL

1.01 DESCRIPTION

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all backfilling as described herein or shown on the Contract Drawings.

A. Work included in this section:
   1. Site filling and backfilling.
   2. Fill under culverts and access road.
   3. Classification of materials.

B. Related work specified in other sections:
   1. Section 02222 - Excavation
   2. Section 02228 - Compaction

1.02 SUBMITTALS

A. For each material proposed, notify the Engineer of the source of material and furnish for approval a certified gradation analysis at least 10 days prior to date of anticipated use of such material. Except as specified herein, only offsite approved materials shall be utilized.

1.03 QUALITY ASSURANCE

A. Referenced standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.
   1. ASTM D2487 - Classification of Soil.
   2. ASTM D698 - Standard Proctor Compaction.
   3. ASTM D854, D2216 - Physical Property of Soils
   4. ASTM D4318 - Atterburg Limits.
   5. ASTM D136 - Method for Seive Analysis of Fine and Coarse Aggregates

B. Alcoa and the Engineer reserve the right to inspect proposed sources of offsite granular material and to order such tests of the materials deemed necessary to ascertain its quality and graduation of particle size. The Contractor shall, at his own expense, engage an approved testing laboratory to perform such tests, and submit certified test results to the Engineer. If similar tests of the material from a particular source were performed previously, submit results of these tests to the Engineer for consideration.

C. No materials shall be used on this project for fill, backfill, subbase, or other purpose until approval is obtained from the Engineer. Only material from approved sources shall be used.

PART 2 - PRODUCTS

2.01 ONSITE INPACTED MATERIALS

A. Material under this classification includes: excavated soil with PCB concentrations between non-detect and 10 ppm; and soil that has been treated by the S/S process. Onsite impacted materials will only be backfilled within the cap area. The Contractor shall backfill the onsite impacted material to the specified lines and grades per the Contract Drawings.

2.02 OFFSITE MATERIALS

A. Offsite material required for fill or backfill shall be natural material, from offsite sources, free from trash, debris, deleterious materials, snow, ice, or soils that contain detectable levels of PCBs, including topsoil under sections 02910 and 02990. The Contractor shall test all proposed offsite materials for PCBs by USEPA Method SW-846 in accordance with the Quality Assurance/Quality Control Plan. The testing frequency shall be one sample per 5,000 cubic yards of each material or a minimum of one sample per borrow source. The Engineer shall witness the sampling. Only materials with no detectable levels of PCBs shall be brought to the site.

B. STRUCTURAL BACKFILL/CRUSHED AGGREGATE shall conform to NYSDOT for Type 4 granular fill materials. Materials furnished for Type 4 shall consist of stone, or sand and gravel or blends of these materials. Materials furnished shall be well graded from fine to coarse and shall be free of mud, debris, organic matter or other deleterious materials.

Gradation for Type 4 structural fill/crushed aggregate shall conform to:

Sieve Size Designation	Percent Passing By Weight
2 inch	100
No. 40	20-65
No. 200	0-10

C. UNCLASSIFIED FILL OR BACKFILL shall be materials classified in ASTM D 2487 as GW, GP, GC, SW, SP, SM, SC, and CL and shall be free from roots and other organic matter, trash, debris, frozen materials, and stone larger than 2 inches in any dimension. Additionally, any material classified as SM shall have not more than 25 percent by weight passing the No. 200 sieve. CL soils shall have a liquid limit no greater than 30 and a plasticity index no greater than 15.

D. Unsatisfactory Materials: Unsatisfactory materials shall be materials that do not comply with the requirements of satisfactory materials. Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials, stones larger than 2 inches, and materials classified in ASTM 02487 as PT, GM, ML, MH, CH, OH, and OL. Unsatisfactory materials also include man-made fills, or refuse.

PART 3 - EXECUTION

3.01 GENERAL BACKFILLING REQUIREMENTS

A. Verify that fill materials to be used are acceptable to that specified. Any crushed stone stockpiles which have undergone excessive particle segregation shall be removed prior to backfilling.

B. Verify that all subsurface installations for the project have been inspected and are ready for backfilling.

C. Generally, compact subgrade to density requirements for subsequent backfill materials. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with a material as specified in Part 2 (above) and compact to density equal to or greater than requirements for subsequent backfill material.

D. Backfill spaces shall be inspected prior to backfilling operations and all unsuitable materials, including sheeting, bracing forms and debris, shall be removed. Remove all water, snow, and ice and debris from surfaces to accept backfill material. No backfill shall be placed against foundation walls of structural members unless they are properly shored and braced or of sufficient strength to withstand lateral soil pressures.

E. Onsite backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed. Stones larger than 12 inches in any dimension shall be removed or broken. Stones shall not be allowed to form clusters with voids. If the Contractor fails to stockpile and protect onsite excavated material acceptable for backfill, then the Contractor shall provide an equal quantity of acceptable offsite material at his own expense.

F. Backfilling shall be started as soon as practicable and after structures or pipe installations have been completed and inspected, concrete has acquired 70 percent of design strength, and subgrade waterproofing materials have been in place for at least 48 hours. Backfilling shall be carried on expeditiously thereafter. Backfill shall be started at the lowest section of the area to be backfilled. Natural drainage shall not be obstructed at any time.

G. No backfill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments when placed. No calcium chloride or other chemicals shall be added to prevent freezing. Material incorporated in the backfilling operation which is not in satisfactory condition shall be subject to rejection and removal at the Contractor's expense.

H. Backfill material shall not be placed when moisture content is more than two percent above optimum or is otherwise too high to allow proper compaction. When material is too dry for adequate compaction, water shall be added to the extent necessary. Maintain within two percent of optimum moisture content of backfill materials to attain required compaction density. Rough grade all backfilled and filled areas to meet subsequent topsoiling or paving requirements. Make grade changes gradual. Blend slopes into level areas.

I. Backfill areas to required contours, grades, and elevations.

J. Hydraulic compaction by ponding or jetting will not be permitted except in very unusual conditions and then only upon written request and demonstration of its effectiveness by the Contractor and the written acceptance by the Engineer.

K. Place and compact fill materials in continuous layers to meet appropriate requirements of Table 1 of Section 02228, Compaction.

L. Employ a placement and compaction method consistent with Section 02228 that does not disturb or damage adjacent walls, drainage systems, damp-proofing, waterproofing, protective coverings, utilities in trenches, underground conduits or tanks.

M. Remove surplus backfill materials from site and/or place in an area acceptable to the Engineer.

3.02 TOLERANCES

A. Top Surface of General Backfilling - plus or minus one inch from required elevations.

3.03 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01400.

B. Tests and analysis of fill material will be performed in accordance with Section 02228.

C. Compaction testing will be performed in accordance with Sections 01400 and 02228.

D. If tests indicate the Work does not meet the specified requirements, the Contractor shall remove, replace and retest the work at his own expense.

E. Proof roll compacted fill surfaces under gravel access road.

3.04 PROTECTION OF FINISHED WORK

A. Regrade and recompact fills subjected to vehicular traffic.

END OF SECTION 02223

SECTION 02228

COMPACTION

PART 1 - GENERAL

1.01 DESCRIPTION

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all compaction as described herein or shown on the Contract Drawings.

A. Work included in this section:
   1. Compaction requirements.
   2. Compact all subgrades, foundations, replaced, filled and backfilled material as specified.

B. Related work specified in other sections:
   1. Section 02222 - Excavation
   2. Section 02223 - Backfilling
   3. Section 02260 - Soil Cover Construction
   4. Section 02269 - QA/QC for Soil Cover Soil Material
   5. Section 02501 - Gravel Access Road
   6. Section 02727 - Drainage Piping
   7. Section 02990 - Finish Grading, Topsoil, and Seeding

1.02 QUALITY ASSURANCE

A. The Engineer shall provide in place moisture-density testing to verify the Contractor's work quality.

B. The Contractor shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the structures and piping to be placed thereon, or therein, without damage to the new or existing facilities.

C. The natural subgrade for all footing, mats, slabs-on-grade for structures, or pipes shall consist of firm undisturbed natural soil, at the grades shown on the drawings.

D. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.
   1. This compaction shall be limited to that required to compact loose surface material and shall be terminated in the event that it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.
   2. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

1.03 SUBMITTALS

A. Submit in writing a description of the equipment and methods proposed to be used for compaction.

B. Submit samples of materials to be compacted on the project to the Engineer for analysis prior to beginning compaction.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 PREPARATION

A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.

B. Proof-roll all subgrade surfaces to accept fill or backfill material.

C. Each layer of fill or backfill shall be compacted to the specified density the same day it is placed.
   1. The moisture content of backfill or fill material shall be adjusted, if necessary, to achieve the required degree of compaction.

D. Compact each lift in accordance with Table 02228-1 (attached at end of section).

E. Match compaction equipment and methods to the material and location being compacted in order to obtain the specified compaction, with consideration of the following guidelines:
   1. Vibratory compaction is preferred for dry, granular materials.
   2. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.
   3. Hydraulic compaction by pounding or jetting will not be permitted except in unusual conditions, and then only upon written approval by the Engineer and after a demonstration of effectiveness.
   4. Backhoe mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self propelled vibratory compactors or static rollers.
   5. For plastic pipelines (PVC, PE or PB) do not compact directly over the center of the pipe until the backfill has reached 2 feet above the top of the pipe.
   6. Compaction of relocated waste material shall be performed by making a minimum of three passes with a vibratory sheepsfoot roller. The roller shall weigh a minimum of 23,000 pounds.

3.02 FIELD QUALITY CONTROL

A. Material Testing

1. The Engineer reserves the right to order testing of materials at any time during the work.
2. Testing will be done by a qualified, independent testing laboratory in accordance with this Section and Section 01400, Quality Assurance and Quality Control Services. The Engineer shall pay for all compaction testing performed by the testing laboratory.
3. The Contractor shall aid the Engineer in obtaining representative material samples to be used in testing.
4. For each material which does not meet specifications, the Contractor shall reimburse Alcoa for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.
5. The Contractor shall anticipate these tests and incorporate the time and effort into his procedures.

B. Compaction Testing

1. The Engineer shall conduct in-place density tests of compacted lifts.
2. Testing may be conducted for every 200 cubic yards of fill or backfill, or every 75 linear feet of trench backfill placed.
3. The Contractor shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Engineer if an area has been covered without approval or is suspected of not meeting the specifications.
4. For each test which does not meet the specifications, the Contractor shall pay for the cost of the test and shall replace all material included in that lift or sector with acceptable material and compact to specification, at no additional compensation.
5. The Contractor shall anticipate these tests and incorporate the time and effort into his procedures.
6. Nuclear moisture density testing by "probe" methods will be acceptable for compacted layers not exceeding 8 inches of thickness.
   a. Only certified personnel will conduct nuclear testing.
7. The Contractor shall be responsible for all subgrade repairs prior to fill placement.

C. Alternate Methods of Compaction - The Contractor may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Engineer's satisfaction.

3.03 PROTECTION

A. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth-drum roller if necessary to eliminate ridges of soil and depressions left by tractors or equipment used for compaction or installing the material.

B. As backfill progresses, the surface shall be graded so as to drain during incidence of rain such that no ponding of water shall occur on the surface of the fill.

C. The Contractor shall not place a layer of fill on snow, ice or frozen soil Unsatisfactory materials shall be removed prior to fill placement.

-- END OF SECTION 02228 --

TABLE 02228-1
MINIMUM COMPACTION REQUIREMENTS

Construction Element	Maximum Compaction Layer Thickness (Inches)	Minimum ASTM	Minimum Compaction
I. Structures			
a. Fill under slabs-on-grade, and backfill around structures and above footings	8	D698	100%
II. Trenches			
a. Fill under pipelines and pipe bedding	8	D698	95%
b. Pipe sidefills and first 1 foot of pipe backfill under pavements[1]	12	D698	95%
c. Backfill from 1 foot above pipe to top of trench under pavement[1]	18	D698	95%
d. Backfill under areas to be seeded	18	D698	85%
e. All other trenches	18	D698	85%
III. Embankments and Fills			
a. Rough site grading and backfilling of sorts beneath area to be capped.	12	D698	95%

Compactio

TABLE 02228-1 (continued)

MINIMUM COMPACTION REQUIREMENTS

Construction Element	Maximum Compaction Layer Thickness (Inches)	Minimum ASTM	Compaction
IV. Access Gravel Roadway			
a. Crushed stone paving	12	D698	100%
V. Soil cover layers			
Relocated Waste	12	--	3 passes
Drainage Layer[3]	12	D698	90% (95% maximum)
Barrier Protection Layer	12	D698	90%
Topsoil Layer	6	-- See Section 02990	

Notes:

1. For plastic or polyethylene pipe, use 2 feet over top of pipe.
2. A permeability of 1×10^{-7} cm/sec must also be achieved.
3. Do not overcompact drainage layer as the permeability may be adversely affected.
4. Material will be compacted with a vibratory roller compactor weight 20 tons or more.

SECTION 02260

SOIL COVER CONSTRUCTION

PART 1 - GENERAL

1.01 DESCRIPTION

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform the construction of the landfill cover layers described herein or as shown on the Contract Drawings.

A. Work included in this section:
   1. Drainage layer.
   2. Barrier Protection layer.
   3. Topsoil layer.

B. Related work specified in other sections:
   1. Section 01564 - Erosion Control
   2. Section 02100 - Site Clearing
   3. Section 02222 - Excavation
   4. Section 02223 - Backfilling
   5. Section 02228 - Compaction
   6. Section 02269 - QA/QC for Soil Cover Materials
   7. Section 02405 - Polyethylene Geomembrane
   8. Section 02445 - Stabilization/Solidification
   9. Section 02990 - Finish Grading, Topsoil, and Seeding

1.02 QUALITY ASSURANCE

The Contractor shall have successfully completed at least two landfills of equal or larger size, one of which involved the placement of a low permeability soil layer or barrier protection layer.

1.03 SUBMITTALS

A. Submit one series of certified quality control tests for each cover soil material for the Engineer's approval. Include a 50-pound sample and identify the source and location of each material. Resubmit as needed to obtain approval.

B. Submit a list of compaction equipment to be used including the manufacturer, model name and/or number, type, gross weight, and areal loading.

C. Submit written certification from the geomembane installer that he has examined the materials to be in contact with the geomembrane and found them to be compatible.

D. Submit a list of at least two successfully completed projects of equal or larger size and or similar construction.

1.04 DELIVERY, STORAGE, AND HANDLING

Material stockpiles shall be segregated by type of material and shall be stored and handled to prevent inclusion of objectionable material such as trash, debris, organic matter, unapproved materials, stones, ice, snow, or other materials.

PART 2 - PRODUCTS

2.01 DRAINAGE LAYER

The drainage layer material shall be a mixture of sand and gravel meeting the following requirements:

Gradation

Sieve Size	% Passing
1-inch	100
3/4 - inch	85-100
#4 sieve	30-60
#40 sieve	5-25
#100 sieve	5-20
#200 sieve	≤5
Type of Sample	(cm/sec)
Hydraulic Conductivity	$\leq 1 \times 10^{-2}$

2.02 COVER SOIL LAYER (BARRIER PROTECTION LAYER)

The cover soil material shall conform to the following requirements:

Gradation

Sieve Size	% Passing
3 inch	100
#4	85
#200	0-60
.002	0-10

Requirements specified in Section 02223 - Backfilling shall also be adhered to.

2.03 TOPSOIL LAYER

Refer to Section 02990 for specifications relating to finish grading, topsoil, and seeding.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

A. The subgrade elevations shown on the Contract Drawings shall be achieved by the excavation of contaminated soil as per Section 02222. The subgrade elevations may vary due to variation in the quantities of relocated waste and soil. Final subgrade slopes shall be between 4 and 20 percent which is in accordance with 6NYCRR Part 360 regulations for landfill closures.

B. Prior to construction of the cover layers, the subgrade shall be proof-rolled using a roller of not less than 23,000 pounds. The Engineer shall observe the proof-rolling and also make determinations of unsuitable subgrades. Unsuitable subgrades shall be excavated in one-foot increments up to a maximum of three feet. The subgrade shall be proof-rolled and re-inspected by the Engineer after each increment until accepted. The excavation shall be backfilled and compacted with barrier protection material, or stable waste material.

3.02 SEQUENCING AND SCHEDULING

A. The Contractor shall be responsible for the installation, sequencing, and scheduling of testing of all cover components.

B. The Contractor shall verify that the subgrade and each cover component has been properly installed, graded, tested, and had the test results accepted as required prior to the installation of subsequent cover components. The Engineer must approve the prior lift surface prior to the installation of subsequent lifts.

C. The Contractor shall be responsible for the layout and protection of a 50-foot survey grid system to be used for identifying all testing locations, seam locations, and panel locations, as required in individual specification services.

D. The Contractor shall notify the Engineer a minimum of 24 hours in advance of required QA/QC testing.

3.03 INSTALLATION (GENERAL)

A. Each lift shall be placed and compacted in uniform lifts in accordance with Section 02228. Employ compaction equipment and methods which will achieve the specified permeabilities and compaction.

B. Employ placement and compaction methods which will not damage previously installed cover layers or geosynthetics and are acceptable to the Engineer. A minimum of three feet of soil shall

be maintained over the geomembrane for wheeled vehicles. Low ground pressure (LGP) tractor-type equipment shall be used to place materials within three feet of the geomembrane.

C. Maintain proper grading and compaction of each cover layer to maintain drainage and prevent ponding. Areas compacted with a sheepfoot roller shall be proof-rolled or back-bladed to a smooth surface each night to prevent infiltration and ponding and to maintain drainage.

D. Do not place materials on spongy, porous, wet or frozen ground or while in a frozen condition.

E. Calcium chloride or other chemicals shall not be used to prevent freezing.

F. QA/QC testing shall be conducted in accordance with Section 02269.

3.04 INSTALLATION (COVER SOIL)

A. Cover soil material shall have all clods and clumps broken down to no larger than 2-inch maximum dimension.

B. If the cover soil is placed on a previously compacted lift, the surface shall be scarified to a nominal depth of 1-inch.

C. Should the soil become overly dry, sprinkle the soil with water, with equipment that shall sufficiently and evenly distribute the water. Sufficient equipment to furnish and blend the required water shall be made available by the Contractor at all times. This work shall be performed at the Contractor's expense.

D. Should the soil be too wet to permit proper compaction, all work on the portions of the soil liner thus affected shall be delayed until the material has dried to the required moisture content. Drying of the soil by manipulation may be necessary to obtain the proper moisture content throughout the material for compaction to achieve the specified permeability. This work shall be performed at the Contractor's expense.

END OF SECTION 02260

SECTION 02269

QUALITY ASSURANCE/QUALITY CONTROL SOIL COVER MATERIALS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included in this section:

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all QA/QC requirements for the landfill cover only as described herein or shown on the Contract Drawings. The quality assurance/quality control requirements, including sampling frequency and test type; the documentation requirements for the sampling and testing; and the requirements for failed quality control tests.

B. Related work specified in other sections:

1. Section 02222 - Excavation
2. Section 02223 - Backfilling
3. Section 02228 - Compaction
4. Section 02260 - Soil Cover Construction
5. Section 02990 - Finish Grading, Topsoil, and Seeding

1.02 SUBMITTALS

A. The Contractor shall submit one series of quality control tests for each soil material for the Engineer's approval prior to use of that material.

The test reports shall include, at a minimum, the sample number, the location of the sample, the quantity of material represented by the sample, the location of the overall quantity represented by the sample, the test methods used, the name of the technician conducting the tests, and a signed certification from the laboratory. Each certificate shall be signed by an authorized representative of the testing firm, such as the laboratory manager, who will certify that sampling and test methods were performed in accordance with those described for this work. Each certificate shall reference the test sample number.

