FINAL SUBMISSION

TECHNICAL SPECIFICATIONS FOR LANDFILL REMEDIATION OF SIDNEY LANDFILL SITE SIDNEY CENTER, NEW YORK

Prepared for:

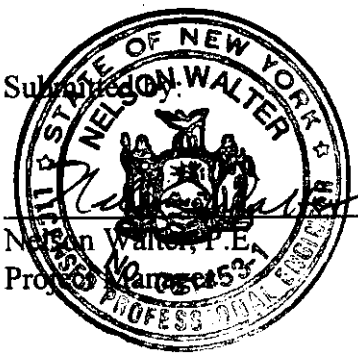
Sidney Landfill Respondents
Amphenol Corporation
and AlliedSignal, Inc.

Prepared by:

Harding Lawson Associates
511 Congress St.
Portland, Maine
Project No. 2226-08

MARCH 1999

Submitted by:



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This document meets standards prescribed in project planning documents and has been reviewed by qualified professionals.

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DIVISION 1

GENERAL

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SCOPE:

A. General: The work required for this contract includes construction of an approved 6 New York Code of Rules and Regulations (NYCRR) Part 360 landfill cover for four (4) separate disposal areas at the Sidney Landfill Site located in Sidney, New York. The total area of landfill cover to be constructed is approximately 9 acres.

B. The remedial work is being conducted in accordance with the selected remedy specified in the United States Environmental Protection Agency's (USEPA's) September 28, 1995 Record of Decision (ROD) and Appendix II Statement of Work, Sidney Landfill Site, of the "Administrative Order for Remedial Design and Remedial Action" USEPA Index No. II-CERCLA-96-0204, dated July 9, 1996.

C. Construction work will generally consist of the following items:

1. Access road improvements and installation of stormwater and erosion and sediment control measures.
2. Excavation of wastes within two (2) can and bottle disposal areas, one (1) white goods disposal area and relocation and consolidation within the existing landfill limit of the North Disposal Area that is to be covered.
3. Crush drums located in the onsite RI/FS staging areas and dispose within the limit of the North Disposal Area.
4. Cut and fills, including that required for landfill grading.
5. Excavation, hauling, and placement of common borrow fill to develop the landfill cover slopes (5 percent minimum, 33 percent maximum).
6. Installation and monitoring of settlement platforms.
7. Construction of four (4) landfill caps consisting of a 6 inch vegetative soil layer overlying 24 inches of barrier protection soil, a 60 mil polyethylene geomembrane, and a 12-inch sand gas venting layer.
8. Removal of four (4) existing gas probes.
9. Decommissioning of three (3) existing monitoring wells and construction of three (3) new monitoring wells.
10. Health and safety.
11. Air Monitoring.
12. QC testing.
13. Construction of chain-link fencing.
14. Establishing vegetation on all disturbed areas.

D. The Contractor will be responsible for the storage, handling, characterization, transportation and disposal of Contractor generated wastes.

1.02 SITE ACCESS:

A. Direct access to the landfill is provided by a seasonal jeep trail from the east side of Richardson Hill Road.

1.03 OTHER CONTRACTS:

A. All construction activities will be coordinated with the Engineer and other contractors on the project.

B. Other work including construction quality assurance activities may be required by the Engineer to be performed by others concurrently with the landfill work under this contract. The Contractor will provide access and will cooperate with others as directed by the Engineer.

1.04 WORK SEQUENCE:

A. General: The sequence of construction activities shall proceed generally using the following stages: preparation of plans (Work Plan, HASP, etc.), mobilization to site, installation of erosion control measures, site clearing, access road improvements and culvert installations, ditch and levelspreader construction, waste excavation and relocation, subgrade placement, gas probe decommissioning, cover system construction, final grading, monitoring well installation, fence installation, and re-vegetation of all disturbed areas.

B. Key Construction Phase Approvals:

1. Soil materials require acceptance by the Engineer before delivery and placement.
2. Geomembrane and geocomposite materials requires acceptance prior to installation.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Bid Proposal
B. General Conditions
C. Summary of Work: Section 01010

1.02 DESCRIPTION:

A. For unit price items, the Contractor will be paid for the actual amount of work accepted and for the actual amount of materials in-place, materials used, and materials transported and disposed during the execution of this project. After the work is completed and before final payment is made therefore, all manifests, certificates of disposal, tracking reports and weekly updates will be supplied to the Engineer.
B. For lump sum items, the Contractor will be paid on the basis of actual work accepted until the work item is completed. Upon completion of the item, 100 percent of the lump sum price may be paid, subject to the terms of the General Conditions or Supplementary Conditions.
C. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.

1.03 INCIDENTAL WORK:

A. Incidental work items for which separate payment is not measured include, but is not limited to, the following items:
   1. Dust control.
   2, Clean up.
   3. Signs.
   4. Restoration of disrupted areas not designated on the Drawings.
   5. Cooperation with other Contractors and others.
   6. Dewatering.
   7. Project records, record drawings, surveys, reports, permits, certificates or manifests.
   8. Stormwater control.
   9. Disposal of sampling materials and waste samples.
   10. Characterization, transport, and disposal of hazardous and/or non-hazardous wastes generated by the Contractor.
   11. Construction photographs.
   12. Borrow studies.
   13. Survey work.
   14. Construction permits.

1.04 SCHEDULE OF VALUES:

A. The Contractor shall prepare and submit to the Engineer for approval, a Schedule of Values based on the Pay items listed below.
B. The Schedule of Values is an itemized list that establishes the cost of each major work task.

C. The Schedule of Values is to be used as the basis for preparing applications for payment and may be used as a basis for negotiations concerning additional work not covered within the scope of work.

D. Identify schedule with:
   1. Title of Project and Location.
   2. Project Number.
   3. Name, Address, and Phone Number of Contractor.
   4. Date of Submission.

E. The schedule shall show each task and the corresponding value of each task; including separate monies allocated for any required General Condition items.

F. Schedule shall show breakdown of costs for each pay item used in preparation of the Bid.

G. Breakdown shall be in sufficient detail to serve as a basis for computing values for progress payments during construction.

H. Upon request of the Engineer, support the values with data which will substantiate their correctness.

I. The aggregated total for all of the individual values shown on the Schedule of Values must equal the total Contract Price.

J. Submit Schedule of Values to the Engineer for review and approval within twenty (20) calendar days after Award of Contract. After review by the Engineer, revise and resubmit Schedule as required until it is approved.

1.05 DESCRIPTION OF PAY ITEMS:

A. The following pay items describe the measurement of and payment for the work to be done under the respective items listed in the Bid.

B. Each unit or lump sum price stated in the Bid shall constitute full compensation including all fees and taxes, as herein specified, for each item of the work completed.

1.06 PAY ITEMS:

Item No. 1 - Mobilization/Demobilization

A. Work Included: Mobilization and demobilization of all labor, equipment, tools, and supplies required to excavate, relocate, and consolidate waste materials; to construct the landfill cover systems and associated structures; to decommission and construct groundwater monitoring wells; and other items not specifically covered by other payment items.

B. Method of Measurement: Lump sum.

C. Payment: Payment shall be at the contract lump sum price, which shall be full compensation for mobilization and demobilization. Partial payments shall be made at the following distribution: 50 percent at the completion of mobilization and 50 percent at the completion of demobilization. The contract lump sum price of mobilization/demobilization shall be limited to less than or equal to four percent of the total contract price. No payment shall be made until:
   1. The Contractor has physically occupied the site.
   2. Temporary utilities are connected and operational.
   3. Staging areas are established.
   4. Decontamination pad has been constructed and is operational.
   5. Sufficient equipment is available to start clearing and excavation work.
   6. All Contractor plans, including but not limited to Remedial Action Work Plan, Health and Safety Plan, Contractor Quality Control Plan, approved.

Item No. 2 - Site Services

A. Work Included: Providing site services including temporary utilities, Engineer's trailer, water, power, heat, lighting, office equipment, telephone, sanitary facilities, and associated structures not specifically covered under other payment items.

B. Method of Measurement: Lump sum.

C. Payment: Payment shall be at the contract lump sum price, which shall be full compensation for all site services. Partial payments shall be made at the following distribution: 50 percent at the completion of mobilization and the remaining 50 percent in twelve (12) prorated monthly payments thereafter.

Item No. 3 - Site Preparation

A. Work Included: All labor, equipment, tools, and materials required to construct and maintain for the duration of the Contract, erosion control measures, clear and grub the site, as shown on the Drawings and described in the specifications.

B. Method of Measurement: Lump sum.

C. Payment: Payment shall be at the contract lump sum price, which shall be full compensation for site preparation. Payment shall be made on a progress basis, based upon the percentage of work completed and an approved schedule of values.