1.03 REFERRED STANDARDS

A. ASTM D-75, "Standard Practice for Sampling Aggregates".

B. ASTM D-422, "Standard Test Method for Particle-Size Analysis of Soils".

C. ASTM D-1556, "Standard Test Method for Density of Soil in Place by the Sand-Cone Method."

D. ASTM D-698, "Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 pound Rammer and 12-inch Drop."

E. ASTM D-1587, "Standard Practice for Thin-Walled Tube Sampling of Soils."

F. ASTM D-2216, "Standard Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures."

G. ASTM D-2434, "Standard Test Method for Permeability of Granular Soils (Constant Head)."

H. ASTM D-2922, "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

I. ASTM D-2974, "Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils."

J. ASTM D-3017, "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)."

K. ASTM D-3740, "Standard Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction."

L. ASTM D-4220, "Standard Practices for Preserving and Transporting Soil Samples."

M. ASTM D-4253, "Standard Test Methods for Maximum Index Density of Soils Using a Vibrating Table."

N. ASTM D-4254, "Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density."

O. ASTM D-4318, "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils."

P. ASTM D-5084, "Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter."

1.04 RESPONSIBILITIES

A. Contractor Responsibilities: The Contractor shall be responsible for and pay for one series of quality control tests for each cover soil material for the Engineer's approval. Resubmissions to obtain approval shall also be at the Contractor's expense.

The Contractor shall notify the Engineer on a daily basis and no less than 24 hours in advance of testing required. The contractor shall make available personnel or equipment as needed to assist with the testing.

B. Engineer's Responsibilities: The Engineer shall be responsible for and pay for all quality control and quality assurance testing with the exception of the initial quality control tests for material approval. The Engineer shall provide copies of all test reports to the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

Not Used

PART 3 - EXECUTION

3.01 INSPECTION

A. Maintain on the site for inspection, the information outlined in ASTM Designation D-3740.

B. Prior to beginning work, verify that the Engineer has reviewed the testing facilities.

3.02 PREPARATION

A. Verify that the areas to be tested are ready to be tested.

B. Review testing parameters, requirements, and anticipated schedules to ensure that adequate personnel and proper equipment will be available. Notify the Engineer at least 24 hours in advance of the required testing.

C. Perform audits, as needed, to evaluate construction test results and discuss with the Engineer any changes which may simplify and expedite the work.

D. Coordinate sampling and testing operations so as to have the necessary data available on a timely basis.

1. Quality control samples shall be scheduled such that test results are available at the time the sampled material is being placed and compacted.
2. Quality assurance tests should be scheduled immediately after material placement so evaluations and determinations concerning installed material can be made.

3.03 PROTECTION

A. Minimize disturbance of previous completed work during the performance of the work in this Section.

3.04 QUALITY CONTROL SAMPLING AND TESTING

A. The Contractor shall schedule quality control sampling and testing of source materials prior to the use of a specified quantity of materials to determine if mechanical characteristics and laboratory performance criteria are consistent with those required for the work, and to provide information

for use in handling, preparation and compaction activities. Quality control testing shall be performed by the Engineer.

B. Inform the Engineer of anticipated quantities and locations of excavated soil on a daily basis and no less than 24 hours in advance to enable the Engineer and the testing firm to prepare for quality control sampling and testing.

C. Based on quantity estimates, notify the Engineer when and where quality control sampling is required.

D. Quality control sampling shall be performed as follows:
   1. For material which is taken directly from its natural state to the landfill, the testing firm shall obtain a representative sample from the next proposed section of the material source, as identified by the Contractor.
   2. For material which is excavated, spread and/or worked to prepare the material, and then used for construction, the testing firm shall obtain a representative sample from the next proposed section of the material source, as identified by the Contractor.
   3. For material which is excavated and stockpiled for later use or excavated, spread and then stockpiled, the testing firm shall obtain a representative sample from the stockpile in accordance with ASTM Designation D-75.
   4. In all cases, the testing firm should visually inspect the proposed borrow material for noticeable variations in material and sample different materials separately.
   5. Mass samples shall be of sufficient quantity for the required testing. Subsamples for individual test procedures shall be extracted as required by specific test methods.
   6. All samples shall be individually labeled for identification purposes.
   7. Subsample labels shall denote the sample from which they were derived.

E. Quality control testing shall be performed as follows:
   1. The minimum frequency of testing and test methods used shall be in accordance with Table 02269-1 at the end of this section.
   2. Samples which must be tested offsite shall be handled in accordance with ASTM Designation D-4220.
   3. Permeability testing of drainage layer material shall be performed at 95% of its maximum dry unit weight as determined by the modified Proctor or relative density analysis.

3.05 QUALITY ASSURANCE SAMPLING AND TESTING

A. Quality assurance sampling and testing of compacted soil materials shall be performed by the Engineer after a specified quantity of material has been prepared, placed, and compacted to verify that compaction requirements have been met and that the resulting field performance criteria are consistent with those obtained from quality control testing and those required for the work.

B. Inform the Engineer of anticipated quantities and locations of placed and compacted material on a daily basis and no less than 24 hours in advance to enable the testing firm to prepare for quality assurance sampling and testing.

C Quality assurance testing and sampling shall be performed as follows:

1. The minimum frequency of testing and the test methods to be used are listed in Table 02269-2 at the end of this section.
2. Depending on the nature of the drainage material, field compaction verification testing may be waived and visual observation of compaction may be substituted. A written request with supporting documentation shall be submitted to, and written approval received from the Engineer, prior to a change in the Quality Assurance Program.
3. Penetrations in the barrier protection layers shall be filled with the same material and compacted.

3.06 SPECIAL CONDITIONS

A. Failed Tests

1. Acceptable soil shall be defined as soil which lies between consecutive sample locations which produced test results meeting all applicable specifications.
2. In the event that a quality control test result does not meet specifications, the material from which the sample was taken, and which the sample represents, shall be considered unacceptable and shall not be used for construction.
   a. The Engineer may take and test additional samples about the failed sample to limit the area represented by the failed sample at the expense of the Contractor.
   b. The Contractor may amend the soil as he deems necessary and retest the soil. The amendment shall be documented by a certified soil testing laboratory at the expense of the Contractor.
3. In the event that a quality assurance test does not meet specifications, the area represented by the failed sample shall be considered unacceptable and shall be removed and replaced with an equivalent amount of acceptable material at no additional compensation.
   a. The Engineer may take and test additional samples about the failed sample to limit the area represented by the failed sample, at the expense of the Contractor.

TABLE 02269-1
QUALITY CONTROL
FREQUENCY OF TESTING

Test [1]	Method	Drainage Layer	Barrier Protection Layer	Topsoil Layer
Particle Size Analysis	ASTM D-422	1/500 cy	1/2,500 cy	1/2,500 cy
Standard Proctor Analysis [2]	ASTM D-698	1/2,500 cy	1/2,500 cy	N/A
Permeability	ASTM D-2434	1/500 cy	N/A	N/A
Moisture Content	ASTM D-2216	N/A	1/2,500 cy	N/A
Organic Content	ASTM D-2974	N/A	N/A	1 / 2,500 cy
PCBs	EPA Method 8080	1 / 2,500 cy	1 / 2,500 cy	1 / 2,500 cy
Soil pH	ASTM D4922	N/A	N/A	1 / 2,500 cy

(1)Testing shall also be performed at noticeable changes in material, such as different borrow piles.

(2)Perform minimum/maximum density testing (ASTM D-4253 and ASTM D-4254) for material not meeting the oversize correction requirements of the Standard Proctor Analysis (ASTM D-698).

N/A = Not Applicable

TABLE 02269-2
QUALITY ASSURANCE
FREQUENCY OF TESTING

Test	Method	Drainage Layer	Barrier Protection Layer	Topsoil Layer
In Place Density (Nuclear)	ASTM D-2922	10/acre/lift	10/acre/lift	N/A
Moisture Content (Nuclear)	ASTM D-3017	10/acre/lift	10/acre/lift	N/A
In Place Density (Nuclear)	ASTM D-1556	10/acre/lift	10/acre/lift	N/A
Moisture Content (Sand cone)	ASTM D-1556	10/acre/lift	10/acre/lift	N/A

END OF SECTION 02269

SECTION 02275

RIPRAP

PART 1 - GENERAL

1.01 DESCRIPTION

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to provide and place riprap as described herein or shown on the Contract Drawings.

A. Items included in this section:
   1. Riprap requirements for shoreline protection, ditches, and outfall structures

B. Related work specified in other sections:
   1. Section 01564 - Erosion Control
   2. Section 02222 - Excavation
   3. Section 02223 - Backfilling

1.02 SUBMITTALS

A. Submit the name and location of the source of stone used.

B. Submit test reports on the materials including sieve analysis, freeze-thaw and magnesium sulfate soundness. Provide proof that the material is New York State Department of Transportation (NYSDOT) approved.

PART 2 - PRODUCTS

2.01 GENERAL

A. Riprap shall be clean, hard, durable, angular stone as delivered from an offsite source.

B. Riprap shall be free from organic matter, trash, debris, shale, show, ice, and other frozen or mechanically deleterious materials.

C. Riprap shall be hard enough to withstand exposure to air, water, freezing, and thawing.

2.02 RIPRAP

A. Riprap shall meet the gradation requirements for NYSDOT stone fill (riprap), item #620-2.02. Gradation shall be as follows:

Stone Filling Item	Stone Size [1]	Percent of Total by Weight
Fine	Smaller than 8 ins. Larger than 3 ins. Smaller than No. 10 Sieve	90 - 100 50 - 100 0 - 10
Light	Lighter than 100 lbs. Larger than 6 ins. Smaller than ½ in.	90 - 100 50 - 100 0 - 10
Medium	Heavier than 100 lbs. Smaller than 4 ins.	50 - 100 0 - 10
Heavy	Heavier than 600 lbs. Smaller than 6 ins.	50 - 100 0 - 10

PART 3 - EXECUTION

3.01 PLACEMENT

A. The Contractor shall place the riprap in accordance with NYSDOT Specification 620-3.02 in the locations shown on the Drawings. The subgrade surface on which the riprap is to be placed shall be cut or filled, graded, and compacted to the lines and grades shown on the Drawings and as necessary to provide an even surface.

B. The stone fill shall be placed in a manner that will minimize damage to the underlying geotextile and produce a reasonable well-graded mass of stone with smaller stone fragments filling the space between the larger ones, so as to result in the minimum practicable percentage of voids.

C. The final section of riprap shall be in conformance with the lines, grades, and thicknesses shown on the plans. Riprap used for bank or channel protection shall be placed to its full course thickness in one operation, unless otherwise directed by the Engineer or specified in the special provisions, and in such a manner that the underlying material will not be displaced or worked into the layer of riprap.

D. Placement of stone upon finished bedding material, when used, shall be carefully controlled to avoid disruption and damage to the layer of bedding material. The stone shall be so placed and distributed that there will be no pockets of uniform size material.

E. The desired distribution of the various sizes of stone throughout the mass shall be obtained by selective loading of the material at the quarry of other source; by controlled dumping of successive loads during final placing or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent neeessary to secure the specified results

F. The riprap shall be placed starting at the bottom of the placement areas and proceed to the top, or in such a manner that stones will not slide or roll down during their placement. On slopes, the largest stones shall be placed at the bottom of the slope.

G. The ground surface on which channel protection is to be placed shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface. Do not place riprap over frozen or spongy subgrade surfaces.

H. Riprap shall be placed to allow the weight of the stone to be carried by the underlying material and not by the adjacent stones.

END OF SECTION 02275

SECTION 02405

POLYETHYLENE GEOMEMBRANES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work specified herein consists of the furnishment and placement of a textured 40-mil linear low density polyethylene (LLDPE) geomembrane on the site as shown on the Contract Drawings. The work shall include the furnishing of all labor, supervision, equipment, materials, small tools, seaming devices, and quality control devices to install a complete and watertight geomembrane.

B. Related work specified in other sections:
   1. Section 01400 - Quality Assurance and Quality Control
   2. Section 02222 - Excavation
   3. Section 02223 - Backfilling
   4. Section 02228 - Compaction
   5. Section 02260 -Soil Cover Construction
   6. Section 02269 - QA/QC for Soil Cover Soil Materials

1.02 SUBMITTALS

A. To be submitted prior to construction:
   1. Manufacturer
      a. The name of the intended membrane manufacturer and the geomembrane type to be supplied.
      b. The manufacturer's quality control program or descriptive documentation.
      c. Test results indicating the typical minimum average roll values of the geomembrane which meet or exceed those listed in Table 02405-1 at the end of this section.
      d. Samples of the geomembrane (4 @ 8 x 10 inch).
   2. Manufacturer's Quality Control Submittals:
      a. The origin and identification of the raw materials used to manufacture the geomembrane including the supplier's name, production plant, brand name, and type.
      b. Copies of quality control certificates issued by the producer of the raw materials.
      c. Test reports for specific gravity and melt flow index, to verify the quality of the raw materials used.
      d. Copies of quality control certificates for each roll of geomembrane identifying: a) the date of manufacture and identification number; b) that each roll was continuously inspected for uniformity, damage, imperfections, holes, cracks, thin spots, foreign materials, tears, punctures, and blisters; and c) that non-destructive seam testing was performed on all fabricated seams over their full length. Include copies of tests for seam testing.
      e. Copies of destructive seam testing performed on a minimum of two samples per blanket taken from extra material at the beginning or end of blanket seams such that the blanket is not damaged or its geometry changed. Testing is to be performed by an independent laboratory.

f. Certification that the geomembrane does not exceed the specified a maximum coefficient of permeability of 1x10-11 cm/s for LLDPE.

g. A compatibility report and certification that the LLDPE membrane will not degrade due to the wastes in the landfill.

3. Installer
   a. The name of intended installer including the company name, field crew foreman, and seaming foreman.
   b. A list of at least ten projects completed by the intended installation company using similar membranes which total a minimum of 100 acres. For each project identify the name and purpose of the facility, location, completion date, owner, designer, installer, point of contact and phone number, total square footage, and geomembrane type and thickness, and seaming method used.
   c. A list of at least five projects completed by the installer's field crew foreman using the same geomembrane which total a minimum of 50 acres. For each project identify the name and purpose of the facility, location, completion date, owner, designer, installer, point of contact and phone number, total square footage, and geomembrane type and thickness, and seaming method used.
   d. A list of at least three projects completed by the installer's seaming foreman using the same geomembrane which total a minimum of 50 acres. For each project identify the name and purpose of the facility, location, completion date, owner, designer, installer, point of contact and phone number, total square footage, and geomembrane type and thickness, and seaming method used.
4. Shop Drawings
   a. Layout of the geomembrane system showing panels, seams, and vent locations as proposed for construction.
   b. Details of seaming and welding the geomembrane material.
   c. Details of joining the geomembrane material to concrete or other dissimilar materials as required.
   d. Details of joining the geomembrane material to pipe penetrations as required.
   e. An installation schedule showing the sequence of operations, the objectives to be completed daily, including personnel, number of shifts, and capacity per shift, and the anticipated total duration required to complete the membrane.
5. Manufacturer's installation instructions, including repair procedures.
6. Quality control requirements and procedures.
7. Qualifications of the independent testing laboratory and its key personnel that the Contractor will retain to perform quality control testing. Submit a listing of the testing apparatus, testing standards typically performed, QA sampling and testing schedule, and a letter stating that the testing laboratory is independent from, and has no financial interest in, the geomembrane installer, manufacturer, or Contractor.

B. To be submitted by installer during liner installation:
   a. Copies of seaming quality assurance records which shall include apparatus temperature, extrudate temperature, if applicable, and ambient air temperature.
   b. A letter stating that the granular materials and Contractor's proposed installation methods for soil materials immediately above and below the geomembrane are acceptable for geomembrane installation.

c. Copies of quality assurance certificates and laboratory test results signed by an authorized representative of the testing firm which shall include:
   1) Panel numbers and identification.
   2) Quality assurance test locations, procedures and results.
   3) Documentation of repairs, including location and retest results.

d. Archive samples of material from each destructive seam location. Enough material shall be submitted to allow for one complete set of destructive tests for both peel adhesion and shear strength.

C. To be submitted by installer after completion of construction:

1. Record Drawings: Submit within two (2) weeks after demobilization of the liner installer from the construction site, record drawings showing the following information:
   a. Layout of geomembrane system showing panels including roll identification, destructive sample locations indexed to test results and repair disposition, and any other repairs or patches.
   b. Any deviation from previously submitted certified drawings.
2. Summary and log of the following information:
   a. Quality assurance testing performed.
   b. Ambient temperature at which seaming was performed recorded every two hours during placement and seaming.
   c. Geomembrane surface temperature recorded every two hours during placement and seaming.
   d. Seam wedge temperature, recorded every two hours during placement and seaming.

PART 2 - PRODUCTS

2.01 SHEET GEOMEMBRANE

A. The LLDPE geomembrane shall be textured both sides and have a thickness of 40 mil containing no fillers or extenders certified by the manufacturer to meet or exceed the material properties tabulated in Table -02405-1 of this Section.

2.02 EXTRUSION JOINING RESIN

A. Any resin used for extrusion welding of sheets and/or sheet to penetrations shall be LLDPE produced from the same material as the sheet resin. Physical properties shall also be the same as those of the resin used in manufacture of the geomembrane material.

PART 3 - EXECUTION

3.01 INSPECTION OF SHEET GEOMEMBRANE AT JOBSITE

A. The Engineer will visually inspect the sheet rolls as they arrive on the jobsite for possible damage in transit. If, in the opinion of the Engineer, the roll is not suitable for repair, the roll will be rejected and removed from the jobsite. As each sheet is unrolled, the Engineer will further visually inspect the sheet surfaces. The geomembrane surface shall be brushed, blown or washed

by the installation contractor if the amount of dust or mud inhibits inspection. The Engineer shall decide if cleaning of the geomembrane is needed to facilitate inspection. Sharp creases resulting from wrinkles in the material at the time of manufacture are not acceptable. All faulty areas will be repaired in an appropriate manner using methods that meet the approval of the Engineer. Repairs will be tested as described in 3.05-L of this section.

3.02 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

A. Delivery:

1. Delivery: Materials shall not be delivered to the site until the appropriate submittals of Section 1.02 of this specification have been approved by the Engineer. At such time, the manufacturer/installer may deliver the materials to the jobsite and shall unload and store materials at an area approved by the Engineer.

B. Storage and Handling:

1. Storage and handling of the materials shall conform to the manufacturer's recommendations and shall be done in such a manner as to prevent damage or deterioration to any part of the geomembrane. Further, the installer assumes the responsibility for proper storage and handling prior to and during installation of the geomembrane materials. Rolls shall be stored on a prepared surface (not wooden pallets) with no protrusions greater than 1/2 inch and shall not be stacked.
2. The membrane shall be protected from puncture, mechanical abrasions, dirt, grease, mud, moisture, excessive heat, light, or other damage. Any damage to protective wrapping shall be repaired immediately. The Installation Contractor shall be responsible for the onsite handling of all geomembrane materials. No geomembrane material shall be unloaded without the field crew foreman present.
3. When using a front end loader to handle geomembrane rolls for transport from storage to the specific installation location, the installer shall incorporate the use of nylon straps and a spreader bar assembly to lift the roll. The nylon straps are to be centered so that the roll can be lifted and remain relatively level. It will not be acceptable to drag one end of the roll during transport. A backhoe with a smooth bucket blade would be an acceptable piece of equipment for lifting the rolls. Only with the Engineer's approval, will a fork truck be used for lifting. Under no circumstances will it be acceptable to force the fork truck tongs under a roll.

C. Equipment and tools shall not damage the membrane. No vehicular equipment shall be driven directly on the membrane. Personnel working on the membrane shall not smoke and shall wear smooth soled shoes. Shoes with uneven bottoms or protrusions which may trap stones are not allowed.

3.03 PRE-INSTALLATION SUBGRADE PREPARATION

A. The surface of the site to be capped with the geomembrane shall be finish graded to the lines and grades as shown on the construction drawings. The surface for placement of the geomembrane cap shall be rolled smooth prior to installation. No standing water will be allowed. The Contractor is to certify to the Engineer that the surface on which the membrane cap is to be

installed is acceptable before commencing work. The contractor shall maintain these surfaces in an acceptable condition during installation of the membrane.

3.04 PRE-INSTALLATION CONFERENCE

B. The Contractor shall hold a pre-installation conference with Alcoa representative, Engineer, installer, and manufacturer's representative.