Item No. 4 - Health and Safety and Decontamination

A. Work Included: To provide all Contractor health and safety measures, including health and safety related environmental monitoring, perimeter air monitoring, analysis, clothing, equipment, PPE disposal, decontamination water and equipment disposal, required personnel, medical surveillance program including physical examination, and all project documents. Construct and operate required and necessary decontamination facilities.

B. Method of Measurement: Monthly pro-rated for the duration of the project.

C. Payment: Payment shall be at the contract unit price, which shall be full compensation for health and safety aspects during the project. Payment shall be made on a monthly basis provided the work is on schedule. If the work is behind schedule payment shall be based upon the percentage of work completed.

Item No. 5 - Landfill Grading

A. Work Included: For all labor, equipment, tools, and other materials required to conduct initial landfill grading by cutting the existing grade at the locations required and filling in low areas prior to placement of waste materials from other locations or common borrow for subgrade development.

B. Method of Measurement: Lump sum.

C. Payment: Payment shall be at the contract lump sum price, which shall be full compensation for cutting and filling for initial landfill grading. Payment shall be made on a progress basis, based upon the percentage of work completed and an approved schedule of values.

Item No. 6 - Waste Excavation, Relocation and Consolidation

A. Work Included: For all labor, equipment, tools, and other materials required for excavation, transporting, and compacting onsite waste from the White Goods Disposal area "B", the Can & Bottle disposal areas, and the drums from onsite RI/FS staging areas into the North Disposal area. This item also includes providing daily cover of exposed

waste and final grading each excavation area with existing material to provide adequate surface drainage.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of cubic yards of waste material excavated for reconsolidation in the North Disposal Area. Initial and final elevations at each waste excavation location shall be measured by field survey conducted by the Contractor's New York State Licensed Land Surveyor and approved by the Engineer. At the Contractor's option, the existing topographic information provided on the Drawings (C-102 and C103) may be used for initial elevation data. The volume of material excavated will be computed by the Contractor using the average end area method or by other methods conforming to good engineering practice and approved by the Engineer.

C. Payment: Payment shall be at the contract unit price, which shall be full compensation for waste excavation, relocation, and consolidation.

Item No. 7 - Landfill Common Borrow Soil

A. Work Included: For all labor, equipment, tools, materials and material testing required for construction of common borrow fill for subgrade construction within the landfills as described in the technical specifications and on the Drawings. The Contractor is responsible for furnishing, equipment, labor and materials necessary for locating, transporting, unloading, placing and compacting common borrow soil as specified. This payment item includes providing, installing and monitoring settlement platforms as shown on the Drawings.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of cubic yards measured from existing ground prior to filling, to the subgrade contours and limits shown on the Drawings or as specified in the field by the Engineer. Initial and final elevations shall be measured by field survey conducted by the Contractor's New York State Licensed Land Surveyor and approved by the Engineer. The volume of material in-place will be computed by the Contractor using the average end area method or by other methods conforming to good engineering practice and approved by the Engineer.

C. Payment: Payment shall be at the contract unit price, which shall be full compensation for common borrow placed within the landfills.

Item No. 8 - Landfill Gas Venting Sand

A. Work Included: For all labor, equipment, tools, materials, and material testing required for locating, transporting, unloading, placing and compacting gas venting sand within the landfills as described in the technical specifications and on the Drawings. The Contractor is responsible for furnishing, equipment, labor and materials necessary for locating, transporting, unloading, placing and compacting gas venting sand as specified. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of cubic yards measured from ground elevations prior to placement to the completed elevations following sand placement to the depths shown on the Drawings or as specified in the field by the Engineer. Initial and final elevations shall be measured by field survey conducted by the Contractor's New York State Licensed Land Surveyor and approved by the Engineer. The volume of material in-place will be computed by the Contractor using the average end area method or by other methods conforming to good engineering practice and approved by the Engineer.

C. Payment: Payment shall be at the contract unit price, which shall be full compensation for gas venting sand placed within the landfill.

Item No. 9 - PE Geomembrane

A. Work Included: For all labor, equipment, tools, materials, and material testing required for construction of the 60 mil PE geomembrane as described in the technical specifications and on the Drawings. The Contractor is responsible for furnishing, equipment, labor and materials necessary for locating, transporting, unloading, placing, seaming, destructive and nondestructive seam testing, parent material testing, and providing an independent third-party testing service. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of square yards of PE geomembrane installed at the site, measured by a limits survey conducted by the Contractor's New York State Licensed Land Surveyor and approved by the Engineer.

C. Payment: Payment shall be at the contract unit price, which shall be full compensation for geomembrane placed.

Item No. 10 - Barrier Protection Soil

A. Work Included: For all labor, equipment, tools, materials, and material testing required for locating, transporting, unloading, placing and compacting barrier protection soil as described in the technical specifications and on the Drawings. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of cubic yards measured from ground elevations prior to placement to the completed elevations following barrier protection soil placement to the depths shown on the Drawings or as specified in the field by the Engineer. Initial and final elevations shall be measured by field survey conducted by the Contractor's New York State Licensed Land Surveyor and approved by the Engineer. The volume of material in-place will be computed by the Contractor using the average end area method or by other methods conforming to good engineering practice and approved by the Engineer.

C. Payment: Payment shall be at the contract unit price, which shall be full compensation for barrier protection soil placed.

Item No. 11 - Landfill Vegetative Soil

A. Work Included: For all labor, equipment, tools, materials, and material testing required for locating, transporting, unloading, placing and compacting vegetative soil within the landfills as described in the technical specifications and on the Drawings. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of cubic yards measured from ground elevations prior to placement, to the completed elevations following vegetative soil placement to the elevations or depths shown on the Drawings or as specified in the field by the Engineer. Initial and final elevations shall be measured by field survey conducted by the Contractor's New York State Licensed Land Surveyor and approved by the Engineer. The volume of material in-

place will be computed by the Contractor using the average end area method or by other methods conforming to good engineering practice and approved by the Engineer.

C. Payment: Payment shall be at the contract unit price, which shall be full compensation for vegetative soil placed within the landfills.

Item No. 12 - Gas Vents

A. Work Included: For all labor, equipment, tools, and materials required to construct 13 gas vents and gas collection piping, for drilling, for filter stone columns, for all decontamination associated with drilling, in accordance with the contract Drawings and specifications. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: Lump Sum.

C. Payment: Payment shall be at the contract lump sum price, which shall be full compensation for all gas vents installed.

Item No. 13 - Perimeter Drains

A. Work Included: For all labor, equipment, tools, materials, and material testing required to construct landfill perimeter drains including piping, geotextile, and filter stone in accordance with the contract Drawings and specifications. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: Lump Sum.

C. Payment: Payment shall be at the contract lump sum price, which shall be full compensation for all perimeter drains installed.

Item No. 14 - Landfill Access Road Aggregate Subbase

A. For all labor, equipment, tools, materials and material testing required for locating, transporting, unloading, placing and compacting aggregate subbase for access road improvements and landfill access road construction as described in the technical specifications and on the Drawings. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of cubic yards measured from ground elevations prior to placement to the completed elevations following aggregate subbase placement to the elevations or depths shown on the Drawings or as specified in the field by the Engineer. Initial and final elevations shall be measured by field survey conducted by the Contractor's New York State Licensed Land Surveyor and approved by the Engineer. The volume of material in place will be computed by the Contractor using the average end area method or by other methods conforming to good engineering practice and approved by the Engineer.

C. Payment: Payment shall be at the contract unit price, which shall be full compensation for aggregate subbase placed for access road improvements and construction.

Item No. 15 - Drainage Ditches and Culverts

A. Work Included: For all labor, equipment, tools, and materials required to construct drainage ditches and install culverts including culvert pipe, geotextile, and for rip rap stone in accordance with the contract Drawings and specifications. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: Lump Sum.

C. Payment: Payment shall be at the contract lump sum price, which shall be full compensation for all drainage structures constructed.

Item No. 16 - Permanent Chain Link Fencing

A. Work Included: For all labor, equipment, tools, and materials required for construction of 6 foot high chain link fencing along the perimeter of the landfill covers, three (3) 20-foot wide double swing gates, and four (4) 10-foot wide single swing gates as described in the technical specifications and shown on the Drawings. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of linear feet of new fencing installed at the site.

C. Payment shall be at the contract unit price, which shall be full compensation for fencing installed.

Item No. 17 - Landfill Seeding

A. Work Included: For all equipment, labor and materials required to prepare the ground surface for seeding, furnish and place lime, fertilizer, seed, mulch, and jute mat in the areas indicated, in accordance with the Technical Specifications and Drawings, and maintain new seeding through the contract maintenance period. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: The quantity to be measured for payment shall be the actual number of 1,000 square feet units of surface area seeded, measured in-place by the Contractor and approved by the Engineer.

C. Payment: Payment shall be at the contract unit price per 1,000 square feet, which shall be full compensation for landfill seeding, including maintenance.

Item No. 18 - Monitoring Well Decommissioning

A. Work Included: For all equipment, labor and materials required to decommission monitoring wells, in accordance with the Technical Specifications and Drawings. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items. Well decommissioning costs provided in this payment item include the grout, materials disposal, and drill rig costs including any stand-by-time.

B. Method of Measurement: The quantity to be measured for payment shall be the actual cumulative depth of wells decommissioned as measured from ground surface to the bottom of the well prior to decommissioning, as approved by the Engineer.

C. Payment: Payment shall be at the contract unit price per foot, which shall be full compensation for decommissioning of monitoring wells.

Item No. 19 - Groundwater Monitoring Well Installation

A. Work Included: For all equipment, labor and materials required to drill, log, install, and develop groundwater monitoring wells, in accordance with the Technical Specifications and Drawings. This payment item includes other materials required and for other expenses incidental thereto, for which payment is not provided under other items.

B. Method of Measurement: The quantity to be measured for payment shall be the actual cumulative depth of wells as measured from ground surface to the bottom of the well, as approved by the Engineer.

C. Payment: Payment shall be at the contract unit price per foot, which shall be full compensation for installation and development of the wells.

END OF SECTION

SECTION 01040

PROJECT COORDINATION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. General Conditions

1.02 DESCRIPTION:

A. Coordinate all work under this Contract with the Engineer.

B. Make arrangements for temporary storage of materials and supplies and for timely delivery to the job site.

C. Maintain up-to-date progress records and record drawings.

D. Maintain the project site in a neat condition.

E. Maintain monitoring well accessibility at all times.

G. Coordinate the work of subcontractors, equipment, and material suppliers.

H. Maintain good relations with the community, local, state, and federal agencies at all times.

I. Ensure that the Contractor's Health and Safety Plan (see Section 01620, General Requirements, Safety, Health, & Emergency Response) is appropriate for the anticipated hazards associated with all portions of the work and the exposure to the work by others.

1.03 START OF WORK:

A. Contractor will provide Engineer with 15 days notice prior to mobilization and beginning any proposed remedial activities.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Reference Codes and Standards: Section 01091

1.02 DESCRIPTION:

A. Section 120 of CERCLA requires that federal facilities be subject to the provisions of CERCLA, both procedural and substantive. CERCLA, as amended by SARA and the NCP requires that removal actions attain applicable or relevant and appropriate requirements to the greatest extent practicable.

1.03 ON-SITE WORK:

A. Regulations applicable to on-site waste handling activities will include but not necessarily be limited to the following regulations promulgated under the Resource Conservation and Recovery Act (RCRA), Clean Air Act (CAA), Clean Water Act (CWA), Occupational Safety and Health Act (OSHA), the U.S. Army Corps of Engineers (USACE) and the NYSDEC.

1. RCRA - Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262).
2. RCRA - Hazardous Waste Management (40 CFR Part 264)
   a. Subpart C - Preparedness and Prevention (40 CFR 264.30 - 264.37)
   b. Subpart D - Contingency Plan and Emergency Procedures (40 CFR 264.50 - 264.56)
3. CAA - National Ambient Air Quality Standards (NAAQS) for Particulate Matter (40 CFR Part 50).
4. NESHAP - National Emissions Standards for Hazardous Air Pollutants.
5. CWA - Clean Water Act Section 404, 33 U.S.C. 1344.
6. OSHA -
   a. Standards for Hazardous Waste Site Operations (29 CFR 1910)
   b. Safety and Health Standards (29 CFR part 1926)
   c. Recordkeeping, Reporting, and Related Regulations (29 CFR Part 1904)
7. USACE - Wetlands regs
8. NYSDEC -
   a. New York State Air Emission Standards (6 NYCRR Part 212).
   b. New York State Air Quality Standards (6 NYCRR Part 257).
   c. New York State Fugitive Dusts Regulations (6 NYCRR Part 373).
   d. New York State Rules for Inactive Hazardous Waste Disposal Sites (6 NYCRR Part 375).
   e. New York State Groundwater and Surface Water Quality Regulations (6 NYCRR Part 700-705).
   f. New York State Guidelines for Soil Erosion and Sediment Control.

1.04 TRANSPORTATION:

A. Hazardous Waste/Material transportation regulations will include, but not necessarily be limited to the following:

1. Department of Transportation (D.O.T.), Hazardous Materials Program Procedures (49 CFR Part 107).
2. D.O.T. Hazardous Materials Regulations (49 CFR Parts 171-179).
3. RCRA - Subpart E - Manifest System, Recordkeeping, and Reporting (40 CFR Parts 264.70 -264.77).
4. 6 NYCRR Part 364 - Waste Transporter Permits.
   6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities.

1.05 OFF-SITE TREATMENT/DISPOSAL:

A. Regulations applicable to off-site treatment and disposal of hazardous wastes will include but not necessarily be limited to the following:

1. RCRA - Hazardous Waste Management (40 CFR, Part 264).
2. RCRA - Land Disposal Restrictions (40 CFR Part 268).

END OF SECTION

SECTION 01070

ABBREVIATIONS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Whenever an abbreviation is used, it shall be understood to mean the full name of the respective organization as listed below.

1.02 ABBREVIATIONS: Whenever in the Contract the following abbreviations are used, their meanings shall be as follows:

AA	Aluminum Association
AABC	Associated Air Balance Council
AASHTO	American Association of State Highway and Transportation Officials
ABS	Acrylonitrile-butadieze-styrene
AC	Acre
ACI	American Concrete Institute
AGC	Associated General Contractors of America
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASP	Analytical Services Protocol
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BGS	Below Ground Surface
BOCA	Building Officials and Code Administrators - "National Building Code"
CAA	Clean Air Act
CAAA	Clean Air Act Amendment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFM	Cubic Feet per Minute
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
CLFMI	Chain Link Fence Manufacturer's Institute
CLP	Contract Laboratory Program

cm/sec	centimeter per second
COE	Corps of Engineers (Army)
CQA	Construction Quality Assurance
CQCP	Contractor Quality Control Plan
CWA	Clean Water Act
DCDMA	Diamond Core Drill Manufacturers' Association
DOT	Department of Transportation
EI	Electrical/Instrument Conduit
EPA	United States Environmental Protection Agency
ER	Engineering Regulation
ETL	Electrical Testing Laboratories
EW	Extraction Well
FID	Flame Ionization Detector
FM	Factory Mutual System
FPM	Feet Per Minute
FPS	Feet Per Second
FS	Federal Specifications
FTMS	Federal Test Method Standard
GC	Gas Chromatograph
GPM	Gallons per Minute
HASP	Health and Safety Plan
HDPE	High Density Polyethylene
Hg	Mercury
HI	Hydraulic Institute
HSA	Hollow-stem auger
ICBO	International Conference of Building Officials
ID	Internal Diameter
IPM	Inches per minute
JIC	Joint Industrial Council
LEL	Lower Explosive Limit
MGL	Milligrams per Liter
MS	Mass Spectroscopy
MSDS	Material Safety Data Sheet
NAAQS	National Ambient Air Quality Standards
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NPT	National Pipe Thread
NRMCA	National Ready Mix Concrete Association
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation

OSHA	Occupational Safety and Health Administration
OE	Overhead Electric
PCB	Polychlorinated Biphenyl
PE	Polyethylene
PID	Photoionization Detector
PLS	Pure Live Seed
PSF	Pounds Per Square Foot
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RCRA	Resource Conservation and Recovery Act of 1976
RG	Remediation Goal
RI	Remedial Investigation
ROD	Record of Decision
RPM	Revolutions per Minute
SCH	Schedule
SP	Static Pressure
SSPC	Steel Structures Painting Council
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
TSP	Tri-Sodium Phosphate
UL	Underwriter's Laboratories, Inc.
USBR	U.S. Bureau of Reclamation
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
VLDPE	Very Low Density Polyethylene
VOC	Volatile Organic Compound

1.03 DEFINITIONS:

Contractor: The person, partnership, corporation, joint venture, or other combination thereof, who has entered into the Contract with Owner for the Work. The term "Contractor" means Contractor or its authorized representative.

Engineer: The individual, partnership, corporation, joint venture, or any combination thereof, any entity named as Engineer in the Agreement who will have the rights and authority assigned Engineer in the Contract Documents. The term "Engineer" means the Engineer or its authorized representative.