3.05 INSTALLATION

A. General: The geomembrane material shall be laid out and installed in accordance with the applicable approved shop drawings by crews experienced in the installation of the geomembrane. Seams directly exposed to weather should be minimized in the fabrication plans. A minimum of three feet (3') of soil for wheeled vehicles and one foot (1') of soil for tracked vehicles shall be maintained over installed geomembranes at all times. The geomembrane shall not be covered until acceptable results for both non-destructive and destructive tests have been submitted to, and approved by, the Engineer. Geomembrane rolls or panels should be placed in an orderly fashion which shall minimize or prevent surface water from flowing below an in-place geomembrane.

B. Weather Conditions: The effects of weather are critically important in obtaining a high quality installation.
   1. Field seaming is not permitted when the ambient air temperature is below 40° F (10° C) or above 100° F (38° C).
   2. Field seaming is not permitted during precipitation, fog, or in the presence of moisture.
   3. Field seaming is not permitted when winds are in excess of 20 miles per hour.

C. Lap joints will not be laid out or prepared for welding (cleaning and/or grinding) further ahead than one day's welding time. Prepared joints that have laid out over night will be recleaned and/or ground prior to welding.

D. Field seams should be oriented parallel to the line of maximum slope, i.e. oriented along, not across the slope. In corners and irregularly shaped locations, the number of field seams should be minimized. No seam should be less than five feet from the edge of the cover.

E. Slack: The geomembrane shall be installed with an adequate amount of slack to allow future temperature shrinkage of the material to occur with minimal stretching and tightening of the geomembrane. As a guideline, for every 100 ft. of surface to be covered, 3/4 inch for each 5° F of temperature differential (the difference between the installation sheet temperature and 35° F, or the average daily minimum winter temperature for the installation site, whichever is lower) should be added to the 100 foot dimension to compensate for shrinkage. Using this approach, a geomembrane installation at a sheet temperature of 75° F would provide for six inches of geomembrane for every 100 linear feet of surface to be covered. Excessively large wrinkles in the geomembrane, so large that the wrinkle could fold over and cause a sharp crease in the material under overburden pressure, shall be removed.

Cover materials shall be carefully placed over the liner to avoid stretching and folding of the geomembrane.

F. Tenting: There will be no tenting of the geomembrane at the toes of slopes or in corners at a sheet temperature of 35° F or higher. Tenting is the formation of air space beneath the geomembrane that results from temperature changes and/or improper installation.

G. Layout: It will not be an acceptable practice to "free roll" the geomembrane rolls down the slopes. The roll will be controlled as it is unrolled down slopes.

H. Extrusion Welded Field Joints: Extrusion welded field joints shall be made by overlapping adjacent sheets by five inches (minimum) and extruding a ribbon of hot extrusion resin along seams to ensure a complete weld of the joined materials. Prior to extrusion welding of the seams, all areas which are to become seam interfaces shall be cleaned of dust, dirt and moisture. The slick surfaces of the geomembrane sheet which are to become seam interfaces shall be roughened with a wire brush, fine grain sanding disk, or other acceptable means before extrudate is placed between, or at the edge of, the overlapped sheets. Sufficient extrudate shall be used to assure that a weld bead is visible at the edge of the sheet overlap. Joints between the geomembrane sheets shall be field welded using the particular manufacturer's extrusion joining apparatus and technique under suitable ambient conditions. Any joining procedure utilized shall properly prepare the surfaces and heat the geomembrane materials sufficiently with the addition of a molten bead to ensure a homogeneous and consistently fused seam. A moveable protective layer shall be used below each overlap of geomembrane during field seaming to prevent the buildup of moisture between the sheets.

I. Hot Shoe Seamed Field Joints: Hot shoe seaming joints shall be made by overlapping adjacent sheets by five inches (5") (minimum) and running a hot metal shoe wedge between the overlapped area. The controlled heating is followed by pressure/nip rollers which uniformly fuse the materials together. Prior to seaming all areas which are to become seams, interfaces shall be cleaned of dirt, dust and moisture. Depending upon the type of wedge used, a single fusion seam or a double fusion seam may be produced. In the case of the single fusion seam, testing will be conducted in the same manner as with the extrusion welded seam system. If a split wedge is used, the resulting double seam shall also be subjected to testing by air pressure as set out in Section 4 of this specification. A moveable protective layer shall be used below each overlap of geomembrane during field seaming to prevent the buildup of moisture between the sheets.

J. Welder Certification and Testing: Each welder will certify his welding equipment at the beginning of each work shift by running a sample weld on extra material and testing for peel adhesion and seam strength on at least three specimens from the weld. All specimens must pass before production welding will be allowed. Acceptable welds are when elongation occurs in the geomembrane sheeting before there is more than 1/16 inch of peel failure of the weld. A test sample will be removed and tested for peel adhesion and seam strength after every 500 feet of seam welding after every two hours of continuous welding. If the sample fails, then a sample will be taken every ten feet back along the previously welded seam until acceptable production welding is located. Weld seams designated for repair shall be done by capping the seam. If welding is stopped and the production seam is less than 500 feet, a sample will be tested to represent that footage of seam completed. Geomembrane sheets shall be placed to lay smooth and be allowed time to relax and smooth out prior to seam welding. Welding a wrinkled or rough sheet to a smooth sheet will not be an acceptable practice, nor will the welding together of two wrinkled sheets be accepted.

K. Geomembrane Penetrations: Penetrations through the geomembrane for monitoring wells, piping, support structure, inlet/outlet structures, pump pits, etc., shall be sealed using factory fabricated seals. The liner installer may submit alternate connection systems or methods which will be given full consideration by the Engineer.

A geomembrane reinforcement overlay of thickness equal to the geomembrane shall be placed around the penetration opening. The opening in the overlay shall be of the same size and configuration as the opening in the geomembrane. The overall minimum dimensions of the overlay shall be related to the geomembrane opening as follows:

Reinforcement Overlay Penetration Opening Dimension	Overall Dimension (min)	Outside Corner Radius
< 6 inches	3 feet	6 inches
6 inches to 1 foot	4.5 feet	9 inches
1 foot to 2 feet	7 feet	1.25 feet
2 feet to 3 feet	10 feet	1.75 feet
3 feet to 4 feet	12.5 feet	2.25 feet
4 feet to 5 feet	15.5 feet	2.75 feet
5 feet to 6 feet	18 feet	3 feet
6 feet to 7 feet	21 feet	3.5 feet
> 7 feet	Opening size plus 14 feet	3.5 feet

The outside edge of the overlay shall be welded to the geomembrane.

The factory fabricated seals shall not be installed until after placement of the drainage sand layer for 50 feet in all directions around each penetration to allow for shifting of the geomembrane. The area immediately surrounding each penetration shall be left open until the seal is installed and tested.

L. Repairs in Geomembrane Material: Immediately upon discovery or inspection of the installed geomembrane, all defects and damage shall be repaired in accordance with standard practices as approved by the Engineer.

Repairs of holes and test sample cutouts will be patched with a square or circular shaped precut geomembrane piece. A minimum lap of six inches is required from all cut edges or repairs. If the patch is square or rectangular shaped, the corners of the piece shall be rounded off with a minimum three inch radius of curvature. Cutting out of patch pieces from a piece of geomembrane laid directly on an already installed geomembrane sheet will not be allowed. Patches are to be cut out from pieces laid either on the ground outside the site area or upon a backup board or scrap material laid over the installed geomembrane.

Patches are to be cut out from pieces laid either on the ground outside the site area or upon a backup board or scrap material laid over the installed geomembrane.

Defective seams shall be rewelded, overlaid, or cut out and replaced as the conditions may dictate All repairs shall be tested as described in paragraph 3.06 and documented pursuant of paragraphs 1.02 B and C. Exact location of all repairs shall be measured and included in the as-built drawings.

M. Temporary Anchoring: Sandbags or rubber tires may be used as required to hold the membrane in place during installation. Tires shall not have exposed steel cords or other sharp edges which may snag or cut the membrane. At the end of each day the membrane shall be sufficiently anchored to prevent displacement and/or tenting.

N. Final Review: After completion of installation and testing, and prior to construction of subsequent cover layers, all field test results shall be reviewed and a final walk-through inspection performed by the Engineer, and released to contractor in writing.

3.06 QUALITY CONTROL

A Reference Standards: Where Applicable, The Provisions And Recommendations Of The Designated Standards Adopted By The American Society For Testing Materials (ASTM) Shall Be Used As The Basis For The Material Requirements, Unless Otherwise Specified.

B. Testing

1. The Contractor shall perform quality assurance sampling and testing after the installation of each roll or panel to verify that a satisfactory seam has been obtained.
   a. Non-destructive testing shall be performed by the Contractor for the entire length of all seams using one of the methods described in paragraph 3.06.
   b. Destructive testing as described in Paragraph 4.04 shall be performed after every 500 feet of seam welding, after every two hours of continuous welding, or if welding is stopped less than 500 feet, for that section of seam completed.
   c. Both peel adhesion and shear strength tests shall be performed at each destructive testing interval. All testing shall be performed in the presence of the Engineer.
2. During the geomembrane installation process, the Installation Contractor shall record the following information on record drawings.
   a. The location and identification number of each imperfection, the date found, the date repaired and the result of non-destructive testing on the seam (acceptable/unacceptable).
   b. The location, date, sample number and test result (acceptable/unacceptable) of each destructive test series.
   c. The location, identification number and date of each non-destructive air pressure seam test, the length of the tested seam, and the result of the test (acceptable/unacceptable), if applicable.
   d. The location, date and lengths of nondestructive vacuum box seam testing performed on a daily basis.

C. Non-Destructive Tests:

1. Seam Pressure Testing: In the case of split wedge fusion seams, vacuum testing can be eliminated provided that it passes the seam pressure test.
   The seam pressure test shall be conducted along the entire length of a seam as follows:
   a. Seal and clamp both ends of the flow channel to assure an air tight seal. During the test, apply soapy water to the clamps to assure adequate air tightness at the clamps.
   b. Connect a pump to the test device (a small bicycle pump will suffice) and inflate the flow channel to the desired pressure of 25-30 P.S.I. Allow one (1) minute for the seam to stabilize as indicated by a possible slight drop in the initial pressure reading due to the seam expanding slightly under pressure.
   c. Re-inflate to the desired pressure and test for a period of two (2) minutes.
   d. At the end of the test period, if the pressure has not dropped more than two (2) P.S.I. (a small pressure drop would be the result of some air seeping around the inflation needle), the test is considered a pass and the following procedure is implemented.
      1) Remove the test device and clamps.
      2) Make any repairs, if necessary, to the area where the flow channel was clamped or inflated.
      3) Record the test results, mark the seam as passing and proceed to the next seam.
   e. If the pressure drops below the two (2) P.S.I. allowance, the test is considered a failure, and further testing will be conducted on the seam including vacuum testing until the leak is found and repaired.
2. Air Lance Testing: Air lance testing shall be performed for seams where the vacuum box or seam pressure tests cannot be used. The testing equipment shall consist of a portable air pump, an air lance with a 3/16-inch diameter orifice capable of delivering 50 psi of continuous air, associated hose and fittings, and a mounting cushion to protect the membrane from damage.

3. Testing is performed by placing the orifice of the air lance at the underside of the upper geomembrane panel of the seam at a slightly upward angle. Air of approximately 50 psi (±5 psi) is blown onto the seam being tested. Defective seams are located when the air jet causes the membrane to inflate, flutter, or otherwise behave dissimilarly to properly seamed areas.

D. Destructive Tests
   1. Destructive tests, both peel adhesion and shear strength, shall be performed for every 500 feet of seam, after every two hours of continuous welding, or, if welding is stopped less than 500 feet, for that section of seam completed.
      a. Peel Adhesion Testing: Peel adhesion testing shall be performed in accordance with ASTM Method D-4437. The Contractor's approved testing laboratory may perform this test in the field or laboratory provided proper equipment is used.
      b. Shear Strength Testing: Shear strength testing shall be performed in accordance with ASTM Method D-4437. The Contractor's approved testing laboratory may perform this test in the field or laboratory provided proper equipment is used.
   2. An adequate amount of material from each destructive seam test location shall be taken to perform three (3) complete sets of destructive tests for both peel adhesion and shear strength. Additional material for one set of destructive tests shall be submitted to the Engineer for archiving.

3.07 WARRANTY AND GUARANTEE

A. Prior to acceptance, the manufacturer/installer shall provide evidence in writing of all testing made to ensure joint integrity and to verify conformance to the specifications. The manufacturer/installer shall warrant that materials and workmanship supplied conform to the contract documents.

1. Guarantee of Materials: The lining material shall be guaranteed in writing by the manufacturer on a pro rata basis for a period of 20 years. The guarantee shall be against manufacturing defects of workmanship and against deterioration due to ozone, ultraviolet, or other normal weather aging. The guarantee shall be limited to replacement of material only and shall not cover vandalism, acts of animals, earthquakes, other acts of God.

2. Guarantee of Work: The Contractor shall guarantee in writing the entire work constructed by him under the contract to be free of defects in materials and workmanship for a period of one year following the date of acceptance of the work. The Contractor shall agree to make, at his own expense, any repairs or replacements made necessary by defects in materials or workmanship which become evident within the said guarantee period. The Contractor shall further agree to indemnify and save harmless Alcoa and the Engineer and their officers, agents, and employees against and from all claims and liability arising from damage and injury due to said defects. The Contractor shall make repairs and replacements promptly upon receipt of written order. If the Contractor fails to make the repairs and replacements promptly, Alcoa may do so and the Contractor shall be liable for the cost of such repairs and replacements.

3.08 CERTIFICATION

A. At the conclusion of placement of the geomembrane, the Contractor shall prepare and submit three (3) copies of a written report of the Work which includes the following:

1. Complete identification of geomembrane, including, but not limited to, resin type, physical properties, an other pertinent data.
2. Complete description of seaming system used, including material, method, temperatures, seam overlap width, and cure or aging time.
3. Complete description of field sampling and testing including test equipment used, location of field tests, copy of field test results, conditioning procedure prior to destructive seam testing, method of recording loading and determining average load for destructive test method, and type of failure in tests (i.e.; within the seam, within the sheet material, clamp edge, seam edge.)
4. As-Built drawings showing:
   - actual layout of liner sheets;
   - panel identification numbers;
   - anchor trench details;
   - boot details;
   - dimensions of panels;
   - locations and type of repairs made; and
   - location of destructive tests and seams.
5. Copies of independent laboratory test results.

6. Liner manufacturer's warranty.
7. Certified copies of manufacturer's test results.
8. Written acceptance of liner subgrade.
9. Equipment calibration information.
10. "I (name and title), as the duly authorized representative of (Company name), hereby certify that the installation of the geomembrane has been completed in accordance with the terms and conditions of the Contract Documents entitled (date to be established)."

BY:_____

(Corporate Seal)

WITNESS:_____

DATE:_____

The report shall be clear and concise, shall be bound with a cover, and shall contain a Table of Contents. Data for each liner segment, where applicable (i.e.; primary geomembrane, secondary geomembrane), shall be organized separately in the report. Final payment shall not be made until the report is determined to be acceptable to the Engineer."

TABLE 02405-1
REQUIRED PHYSICAL PROPERTIES OF MEMBRANE LINER (LLDPE) SHEET

PROPERTY	TEST METHOD	REQUIRED TEXTURED VALUES 40-MIL	UNITS
Thickness, Mil. (min.)*	ASTM D5199	36/40	Mil
Sheet Density, (min/max)	ASTM D792 or D1505	0.910/0.935	g/cc
Min. Tensile Properties (each direction)	ASTM D638 (As modified in NSF54 Appendix A)		
Stress (Strength) at Break		60	lb/in
Strain at Break	2.0" gage length	700	%
Strain (Elongation) at Break	2.5" gage length	300	%
Tear Resistance, (min).	ASTM D1004	20	lbs
Low Temperature Impact, °F(max).	ASTM D746	-94	°F
Dimensional Stability, (max).	ASTM D5397	±2.0	%
Environmental Stress Crack, (min. hrs. with no failures)	ASTM D1693 (As modified in NSF54 Appendix A)	200	hrs
Puncture Resistence, (min).	FTMS 101 method 2065	56	lbs
Carbon Black Content (Allowable Range)	ASTM D1603	2.0-3.0	%
Carbon Black Dispersion, (Acceptable Levels)	ASTM D-3015 (As Modified in NSF54 Appendix A)	A1, A2 or B1	

SEAM REQUIREMENTS			
		REQUIRED TEXTURED VALUES	
PROPERTY	TEST METHOD	40-MIL	UNITS
Peel Adhesion (min). - Fusion	ASTM D4437 (as modified by NSF 54, Appendix A)	44	lb/in
Extrusion		44	lb/in
Shear Strength, (min). - Fusion	ASTM D4437 (as modified by NSF 54, Appendix A)	53	lb/in
Extrusion		53	lb/in

* Thickness - first value represents lowest individual value.
  - second value represents average across roll.
* Value in parenthesis represents minimum value for textured sheet where it differs from smooth sheet value.

END OF SECTION 02405

SECTION 02421

GEOTEXTILES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Separation Geotextile.

B. Reinforcement (Woven) Geotextile.

1.02 RELATED SECTIONS

A. Section 02222 - Backfilling

B. Section 02260 - Soil Cover Construction

C. Section 02275 - Rip-Rap

D. Section 02501 - Gravel Access Road

1.03 REFERENCES

A. Documents
1. Task Force #25, AASHTO-ABC-ARTBA Joint Committee, "Specifications for Geotextiles." July 1986.

B. Quality Control Testing Standards
1. ASTM D3786 - Hydraulic Bursting Strength of Knitted Goods and Non-Woven Fabrics.
2. ASTM D4354 - Sampling of Geosynthetics for Testing.
3. ASTM D4491 - Water Permeability of Geotextiles by Permittivity.
4. ASTM D4533 - Trapezoidal Teaming Strength of Geotextiles.
5. ASTM D4594 - Effects of Temperature on Stability of Geotextiles.
6. ASTM D4595 - Tensile Properties of Geotextiles by the Wide Width Strip Method.
7. ASTM D4632 - Breaking Load and Elongation of Geotextiles (Grab Method).
8. ASTM D4751 - Determining Apparent Opening Size of a Geotextile.
9. ASTM D4833 - Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
10. ASTM D4873 - Identification, Storage and Handling of Geotextiles.
11. ASTM D5188 - Nominal Thickness of Geotextiles and Geomembranes.
12. ASTM D5261 - Mass Per Unit Area of Woven Fabric.

1.04 SUBMITTALS

A. Materials: Submit product data and a 1-foot square sample of each geotextile proposed for use on this project.

B. Certification that each geotextile meets the criteria listed in Table 02421-1 at the end of this section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store geotextiles out of the elements and protect from abrasion or tearing.

B. Clearly mark rolls showing the type of fabric and manufacturer.

C. Handling of the geotextile rolls shall be based on the manufacturer's recommendations.

D. The requirements for identification, storage and handling of geotextiles in ASTM D4873 shall be followed as a minimum.

PART 2 - MATERIALS AND PRODUCTS

2.01 MATERIALS

A. Separation Geotextile (Filters and Riprap Base)
   1. Shall be heat-bonded (non-woven) geotextile specifically designed for drainage and separation applications.
   2. Shall be composed of polyester and/or polypropylene polymers.
   3. Shall meet the criteria listed in Table 02421-1.

B. Reinforcement Geotextile (Road Reinforcement)
   1. Shall be a woven geotextile specifically designed for reinforcement applications.
   2. Shall be composed of polyester and/or polypropylene polymers.
   3. Shall meet the criteria listed in Table 02421-1.

C. Filtration Geotextile
   1. Shall be a needle-punched, non-woven geotextile specifically designed for filtration applications.
   2. Shall be composed of polyester and/or polypropylene polymers.
   3. Shall meet the criteria listed in Table 02421-1.