Owner: The public body, or authority, individual or entity with whom the Contractor has entered into the Contract and for whom the Work is to be provided.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION

SECTION 01091

REFERENCE CODES AND STANDARDS

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Regulatory Requirements: Section 01060.

1.02 DESCRIPTION:

A. Comply with local, state, and national codes applicable to the proposed work including but not limited to the following:

1. OSHA - National Occupational Safety and Health Act.
2. BOCA - Building Officials and Code Administrators - "National Building Code".
3. Associated General Contractors of America - "Manual of Accident Prevention in Construction".
4. National Electrical Code.
5. New York State Department of Transportation Standard Specifications Construction and Materials.
6. NYCRR - Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York.
7. Associated General Contractors of America - " Manual of Accident Prevention in Construction".

B. Applicable standards, tests and recommended methods from trade, industry and professional organizations specified in technical specifications of this Contract determine quality and methods of design, fabrication and testing.

C. Where more than one reference, standard, code, or regulation applies, the most stringent requirements shall apply for this contract.

D. Acquire, post, update and maintain all required permits for the construction. Impacts related to work stoppage or delays as a result of the Contractor's failure to acquire or meet permit requirements will be born by the contractor at no cost to the Owner.

1.03 EDITION DATES:

A. Edition dates of standards and codes specified in this Contract shall be that which are current as of the Bid date of these construction documents unless otherwise identified in the Specifications.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION

SECTION 01125

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Submittals: Section 01340
B. Contractor Quality Control: Section 01440
C. Environmental Protection: Section 01560
D. Dust Control: Section 01562
E. Safety, Health, and Emergency Response: Section 01620
F. Decontamination Procedures: Section 02021
G. Off-Site Transportation: Section 02081
H. Off-Site Disposal: Section 02082
I. Erosion and Sediment Control: Section 02271
J. Handling and Disposal of Contaminated Material: Section 02990

1.02 DESCRIPTION:

A. Special project procedures are required of the Contractor due to the potentially hazardous conditions at this site. These include the following procedures:
   1. Work Procedures
   2. Health and Safety
   3. Spill Control
   4. Erosion and Sediment Control
   5. Stormwater Control
   6. Waste Drum Handling Procedures
   7. Quality Control
   8. Disposal of Waste, Soil and Debris
   9. Decontamination
   10. Site Restoration

B. Provide controls and measures for the prevention of water and air pollution and the protection of natural resources during the execution of work included in this Contract. Environmental protection shall include but not be limited to measures for preventing stormwater runoff from staging areas, erosion and sediment control, spill prevention and control, and dust control.

C. Control operations to provide environmental protection in conformance with local, state, and Federal permits, licenses, and regulations.

D. Contractor is required to certify that Contractor's employees are properly trained to perform the work required by this contract.

1.03 SUBMITTALS:

A. Project Plans:
   1. Submit plans for approval to the Engineer within 14 days of notice of Apparent Low Bidder unless the plan is required as part of the bid submittal. No work on-site will be permitted until the comments received from the regulatory agencies are

adequately addressed by the Contractor and the plans are approved by the Engineer. Comments or approval from the Engineer will be submitted back to the Contractor within 14 calendar days upon receiving the plans. Contractor shall adequately respond to comments to the satisfaction of the Engineer within 14 calendar days upon receiving any comments from the Engineer.

2. The approved plans, complete with all comments addressed, shall be made a part of the Contract Documents. The Contractor shall implement and maintain these procedures at the appropriate time prior to and during performance of the work.
3. Submit one copy of a state and/or local solid waste disposal permit or license showing such agencies' approval of the disposal plan for non-hazardous solid waste.
4. Submit a copy of the applicable EPA and state permits of licenses for transportation, treatment, storage, and disposal of all hazardous wastes by permitted facilities.

B. Work Plan:

1. The Contractor will prepare a Work Plan describing the procedures the Contractor will follow to implement the remedial activities of this Contract. The Work Plan shall be developed in strict adherence with other Contractor-generated plans (e.g., Health and Safety Plan, Sampling and Analysis Plan, Contractor Quality Control Plan) and with all relevant and appropriate Federal, state, and local regulations associated with contaminated materials handling and disposal. The Work Plan will include, but not be limited to, the following:
   a. Use drawings provided with this contract to prepare a diagram of the work site with a layout showing existing site conditions, and the location of anticipated hauling routes, staging areas, office trailers, air monitoring stations, drainage controls and access to the site. The diagram shall also show the decontamination area(s), the Exclusion Zone(s), and the Contamination Reduction Zone(s).
   b. Identification of any permits required to conduct work.
   c. Procedures for handling drums, if encountered to minimize ruptures and punctures.
   d. Procedures for handling contaminated and uncontaminated soil and debris.
   e. Identify the size and locations of the staging areas, and all required maintenance activities.
   f. Procedures for the overpacking of drums if encountered, which are leaking.
   g. Procedures for excavating, relocating, and consolidating wastes onsite.
   h. Provisions for the control of fugitive emissions to the air including dust control and control of volatile organics.
   i. A detailed work schedule for performance of tasks required to complete the Contract.
   j. Description of security operations.
   k. List of equipment to be used or installed on-site.
   l. Procedures for logging (written inventory) of drums (i.e. provide number, description of drum, describe any identifiable markings, etc.) if encountered.
   m. Waste identification methods (e.g., labeling, marking containers).

n. Procedures for controlling stormwater, erosion and siltation, and dust control.

o. Methods proposed for decontamination of equipment and vehicles.

p. Location and construction of decontamination facilities.

q. Identify personnel and their qualifications.

C. Spill Control and Contingency Plan:

1. Prepare as part of the Work Plan, a Spill Control and Contingency Plan which includes provisions for clean up of any spills which may occur during sampling, staging, and transportation. The plan will include, but not be limited to, the following:

a. The availability, location and quantity of spill control equipment and absorbent materials the Contractor can provide.

b. Contingency plan for spills within the Exclusion Zone.

c. Contingency plan for spills outside the Exclusion Zone.

d. Names and telephone numbers of local and State officials to be contacted in the event of a spill.

e. Use of subcontractors for dealing with off-site spills, plan shall include the same information required for the Contractor's own personnel.

f. Evacuation procedures for local residences in case of fire or major vapor release. The procedures shall include, at a minimum, emergency notification procedures and an evacuee receiving area.

g. Fire prevention and fire fighting measures shall include, as a minimum, procedures and equipment to be employed for responses to fires on the site that may occur in equipment, in the refuse, or elsewhere on the site.

h. Services available from the local fire department and coordination with services of the Contractor's onsite personnel.

D. Health and Safety Plan:

1. The Health and Safety Plan shall conform to the requirements of 29 CFR 1910 and to the requirements provided in Section 01620, Safety, Health, and Emergency Response.

2. The Contractor shall determine the level of personal protection (Level B, C, D) necessary for all work under this Contract.

E. Contractor's Certification:

1. Certify in writing that all employees working pursuant to this contract are properly trained for this type of work.

2. This certification shall be notarized and shall state that:

a. All employees are current in their training for that level required by their job function and responsibility, as required by Superfund Amendments and Reauthorization Act (SARA) section 126(b)(2), and 29 CFR part 1910.

b. The individual who signs the certification of training on behalf of the Contractor has the Contractor's authority to certify that this training information is accurate and complete.

c. The Contractor agrees to abide by all applicable federal, state, and local laws and regulations regarding removal, storage and disposal of hazardous waste done pursuant to or in conjunction with this contract.

E. Other Contractor Prepared Plans:
   1. Contractor Quality Control Plan in accordance with the requirements specified in Section 01440.
   2. Decontamination Plan in accordance with the requirements specified in Section 02021.
   3. Off-site Disposal Plan in accordance with the requirements specified in Section 02082 in the event off-site disposal is required.
   4. Erosion and Sediment Control Plan in accordance with the requirements specified in Section 02271.
   5. Sampling and Analysis Plan in accordance with the requirements specified in Section 01410.

1.04 REFERENCES:
   A. Occupational Safety and Health Administration (OSHA) Standards. Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926).
   B. United States Environmental Protection Agency, "Standard Operating Safety Guides", November, 1984.
   C. The most stringent requirement among these references shall apply.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 STORMWATER CONTROL:
   A. Perform soil and waste excavation activities using methods that will divert stormwater around the excavations by providing temporary runoff diversions and/or covering excavations during rain storms. Dewatering of excavations will not be permitted.
   B. Keep stored drums, the staging and decontamination pads clean to avoid contaminating collected rain water and creating additional wastes for disposal. If feasible, cover drums in the staging area during rain events.

3.02 EROSION AND SEDIMENT CONTROL:
   A. As a minimum, provide soil erosion and sediment control measures in accordance with the requirements in Section 02271, Erosion Control, and as shown on the Drawings.
   B. Do not operate mechanized equipment in flowing runoff streams to avoid creating excess sediments being transported in the flow.
   C. If excessive erosion does occur during operations, provide temporary stabilization such as mulching as directed by the Engineer.
   D. Provide mulch and seeding for all disturbed areas at the completion of this project.

3.03 SPILL PREVENTION AND CONTROL:
   A. Drum handling will be confined to the drum staging areas except to transport drums offsite for disposal.

B. Immediately following decontamination activities collect and containerize the decontamination water and sediments and clean the decontamination pad.

C. Keep an adequate supply of absorbent materials on-site to immediately cleanup any leaks or spills that may occur. Immediately notify the Engineer of hazardous material spills.

D. Store all hazardous wastes in approved containers properly labeled to identify the type of waste and the date the container was filled. Handle, transport and dispose of hazardous waste materials in accordance with state and federal regulations.

E. Soils and waste materials generated when cleaning a spill will be collected, containerized, sampled and analyzed, transported and disposed by the Contractor at no additional expense to Owner.

3.04 DUST CONTROL:

A. Provide dust control in accordance with the requirements provided in Section 01562, Dust Control.

B. At a minimum, control dust as necessary to protect worker and public health and safety. Keep dust down at all times, including during nonworking periods. Sprinkle or treat with dust suppressants, the soil of areas disturbed by the operations at the site.

3.05 CLEANUP:

A. On completion of the removal operations, remove all temporary facilities or structures, such as the drum staging pads and decontamination pads both existing and constructed under this Contract, and restore all disturbed areas.

B. Remove and dispose of all rubbish and garbage, and leave the site clear of debris related to Contractor's activities on a frequent basis.

END OF SECTION

SECTION 01220

PROJECT MEETINGS

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

A. Project Coordination: Section 01040

1.02 DESCRIPTION OF WORK:

A. Contractor is required to have General Superintendent present at all meetings scheduled by Engineer.

B. When required by Agenda items, subcontractor representatives and the Contractor's safety representative shall also be present.

PART 2 - PRODUCTS

(Not applicable)

PART 3 - EXECUTION

3.01 SCHEDULING AND ADMINISTRATION:

A. Engineer will schedule and distribute written agendas of regular and called meeting 4 days prior to meeting date.

B. Engineer will type and distribute minutes of meeting to participants within 4 days after meetings. The Contractor shall review the and sign the final minutes prepared for each project meeting.

C. Progress meetings will be held at least once each week.

D. Meetings will be held in Contractor's construction office or as indicated in agenda.

E. The Contractor shall provide a weekly progress report during the meeting detailing activities completed and activities scheduled for the following week.

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide projected construction schedules for entire work , revise monthly.

B. Coordination:

1. Schedules of other contractors will be available for inspection.
2. Arrange schedules with reviewed schedules of other contractors.
3. General Contractor in conjunction with the Engineer will resolve conflicts among schedules of various contractors and will do so within substantial completion duration of the project at no additional cost to the owner.

C. Form of schedules:

1. Prepare in form of horizontal bar chart or other format, subject to review and approval.
   a. Provide separate bar or chart for each trade or operation.
   b. Present scheduled items in chronological order.
   c. Identify the first work day of each week.
   d. Scale and spacing: Provide sufficient scale for ease of legibility and spacing to facilitate mark-up and revision.
2. Minimum sheet size: 11" - by - 17".

D. Content of Schedules

1. Provide complete sequence of construction by activity including but not limited to the following:
   a. Shop drawing, project data, and sample submission dates.
   b. Product procurement and delivery dates.
   c. Beginning and end dates for completion of each element of construction, specifically:
      1) Layout, site preparation, and establishment of erosion and sediment controls.
      2) Landfill waste relocation.
      3) Landfill subgrade development.
      4) HDPE geomembrane installation.
      5) Protective cover construction.
      6) Seeding.
      7) Fence installation.
      8) Installation of groundwater monitoring wells.
2. Show projected percentage of completion for each item of work as of the first day of each month.
3. Provide sub-schedules in necessary to define critical portions of the entire schedule.

E. Updating:

1. Show all changes occurring since previous submission of schedule.
2. Indicate progress of each activity.
3. Include:

a. Changes of scope.
b. Activities modified since previous updating.
c. Revise projections due to changes.
d. Other identifiable changes.

4. Provide narrative report, including:
   a. Discussion of problem areas.
   b. Corrective actions taken, or proposed and its effect.
   c. Effects of changes in schedules on other contractors.
   d. Schedule impacts due to scope changes
   e. Revisions in activity duration.
5. Request extension of time, if warranted, in accordance with applicable contract provisions.

1.02 SUBMITTALS:

A. Submit initial schedules within 15 days of Notice to Proceed.
   1. The Engineer will review schedules and return review copy within 10 days of receipt.
   2. If required, re-submit within 7 days after return of review copy.
   3. The Contractor will not begin work until approval of the Contractor's schedule.

B. Submit monthly updated schedules accurately depicting progress to first day of each month.

C. Submit number of copies consistent with contract submittal requirements.

END OF SECTION

SECTION 01340

SUBMITTALS

PART 1- GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

A. Special Project Procedures: Section 01125.
B. Project Record Documents: Section 01721.
C. Excavation, Backfill, and Compaction: Section 02221.
D. Groundwater Monitoring Wells: Section 02670.

1.02 DESCRIPTION:

A. Submit to Engineer:
   1. Project Plans, Shop Drawings, Manufacturer's Certificates, and Project Data.
   2. Samples required by the Contract Documents.
B. Prepare and submit a schedule listing dates for submission of each product.

1.03 WORK PLANS, SHOP DRAWINGS, AND PROJECT DATA:

A. All costs necessary for compliance with requirements of this Section of Specifications shall be incidental to bid items under which each material and piece of equipment is paid for.
B. Work Plans shall describe equipment, personnel, sampling and methods intended to be used to carry out the specified task as described in these specifications.
C. Work Plans, shop drawings, project data, and other information concerning methods of operation or fabrication to be incorporated in work shall be submitted to Engineer for review for general compliance with Contract Documents before implementation. Contractor shall obtain and check subcontractor's schedule, and other pertinent information for conformance with all requirements of Contract Documents in ample time to permit satisfactory progress of work. After completion of such checking and verification, Contractor shall sign or stamp such work plans, which stamp shall state as follows:

Checked by: _____
(Contractor's Name)

Signed by: _____
(Checker's Name)

All data, drawings, and correspondence from subcontractors, manufacturers, or suppliers shall be routed through Contractor. Engineer shall review only such data and details as are transmitted to him by Contractor. All correspondence from Contractor to Engineer shall refer to appropriate Section of these Specifications containing subject matter of inquiry.

D. Contractor's attention is specifically directed to fact that Work Plans are required for each and every element of work. Each Work Plan shall be assigned a sequential number for purposes of easy identification, and shall retain its assigned number, with appropriate subscript, on required resubmissions.

E. Contractor shall submit to Engineer 6 copies (or more as Contractor may require for his own distribution) of Work Plans and approved data. The Engineer will retain [3] copies of each submittal and return the additional copies to the Contractor. The Engineer notations of the action taken will be noted on all of the returned copies. At the time of each submission, the Contractor shall call to the Engineer attention, in writing, any deviations that the Work Plans may have from the requirements of the Contract Documents

F. Corrections or comments made on Work Plans during Engineer review do not relieve Contractor from compliance with requirements of Contract Documents. This check is only for review of general conformance with design concept of Project and general compliance with information given in Contract Documents. Contractor is responsible for confirming and correlating all quantities. If Work Plans deviate from Contract Documents, Contractor shall advise Engineer in writing of deviations accompanying Work Plans, including reasons for deviations, and shall request a deviation from Contract Documents.

G. Contractor shall also submit to Engineer, for review with such promptness as to cause no delay in work, all samples required by Contract Documents. All samples will have been checked by and stamped with approval of Contractor, identified clearly as to material, and use for which intended.

H. Contractor's attention is specifically directed to fact that no construction shall be performed, prior to approval by Engineer.
Construction performed in violation of this requirement will be neither approved nor certified for payment until applicable Work Plans have been submitted and approved. If Engineer so directs, Contractor shall remove any such construction performed prior to approval by Engineer of Work Plans applicable thereto, and Contractor will be allowed no additional compensation nor extension of contract time. If any equipment or materials are ordered by Contractor prior to submission and approval of Work Plans, it is done at Contractor's risk.