D. Cushion Geotextile
   1. Shall be a needle-punched, non-woven geotextile specifically designed for protection applications.
   2. Shall be composed of polyester and/or polypropylene polymers.
   3. Shall meet the criteria listed in Table 02421-1.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Contractor shall inspect all geotextiles upon delivery and verify that the proper materials and quantities have been supplied.

B. The Contractor shall inspect the subgrade for protrusions or other unacceptable conditions prior to installation of geotextiles.

C. The Contractor shall continuously inspect needle-punched geotextiles during deployment for broken needles remaining from needle-punching operations.

3.02 PREPARATION

A. The subgrade shall be prepared as indicated in the specifications.

3.03 PROTECTION

A. Protect all geotextile materials from damage due to exposure to sunlight, dirt, dust and other hazards.

B. Maintain the protective wrapping on geotextile rolls at all times.

C. The geotextiles shall be covered within 10 days after installation.

D. During spreading operations of backfill, a minimum depth of 12 inches of aggregate shall be maintained over the geotextiles when possible. Construction equipment shall not operate directly on the geotextile.

3.04 PERFORMANCE

A. Geotextile rolls shall be positioned as required and unrolled.

B. When placed on stable subgrades flatter than 1V:5H, geotextiles shall be overlapped a minimum of 1.0 feet on all edges.

C. When geotextile is placed on unstable subgrades flatter than 1V:5H or slopes steeper than 1V:5H, horizontal overlaps shall be sewn.

D. When geotextile is placed on slopes steeper than 1V:5H, longitudinal seams shall be sewn or overlapped a minimum of 2 feet.

E. Sewing requirement:
   1. The thread color shall contrast with that of the geotextile.
   2. Sewing operations shall employ a thread tension which secures the geotextile rolls without cutting the material.

3. Sewing operation shall use a "J" seam secured with a minimum of one row of four-stitch per inch two thread main stitch.

F. When geotextile is placed in trenches, the material shall be overlapped a minimum of 1 foot over the top of the trench. Longitudinal seams between adjacent rolls of material shall be overlapped a minimum of 2 feet.

G. Geotextile rolls shall be cut and laid flat such that buckling of the roll does not occur.

H. If geotextiles are damaged during any phase of construction or installation, a new piece of the same type shall be cut and placed over the damaged area with a 2-foot minimum overlap and sewn.

I. Aggregate shall be spread in the direction of overlap wherever possible.

TABLE 02421-1

MINIMUM ACCEPTANCE CRITERIA GEOTEXTILE

Test Description	Test Method	Criteria
Separation		
Mass per unit area	ASTM D5261	≥6 oz/SY
Apparent opening size (AOS)	ASTM D4751	<No. 70 sieve
Puncture resistance	ASTM D4833	≥60 lb.*
Grab strength	ASTM D4632	≥150 lb.*
Trapezoidal Teaming strength	ASTM D4533	≥65 lb.*
Permittivity	ASTM D4491	≥2.0 sec^{-1}*
Burst strength	ASTM D3786	≥200 psi*
Reinforcement		
Mass per unit area	ASTM D5261	>8 oz/SY
Puncture resistance	ASTM D4833	>150 lb.
Grab strength	ASTM D4632	>400 lb.
Trapezoidal Teaming strength	ASTM D4533	>130x150 lb./in.
Burst strength	ASTM D3786	>800 psi

Filtration		
Mass per unit area	ASTM-D5261	≥6 oz/SY
Apparent opening size (AOS)	ASTM-D4751	<No. 50 sieve
Puncture resistance	ASTM-D4833	≥75 lb.*
Trapezoidal Teaming	ASTM-D4595	>50 lb./in.*
Permittivity	ASTM-D4491	≥1.0 sec^{-1}*
Burst strength	ASTM-D3786	>200 psi*
Cushion		
Mass per unit area	ASTM-D5261	≥12 oz/SY
Puncture resistance	ASTM-D4833	≥175 lb.
Thickness	ASTM-D5188	≥145 mils

Minimum strength criteria shall apply to both the machine direction (MD) and the cross machine direction (XMD).

* Minimum Average Roll Values (MARV)

END OF SECTION 02421

SECTION 02445

SOLIDIFICATION/STABILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION

This specification provides requirements for treatment by solidification/stabilization (S/S) and provides performance requirements for the final stabilized product. A S/S system shall be used which provides a safe, reliable method to treat the contaminated material. The Contractor may select the S/S method to be used and is responsible to demonstrate the capabilities of the proposed method. The Contractor shall be responsible for meeting the specified requirements for safety, reliability, and performance.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

1. Section 01564 - Erosion Control
2. Section 02222 - Excavation
3. Section 02223 - Backfilling
4. Section 02228 - Compaction
5. Section 02260 - Soil Cover Construction
6. Section 02990 - Finish Grading, Topsoil, and Seeding

1.03 REFERENCED STANDARDS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The date of the reference shall be that in effect at the time of bidding.

A. American Society for Testing and Materials (ASTM)

ASTM D1633, "Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders"

ASTM D4832, "Standard Test Method for Preparation and Testing of Soil-Cement Slurry Test Cylinders"

B. Environmental Protection Agency (EPA)

EPA SW-846 Various Methods, Toxicity Characteristic Leaching Procedure (TCLP), PCBs and RCRA metals.

1.04 SUBMITTALS

A. Work Plan: Submit a S/S Work Plan within 14 days after Notice to Proceed. No S/S of contaminated material shall be performed until the work plan is approved. The Contractor shall allow a period of 30 days in the schedule for review and approval of the work plan. The work

plan shall address the technical requirements listed in this section and shall include, but is not limited to the following:

1. Mix Design: A bench-scale treatability study has been performed by Kiber Environmental Services on the contaminated materials. Results of this study are provided herein. The bid shall be based on using Portland cement as presented the 1997 Kiber study.

   The Contractor shall be responsible for the selection of the stabilization/solidification design mixture to ensure that the chemical stability and physical integrity of the final stabilized product meets the performance criteria described herein. The Contractor shall submit proposed mix designs for the various site materials being treated including the source and amount of each ingredient to be used. The Contractor shall submit TCLP testing for RCRA metals and PCBs for reagents including Type I Portland cement. Additionally, the Contractor shall perform TCLP testing for RCRA metals for materials treated with reagents other than Type I Portland cement during the Field Start-Up Demonstration. The proposed source of water to be used for the S/S process shall be identified and tested for TCLP RCRA metals and PCBs. Reagents or water sources with oils, acids, salt alkali, significant organic matter, or hazardous levels of RCRA metals or PCBs shall not be allowed.

2. Submit a Field Start-up Demonstration (Pilot Test) Work Plan for approval prior to beginning any treatability work. The treatability study test results shall include the proposed reagents and mix ratios to be used during full scale treatment. The test results submitted shall verify that the proposed mix design meets the post-treatment criteria. Consideration shall also be given to the need to monitor off-gas and dust emissions during the treatability study. Detailed information on testing requirements, test methods, detection limits, and off-gas and dust emission monitoring requirements should be presented in the appropriate section. Prior to performing any treatability study, the untreated samples should be tested to verify that they contain the contaminants of concern at high enough concentrations to verify proper S/S treatment. Additional testing may be needed to verify that physical properties of the samples are also representative of site conditions.

3. Equipment: Specifications for the proposed homogenization and mixing equipment, processing equipment, and process control instrumentation. Process flow diagrams, mixing times, and processing rates shall be included. Anticipated pretreatment of the contaminated material shall be identified.

4. Drawings: Drawings indicating dimensions and layout of the S/S system on the site including the process equipment, stockpile areas and work areas. Drawings shall be to scale.

5. Emissions: Air emissions, dust, and noise from the system shall be identified and estimated. Control systems required to maintain compliance with local, state, and federal regulations shall be described as appropriate. Air emissions, dust, and noise testing protocol to be performed during the test run and full scale operations shall also be described.

6. Quality Control: The Contractor's quality control program including the following items:

   a. Procedures to control mix proportions, mixing time, mixing speed, sample collection, sample curing, and post-treatment testing.

b. Tracking system for reagent delivered to and used at the site, manufacturer specification sheets and test results.

c. Equipment calibration information and protocols

7. Schedule: The anticipated production rate and provisions for carefully expediting the work effort.

8. Stockpile Design: A proposed stockpile design which meets the criteria outlined in Part 3 of this section.

9. Demobilization: A post-treatment cleanup and sampling procedure for the treatment area.

B. Daily Reports: Submit a daily report detailing the soil source area, the quantities treated, operating times, batch identification number, batch proportions, mixing quality control data, mixing times and speed for each batch, and batch placement location. Include any data logging charts for input and output of materials from the treatment system and calibration information.

C. Test Results: Submit the results of post-treatment tests performed.

D. Field Demonstration Report: Submit a field demonstration report 7 days prior to full-scale S/S which includes documents relevant field demonstration data including but not limited to: mix proportions, mixing time, and mixing speed.

E. Certificates: Submit certificates of analysis verifying reagent composition prior to use.

1.05 QUALIFICATIONS

A. Contractor Experience: The Contractor shall have completed at least three S/S projects of comparable size and scope in accordance with local, state, and federal requirements using the proposed system or a similar system.

B. Key Personnel: Key personnel shall have a minimum of two years of S/S field experience. Key personnel shall include system operators, quality control personnel, and supervisory engineering and technical staff involved with the S/S system operation.

1.06 FIELD TESTING CONTROL

The Engineer shall employ a laboratory to perform the verification sampling and analysis of the stabilized material. The Engineer's laboratory results shall be the governing results for the project. Certified test reports shall be submitted to the Contractor within 24 hours of completion of the tests. All analyses will be in accordance with Table 02445-1 at the end of this section. Testing shall initially be performed once per every 250 cubic yards treated for the first 2,000 cubic yards treated during full-scale treatment. Testing shall be performed once per every 500 cubic yards treated after the initial 2,000 cubic yards is treated. Additionally, testing shall be performed once per day when less than the above quantities are treated daily.

1.07 PROJECT SITE CONDITIONS

The physical conditions indicated on the drawings and in the specifications are the result of site investigations. While the site investigation data is representative of subsurface conditions at a specific location, variations in the contaminated materials are expected to exist.

PART 2 PRODUCTS

2.01 MATERIALS

A. Water: Water shall not contain significant concentrations of oil, acid, salt, alkali, organic matter, or other deleterious substances which will be detrimental to the successful execution of the S/S treatment process.

B. Reagents: A certificate of analysis showing the chemical composition of reagents supplied by the vendor shall accompany each shipping unit of reagent. Reagents shall be shipped in properly labeled containers with instructions for handling and storage. The instructions shall be strictly adhered to.

2.02 EQUIPMENT

A. Mixing Equipment: The Contractor shall be responsible for the selection of the process facility. The mixing equipment shall have a minimum capacity adequate to meet the performance and schedule requirements and shall be equipped with positive means for controlling the mix proportions, maintaining the time of mixing constant, and maintaining the appropriate speed of rotation of the mixer.

B. Reagent Feed Units: Satisfactory means, incorporating weighing, metering or volumetric measurement shall be provided to separately batch the required amount of each reagent. Silos and feeders shall be equipped and operated so that no caking of material or variation in feed occurs. Provision shall be made so that each reagent can be easily sampled.

C. Water Flow Control System: Satisfactory means to measure and control the flow of water used for S/S shall be provided. The preferred method shall be a flow metering device.

D. Accuracy of Measurement Equipment: Scales, meters, and volumetric measuring devices used for measuring contaminated material, reagents, and water for S/S processing shall be accurate to plus or minus one percent of the quantity being measured. A check of calibration of measuring equipment shall be performed once every five working days.

E. Emission and Noise Controls: As needed, the S/S system shall include control apparatus necessary to meet OSHA worker protection requirements.

PART 3 EXECUTION

3.01 STOCKPILES

A. Stockpile storage areas shall be constructed for storing contaminated material prior to treatment. If stockpiles are placed outside the excavation area, they shall be constructed similar to the soil treatment area shown on the drawings and include:

1. An impermeable HDPE or LLDPE geomembrane liner (FML) with a minimum thickness of 40 mils. The liner shall be protected from vehicle damage by a cushion geotextile. The FML shall be placed on a prepared subgrade which is graded to drain and compacted/rolled smooth such that all deleterious material which could damage the FML is removed prior to placement of the FML. If the subgrade contains soils which are excessively wet or weak, the weak materials shall be removed and replaced with soils or other materials which, when compacted in place, will support the FML without excessive deformation. All FML seams shall be welded by an experienced FML seam welder approved by the manufacturer. No seam testing will be necessary. A traffic layer consisting of well graded gravel or stone or other material which will not damage the FML and will be stable and create a firm work surface shall be placed on the FML/geotextile.

2. Berms surrounding the stockpile which are a minimum of 12 inches in height.

3. The liner shall be sloped to a low point to allow leachate to be collected. Leachate collected from the stockpile shall be analyzed and, if necessary, treated to meet applicable local, state, and federal regulations. Leachate collected from the stockpile shall be handled in accordance with Section 02140, Dewatering and Construction Water Management. Leachate may be used in the S/S process provided the treated material meets the physical and chemical post-treatment test criteria.

B. Stockpiles shall be covered with an impermeable cover to prevent precipitation from entering the stockpile. The cover shall be constructed of geomembrane with a minimum thickness of 10 mils or reinforced polyethylene sheeting (Griffolyn T-55 by Reef Industries, Inc. or approved equal). The cover shall be anchored to prevent dislocation due to wind.

3.02 OPERATIONS

A. Weather Conditions: S/S shall not take place in an ambient air temperature below 32 degrees Fahrenheit without approval from the Engineer. Provisions shall be made to maintain the temperature of the treated material above freezing while curing. Contaminated material shall not be treated if it contains any frozen material. S/S shall not be performed during periods of heavy rainfall if this will result in the addition of excess water to the mixture.

B. Dissimilar Materials: Dissimilar materials, for which testing has indicated the need of different mix ratios, shall not be mixed together.

C. Oversize Material: Contaminated material that exceeds the maximum allowable particle size of the S/S mixing unit and that is amenable to treatment shall be reduced to a size that the mixing unit can accept. Oversize material that cannot be reduced to an allowable size for the S/S unit

shall be mixed with Type I Portland cement and buried in the cover area with other excavated materials not being treated by S/S.

3.03 FIELD START-UP DEMONSTRATION (PILOT TEST)

A. Prior to full-scale operations, a field start-up demonstration (also called a pilot test) shall be performed on each material or combination of materials to be treated. The selected materials or combination of materials shall match the soil handling procedures proposed for full-scale treatment. Contaminated material used for the field demonstration shall be obtained from each of the following three soil types: (1) excavation area 7 (Western Drainage Area), (2) excavation areas 3 through 3I (Former Lagoon #3) and the oil-stained soil from excavation areas #1 and 2 (Former Lagoons #1 and 2), and (3) the oily sludge from excavation areas #1 and 2 (Former Lagoons #1 and 2). Excavation areas 4, 5 and 6 are not included in the start-up demonstration.

B. Full-Scale Processing Equipment: The full-scale processing equipment shall be used for the field demonstration. Reagents, mix ratios, and mixing procedures used during the field demonstration shall be the same as those used for full-scale processing.

C. Sampling Locations: Prior to performing the field demonstration, contaminated material to be used for the field demonstration shall be tested to verify it contains the following minimum levels of contamination: Total PCBs ≥10 ppm.

D. Demonstration Mixes: Three separate reagent mixes (optimum, optimum minus 5% and optimum plus 5%) shall be run for each material or combination of materials. Each demonstration mix shall produce 50 cubic yards of treated material or the amount processed in one hour of continuous processing at full production rate, whichever is greater.

E. Material Preparation: Materials for the start-up demonstration shall be prepared in the same manner as proposed for the full-scale treatment including dewatering, homogenization of combined materials, screening, etc. Use the same water source as proposed for the full-scale treatment.

F. Verification Testing: Testing shall be performed by the Engineer's testing laboratory to verify that the treated material from the field demonstration meets the specified physical and chemical criteria listed in Table 02445-1. The Engineer shall make enough cylinders to perform UCS testing at 1, 2, 3, 4, 5, 7, 10, 14, 21 and 28 days to establish compressive strength versus curing time curves.

G. Volume Increase: The estimated increase in volume resulting from treatment shall be determined and reported with the field demonstration test results. Volume increase shall be determined by comparing the volume of in situ contaminated material to be treated to the volume of treated material using the following formula:

$$B = 100 \times [(1+R) \times (D \text{ in situ}/D \text{ treated}) - 1]$$

B = Volume increase in percent.

R = Dry weight ratio of solidifying agent to waste
D in situ = Dry unit weight of in situ waste.
D treated = Dry unit weight of compacted treated material.

H. Field Demonstration Test Result: After completion of the field demonstration, no additional contaminated material shall be processed until test results from the field demonstration verify that the treated material meets the physical and chemical criteria listed in Table 02445-1. If the treated material produced during the field demonstration does not pass the testing requirements, a detailed review of the treatment process will be implemented by the Engineer. This review will include all information necessary to validate the treatment process and verify that the proper reagent addition rate was utilized. If it is determined that operational or mechanical errors were introduced during treatment, then the source of the error will be corrected, and further demonstration testing performed to again verify the mix design. However, if after this review, operational or mechanical errors are eliminated, then further treatment on a new batch of material will be performed to evaluate a new mix design. All reprocessing shall be at the expense of the Contractor. Full scale treatment shall not begin until 28-day results for the field demonstration have been received and pass the treatment requirements.

3.04 TESTS

Leaching tests are not amenable to real time quality control because of the time required to perform the tests. Therefore, it is preferable to minimize the number of leaching tests performed and to maintain quality control of the S/S process by verifying that the mix design works during the field demonstration/pilot-scale testing and maintaining quality control by monitoring batch proportions and mixing time.

During the Pilot-scale testing, data will be obtained correlating one to three day cure time unconfined compressive strength (UCS) test results with passing 28 day UCS and TCLP PCB test results. These one to three day UCS values will be used to confirm compliance of the S/S treated materials during full scale production. Samples of the S/S treated materials will be taken and cylinders made prior to the material being placed back in the excavation within the area to be capped. After the one to three day cure period, these cylinders shall be tested and the results compared to the one to three day UCS data obtained during pilot-scale testing to provide confirmation of successful treatment.

A. Mix Proportions: Mixing time, mixing speed, and amounts of contaminated material, reagents, and water added to each batch shall be recorded. Mixing time, mixing speed, and mix proportions shall be maintained within the limits specified in the approved Work Plan and as modified during the field demonstration/pilot-scale testing.

B. Segregation: Treated material shall be placed directly into the onsite area to be capped after treatment. Treated material shall be placed such that the material from specific batches or runs can be defined and removed if the material fails post-treatment testing.

C. Test Results: Samples shall be collected immediately after treatment and allowed to cure for one to three days. After one to three days of curing, the samples must have UCS values which, as

criteria after 28 days of curing. The actual verification of treatment process, however, will be based on the results of testing obtained after 28 days of curing.

D. Retesting and Reprocessing: Retesting and reprocessing shall be performed at the expense of the Contractor for treated material that does not meet the physical and chemical requirements established during pilot-scale testing. Reprocessed material shall be deducted from the daily production rate.

1. Retesting: Any unit that fails post-treatment quality control or quality assurance testing shall be retested or reprocessed. If the Contractor elects to retest the unit, two additional samples shall be collected and tested for the failed parameter. If both tests pass, reprocessing of the unit will not be required. If either sample fails, the unit shall be reprocessed and samples shall be tested as described in Section 3.4.3, Test Results.
2. Reprocessing: Reprocessing and retesting shall be performed on treated material that does not meet the 28-day UCS or TCLP PCB requirements. If the Contractor elects to reprocess a unit without retesting, the unit shall be sampled and tested as described in paragraph Test Results after reprocessing.

A. Adjustments to Mix Design: Subject to approval, the mix design may be changed based on the characteristics of the material being treated. An additional field demonstration may be required by the Engineer prior to implementation of the new mix design.

B. Quality Control / Quality Assurance Testing: Duplicate samples shall be submitted to the laboratory provided by the Engineer or Alcoa. The quality assurance sample frequency shall be one set of samples per ten sets of quality control tests performed. At least one set of quality assurance samples shall be submitted each week that S/S is performed. The Engineer may require additional quality assurance tests as a result of failed quality assurance or quality control tests. The Engineer may also require additional quality assurance tests due to changes in the mix design or physical appearance of the contaminated material.

3.05 SOIL TREATMENT PERFORMANCE STANDARDS

During full production, the final product of the treatment operation shall be a stabilized matrix. The chemical stability and physical integrity of the matrix shall be documented by monitoring the S/S process for conformance to the mix design established during pilot-scale testing and sampling and UCS testing for one to three-day cured samples at the specified frequency by sampling and analysis. The samples shall be analyzed for the following parameters:

A. Unconfined Compressive Strength (UCS) and TCLP PCB analysis. After one to three days of curing, the samples must have UCS values which, as established during the field demonstration, are sufficient to achieve the 100 lbs/in^2 treatment criteria after 28 days of curing. The actual verification of treatment process, however, will be based on the results of testing obtained after 28 days of curing. TCLP PCB results after 28 days of curing shall be less than or equal to 0.5 micrograms per liter (ug/l) for total PCBs.

TABLE 02445-1

STABILIZATION/SOLIDIFICATION TESTING CRITERIA

Parameter	Performance Criteria	Maximum Reporting or Quantitation Limit	Test Method
UCS	100 psi min	25 psi	ASTM D1633, Method B
TCLP PCBs	0.5 ug/l max	0.1 ug/l	EPA SW-846, Methods 1311 and 3510A/8080/8082

END OF SECTION

SECTION 02501

GRAVEL ACCESS ROAD

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work herein consists of the furnishment and placement of the following materials at the site.

B. Section Includes:
   1. Subgrade preparation.
   2. Furnishing natural soils.
   3. Furnishing select borrow material.
   4. Furnishing granular access road material.
   5. Temporary drainage.
   6. Compaction.
   7. Proof rolling.
   8. Removal and replacement of unacceptable materials.
   9. Grading.
   10. Installation of geotextile fabric.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Section 01040 - Project Coordination
B. Section 01500 - Temporary Facilities and Controls
C. Section 01564 - Erosion Control
D. Section 02100 - Site Clearing
E. Section 02223 - Backfilling
F. Section 02228 - Compaction
G. Section 02421 - Geotextiles

1.03 REFERENCES

A. ASTM D698 - "Moisture-Density Relations of Soil and Soil Aggregate Mixtures Using 5.5 pound Rammer and 12-inch Drop".

1.04 DEFINITIONS

A. "Subgrade" shall be defined as the foundation layer of natural soils or select borrow material that supports the gravel pavement layer.

1.05 PERFORMANCE REQUIREMENTS

A. Compaction of subgrade shall meet the requirements for compaction as stated in Section 02228, Table 1.

PART 3 - EXECUTION

3.01 EXAMINATION

A. See Section 02100 and Section 02223.

B. All underground utility installations, including culverts, shall be completed, backfilled and compacted prior to completion of subgrade.

C. Verify that traffic controls and erosion and sediment controls are in place.

3.02 PREPARATION

A. See Section 02100 and Section 02223.

B. Temporary erosion and sediment controls shall be installed prior to construction of subgrade. See Section 01564.

C. Temporary drains and ditches shall be constructed as necessary to remove water from the subgrade area.
   1. Temporary drainage openings in existing catch basins may be made in a manner acceptable to the Engineer. Such openings to be repaired to the satisfaction of the Engineer.
   2. Contractor shall prevent debris, stones and silt from entering drainage systems, including the use of hay bales, screens and other desilting methods.

D. Backfilled areas shall be retested at the discretion of the Engineer.

3.03 INSTALLATION

A. Construct the subgrade by cutting existing grades or by filling with clean offsite fill.
   1. The final subgrade surface shall be fine graded, rolled and compacted to form a smooth, even surface.

B. The subgrade in fill sections shall be placed in maximum 12-inch layers before compaction, and compacted before the next layer is spread.

C. The subgrade surface shall drain to the road edges, be free from holes, bumps, wheel ruts and of standing water, snow, frozen material and organic materials prior to the placement of the next course.
   1. Soft or otherwise unacceptable subgrade materials shall be removed and replaced with select onsite material acceptable to the Engineer.
   2. Where no suitable onsite fill is available, granular materials shall be installed and compacted.

3.04 FIELD QUALITY CONTROL

A. For compaction requirements, refer to Section 02228, Table 1.

B. Tolerances - Refer to Section 02223.

C. Proof Rolled - Prior to the placement of the next granular layer or geotextile fabric, the subgrade surface shall be proof rolled to locate areas of inadequate compaction, deflection, or soft or rutting areas requiring undercutting, with 8 to 10-ton pneumatic tire compactors.

1. Areas of inadequate compaction will be recompacted
2. If additional rolling does not correct an area of unstable conditions, the unstable area shall be removed and replaced with select onsite material and compacted.
3. Where no suitable onsite material is available, granular materials shall be installed and compacted.
4. Areas inaccessible to rollers are to be compacted by other mechanical methods.

3.05 PROTECTION

A. No vehicular traffic will be allowed on the newly-placed fabric until covered with the granular layer.

3.06 DUST CONTROL

A. Dust Control shall be accomplished by using water, brooming and cleaning methods.

1. Dust control shall be carried out on a daily basis including weekends and holidays as needed based on the Engineer's direction.

END OF SECTION 02501

SECTION 02671

EXTRACTION AND MONITORING WELLS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included in this section: The Contractor shall provide all labor, materials, equipment, and incidentals as required by this specification to complete the work as described.

B. Two groundwater extraction wells will be installed at the Site in locations shown on the drawings. The wells will be constructed using the appropriate equipment to advance the borehole to its completion depth and install well materials. The drilling equipment and well materials include: an appropriate drill rig to drill 10-inch boreholes, 8-inch steel outer casing through the shallow groundwater zone, 6-inch stainless steel well screen and riser, properly sized sand filter pack, bentonite, and cement/bentonite grout.

In addition, one new montioring well will be installed to the same depth as the two extraction wells at a midway between the two extraction wells. The only difference between the new monitoring well and the two extractions wells is the diameter of the casings.

C. Related work specified in other section:
1. Section 02674 - Recovery Well Pumping Equipment

1.02 SUBMITTALS

A. Product Data: The product data for each component to be used in construction of the extraction well, including well screen, filter pack, cement and bentonite must be submitted by the Contractor. Product data must include manufacturer's name and the source of the material and be submitted prior to use in extraction well construction.

B. Installer: The name and address of the proposed well driller and a list of at least five completed projects of similar construction must be submitted by the Contractor.

1.03 REFERENCE STANDARDS

A. Title 6, New York Code of Rules and Regulations, Part 360 and Part 373.

PART 2 - PRODUCTS

2.01 OUTER CASING

A. The outer casing for the extraction wells will be 8-inch ID, flush joint or butt welded Schedule 40 carbon steel pipe. For the monitoring well, the outer casing will be 4-inch or 6-inch ID, flush joint or butt welded Schedule 40 carbon steel pipe.

B. The outer casing shall be installed through the shallow groundwater zone to a depth of 20 feet below ground level.

C. The outer casing will be grouted in place. Well installation will not continue until the grout has set-up for a minimum period of 24 hours.

2.02 RISER AND SUMP

A. The extraction well riser and sump pipe will be 6-inch ID, flush joint, threaded, Schedule 10, 304 stainless steel. The monitoring well riser and sump pipe will be 2-inch ID, flush joint, threaded, Schedule 10, 304 stainless steel.

B. The well sump will be five-feet long.

C. The well riser will extend a minimum of 1 foot and a maximum of 2 feet above the ground surface.

2.04 WELL SCREEN

A. The extraction well screen will be 6-inch ID, wire wound 304 stainless steel with flush threaded joints. The monitoring well screen will be 2-inch ID, wire wound 304 stainless steel with flush threaded joints. The screen section for both the extraction and monitoring wells will be a minimum of 10-feet in length with a slot size of 0.03 inches (30-slot).

2.05 SAND PACK

A. The primary sand pack surrounding the well screen will be a clean, inert, siliceous material with a grain size greater than 0.01 inches (Morie # 0 or equivalent).

2.06 BENTONITE SEAL

A. The seal will consist of 3/8-inch diameter sodium bentonite pellets. In unsaturated conditions, the bentonite pellets will be hydrated with potable water. The bentonite pellets will be allowed to hydrate a minimum of 30 minutes after installation.

2.07 GROUT MIXTURE

A. The grout mixture shall be a mixture of Type I, Portland Cement (one 94 lb. bag), minus No. 200 sieve bentonite powder (3 lbs.), and potable water (7 gallons) in appropriate quantity to fill the borehole.

PART 3 - EXECUTION

3.01 GROUNDWATER EXTRACTION WELL INSTALLATION

A. Installation of the groundwater extraction well shall be recorded in a field log book.

B. Extraction wells shall be installed to specified depths using either hollow stem auger or air-rotary drilling techniques. Each extraction well will be drilled from the ground surface. The extraction wells will be screened at the elevations noted in the Drawings. All cuttings will be disposed in the cover area with soils containing 0 - 10 ppm PCBs. All drilling fluids will be disposed in accordance with Section 02140. Drilling equipment shall be decontaminated prior to drilling, between boreholes, and before leaving the site.

C. Upon reaching the required depth, the groundwater extraction well will be constructed in the borehole. Each groundwater extraction well will be constructed with the appropriate length of slotted well screen. The borehole annulus around the outside of the screen will be backfilled with a properly sized clean, inert, silica sand that extends from six inches below the bottom of the screen to 2 feet, or 20 percent, of the length of the well screen (whichever is greater) above the top of the screen. The sand pack will be placed using methods that avoid bridging and ensure accurate placement of filter materials. A minimum three foot thick bentonite pellet seal will be placed above the sandpack, hydrated, if necessary, and allowed to swell a minimum of 30 minutes. After allowing the bentonite seal to swell, cement/bentonite ground will be installed above the bentonite seal to within three to five feet of ground surface. The grout will be placed ensuring that it is not diluted by formation water and that any water in the annular space is displaced.

3.02 ACCEPTANCE

A. If at any time during the installation of a groundwater extraction well the Engineer determines that the groundwater extraction well has not been properly installed, the Driller shall abandon the hole and slurry grout its full depth as directed by the Engineer and initiate construction of a new groundwater extraction well at a location determined by the Engineer at no cost to Alcoa.

B. Upon completion of a groundwater extraction well, the Driller shall demonstrate to the Engineer that the full depth of the groundwater extraction well is free from any obstructions and clear of any formation materials and that it will produce clean sediment-free water, or the groundwater extraction well shall be deemed unacceptable and shall be abandoned and re-drilled at no cost to Alcoa.

3.03 DRILLING RECORDS

A. The Engineer will record all drilling activities in a well log. The well log will contain the following information:
   1. A record of the soil materials penetrated and the depth to which they were encountered in accordance with 6 NYCRR 360-2.11(a)(10).
   2. A record showing the materials and measurements of casing and screen used and the location of packers, plugs and seals.
   3. Static groundwater level and the levels at which water was encountered during drilling.

3.04 SURVEYING

A. Vertical and horizontal coordinates of newly installed groundwater extraction wells will be determined by a state licensed land surveyor. Each well shall be surveyed from the permanent measuring point scribed onto the well riser. Vertical measurements (elevations) will be measured to within +/-0.01 feet and horizontal measurements within 0.1 feet. Measurements will be tied into the horizontal and vertical control established for the site.

B. Surveying shall be provided by the Contractor.

3.05 DECONTAMINATION

A. The contractor will not use, reuse, or remove any equipment, materials, samples, or other goods at or from the site until it is certified to be uncontaminated. Decontamination will consist of washing and steam cleaning all equipment and materials that may be required as specified above or at the request of the Engineer. The drilling crew will undertake the decontamination of the given equipment or materials under the field Geologist's supervision. The Contractor shall comply with all request and procedures of the onsite Geologist regarding decontamination during the course of the work, close of the workday, and upon completion of the project. Anticipated requests and procedures for decontamination are outlined below.

B. General Decontamination Procedures and Requirements Surveying
   1. All drilling equipment shall be inspected for integrity of hydraulic and oil fluid handling systems and general overall cleanliness. Leaking hoses, tanks, hydraulic lines, etc., shall be replaced or repaired prior to beginning work.
   2. All well casing, screens, and other construction materials must be in new condition. Used materials shall not be permitted in well construction.

C. Initial Cleaning
   1. All drilling equipment and associated tools shall be steam cleaned upon arrival at the Site. Equipment will include at a minimum, but not be limited to:
      - drilling rods and bits;
      - augers (clips, pins, and associated hardware);
      - samplers (i.e. split spoon);
      - casing materials (both temporary and permanent);

- wrenches;
- hammers;
- other hand tools and tool boxes;
- hoses and tanks;
- able clamps and other holding devices in direct contact with drilling rods; and
- drill rig and undercarriage, wheel wells, chassis.

2. During and following cleaning, equipment shall be handled only with clean gloves. A new set of gloves will be utilized between each location.
3. Cleaned materials shall be protected from contamination by such means as the Engineer deems necessary.

D. Onsite Cleaning

1. Following use, all equipment with the exception of the carrier truck and undercarriage, shall be steam-cleaned between borings.
2. Down hole sampling equipment must be washed in laboratory grade detergent and water, and rinsed in clean, clean potable municipal water between consecutive samples and/or each boring, as appropriate.
3. If immiscible products are encountered during drilling, the drilling and sampling equipment must be cleaned in a manner consistent with the equipment decontamination procedures described in the Post-Remedial Construction Operations and Maintenance Plan for the Site.

END OF SECTION 02671

SECTION 02674

RECOVERY WELL PUMPING EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

Requirements specified in Conditions of the Contract and Division 1 form a part of this Section. Furnish all tools, equipment, materials, supplies, and manufactured articles and perform all labor necessary for the construction and installation of submersible recovery well pumping equipment, ready for standard operation as specified herein and as indicated on the Drawings.

A. Work Included:
   1. Installing pumps, coping, controllers, and appurtenances in recovery wells.

B. Related Work specified on other sections:
   1. Section 02671 - Extraction wells.

1.02 SUBMITTALS

Shop drawings showing fabrication, assembly, and installation drawings, together with detailed specifications and data covering performance and materials of construction, power drive assembly, parts, devices, and other accessories forming a part of the equipment furnished shall be submitted. Data and specifications for the equipment shall include, but shall not be limited to the following:

A. Prior to preparation of shop drawings, the Contractor shall submit the following information for each pump specified under this Section.
   1. Pump curves indicating total dynamic head, flow rate, brake horsepower, shutoff head, net positive suction head, and efficiency for entire operating range and for points specified on pump performance curves.
   2. Materials of pump construction including shafts, bearings, impellers, castings, pump base, stuffing boxes, and shaft guards.
   3. Electric motor data including size, make, type, designation, thermal protection (yes/no), NEMA insulation class, full load amperage, locked rotor amperage, voltage, horsepower, and full speed (rpm).
   4. Standard wiring diagrams unless wiring diagrams are specially prepared and submitted with shop drawings.
   5. Operation and Maintenance Manuals including: complete installation, operation, and maintenance data, and copies of all approved Shop Drawings.

B. After the above equipment submittals have been approved, complete fabrication, assembly, foundation, and installation drawings, together with detailed specifications and data covering materials of construction, parts, devices, wiring diagrams, and other accessories forming a part of the equipment furnished, shall be submitted for approval.

1.03 QUALITY

A. All pumping equipment furnished under this Section shall be (1) of a design and manufacturer that has been used in similar applications and (2) be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by those manufacturers specifically named herein. Pumps shall not be delivered until approved.

B. Warranty: The pumping units shall be warranted by the manufacturer for a one-year period. Wear items such as seals, bearings, impellers, rotors, and stator may be prorated for the one-year period.

PART 2 - PRODUCTS

2.01 GENERAL

Pumps and motors shall be rated for continuous duty and shall be capable of pumping the specified flow range without surging, cavitation, or vibration. The pumps shall not overload the motors for any point on the maximum speed pump performance characteristic curve within the limits of stable pump operation as recommended by the manufacturer to prevent surging, cavitation, and vibration, as well as throughout the entire pump operating range. The service factors for the motors shall not be applied when sizing the motors. To insure vibration-free operation, all rotative components of each pumping unit shall be statically and dynamically balanced. Excessive vibration shall be sufficient cause for rejection of the equipment. The mass of the unit and its distribution shall be such that resonance at normal operating speeds is avoided. In any case, the amplitude of vibration as measured at any point on the pumping unit shall not exceed the limits set forth in the latest edition of the Hydraulic Institute Standards. All parts of each pump shall be designed to withstand the stresses that will be imposed upon them during their handling, shipping, erection, and operation. The completed units, when assembled and operating, shall be free of cavitation, vibration, noise, and oil or water leaks over the range of operation. Pump supplier shall be responsible for proper operation of the complete pumping system, which includes pump and motor. The pumps shall be the product of a single manufacturer unless otherwise specified.

2.02 PUMP SCHEDULE

The Contractor shall supply and install the following pumps:

Pump ID/Location	EW-1	EW-2
Operating Conditions		
- TDH (ft)	43	46
- Flow (gpm)	10	10
PUMP		
- Manufacturer	Grundfos	Grundfos
- Model No.	10E5	10E5
- Hp	1/3	1/3
- Voltage/Phase	230/1	230/1
- Discharge Size (in NPT)	1-1/4	1-1/4
- Construction Materials		
casing	Stainless Steel	Stainless Steel
impeller	Stainless Steel	Stainless Steel
shaft	Stainless Steel	Stainless Steel
hardware	Stainless Steel	Stainless Steel

All pumps shall be equipped with 50 feet of waterproof, oil-resistant power cord.

2.03 NAME PLATES

A. The pumps shall have a Type 316 stainless steel plate permanently attached to the pump frame into which the following information shall be impressed, engraved, or embossed: Manufacturer's name, pump size, serial number, impeller diameter, capacity, head rating and speed. Nameplates shall also include information unique to each item of equipment and device to identify its function as described herein. Function nameplates shall be approximately one-inch by 3 inches if made separately. Letters of function titles shall not be smaller than 1/4-inch high.

2.04 MOTORS

A. Permanently sealed and rigidly coupled to the pump.

B. Grease-sealed lifetime lubricated bearings.

C. Voltage and horsepower ratings per pump schedule.

2.05 APPURTENANCES

A. Start and stop float switches activated by change in water level.

B. Pump Mount Fittings: Provide Campbell pitless adaptors for submersible pump installation: Model: B-20X (bronze), size: 1-1/4 inch with the discharge bushed to 1-1/2 inch.

2.06 GROUNDWATER DISCHARGE PIPE

A. Pipe and fittings
   1. The polyethylene piping used shall have a cell classification of 345434C or better, in accordance with ASTM D3350-84 Standard Specification for Polyethylene Plastics Pipe and Fittings materials, or most recent revision thereof.
   2. Pipe shall conform to ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter, or most recent revision thereof.
   3. All piping materials shall he listed by the Plastic Pipe Institute (PPI) with a designation of PE 3408.
   4. All polyethylene pipe shall be supplied in Nominal Diameter and Standard Diameter Ratio (SDR), as shown in the Construction Drawings.

B. Manufacturer and Product
   1. Phillips Petroleum: Drisco Pipe
   2. Central PlasticHDPE Pipe
   3. or equal.

PART 3 - EXECUTION

3.01 INSTALLATION AND START-UP

A. Install in accordance with manufacturer's written instructions and approved submittals.

B. The Contractor shall furnish the services of competent factory-trained personnel to supervise the installation and initial operation.