I. Contractor is responsible for making necessary changes in other items, which result from deviations or changes requested by the Contractor and approved by Engineer, so that all items perform requirements and intent of Contract Documents.

1.04 SAMPLES:

A. Physical examples to illustrate materials and to establish standards by which completed work is judged.
   1. Soil Samples: Sufficient quantity to perform required test.

1.05 CONTRACTOR RESPONSIBILITIES:

A. Review submittals prior to submission.

B. Samples:
   1. Field measurements.
   2. Field construction criteria.

C. Coordinate each submittal with requirements of work and of Contract Documents.

D. Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals.

E. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Engineer review of submittals, unless Engineer gives written acceptance of specific deviations.

F. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.

G. Begin work which requires submittals after return of submittals with Engineer's stamp and initials or signature indicating review and approval.

H. After Engineer's review, distribute copies.

1.06 SUBMISSION REQUIREMENTS:

A. Schedule submissions at least 20 days before dates reviewed submittals will be needed, except where longer lead time is specified.

B. Submit the number of Samples specified in each of the Specification Sections.

C. Accompany submittals with transmittal letter (see attached form supplied by the Engineer), in duplicate, containing:

1. Submittal number (in sequence, beginning with 1).
2. Date
3. Project title and number
4. Contractor's name and address
5. The number of copies of each Work Plan, Shop Drawing, Project Data and Sample submitted.
6. Notification of deviations from Contract Documents.
7. Return date required by Contractor.
8. Other pertinent data.

D. Submittals shall include:

1. Date and revision dates
2. Project title and number
3. The names of:
   a. Engineer
   b. Contractor
   c. Subcontractor
   d. Supplier
   e. Manufacturer
   f. Separate detailer when pertinent
4. Identification of product or material.
5. Relation to materials
6. Field dimensions, clearly identified as such
7. Specification section number
8. Applicable standards, such as ASTM number or Federal Specification.
9. A blank space, 4 inches by 4 inches, for Engineer's stamp.
10. Identification of deviations from Contract Documents.
11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.
12. Manufacturers Certificate of Compliance for manufactured or fabricated materials. See attached form.

1.07 RESUBMISSION REQUIREMENTS:

A. General: Identify as a resubmission by adding a letter suffix to the original submittal number (1A for the first resubmission of the first submittal; 1B for the second resubmission; etc.)

B. Project Plans:

1. Revise initial submittal as required and resubmit as specified for initial submittal.
2. Indicate on submittal any changes which have been made other than those requested by Engineer.

C. Project Data and Samples: Submit new data and samples as required for initial submittal.

1.08 DISTRIBUTION OF SUBMITTALS AFTER REVIEW:

A. Distribute copies of Project Plans and Project Data which carry Engineer's stamp, to the following as applicable.

1. Contractor's file
2. Job site file
3. Record Documents file
4. Other prime contractors
5. Subcontractors
6. Supplier

B. Distribute samples as directed

1.09 ENGINEER'S DUTIES:

A. Review submittals with reasonable promptness.

B. Review for conformance with:

1. Design concept of project.
2. Information given in Contract Documents.

C. Review of separate item does not constitute review of an assembly in which item functions.

D. Affix stamp and initials or signature indicating review of submittal.

E. Return submittals to Contractor for distribution.

F. Additional duties as specified in the General Conditions of the Contract Documents.

1.10 SUBMITTAL LIST:

A. List of Submittals: Contractor's submittals shall include, but not be limited to the following:

Division 1

Section 01025	MEASUREMENT AND PAYMENT
01025-1	Schedule of Values
Section 01125	SPECIAL PROJECT PROCEDURES
01125-1	Work Plan
01125-2	Spill Control and Contingency Plan
01125-3	Contractor's Certification
Section 01220	PROJECT MEETINGS
01120-1	Weekly Project Report
Section 01310	CONSTRUCTION SCHEDULES
01310-1	Construction Progress Schedule
Section 01340	SUBMITTALS
01340-1	Schedule of Submittals

Section 01410	SAMPLING AND ANALYSIS
01410-1	Sampling and Analysis Plan
01410-2	Analytical results
Section 01440	CONTRACTOR QUALITY CONTROL
01440-1	Contractor Quality Control Plan
01440-2	Inspection Reports
01440-3	Testing Results
01440-4	CQC Reports
Section 01620	SAFETY, HEALTH, AND EMERGENCY RESPONSE
01620-1	Health and Safety Plan
01620-2	Certification of Employee Fitness
01620-3	Safety and Occupational Health Compliance
01620-4	Contractor's Safety Declaration
01620-5	Daily Safety Reports
01620-6	Safety Incident Reports
01620-7	Employee/Visitor Log
01620-8	Monitoring/Sampling Results
01620-9	Training Logs
01620-10	Monthly Man-Hours
01620-11	Phase-Out Report
Section 01700	PROJECT CLOSEOUT
01700-1	Written Certification of project completion
01700-2	Final application for payment
Section 01721	PROJECT RECORD DOCUMENTS
01721-1	Project Record Documents
Division 2	
Section 02021	DECONTAMINATION PROCEDURES
02021-1	Decontamination Plan
Section 02081	OFF-SITE TRANSPORTATION
02081-1	Off-Site Transportation Plan
Section 02082	OFF-SITE DISPOSAL
02082-1	Off-Site Disposal Plan
02082-2	Disposal Records
Section 02221	EXCAVATION, BACKFILL, AND COMPACTION
02221-1	Borrow Study Material Testing Results (gradation, moisture density, hydraulic conductivity) for common borrow, gas venting sand, barrier protection soil, vegetative soil, aggregate subbase, and filter stone.
02221-2	Daily Logs
02221-3	Field Quality Assurance Testing (compaction, permeability)
Section 02271	EROSION CONTROL
02271-1	Erosion and sediment control plan
Section 02272	GEOTEXTILES
02272-1	Geotextiles
Section 02275	RIPRAP
02275-1	Stone gradation
Section 02611	PIPE AND FITTINGS
02611-1	Name of pipe manufacturer

02611-2	Pipe manufacturer's pipe data
02611-3	Field test results and certification
Section 02670	GROUNDWATER MONITORING WELLS
02670-2	Drilling procedures work plan
02670-3	State of New York license/registration for well drilling
02670-4	Statement of qualifications to perform drilling
02670-5	Current health and safety documentation for field personnel
02670-6	Well Inspection Report
02670-7	Drilling logs
02670-8	Rock core logs
02670-9	Well installation records
02670-10	Plumbness and alignment test report
02670-11	Well development records
02670-12	Well abandonment records
02670-13	Material certifications for: casings, cement grout, well screens, gravel pack, drilling fluid additives, bentonite seals, protective casings
Section 02722	CULVERTS
02722-1	Culvert pipe manufacturer's pipe data
Section 02776	HDPE GEOMEMBRANE
02776-1	Manufacturer's Data
02776-2	Installer's Data
02776-3	Third-Party Independent Geomembrane Testing Service
02276-4	Manufacturer's Experience
02276-5	Installer's Experience
02276-6	Resin certification
02276-7	Manufacturer's geomembrane certification and geomembrane data
02276-8	Installer's subgrade acceptance
02276-9	Manufacturer's Warranty
02276-10	Installer's Warranty
02276-11	Geomembrane direct shear testing results
02276-12	Geomembrane source quality control testing results
02276-13	Geomembrane installation quality control testing results
Section 02832	CHAIN LINK FENCE AND GATES – STEEL
02832-1	Manufacturer's product data and installation instructions
02832-2	Layout plan and installation details
02832-3	Name of installer
Section 02931	SEEDING
02931-1	Grass seed vendor's certification
02931-2	Fertilizer
02831-3	Hydraulic seed method certification

END OF SECTION

(Sample)

MANUFACTURER'S LETTERHEAD
CERTIFICATE OF COMPLIANCE
(Manufactured or Fabricated Material)

Date _____

WE HEREBY CERTIFY that _____
(Description, Kind of Material, Model No., etc.)

Furnished to _____
(Name of Contractor) (Prime or Sub.)

For Use On _____
(Project Name)

No. _____ Owner _____

In the Amount of _____
(Quantity Represented)

Identified By _____
(Label, Marking, Seal No., Consignment, or Waybill No.)

Shipped on _____ 19__, Delivered on _____ 19__,

Shipped Via _____
(Method of Shipment, Car No., Truck No.)