3.02 EQUIPMENT TESTING

A. Field Testing. Following completion of the installation and satisfactory startup of the equipment, the Contractor shall in the presence of the pump manufacturer's representative, operate each pumping unit over the entire specified range. The operation, over the entire specified range, shall be free of vibration, noise, or cavitation.
   1. Vibration shall be checked and recorded. The vibration of each pump, operating at full speed, shall be equal to or less than the amplitude limits recommended in the Hydraulic Institute Standards.
   2. Each pump performance shall be documented by obtaining concurrent readings showing motor voltage and amperage, pump suction head and pump discharge head. Readings shall be documented for at least three pumping conditions to ascertain the actual pumping curve. One test shall be at shutoff head. Each power lead to the motor shall be checked for proper current balance.
   3. In the event any of the pumping equipment fails to meet the above test requirements, it shall be modified and retested in accordance with the requirements of these Specifications.

3.03 MANUFACTURER'S FIELD SERVICE

After the equipment has been installed, tested, adjusted, and placed in satisfactory operating condition, the Contractor shall provide the services of a representative of the manufacturers to instruct the operating personnel in the use and maintenance of the equipment. At least one week prior to commencement of the construction period, the Contractor shall give the Owner formal written notice of the proposed time of instruction. The Manufacturer shall provide a level of instruction which is adequate to train the Owner's personnel regarding use of the equipment. During this instruction period, it shall be the responsibility of the Manufacturer to answer any questions from the Owner's operating personnel. The Manufacturer's obligation shall be considered ended when he and the operating personnel agree that no further instruction is needed. An appropriate allowance for this instruction shall be included by the Manufacturer in the price of his equipment.

END OF SECTION 02674

SECTION 02727

DRAINAGE PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnishing and installation of smooth high density polypropylene (HDPE) pipe for use as culverts under the gravel access road.

B. Requirements.

C. Installation.

D. Pipe Schedule.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Section 01564 - Erosion Control

B. Section 02222 - Excavation

C. Section 02223 - Backfilling

D. Section 02228 - Compaction

E. Section 02421 - Geotextiles

F. Section 02990 - Finish Grading, Topsoil and Seeding

1.03 REFERENCES

A. The drainage piping and accessories shall meet the applicable requirements of the following specifications:
   1. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
   2. ASTM D883 - Terms Relating to Plastics
   3. ASTM D1248 - Polyethylene Plastics Molding and Extrusion Materials.
   4. ASTM D1693 - Environmental Stress Cracking of Ethylene Plastics.
   5. ASTM D2122 - Determining Dimensions of Thermoplastic Pipe and Fittings.
   6. ASTM D2412 - Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
   7. ASTM D2444 - Tests for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a TUP (Falling Weight).

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings - Provide data, indicating conformance to ATSM/AWWA codes, pipe material, sizes, class, dimension, joint type and accessories.

C. Manufacturer's Certification - Certify that products meet or exceed specified requirements.

1.05 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01300.

B. Submit marked-up record plans including record location of pipe culverts and invert elevations.

C. Identify and locate on record drawings during construction, the discovery of exposed uncharted existing utilities and services.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable codes for materials and installation of the work of this section.

B. Conform to New York State Industrial Code Rule 53, entitled "Construction, Excavation and Demolition Operations at or Near Underground Facilities," as issued by the State of New York Department of Labor, Board of Standard and Appeals.

1.07 FIELD MEASUREMENTS

A. Prior to start of construction, verify that the elevations of existing conditions are as shown on drawings. Notify Engineer of specific differences.

1.08 TEST REQUIREMENTS

None

PART 2 - PRODUCTS

2.01 GENERAL

A. All products included in this section shall conform to the requirements of the standard specifications referenced herein.

B. Pipe material, pipe class and pipe sizes shall be furnished and installed as listed herein, in the pipe schedule, or as shown on the Drawings.

C. All fittings, if required, shall be provided.

2.02 PIPE MATERIALS

A. Culvert Pipe
   1. AASHTO Designation M294-90, Type S.
   2. Pipe and fittings shall be made of virgin PE compounds which conform to the requirements of Type III, Category 3, Grade P34, Class C as defined and described in ASTM D1248.
   3. Manufacturers and Product
      a. ADS:N-18 pipe

b. Hancor Hi-Q pipe
c. or equal

4. Include flared end sections for each pipe.

2.03 IDENTIFICATION

A. Each pipe length and fitting shall be clearly marked with:
1. Manufacturer's name and trademark.
2. Nominal pipe size and class.
3. Material designation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that trench cut, excavated base and pipe bedding are ready to receive pipe and that excavations and pipe bedding dimensions and elevations are as shown on Drawings.

B. All pipe or fittings that have been damaged in transit or that are obviously deformed or refinished in any way shall be rejected, marked, and removed from the site of the work.
1. Any pipe or fitting that the Engineer suspects is improper for the job shall be temporarily rejected, marked, and set aside for subsequent investigation to determine its conformity with the specifications.
2. All pipe fittings and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged pipe joints including damaged pipe lining or coatings or specials, as determined by the Engineer, shall be culled out and not installed.
a. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the Contractor at his own expense.

3.02 PREPARATION

A. The Contractor shall have on the job site with each pipe laying crew, all the proper tools, gauges, pipe cutters, lubricants, etc. to handle, cut and join the pipe.

B. Flat-bottom trenches of required width shall be excavated to the necessary depth as required and maintained in accordance with Section 02222.

C. Prior to installing the pipe foundation material, trenches shall have all water removed and all work performed in a dry trench.

D. All pipes, fittings and specials which are to be installed in the open trench excavation shall be properly bedded in, and uniformly supported on pipe foundations of the type specified in Section 02223 and shown on the Drawings. In particular, stones 2 inches and larger in diameter shall be removed from the bearing surface of the pipe foundations.

E. Pipe foundation bedding material shall be spread in maximum 8-inch layers and each layer shall be compacted up to the spring line of the pipe.

F. Compaction methods include hand tamping with T-bars, flat heads, level slicing as well as mechanical compactors.

G. The Contractor shall perform his bedding operations with care to maintain line and grades

H. Suitable holes or depressions shall be provided in the pipe bedding to permit adequate bedding of bells, couplings, or similar pipe projections.

3.03 LINES AND GRADES

A. The Contractor shall furnish all labor, materials, surveying instruments, and tools to establish and maintain all lines and grades. The Contractor shall have personnel on duty or on standby call, at all times, who are qualified to check line and grade of pipe lines as they are installed.

B. Control points and lines necessary for locating the work are as shown on the Drawings and as described in Section 01051.

C. During construction, the Contractor shall provide the Engineer at his request, all reasonable and necessary materials, opportunities, and assistance for setting stakes and making measurements, including the furnishing or one or two rodmen or chainmen as needed at the intermittent times.

D. The Contractor shall carefully preserve bench marks, reference points and stakes established by Alcoa, and in case of willful or careless destruction by his own operations he will be charged with the resulting expense to reestablish such destroyed control data and shall be responsible for any mistakes or delay that may be caused by the unnecessary loss or disturbance of such control data.

E. The Contractor may use laser equipment to assist in setting the pipe provided he can demonstrate satisfactory skill in its use.

F. The use of string levels, hand levels, carpenter's levels or other relatively crude devices for transferring grade or setting pipe are not to be permitted.

3.04 TOLERANCES

A. Pipes shall be laid to the lines, grades, and inverts shown on the Drawings. Maintain a minimum grade of 1/8-inch per foot (1 percent).

B. Minimum depth of cover shall be maintained as shown on the Drawings or as described herein.

3.05 INSTALLATION

A. The Contractor shall furnish slings, straps and/or approved devices to provide satisfactory support of the pipe when it is lifted. Transportation from storage areas to the trench shall be restricted to operations which can cause no damage to the pipe.

B. The pipe shall not be dropped from trucks onto the ground or into the trench.

C. Pipe laying shall proceed upgrade

D. Each pipe section shall be placed into position in the trench on the pipe bedding in such manner and by such means required to cause no injury to the pipe, persons or to any property.

E. Pipe laying procedures shall be as recommended by the manufacturer and approved by the Engineer to control thermal expansion and contraction, both during and after installation.

F. Pipes, fittings, and specials shall be firmly bedded in the pipe foundation and shall have full bearing throughout their entire length, which shall be accomplished by combination of shaping the bedding and adequately combating the pipe bedding and backfill under and around the pipe to the spring line of the pipe. The remaining backfill placed in 12-inch lifts to 1-foot above the crown of the pipe in accordance with Section 02223.

G. Pipe laid in normal trench excavation shall not be laid on wood blocking.

H. Backfill material within 12 inches of the pipe shall be free of stones greater than 2 inches in any dimension.

I. Pipe deflection shall be according to the recommendations of the manufacturer.

3.06 PIPE SCHEDULE

Description	Size (in)	Type	Schedule or Class	Joints
Drainage Culvert	12, 18	Smooth bore corrugated HDPE	AASHTO Designation M294-90 Type S	Split Couplings

END OF SECTION 02727

SECTION 02910

WETLAND RESTORATION

PART 1 - GENERAL

1.01 DESCRIPTION

The work specified herein includes the material, equipment and labor necessary to place topsoil, fertilizer, seed, and mulch within wetlands at the Western Drainage Area.

A. Work included in this section:

1. Soil preparation at all planted areas including placing, loosening, conditioning, and fertilizing the soil

2. Cleanup of all project areas.

3. Maintenance for 60 days.

B. Related work not included in this section:

1. Section 02222 - Excavation;

2. Section 02223 - Backfilling;

3. Section 02228 - Compaction; and

4. Section 02990 - Final Grading, Topsoil, and Seeding

1.02 SUBMITTALS

A. Topsoil source: The Contractor shall submit for approval by the Engineer a written statement giving location of soil source and test results for pH, organic content, PCB content, and sieve analysis.

B. Wetland Seed Vendors Certificate: The Contractor shall submit the seed vendor's certified statement for the wetland seed mixture required, stating common name, percentage by weight, and percentages of purity and germination rates for the grasses and sedges used for seeding.

C. Fertilizer: The Contractor shall submit for approval by the Engineer, the manufacturer's literature concerning chemical composition, chemical make-up,, application rates, and application procedures.

D. Hydroseeders: The Contractor shall submit for approval by the Engineer all data concerning hydroseeding equipment including all material application rates.

1.03 QUALITY ASSURANCE

A. Certificates. In addition to any other certificates specified, the Contractor shall furnish a certificate with each delivery of material, in containers or bulk, the analysis of the material, together with the date of delivery. All certificates shall be delivered to the Engineer, who will inspect the materials prior to its use.

B. Seeding. Seed shall be labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination which shall be within a period of six months prior to commencement of planting operations. Seeding material shall be inspected upon arrival at the job site, and unacceptable material shall be removed from the job site. Seed shall be from same or previous year's crop; each variety of seed shall have a purity of not less then 85%, a percentage of germination not less than 90%, shall have a weed content of not more than 1% and contain no noxious weeds such as purple loosestrife or phrogmites.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Topsoil shall be friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones larger than 2" in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter. Topsoil as delivered to the site or stockpiled shall meet the requirements for topsoil as specified under Section 02990 Finish Grading, Topsoil, and Seeding. Additionally, the topsoil for wetland restoration shall contain at least five percent organic matter and no PCBs; visible nuisance weeds; or seeds, stems or rhizomes of purple loosestrife or phragmites.

B. Fertilizer. Fertilizer shall be a starter fertilizer of commercial stock, of neutral character, with elements derived from organic sources. It shall be a complete, prepared and packaged material and shall contain a minimum of 8% nitrogen, 20% phosphoric acid and 10% potash. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

2.02 WETLAND RESTORATION

A. Vegetation Restoration Overview

Plant materials, which are described in Table 02910-1 are available from commercial suppliers. If proposed plant materials are unavailable (e.g., seasonal constraints, supply shortages, etc.), appropriate substitutes will be obtained by the Contractor and approved prior to use by the Engineer.

Zone A, with water depths of approximately 2 to 3 feet is intended to be a zone of open water with submerged and floating aquatics. Six small 30-foot diameter open water pockets will be

created in the restored wetland area (see Contract Drawing C-2). This zone will be approximately 0.1 acre in size. A list of species, including submerged and floating aquatics to be planted in this zone by the Engineer during the spring following restoration is presented in Table 02910-1.

Zone B, the zone of saturated soils and shallow water (0 to 1 feet), is designed to support persistent and non-persistent emergent vegetation. Zone B will be approximately 1.2 acres in size. Zone B will be restored with a wetland seed mixture specified in 2.02(B).

Some adjacent uplands and access points will be temporarily disturbed during construction. This area is referred to as Zone C. These uplands will be restored and will be seeded with a conservation mixture of herbaceous vegetation at an application rate of 100 pounds/acre (Table 02910-1). Straw mulch will be applied to all disturbed upland areas.

B. Wetland Seed Mix

A suggested wetland seed mixture is as follows:

Common Name	Scientific Name	Weight	Percentage of Mixture
Rattlesnake grass	*Glyceria canadensis*	6 oz.	37.50
Sedge	*Carex crinita or C. comosa*	5 oz.	31.25
Rice cutgrass	*Leersia oryzoides*	3 oz.	18.75
Green bulrush	*Scirpus atrovirens*	1 oz.	6.25
Woolgrass	*Scirpus cyperinus*	1 oz.	6.25
	Total	16 oz (1lb)	100%

Application rate of wetland seed mixture is 5 lbs/acre with an annual cover crop (e.g., winter rye or winter wheat at 25 to 30 lbs./acre).

B. Product and Manufacturer. An approved Central or Northern New York State, Vermont, New Hampshire, Michigan or Wisconsin nursery or equivalent.

C. If a variety of specified seed is not available at the time of seeding, substitutes will be approved by the Engineer. To obtain approval for substitutes, submit signed statements from three recognized seed vendors that the specified seed of the required species is not available.

2.03 EROSION CONTROL MULCH

A. Refer to Section 02990 - Finish Grading, Topsoil and Seeding for material requirements.

PART 3 - EXECUTION

3.01 GENERAL

A. Contractor shall coordinate all work with waste excavation, sediment removal, and cover system construction.

3.02 INSTALLING TOPSOIL

A. Topsoil

1. Topsoil shall be placed outside the six depressions to a depth sufficiently greater than required so that after natural settlement and light rolling, the complete work shall conform to a topsoil depth of six inches. No topsoil shall be spread while frozen or muddy.

2. The topsoil shall then be rolled or compacted with a cultipacker weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement of rolling shall be filled with additional topsoil, and the surface shall be regraded and rolled until a smooth and even finished grade is created.

B. Fertilizer.

1. The fertilizer shall be applied with a mechanical spreader at a minimum rate of 200 lbs/acre or in accordance with the manufacturer's suggested rate.

2. After topsoil has been spread and the fertilizer applied, it shall be carefully prepared by scarifying or harrowing to a depth of 2 inches and left in a roughened condition for seeding. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the area and disposed of by the Contractor. The areas shall also be free of smaller stones, in excessive quantities, as determined by the Engineer.

C. Quality Control

1. The contractor shall provide the services of an Engineer and an independent soils testing laboratory to conduct quality assurance testing.

2. The following material property test methods and frequency shall be conducted for soil:

Material Property	Test Method	Frequency
Grain-size Analysis with Fines	ASTM D-422	2,000 cubic yards
Soil pH	ASTM D-4972	2,000 cubic yards
Organic Content	ASTM D-2974	2,000 cubic yards

3. Additional testing will be required if alternate sources are proposed or utilized.

3.03 SEEDING

A Seeding

1 Moldy or damaged seed will not be accepted.

2 The seed mixture shall be applied uniformly upon the prepared surface with a hydroseeder at a minimum rate as specified in Part 2.02 of this specification immediately following the application of fertilizer. Unless otherwise approved by the Engineer, the permanent wetland seed mixture shall be applied on or before September 15 or cover crop shall be applied by October 15 with the wetland seed applied the following spring.

3. If seed materials arrive before sufficient areas are prepared, provide temporary storage areas that are sheltered from wildlife, vandalism, theft, and adverse weather.

3.04 PLANTING

A. The Engineer shall plant submerged and floating aquatic vegetation shown in Table 02910-1. This planting will be conducted during the spring following wetland sediment removal.

3.05 MAINTENANCE

A. The Contractor shall begin a maintenance period immediately after planting of landscape materials.

B. Seeding establishment period is for one year. If in the judgment of the Engineer coverage has not been met, the Contractor must reseed those areas lacking acceptable coverage. Upon reseeding, the seeded areas shall be reinspected after establishment.

3.06 WARRANTY

A. The warranty period shall be one year from the date of substantial completion or correction period as specified in General Conditions. Areas of erosion shall be immediately repaired, re-seeded, and maintained until an acceptable grass stand is established.

B. Failed plant materials exhibiting conditions that are determined by the Engineer as being unacceptable due to workmanship shall be replaced by the Contractor at no additional cost to the Owner or Engineer. Replacement plant materials must match the size of adjacent specimens of the same specimens of the same species.

TABLE 02910-1

Details of Vegetation Plantings for the Restored Wetland
at the Western Drainage Area

Zone Depth	Species of Plant [a]	Type of Stock	Planting Method	Spacing and Density	Planting Pattern	Plant Quality
Zone A - (0.1 acre) Open water with Submerged/ floating aquatics (2 to 3 feet deep)	Sago Pondweed *(Potamogeton pectinatus)* Water lily *(Nymphaea odorata)* Water celery *(Vallisneria americana)*	Tubers Tubers Tubers	Hand Hand Hand	Scattered Scattered Scattered	Random Patches	200 200 100
Zone B - (1.2 acres) Persistent and non-persistent emergents (0 to 1 foot deep)	Wetland seed mixture [b]	Seed	Hand	5 lbs./acre	Exposed wetland soils	
Zone C - Temporarily disturbed upland edges	Upland conservation seed mixture [c]	Seed	Hand	100 lbs./acre	Entire area	

(a) Substitute plant species may be required, depending on availability.

(b) Wetland seed mixture will not be planted in the inundated areas of Zone B. The contractor will add approximately 30 lbs. of winter rye or winter wheat, which will serve as a cover crop, to the wetland seed mixture. The wetland seed mixture is described in Part 2.02 of Section 02910.

(c) The upland conservation seed mixture is described in Part 2.04 of Section 02990.

END OF SECTION 02910

SECTION 02990

FINISH GRADING, TOPSOIL, AND SEEDING

PART 1 GENERAL

1.01 WORK SPECIFIED

A. The work specified herein includes the material, equipment, and labor necessary to provide finish grading and to place topsoil, fertilizer, seed, mulch, and erosion control fabric. The mulch and erosion control fabric shall be placed as follows:
   1. Mulch - shall be utilized on all slopes.
   2. Natural and synthetic erosion control fabrics - shall be utilized as indicated on the Drawings.

B. Related work specified in other sections:
   1. Section 01500 - Temporary Facilities and Field Office
   2. Section 01564 - Erosion Control
   3. Section 02100 - Site Clearing
   4. Section 02222 - Excavation
   5. Section 02260 - Soil Cover Construction
   6. Section 02269 - QA/QC for Soil Cover Soil Material
   7. Section 02910 - Wetland Restoration

1.02 SUBMITTALS

A. Materials and Products: Submit for approval data.
   1. Topsoil Source: The Contractor shall submit for approval by the Engineer, a written statement giving location of topsoil source. If soil amendments are proposed, submit amendment types, quantities, mixes and test results.
   2. Grass Seed Vendors Certificate: The Contractor shall submit the seed vendor's certified statement for the grass seed mixture required, stating common name, percentage by weight, and percentages of purity, and germination.
   3. Fertilizer: Submit manufacturer's product data showing contents and test results.
   4. Hydroseeders: The Contractor shall submit for approval by the Engineer, all data concerning hydroseeding equipment (if used) including all material application rates.
   5. Erosion Control Fabrics: The Contractor shall submit for approval by the Engineer, the erosion control fabric manufacturer's literature, samples and specifications.

B. Installer - Submit the name of subcontractors (if used) and Qualification Statements.

C. Manufacturer's Certification - Certify that products meet or exceed specified requirements.

1.03 QUALITY ASSURANCE

A. All plants shall conform to or surpass minimum quality standards as defined by the American Association of Nurserymen. All plant materials must be clearly labeled with genus, species, and common name. These plants may be inspected for conditions of root ball, disease, insects, or injury. All rejected plant materials must be removed immediately from the job site and must be replaced by the Contractor at no cost to the Owner within 5 working days. The Engineer has the right to inspect and reject plant materials up to the final acceptance.

B. Certificates. In addition to any other certificates specified, the Contractor shall furnish a certificate with each delivery of material, in containers or bulk, the analysis of the material, together with the date of delivery. All certificates shall be delivered to the Engineer, who will inspect the materials prior to its use.

C. Seeding. Seed shall be labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination which shall be within a period of six (6) months prior to commencement of planting operations. Seeding material shall be inspected upon arrival at the job site, and unacceptable material shall be removed from the job site. Seed shall be from same or previous year's crop; each variety of seed shall have a purity of not less than 85%, a percentage of germination not less than 90%, shall have a weed content of not more than 1% and contain no noxious weeds.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Topsoil shall be natural, friable, fertile soil of loamy character, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones larger than 2 inches in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter. Topsoil as delivered to the site or stockpiled shall meet the following requirements:

1. shall be well graded with a maximum particle size of 2 inches, 85 to 100 percent passing 1 inch, 65 to 95 percent passing 1/4 inch, and 20 to 80 percent passing a Number 200 sieve. Clay content of material passing the Number 200 sieve shall not be greater than 30 percent, as determined by hydrometer analysis;
2. pH between 6.0 and 7.5;
3. shall contain not less than 3 percent organic matter nor more than 20 percent as determined by loss of ignition of moisture-free samples dried at 100° to 110° Celsius;
4. free of pest larvae; and
5. soluble salt content not greater than 500 ppm.

B. The Contractor shall test the proposed topsoil for PCBs by USEPA Method SW-846 in accordance with the Quality Assurance/Quality Control Plan. The testing frequency shall be one

sample per 5,000 cubic yards or a minimum of one sample per borrow source. The Engineer shall witness the sampling. Only topsoil with no detectable levels of PCBs shall be brought to the site.

2.01(B). TOPSOIL AMENDMENTS

A. Natural topsoil materials may be amended or substituted completely with processed materials subject to the Engineer's review and approval. The materials may be processed sewage sludge of yard wastes, manures, mulches, or other like materials. If the Contractor decides to use the materials, he shall be responsible for testing these materials and obtaining the necessary permits, as required under Title 6 NYCRR Part 360 for processing or application of these materials.

B. Topsoil amendments or substitutes shall meet the following requirements as evidenced by laboratory analysis in conformance with Title 6 of the New York State Code of Rules and Regulations Part 360 Section 4.4:

Parameter	Maximum Concentration mg/kg., dry weight
Mercury (hg)	10
Cadmium (Cd)	25
Nickel (Ni)	200
Lead (Pb)	1000
Chromium (total (Cr)	1000
Copper (Cu)	1000
Zinc (Zn)	2500
PCBs (total)	ND

C. The completed topsoil mixture or substitute layer shall be free from nuisance odors, unattractive to vectors, adequately mixed to ensure uniformity of nutrients and properties, and capable of sustaining vigorous growth of plant material. The material shall have no recognizable solid waste materials and a maximum particle size of 1 inch.

D. Guarantee

1. If it is the Contractor's decision to use topsoil amendments or substitutes and the material cannot support vigorous vegetation, it shall be removed and replaced with an equivalent volume of natural topsoil at the Contractor's expense.

2.02 FERTILIZER

A. Fertilizer shall be a starter fertilizer of commercial stock, of neutral character, with elements derived from organic sources. It shall be a complete, prepared and packaged material and shall contain a minimum of 18 percent nitrogen, 24 percent phosphoric acid, and 6 percent potash. Other fertilizer mixes may be acceptable provided the application rate is adjusted to provide equal quantities. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

1. Product and Manufacturers:
   a. Scotts Starter Fertilizer by Scott and Son
   b. or equal

2.04 GRASS SEED

The seed mixture will consist of the following proportions or approved equal

Common Name	% By Weight
Red, Chewing, and Tall Fescue	40
Perennial Ryegrass	25
Annual Ryegrass	15
Climax Timothy	15
White Clover	05
Optimal Seed Mix	

2.05 MULCH

A. Straw Mulch

Mulch shall be comprised of clean, threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10 inches or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

B. Hydromulch

Hydromulch - Wood Cellulose Fiber Pulp.

a. Provide a specially prepared wood cellulose fiber, processed to contain no growth or germination inhibitor factors, and dyed an appropriate color to facilitate visual metering of application of the materials.

b. Hydromulch manufactured from recycled paper products will be acceptable.

c. Product and Manufacturer:

1. Conwed Virgin Wood Fiber Mulch by Conwed, Inc.
2. Silva Fiber by Weyerhaeuser Co.
3. or equal

2.06 EROSION CONTROL FABRICS

A. Natural Erosion Control Fabrics: The natural erosion control fabric shall be a machine-produced mat of 100 percent biodegradable material.

1. Straw matting
   a. The material shall contain straw at 0.5 pounds per square yard with netting on one side only.
   b. Product and Manufacturer:
      1. Erosion Mat SC150BN by North American Green
      2. or equal

B. Synthetic Erosion Control Fabric

The synethic erosion fabric shall be an open 3-dimensional web of bonded PVC monofilaments with a minimum porosity of 85-90%, have a minimum unit weight of 18oz. Per square yard and a minimum thickness of 0.12 inches (Mirafi, Miramat 1800 or approved equal). The synthetic erosion control fabric must be approved by the Engineer.

C. The wire staples for securing erosion control fabrics shall be U-shaped and formed of 11-gauge plain iron wire with dimensions of 6-inch minimum length and 2-inch minimum width.

PART 3 - EXECUTION

3.01 APPLICATION PROCEDURES

A. All final grade surfaces shall receive six (6) inches minimum of compacted topsoil, seeding, mulch/or erosion control fabric, and fertilizer in accordance with this section.

B. All final grade surfaces outside the cover limits that have been disturbed or damaged during completion of the work shall be reseeded using a mixture of seed which shall produce similar vegetative growth as existed prior to commencement of the work.

C. The Contractor shall place mulch or erosion control fabric as follows:
   1. Mulch on all slopes less than or equal to 15 percent.
   2. Natural erosion control fabric on all disturbed or constructed slopes greater than 15 percent or as indicated on the Drawings, whichever is more stringent.

3.02. TOPSOIL

A. The Contractor shall place a minimum of six (6) inches of compacted topsoil over excavated areas, the landfill cover area, and the disturbed areas as directed by the Engineer.

B. The underlying soil shall be tilled to a depth of 2 inches by disking or harrowing before topsoil placement. Tillage shall be parallel to contours, and shall not be performed when the cover is frozen or excessively wet.

C. Topsoil shall be placed to a depth sufficiently greater than required so that after compaction, the complete work will conform to the lines, grades, and elevations indicated on the Drawings and the six (6) inch minimum requirement. No topsoil shall be spread in water or while frozen or muddy.

D. The topsoil shall then be rolled or compacted with a cultipacker weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement of rolling shall be filled with additional topsoil, and the surface shall be regraded and rolled until a smooth and even finished grade is created.

E. Quality Control
   1. The Contractor shall provide the services of an Engineer and an independent soils testing laboratory to conduct quality assurance testing.

2. The following material property test methods and frequency shall be conducted for soil

Material Property	Test Method	Frequency
Grain-size Analysis with Fines	ASTM D-422	10,000 cubic yards
Soil pH	ASTM D-4972	10,000 cubic yards
Organic Content	ASTM D-2974	10,000 cubic yards

3. Additional testing will be required if alternate sources are proposed or utilized.

3.03. FERTILIZER

A. The fertilizer shall be applied with a mechanical spreader at a minimum rate of 200 lbs/acre or in accordance with the manufacturer's suggested rate.

B. After topsoil has been spread and the fertilizer applied, it shall be carefully prepared by scarifying or harrowing to a depth of 2 inches and left in a roughened condition for seeding. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the area and disposed of by the Contractor.

3.04. SEEDING

A. The seed mixture shall be applied uniformly upon the prepared surface with a hand or mechanical spreader at a minimum rate of 100 lbs/acre. The seed shall be raked lightly into the surface and rolled. Seeding shall be conducted from April 1 to May 30 or from August 15 to October 1.

3.05. MULCH AND EROSION CONTROL FABRICS

A. Mulch or erosion control fabric shall be placed immediately after the application of fertilizer and seed.

B. Areas that have been seeded and have a slope less than or equal to 15 percent shall be protected from erosion by the placement of straw mulch or hydromulch. Straw mulch shall be applied with a mulch blower at a uniform rate of 1500 lbs/acre and anchored by use of a tackifier.

C. Natural erosion control fabrics shall be installed in lieu of the mulch in areas that have a slope greater than 15 percent or as indicated on the Drawings.

3.06. WATERING

A. Following applications of the mulch or erosion control fabric, the seed bed shall be moistened. A muddy soil condition will not be acceptable. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory growth. Watering shall be done in such a manner to prevent washing out of seed.

B. The stand of grass resulting from the seeding shall not be considered satisfactory until accepted by the Owner. If areas are determined to be unacceptable, the remaining mulch or erosion control fabric will be removed and all areas shall be reseeded, refertilized and remulched and erosion control fabric replaced as per the above application procedures at the Contractor's expense

3.07 MAINTENANCE

A. The Contractor shall begin a maintenance period immediately after planting of grass and landscape materials.

B. The Contractor shall maintain grass areas, for the periods required to establish an acceptable growth, but not less than 60 days, after seeding. If seeded in the fall and not given a full 60 days of maintenance, or if not considered acceptable by the Owner and the Engineer at that time, continue maintenance during following spring including at least one mowing until acceptable grass stand is established.

C. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory sod growth. Watering shall be in such a manner as to prevent washing out of seed.

D. In the event of late seeding in the fall, the Contractor is responsible for fixing eroded areas and for cleaning out drainage swales to the extent that rip-rap is covered with enough soil to shovel out.

3.08 WARRANTY

A. The warranty period shall be one year from the date of substantial completion or correction period. Areas of erosion shall be immediately repaired, re-seeded, re-mulched and maintained until an acceptable grass stand is established. Areas to be repaired shall also include areas failing to produce a full, uniform strand of grass.

END OF SECTION 02990

SECTION 13290

PREFABRICATED GROUNDWATER TREATMENT SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. The item presented in this section is for treating deep groundwater to be pumped from two recovery wells for a period of up to 25 years. The intent of the Owner is to have a system that has minimal operator attention requirement (on the order of 4 to 8 hours per week).

This treatment system will also be used for managing shallow groundwater generated during the remedial action. The following additional steps are needed to assure the treatment system would effectively manage shallow groundwater:

1. Bulk solids are removed in a temporary lined pond or equivalent water storage unit equipped with an oil skimmer or some equivalent means to remove any oil that may be floating on the water surface. Minimum hydraulic detention time (for sedimentation) will be 24 hours.
2. Inflows to the treatment process units are 10 gallons per minute or less.

B. Work Included in this Section:

1. This specification includes the furnishing, delivering, handling, and installing of a building, equipment and incidentals (as specified) to comprise a system capable of treating groundwater to the effluent discharge limitations specified in Part 2.01 of this specification.
2. The work under this specification consists of an integrated treatment system that is prefabricated, and can be set-up at the site with minimal fabrication. Include: building, labor, equipment, tools, materials, connecting piping and wiring; required to provide a complete and operational treatment system.
3. A process flow diagram is included that depicts the type of groundwater treatment system being designed for the treatment of deep (and shallow) groundwater at the York Oil site. The system is designed to remove: volatile organic compounds, iron, and semi-volatile organics. The bench-scale groundwater treatability work (Parsons ES, 1997c) completed in early 1997 provides much of the basis for the design information provided herein. A copy of the groundwater treatability study is also included.
4. Provisions shall be made to accommodate potential future equipment as described herein. Provisions shall be made with respect to space, electrical power service, and instrumentation/PLC space.

C. Related work not included in this Section:
   1. Section -1650, Facility Startup

1.02 SUBMITTALS

A. At least 30 days prior to starting installation of either a temporary or long term groundwater treatment system, supply three copies of each of the following:
   1. Provide plans, sections, details, and specifications for the supply of one prefabricated building that will house all equipment, incidentals, and supplies required to be supplied under this section. Complete information (materials, finishes, specifications) shall be provided for the following items: design loading, framing, exterior walls, interior walls, roofing, insulation, vapor barrier, electrical power supply and distribution, lighting, heating, ventilation, waterproof floor, doors, windows, and trim.
   2. Provide plans, templates, and directions for the installation of foundations and anchorages required to support treatment system. Supply of the foundation will be included.
   3. Manufacturer's literature, illustrations, specifications, and engineering data including dimensions, materials, size, and weight of treatment system components and the operational (connected) package.
   4. Fabrication, assembly and installation diagrams.
   5. Complete dimensioned layout plans, sections and details of all equipment, piping, structures, and appurtenances furnished as part of the groundwater treatment system, including a complete list of materials and quantities.
   6. Complete electrical and instrumentation drawings consisting of: one-line diagrams, electrical and instrumentation plans, piping and instrumentation diagrams (P&IDs), motor schematics, and control panel drawings. This shall be complete for the building (electrical power distribution, heating, ventilation, lighting) and the treatment system.
   7. Specify voltage and current draw requirements for individual components, and for the total complete treatment system and building. If power with different voltage and phase from that specified in Part 2.02 of this specification, is required, it must be provided by the Contractor.
   8. Detailed description of the treatment system operation (Sequence of Operation).
   9. List of spare parts furnished.
   10. Description and outline of operator training program to be provided by supplier to Owner.
   11. Equipment and building warranty (see Part 1.04 of this specification).
   12. Maintenance data and recommended maintenance schedule.
   13. Sampling Plan for unit start-up (see Part 3.03 of this specification).

B. At the times indicated below, supply five (5) copies of each:
   1. Operations and maintenance manuals for the long term treatment system after the system is installed and prior to startup; and

2 Complete and approvable building submittal complete with plans, and specifications that will be submitted to the local building inspector for approval. The submittal shall be prepared in accordance with all New York State and local Building Codes. Submit prior to erecting the building.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: The manufacturer shall have experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least two installations for treatment of contaminated groundwater using the same or similar technology.

1.04 WARRANTY

A. All treatment system components and ancillary equipment supplied by the Contractor shall be guaranteed to be free from defective materials and workmanship (including installation) for a period of one year from the date of completion of start-up testing.

B. The building shell shall be provided with a warranty against failure of the exterior finish, and against perforation for a period of 20 years.

C. Building mechanical and electrical systems shall be provided with the manufacturer's standard warranty, but not less than 1 year, and shall not start until the date that start-up testing of the treatment system is completed by the Contractor.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Shipping & Handling

All materials must be delivered to the York Oil Site in Moira, New York and placed into the final location by the Contractor. All system components delivered to the site shall be packaged to avoid damage to the equipment. Packaging shall be designed to allow for easy access for inspection and identification as well as provide protection of the materials and equipment from damage. All shipping and handling costs are to be included in the bid price.

B. Storage

Protect all materials from the weather and accidental damage during storage and staging until the system is installed and accepted. Keep materials free from dirt, grease, and other foreign matter during storage. Protect all exposed surfaces from corrosion. All expenses associated with storage of treatment system components/materials shall be included in the bid price.

1.06 SITE CONDITIONS

A. The following utilities will be available at the treatment building (provided by others): electrical power, influent pipeline, effluent discharge piping, and telephone service. Potable water nor natural gas will not be available at the site.

B. The prefabricated groundwater treatment system will be placed onto a concrete foundation that will be constructed in accordance with drawings supplied by the prefabricated groundwater treatment system supplier. The actual excavation and placement of concrete will not be performed by the supplier of the prefabricated treatment building.

C. The site is located in northern New York State.

1.07 GROUNDWATER CHARACTERISTICS

The major parameters of concern and their concentrations based on available data are presented in Table 3.1 of the Design Report. The treatment plant is expected to operate continuously (24 hours per day, 7 days per week). New York State specified discharge limits are included at the end of this specification.

Groundwater samples are available to the Contractor for independent chemical analyses and/or treatability testing upon request. The Contractor will be responsible for collection, transport, testing, and disposal of any samples collected.

PART 2 - PRODUCTS

2.01 SYSTEM PERFORMANCE

A. The treatment system shall be capable of treating groundwater generated from an extraction system. In addition, with sufficient pre-treatment will also be capable of treating water generated during construction. The characteristics of the deep groundwater to be treated are included in Part 1.07 of this specification. The treatment system shall be capable of providing a treated effluent in accordance with State discharge limits that can be discharged to the adjacent ditch following storage as needed to monitor effluent quality. The ditch to receive the discharge proceeds along the north side of the railroad embankment and empties through the Western Wetland and eventually into Lawrence Brook.

B. The prefabricated building heating system shall be capable of maintaining indoor temperatures within the range of 60°F to 80°F during the heating months for any outdoor temperature. Air conditioning will not be provided. Ventilation shall be in accordance with New York State and Local code for an occupied building. Interior lighting shall provide 50 foot candles at 30 inches above the floor. A switch for all interior lights shall be located at each doorway. Exterior area lighting shall be

provided on each of the four exterior walls . Exterior lighting will be controlled by a single on/off switch and by a single photo-electric eye.

C. The Contractor shall include the items listed below to accommodate additional treatment units to remove iron and manganese.

1. Provide a 20' by 20' contiguous space to accommodate additional treatment equipment including: pH adjustment equipment (pump, pH controller) to raise the pH in the equalization tank, 2 drums of sodium hydroxide, a clarifier/sludge holding tank rated for 0.5 gpm/square foot at a flowrate of 10 gpm, a gravity bag dewatering station, and an air diaphragm sludge pump.
2. Provide two additional 2 inch flanged ports on the cover of the equalization tank to accommodate caustic addition and a pH probe. Initially provide as blind flanged ports.
3. Provide a 4 inch flanged gravity discharge port at the waterline of the equalization tank to accommodate a gravity discharge to a clarifier. Initially provide as blind flanged ports.
4. Provide sufficient electrical power service and spare breakers to accommodate electrical service for a chemical feed pump, clarifier, and bag dewatering station. At a minimum supply 4 - 20 amp (120 Volt) breakers to accommodate this equipment.
5. Provide sufficient spare input/output space in the PLC and/or SCADA system to accommodate a 40 percent expansion of input and output.
6. Provide sufficient additional air compressor capacity to drive two additional sludge pumps (10 gpm approximate).

2.02 POWER DISTRIBUTION

A. The Contractor will take power from a disconnect switch provided by others. Power supplied by the Owner will consist of 120/240 Volt. 200 amps of current is available. The amperage required by the Contractor must be specified in the Contractor's proposal. The Contractor will provide all necessary transformers, power distribution panels, motor starters, current overprotection devices, switches, etc. associated with the operation and control of the building and treatment system. Any exception to this section must be clearly stated in the bid. Provide a minimum of 4 - 20 amp (120V) spare breakers.

B. All electrical equipment within the building shall be NEMA 12.

2.03 COMPONENTS

A. Groundwater Treatment System

Based on the required effluent discharge limits (see Part 2.01 of this specification), it is anticipated that the treatment system will require the following primary components:

- Influent Equalization;

- Pre-filtration;
- Air stripping;
- Granular activated carbon;
- Post Filtration;
- Effluent flow meter and composite sampler; and
- Granular activated carbon vapor phase treatment (optional).

Treatment systems which do not contain all of the above identified components will not be dismissed from consideration if Alcoa and the Engineer determine that the system will provide adequate treatment as defined in this specification based on the State discharge limits.

1. In the future to control iron and manganese it may be necessary to add a pH control system that would add 50 percent sodium hydroxide into the equalization tank from a storage drum. Water discharged from the equalization tank would then be fed to a new clarifier/sludge holding tank. Polymer addition may or may not be needed to assist settling within the holding tank. A gravity bag dewatering station and an air diaphragm sludge pump would also be needed. These three systems (pH adjustment, clarifier/sludge holding, and dewatering) require a space approximately 20 feet by 20 feet in size. Power, air compressor, and PLC/SCADA capacity also are needed for these potential additional units.