MEETS THE REQUIREMENTS OF THE PERTINENT PROJECT PLANS, SPECIAL CONDITIONS AND SPECIFICATIONS OF THE SUBJECT PROJECT IN ALL RESPECTS. PROCESSING, PRODUCT TESTING AND INSPECTION CONTROL OF RAW MATERIALS ARE IN CONFORMANCE WITH ALL APPLICABLE SPECIFICATIONS, DRAWINGS AND/OR STANDARDS OF ALL ARTICLES FURNISHED.

All records and documents pertinent to this certificate and not submitted herewith will be maintained available by the undersigned for a period of not less than three years from the date of this certificate.

_____
(Manufacturer)

Signed by _____

Title _____

PROJECT SUBMITTAL

SIDNEY LANDFILL SITE

Contractor's Submittal Number:
Specification Section Number:
Specification Part reference:
Contract and/or Shop Drawing Number(s):
Submittal Description:

_____

_____

_____

Submittal Statement:

By issuing this submittal for approval, I hereby request that I have determined and verified all field measurements, material properties, equipment dimensions, catalog numbers, and laboratory and/or engineering data. I have checked and coordinated this submittal with the above referenced Contract and/or other applicable approved shop drawings and this submittal meets the above referenced specification requirements.

Signature: _____ **Date:** _____

Contractor's Project Manager,
Superintendent or QA Engineer

Approved with No Exceptions (APP) ☐

Approved Subject to Modification (MOD) ☐

Rejected, Revise and Resubmit (REJ) ☐

Received as Information (FYI) ☐

Comments: _____

_____

Approver's Signature: _____ **Date:** _____

SECTION 01410

SAMPLING AND ANALYSIS

PART 1 - GENERAL

1.01 REFERENCES:

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846	Test Methods for Evaluating Solid Waste
EPA/548/G-89/004	Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC)

NYSDEC	Analytical Services Protocol (ASP), December 1991

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Regulatory Requirements: Section 01060
B. Special Project Procedures: Section 01125
C. General Requirements, Safety, Health, and Emergency Response: Section 01620
D. Project Record Documents: Section 01721

1.03 DESCRIPTION

A. Collect samples as specified in Part 3 - Execution. Provide and analyze a complete Quality Assurance/Quality Control split set of samples at a frequency of five percent of the total number of samples analyzed. The Contractor shall provide all required sample and shipping containers, collect representative samples, prepare and maintain chain-of-custody, ship all samples to the laboratory, and provide complete analytical reports with USEPA CLP level quality control/quality assurance documentation. Data validation of the analyses will not be required. Provide for prompt sampling and analysis to avoid delaying the project.

1.04 SUBMITTALS:

A. Sampling and Analysis Plan: Submit a Sampling and Analysis Plan for the Sidney Landfill Site. The plan will describe the procedures the Contractor will follow to collect representative samples of the materials to be analyzed. The plan shall comply with EPA SW-846, EPA 548/G-89/004, and NYSDEC protocols, specifically elements of a field sampling program. The plan will identify the specific analytical procedures the Contractor proposes to use to characterize any wastes that will be disposed of off-site. The plan shall be submitted to the Engineer within 2 weeks of Notice to Proceed.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 SAMPLING REQUIREMENTS:

A. Procedures: Sampling and analytical procedures shall be in accordance with EPA and NYSDEC protocols.

B. Decontamination: Decontaminate sampling equipment prior to collecting each sample and at the end of each day. Decontaminate by:

1. Wash and scrub with low-phosphate detergent.
2. Potable water rinse.
3. Rinse with 10% nitric acid solution. If metals samples are not being collected, the 10% nitric acid rinse step may be omitted. When decontaminating split spoon samplers which are composed of carbon steel, the nitric acid rinse may be lowered to a concentration of 1% instead of 10% to reduce the possibility of leaching metals.
4. Potable water rinse.
5. Acetone only rinse or a methanol followed by hexane rinse. If organic samples are not being collected, the solvent rinse may be omitted.
6. Rinse with analyte-free DI water.
7. Air dry.
8. Wrap in aluminum foil for transport.
9. To decontaminate submersible pumps and tubing after each use, the following decontamination fluids will be run through the pump: (1) a low-phosphate detergent and potable water solution followed by (2) a potable water rinse, and (3) a final DI water rinse.

C. Sampling Documentation: Maintain a permanently bound field notebook on-site indicating the time, date, and location of sample collection if applicable (including written description and map references), sample depth, if applicable, description of the sample preservation, sample container identification number, analyses requested, and the name of the laboratory to which samples were sent. The sampling notebook and associated maps, all laboratory analytical reports, and copies of chain-of-custody and analysis request forms shall be submitted to the Engineer as part of the project records.

3.02 ANALYTICAL REQUIREMENTS:

A. The analytical procedures to be used for this program will be as outlined in the 1995 NYSDEC ASP (Analytical Services Protocol, October 1995). For wastes to be disposed off-site by the Contractor, the specific analyses are to be determined by the Contractor and the TSDF the Contractor proposes to use.

B. The Contractor shall identify the analytical laboratory proposed for this project as part of the Work Plan. The laboratory shall be certified by the NYS Department of Health for solid and hazardous waste testing and will maintain NYSDOH Environmental Laboratory

SECTION 01440

CONTRACTOR QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Bid Proposal
B. General Conditions
C. Project Record Documents: Section 01721.
D. Special Project Procedures: Section 01125.

1.02 DESCRIPTION:

A. Prepare a Contractor Quality Control Plan (CQCP) to identify personnel, procedures, instructions, records and forms to be used in carrying out the requirements of this project. The CQCP shall provide and maintain effective Quality Control for construction, sampling and testing activities.

B. The quality of all work shall be the responsibility of the Contractor. Perform sufficient inspections and tests of all items of work, on a continuing basis, including that of subcontractors, to ensure conformance to applicable specifications and drawings with respect to the quality of materials, workmanship, construction, and functional performance. Provide qualified personnel, appropriate facilities, instruments, and testing devices necessary for the performance of the quality control function. Controls shall be adequate to cover all construction operations, shall be keyed to the proposed construction sequence, and shall be correlated by the Contractor's quality control personnel.

1.03 SUBMITTALS:

A. Prepare and submit a Contractor Quality Control Plan (CQCP) to the Engineer for approval. No work on-site will be permitted until the comments received are adequately addressed by the Contractor and the plan is approved by the Engineer. Comments or approval from the Engineer, will be submitted to the Contractor within 14 calendar days upon receiving the plan. Contractor shall adequately respond to comments to the satisfaction of the Engineer within 14 calendar days upon receiving any comments from the Engineer. The CQCP, at a minimum, shall include the following:

1. A description of the Quality Control Organization, including charts showing lines of internal Contractor authority, and external Contractor, subcontractor, and Engineer relationships. The Quality Control Organization will include the names, qualifications, duties, and responsibilities of each person assigned to a quality control function. The Quality Control Organization chart will identify a Contractor's Quality Control Manager whose responsibilities and qualifications are described in the Article entitled "Contractor Quality Control Organization" in this section.
2. Method of performing, documenting and enforcing quality control operations of both prime and subcontract work including inspection and testing.
3. Inspections as described in the article entitled, "Inspection" in this section.
4. Provide a list of analytical or testing laboratories to be used by the Contractor for

environmental testing (air, soil, and groundwater) and material testing required by the technical specifications.

5. Protocol describing corrective actions to be taken by the Contractor with specifically defined feedback systems. Limits of data acceptability as defined shall be included with the corrective actions to be taken when these limits are exceeded. When limits are exceeded, information justifying the poor recovery or precision shall be documented. The Engineer will then decide what further corrective action, if any, shall be taken by the Contractor. Personnel responsible for initiating and carrying out corrective action shall be indicated in the protocol.

B. Submit daily Quality Control Reports, Test Reports, Deficiency Reports and Project Summary as required by this specification.

1.04 NOTIFICATION OF CHANGE:

A. After submittal and approval of the CQCP, the Engineer shall be notified in writing of any proposed changes to the CQCP.

1.05 CONTRACTOR QUALITY CONTROL ORGANIZATION:

A. CQC Manager:

1. Identify an individual, within the Contractor's organization at the work site, who shall be responsible for overall management of the CQCP and have the authority to act in all CQC matters for the Contractor.

2. The CQC Manager for this contract shall be a qualified hazardous material manager/engineer or comparable individual with a minimum of 2 years of hazardous waste experience, at the Project Manager, Project Engineer, Superintendent or QC Manager level, whose sole responsibility is to ensure compliance with the contract plans and specifications. The CQC Manager shall be independent of the Project Superintendent, shall report to an officer in the Contractor's organization at a higher level than the Project Superintendent, and have no other duties other than quality control.

3. The CQC Manager shall be on-site whenever work is in progress so that he/she may be in charge of the CQCP for the project.