B. Pre-Fabricated Building

The building will be a metal prefabricated building or equivalent complete with steel framing, structural steel floor system, exterior prefinished steel wall panels, and interior prefinished rigid water proof wall panels. The building shall be properly insulated for year round operation in Franklin County, NY. Provide additional space to accommodate potential future equipment as described herein.

2.04 REQUIRED TREATMENT SYSTEM APPURTENANCES/INCIDENTAL EQUIPMENT

The groundwater treatment system shall include the following appurtenances/ incidental equipment:

A. <u>Influent Equalization.</u> The first unit process is equalization with air sparging. The equalization tank will dampen the hydraulic fluctuations inherent in groundwater recovery systems due to well pump cycling. In addition to providing hydraulic equalization, the tank will provide equalization of the groundwater constituent concentrations. The tank will be a closed-top vessel equipped with an air sparger to provide mixing and aeration. The air sparger will supply oxygen to oxidize iron and will also result in some stripping of volatile organics. A hydraulic retention time (HRT) of four hours will be provided to allow iron oxidation to occur. Ancillary facilities include an air compressor with a coarse bubble diffuser system and a recirculation pump with spray nozzle (coarse) system to control foam.

Foaming observed during treatability testing could be controlled through the incorporation of a spray nozzle recirculation system. If this is ineffective, the use of anti-foaming agent may be required. Ports on the equalization tank for caustic addition, a pH probe, and a gravity effluent shall be provided for potential future use. In addition, an activated carbon canister will be provided for VOC removal from the process off-gas (if required). An antifoam reagent is expected to be required in the operation of the air stripping system. Addition of antifoam would occur in the equalization tank, and a metering pump should be provided for this purpose.

See the process description for off-gas treatment below. Process features include:

Influent Flow:	0 to 20 gpm based on the site groundwater flow analysis presented previously
Effluent Flow:	10 gpm based on groundwater flow modeling results presented previously. Provide duplex pumps that alternate operation.
Tank Size:	2,400 gallons
Tank Fittings:	Influent flow, forward flow pump suction line, recirculation pump suction line, bottom drain, pH probe, caustic addition, gravity discharge port, air sparger and air vent).
HRT:	4 hours
Air Flow:	100 SCFM at 10 psi
Diffuser Type:	Coarse Bubble (rack mounted, serviceable by removing entire rack from tank)
Recirculation Flow:	5 gallons per minute

B. Pre-Filtration Pre-filtration will be provided to remove oxidized iron prior to the shallow tray air stripper. Pre-filtration will help prevent clogging and fouling of the air stripper trays. The filters will consist of bag filters that will be multi-plexed, in parallel, and sized to allow sufficient run-time between servicing. Assume four filters initially, but allow room for up to eight filters. Each filter will be equipped with an air release valve. There will be pressure gauges upstream and downstream of the bag filters. The bag filters will be changed based on the pressure differential measured across the filters as they become clogged. Pressure differential sensors and control switches will also provide for emergency shutoff of the groundwater recovery system. There are no provisions for filter backwashing. Process features include:

Influent Flow:	10 gallons per minute
Operating Pressure:	0 to 75 psi
Solids Loading	20 mg/l of total suspended solids (2.5 pounds per day)

C. Shallow Tray Air Stripper The shallow tray air stripper is provided to air strip any remaining volatile organics. The process offgas from the air stripper will be passed through a granular activated carbon adsorber (if required). See the process

description for off-gas treatment below. Provide duplex effluent pumps which alternate operation.

Air Stripper Process features include:

Influent Water Flow:	10 gallons per minute
Airflow:	150 SCFM (based on modeling results presented in Parsons ES, 1997b)
Effluent Flow:	Duplex pumps, 10 gallons per minute each.
Air to Liquid Ratio:	112 to 1
Number of Trays:	2

D. Filtration Filtration is provided to filter out any additional iron precipitant that is formed in the shallow tray air stripper, prior to the activated carbon adsorbers. Filtration will help prevent clogging and fouling of the activated carbon. The filters will consist of bag filters that will be multi-plexed in parallel and sized to allow sufficient run-time between servicing. Assume two filters initially, but allow room for up to four filters. Each filter will be equipped with an air release valve. There will be pressure gauges upstream and downstream of the bag filters. The bag filters will be changed when they are clogged. Pressure differential sensors and control switches will also provide for emergency shutoff capability of the groundwater recovery system. There are no provisions for filter backwashing. Process features include:

Influent Flow:	10 gallons per minute
Operating Pressure:	0 to 75 psi (maximum)
Solids Loading	Assumed to be less than 5 mg/l of total suspended solids (0.6 pounds per day)

E. Granular Activated Carbon (GAC) Aqueous Phase Adsorption Granular activated carbon aqueous phase adsorbers are provided to remove dissolved organic constituents, primarily VOCs (polishing), SVOCs, and any PCBs that may be present in the groundwater to be pumped. Each adsorber will be equipped with an air release valve. There will be pressure gauges upstream and downstream of each adsorber. Three GAC cannisters will be employed in series operation. Piping connections and valving will be arranged to allow for intra-cannister sampling as well as the positioning of any cannister in the lead, mid, or lag treatment position. An empty bed contact time (EBCT) of 20 minutes has been specified based on the characteristics of the deep well pump test groundwater. If influent concentrations of PCB's increase during actual operation, a greater EBCT may be required based on our experience. If required, EBCT would be increased by the addition of modular GAC cannisters.

Process features include:

Influent Flow:	10 gallons per minute

Operating Pressure:	0 to 75 psi (maximum)
EBCT:	20 minutes
Canister Size:	High Pressure Filament Wound Cannister (22"-inch diameter by 48 inches high) with 200 pounds of GAC
Number of Canisters:	3 in series
Pressure Drop:	1.5 psi per canister maximum (clean water)

F. Post-Filtration Post filtration is provided to filter out any activated carbon fines that may carry over from the GAC adsorbers so that the GAC is not discharged to the drainage ditch. The post filter will consist of a single 25-micron bag filter. The filter will be equipped with an air release valve. There will be a pressure gauge upstream and downstream of the bag filter. The bag filters will be changed when it is clogged. There are no provisions for filter backwashing. Process features include:

Influent Flow:	10 gpm
Operating Pressure:	0 to 75 psi (maximum)
Solids Loading:	Negligible

Other ancillary features include:

G. Effluent Flow Meter The effluent flow will be monitored by an in-line magnetic flow meter with local display, and a totalizer to record the number of gallons of water discharged (used to pace the sampler).

H. Effluent Sampler The effluent flow will be sampled using an off-the-shelf flow - proportioned composite sampler. The sampler will be driven by the 4 to 20 mA output from the effluent flow meter by means of a 4 to 20 mA to pulse converter. The sampler will allow for fully programmed sample collection, and will have a refrigerated sample container compartment.

I. Granular Activated Carbon Vapor Phase Adsorption Separate vapor phase canisters of GAC can be provided, as needed, to meet air discharge requirements. One vapor phase canister would be for the equalization/aeration tank, and one for the air stripper offgas. Each canister will be used for VOC adsorption, as required. This item will be bid as an optional item.

Process features of vapor phase GAC system are as follows:

Aeration/Equalization Tank GAC Canister:

Influent Flow:	100 SCFM
Operating Pressure:	0 to 5 psi (maximum)
Canister Size:	Drum (24" diameter by 36" high) with 170 pounds of GAC
Number of Canisters:	1
Pressure Drop:	2 inches of water maximum (0.06 psi)

Air Stripper Off-Gas GAC Canister:

Influent Flow:	150 SCFM
Operating Pressure:	0 to 5 psi (maximum)
Canister Size:	Drum (24" diameter by 36" high) with 170 pounds of GAC
Number of Canisters:	1
Pressure Drop:	2 inches of water (maximum) (0.06 psi)

J. Process Piping Process piping in the building will be PVC SCH 80 solvent weld with full union couplers provided at all valves, pumps, equipment, instruments, etc. to allow for servicing. Provide valves where necessary at full union couplers to allow line breaks without leaking water onto the floor. High pressure air piping will be black iron pipe. Low pressure offgas vent piping will be PVC SCH 80.

K. Process Pumps Two sets of duplex centrifugal pumps will be used for forward flow. The pumps will be rated as needed to deliver the indicated flows and pressures. Pump construction will be compatible with low levels of organic contaminants and suspended solids. The pumps will be flooded suction and will be controlled by level controls in the pump wetwell. Diaphragm control valves to throttle the pump output will be provided on the discharge side of each centrifugal pump.

L. Instrumentation Instrumentation will be provided to indicate and control process operation both locally and from a remote terminal connected by telephone modem. Alarms will be indicated locally and will also activate a telephone auto-dialer. The following instruments will be provided:

Aeration/Equalization Tank:

Level Controls:	Ultrasonic
Levels and Actions:	Low (turns off forward flow feed pump), High (turns on first forward flow feed pump), High-high (turns on second forward flow feed pump), High alarm (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Manually by operator

Pre-Filtration:

Pressure Sensor:	High line pressure differential
Levels and Actions:	High Pressure differential (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Manually by operator

Shallow Tray Air Stripper:

Level Sensor:	Wet well sump will have an integral level sensor that actuates the forward flow pumps to the filtration process
Levels and actions:	Low level (turns off forward flow pump). High (turns on first forward flow feed pump). High-high (turns on second forward flow feed pump). High alarm (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Automatically resets when alarm condition no longer exists
Pressure Sensor:	Low blower pressure
Levels and actions:	Low pressure (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Manually by operator
Temperature Sensors:	High air outlet temperature and low air inlet temperature
Levels and actions:	Low temperature, high temperature (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Manually by operator

Filtration:

Pressure Sensor:	High differential pressure
Levels and Actions:	High Differential Pressure (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Manually by operator

Post Filtration:

Pressure Sensor:	High Differential line pressure
Levels and Actions:	High Differential Pressure (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Manually by operator

Effluent Flow Meter:

Range:	0 to 20 gpm
Display:	Local flowrate (gpm), and totalizer (gallons)
Output:	4 to 20 ma

Building Environmental Monitors:

Temperature Sensor:	Low building temperature
Levels and Actions:	Low building temperature (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Manually by operator
Floor Sump Monitor:	Conductivity probe ,

Levels and Actions:	Water detected in the floor sump (turns off all recovery wells and process equipment and autodials an alarm)
Alarm Reset:	Manually by operator

Future Instrumentation:

pH controller:	Fully adjustable, with high and low alarm outputs to shut down the wells
Clarifier:	unknown
Sludge dewatering station:	unknbown

M. Control Panel and Remote Terminal: A single control panel shall be provided to permit operation and control of the entire treatment system including all pumps, blowers, and instrumentation. A Programmable Logic Controller (PLC) shall be provided within the control panel to provide an indication of all process variables. Alarm conditions shall activate an automatic telephone dialer that is capable of telephoning up to four telephone numbers, and playing a prerecorded message. The PLC shall also be equipped with hardware/software that will enable remote access and control of the system via the same telephone line as the autodialer. The Contractor shall supply a fully programmed remote terminal (PC) and printer that is capable of operating the system remotely via a telephone line connection. Contractor shall also provide 40 percent spare PLC I/O capacity.

N Winterization Package: The treatment system shall be equipped with drains that will allow complete draining of the treatment system including all tanks, pipes, pumps, and appurtenances; to prevent freezing conditions from damaging the equipment.

O. Access/Monitoring Structures: All treatment system components/units shall be readily accessible for maintenance and monitoring through the incorporation of ladders, platforms, and/or catwalks. Access/monitoring structures shall be designed and constructed in accordance with all applicable OSHA requirements. Platform locations shall be indicated in the process submittal drawings (See Part 1.02 of this specification).

P. Treated Water Storage: During startup, treated water will need to be stored for one week and then analyzed to confirm State discharge limits are being met (see the Post Remedial Construction O&M Plan that is part of the Contract Documents). A sufficient storage volume to handle 10 days of treated outflow will need to be part of the construction and long term water treatment system(s).

2.05 REQUIRED PREFABRICATED BUILDING EQUIPMENT

A. Unit Heaters Electrical unit heaters to maintain temperatures in all areas of building. Each unit heater should have its own variable thermostat.

B. Exhaust Fans Roof mounted exhaust fans and wall mounted electrical actuated inlet louvers to provide four air changes per hour. Equipment shall be controlled by an on/off/auto switch, with the automatic position controlled by a variable thermostat installed inside the building.

C. Doors Lockable man-doors with hydraulic closers. Door location and number is to be per code. Doors to be insulated steel doors with a single double glazed lite.

D. Overhead Doors Overhead door(s) sufficient to allow removal and replacement of all proposed equipment. Doors shall be manually operated, and will be insulated steel.

E. Windows Windows per codes. Windows to be double glazed, sealed, high performance windows.

F. Desk Desk sufficiently removed from areas of the building where water is handled so as to prevent water damage to the desk and its contents.

G. Interior Lighting Interior fluorescent lighting.

H. Exterior Lighting Exterior mercury vapor lighting.

I. Grounding, Bonding, and Lightning Protection Provide building grounding, bonding, and lightning protection systems.

J. Building Floor and Sump Building floor system shall be treated with a compatible epoxy coating system to prevent corrosion. The floor shall slope to a centrally located sump that is integral with the building. The sump shall be equipped with a sump pump that automatically pumps accumulated water into the influent tank. The sump pump shall be controlled by a hand/off/auto switch.

K. Eye Wash and Emergency Shower The building shall be equipped with a potable water storage tank and pump system that serves a safety shower and eyewash. The safety shower and eyewash shall be fully compliant with OSHA requirements.

L. Electrical Area or Room A separate area or room that houses the following electrical equipment including motor control center, starters, and panelboards.

PART 3 - EXECUTION

3.01 INSTALLATION/ERECTION

A. The prefabricated building and groundwater treatment system shall be installed/erected by the Contractor. The bid cost shall include all expenses (including material and equipment) associated with system installation. Building shall be appropriately anchored to the concrete foundation provided by others.

3.02 UTILITIES CONNECTIONS

A. Telephone and electricity service shall be supplied by the Contractor. The Contractor will be responsible for connection of these services to render the complete building and treatment system operational.

B. The Contractor shall provide all required interior electrical wiring, interior process plumbing (including connection to discharge pipe), and incidental equipment as established in this specification.

C. Compressed air systems (as required for air sparger, air stripper, air-diaphragm pumps, etc.) shall be supplied by Contractor and included in the bid cost. Sufficient additional capacity to drive up to two air diaphragm pumps shall be provided.

3.03 START-UP AND DEMONSTRATION

A. Following installation, the groundwater treatment system(s) shall be tested at the design operating flow to ensure proper operation. Testing shall be conducted for one week (168 continuous hours) by the Contractor utilizing the water to be treated at the site. The long term treatment system shall not be approved and payment shall not be completely made until the treatment system can meet the required treatment objectives over a three month period of operation. If the treatment system(s) has to be shut down during the testing period to perform repairs or significant modifications, the 7 day test period shall be re-initiated.

Sampling shall be conducted by the Engineer or an O&M Contractor during the start-up period for parameters specified in the State discharge limits attached to this Specification. In addition, sampling shall include appropriate characterization of influent and in-process sampling locations to verify effectiveness of all unit operations. Analysis shall be conducted in accordance with the discharge limits and the New York State Department of Environmental Conservation (NYSDEC) per 40 CFR 136, as amended. Analytical costs shall not be included in the bid price. All water during the start-up and demonstration shall be retained and not discharged until the analytical results prove the discharge limits have been met.

B. All mechanical and electrical building systems shall be tested and verified to be operational.

C. The Contractor shall properly containerize, store and dispose of any LNAPL recovered during the start-up and demonstration.

3.04 TRAINING

After the equipment has been installed, tested, adjusted, and placed in satisfactory operating condition, the Contractor shall instruct the operating personnel (up to

three individuals) in the use and maintenance of all equipment including the PLC and the remote terminal. The Contractor shall give the Owner formal written notice of the proposed instruction period at least one week prior to the commencement of the instruction period. The Contractor shall provide one week (5 working days) instruction by a competent factory representative. An appropriate allowance for this instruction shall be included by the Contractor in the price of the treatment system.

END OF SECTION 13290

New York State Department of Environmental Conservation
Division of Fish, Wildlife and Marine Resources, Region 5
Bureau of Habitat
PO Box 296, Route 86, Ray Brook, NY 12977
(518) 897-1291 FAX: (518) 897-1570

John P. Cahill
Commissioner

MEMO

To: Victor Cardona
From: Kenneth L Kogut
Subject: York Oil Waste Water Discharges

Date: January 8, 1999

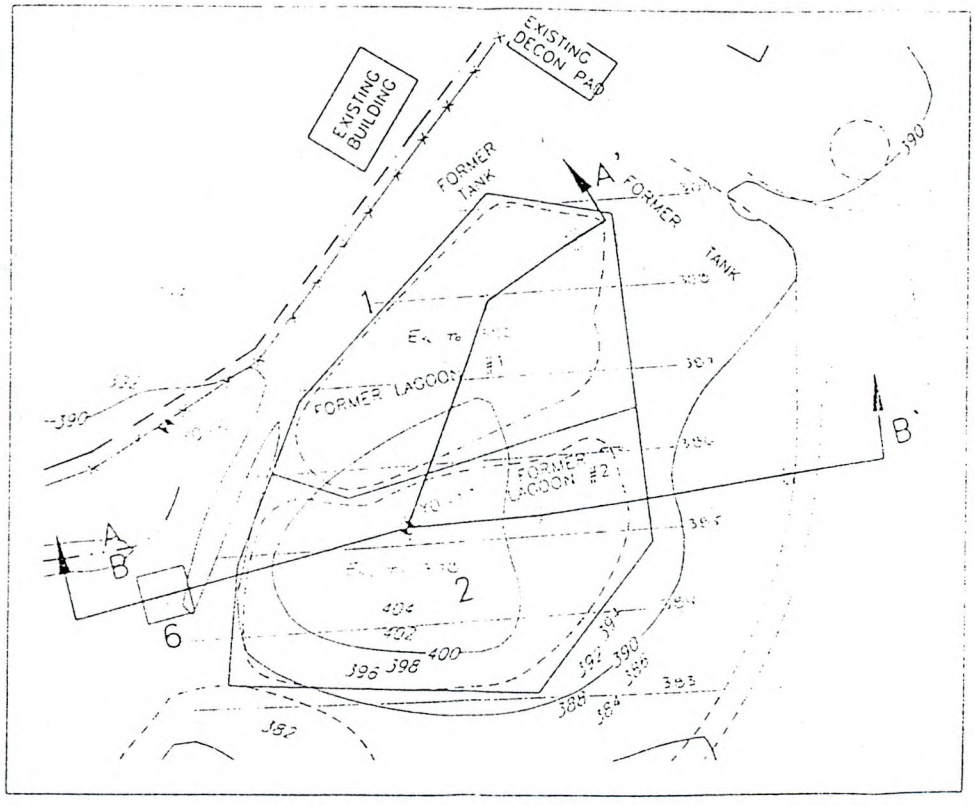
I have reviewed the proposed discharges required during the remediation of York Oil. While the discharge of 100 gallons per minute for an 8 to 10 month period is a significant discharge, I do not believe it should have any long-term impact on wetlands located on site. I assume that this discharge will be to the ditch running along the north side of the abandoned railroad bed which eventually drains to the northwest wetland complex. If the 100 gallon per minute flow is to be in the wetland drainage swale (Wetland #1 of OU-1), then it will be necessary to monitor restored wetland areas to insure erosion of restored wetland areas does not occur as a result of these high flows. The same issue holds true for use of the drainage ditch. If high discharge flows cause erosion of the banks and bottom of the ditch, it will be necessary to stabilize these areas to insure that soils do not erode in the ditch and then deposit in the open waters of the western wetland.

The 10 gallon per minute long-term discharge should not be an issue as long as water quality parameters are being met.

Kenneth L. Kogut
Regional Manager
Bureau of Habitat

KLK/cmt

pc: R. Koeppicus



PLAN SECTION A – A', B – B'

SCALE: 1"=40'-0"