4. All submittals for approval shall be reviewed and modified or corrected as needed by him/her or his/her authorized assistants prior to forwarding each submittal to the Engineer.

1.06 RESPONSIBILITIES:

A. The Contractor is responsible for assuring himself/herself and the Engineer that the remedial action implementation complies with the requirements of these contract plans and specifications. The controls shall be adequate to cover all contract operations. During site operations, the Contractor will be expected to follow outlines and procedures detailed in the CQCP.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 INSPECTIONS:

A. The CQCP shall include inspections and tests.

1. The Contractor shall perform preparatory inspections prior to beginning each feature of work on any on-site construction work conducted by the Contractor or a subcontractor. Preparatory inspections for the applicable feature of work shall include:

a. review of submittal requirements and all other Contract requirements with the performance of the work;

b. check to assure that provisions have been made to provide required field work control testing;

c. examine the work area to ascertain that all preliminary work has been completed;

d. verify all field dimensions and advise the Engineer of any discrepancies;

e. perform a physical examination of materials and equipment to assure that they conform to approved shop drawings or submittal data and that all required materials and/or equipment are on hand and comply with the contract requirements.

2. Perform initial inspection as soon as work begins on a representative portion of the particular feature of work, and include examination of the quality of workmanship as well as review of control testing for compliance with control requirements.

3. Perform follow-up inspections continuously as any particular feature of work progresses to ensure compliance with Contract requirements, including control testing, until completion of that feature of work.

4. Perform daily safety inspections of the job site and the work in progress to ensure compliance with occupational health and safety requirements of the Contract. Daily quality control reports shall be used to document the inspection and shall include a notation of the safety deficiencies observed and the corrective actions taken. Utilize designated quality control staff to perform the required inspections and supplement the staff with additional personnel as required. Additional personnel shall be provided at no additional cost to the Contract.

3.02 TESTING:

A. The Contractor shall be responsible for all required testing, documentation, and corrective measures. The Contractor shall perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements.

3.03 REPORTING:

A. An original and two copies of all inspection and testing results shall be reported daily, weekly, and in project reports unless noted otherwise. All reports shall be prepared and signed by the CQC Manager. All reports shall be legible, literate, complete, and must be submitted on time.

1. Daily Submittals: Reproduce and fully execute the attached sample "CQC Report" to show all inspections, samples collected and test results (e.g., earthwork and paving) and submit to the Engineer on the first work day following the date

covered by the report. Submit an original and two copies of this report. Complete the attached sample "CQC Test Report List" and attach to the CQC Report for submittal to the Engineer.

2. Deficiency Report: Submit a report to the Engineer of any problems which arise with analysis, instrument calibration or quality control within 48 hours of the occurrence. Include proposed remedial action to be taken to correct the deficiency. A list of ongoing deficiencies to be corrected will be attached to the CQC Report daily using the attached sample "List of Outstanding Deficiencies". As deficiencies are corrected they are to be acknowledged in the day's CQC Report and deleted from the list.
3. CQC Preparatory/Initial Inspection Report: Reproduce and fully execute the attached sample "CQC Preparatory/Initial Inspection Report" and submit to the Engineer. The inspections shall be conducted in accordance with the article entitled, "Inspections" in this Section. The report shall be completed in accordance with the instructions on the report form.
4. Project Summary: At the end of the construction, prepare a summary of CQC during the project. The report shall be a consolidation and summary of the CQC daily reports. Submit to the Engineer.

B. Deficiencies in QC Reporting Include Failure To:

1. Indicate deficiencies discovered for the period covering the QC report.
2. Indicate outstanding deficiencies previously discovered, and which of them were being worked on during reporting period.
3. Indicate which follow-up inspections were performed, and results.
4. Indicate tests being performed.
5. Indicate complete minutes of Preparatory and Initial Inspections including construction requirements discussed and results of inspection.
6. Submit QC reports on time.

END OF SECTION

CQC REPORT

No. _____ Date _____

1. Contractor's name and address:

_____

_____

2. Project Title: _____

Location: _____

Contract No.: _____

3. Weather: _____

4. Description and Location of Work (include days of no work and reasons for delay):

5. Labor and Equipment Breakdown by Trade (see continuation):

6. Follow-up Inspections Performed. Results and Corrective Actions Taken:

SHEET 1 OF _____

7. Job Safety:

8. Miscellaneous Activities and Remarks (Check Appropriate Box):

A. Preparatory or initial inspection held (see attached minutes)

B. Testing Performed-See Attached Test Results and/or "CQC Test Report"

C. Outstanding Deficiencies - See Attached "List"

D. Verbal Instructions Received (or Comments)

E. Delivery of Equipment and Materials

F. Submittal Actions

G. Misc/Remarks

Use space below to describe checked items as appropriate.

9. Contractor's Verification: The above report and attachments are complete and all supplies, materials, equipment and workmanship incorporated into the work are in full compliance with the contract except as noted.

SIGNED_____ SHEET 2 OF _____

CQC TEST REPORT LIST

CQC REPORT NO._____ SHEET___ OF_____
PROJECT TITLE:_____
LOCATION:_____

DATE:_____
CONTRACTOR:_____
CONTRACT NUMBER:_____

1. SPEC. PARA. OR DWG. REF.	2. TYPE OF TEST	3. DATE PERFORMED	4. RESULTS	5. REMARKS

Notes on Use of This Form: Contractor shall make up a list of tests by filling out Columns 1 and 2, allowing 3 lines for each entry. Contractor shall submit to Engineer as part of the Quality Control Plan. As tests are performed the contractor will fill Columns 3, 4 and 5, including name of lab, and submit individual sheets as part of CQC report.

SECTION 01510

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Special Project Procedures: Section 01125.
B. Dust Control: Section 01562.
C. Decontamination Procedures: Section 02021.
D. Erosion Control: Section 02271.

1.02 DESCRIPTION:

A. Work Included:
   1. Provide such temporary facilities as the work may warrant.
   2. Facilities include, but are not limited to:
      a. Contractor's office and storage facilities and field lab trailer(s), if necessary.
      b. USEPA Representative and Engineer's field trailer.
      c. Sanitary facilities conforming to local codes and OSHA requirements.
      d. Trash removal.
      e. Security.
      f. Personal safety equipment.
      g. Signs, barricades, warning lights.
      h. Dewatering pumps to remove precipitation and groundwater from excavations.
      i. Dust control.
      j. Fire protection.
   3. At completion of the work, remove all Contractor installed temporary facilities. Repair all damage caused by the installation.
   4. Electricity and telephone service are available on Richardson Hill Road. Contractor shall coordinate with utility companies to access required services. It is the responsibility of the Contractor to provide all labor and materials necessary to extend these services to his job site.
   5. Water service is not available at the site. The Contractor shall provide temporary water supply tanks or containers as necessary for potable drinking requirements, dust control, or decontamination requirements.

B. Other Requirements:
   1. Obtain permits as required by local governing authorities.
   2. Obtain easements, when required, across private property other than that of the Owner for utility service.
   3. Comply with all local, State, and Federal codes, laws, and regulations.

1.03 SUBMITTALS:

Not Applicable

PART 2 - PRODUCTS

2.01 OFFICE AND MATERIAL STORAGE FACILITIES:

A. Provide and maintain.

B. Erect at a location approved by the Engineer.

C. Do not disturb, move, or interrupt without Engineer approval.

2.02 USEPA REPRESENTATIVE'S AND ENGINEER'S FIELD TRAILER:

A. Provide and maintain a Field Office for the exclusive use of the Engineer and designated USEPA Representatives for entire life of the project.

B. Do not disturb, move, or interrupt without the Engineer's approval.

C. Maintain a separate structure or a separate room within the Contractor's office trailer for both the Engineer and the USEPA Representative, sealed from the weather, completed and ready for occupancy within ten (10) days following notification to proceed with the project.

D. Erect on a location approved by the Engineer.

E. A mobile field office trailer is acceptable if it contains the required facilities described herein.

F. Requirements for both Engineer's and USEPA Representative's office:

Size	-	Equivalent to 10 feet by 10 feet in area.
Windows	-	2 arranged for cross ventilation with screens
Door	-	With secure lock
Lighting	-	Adequate lights over all work areas, convenience outlets each wall
Heating/Air Conditioning	-	Adequate equipment to maintain an ambient air temperature of approximately 70 deg. F.
Telephone	-	Private line service exclusively for Engineer
FAX Machine	-	Provide dedicated telephone line for FAX machine
Desk Top Photocopier	-	Supply all necessary toner and paper
Cleaning Tools	-	Supply push broom, dust pan, paper towels, window cleaner, bucket, mop

Office furniture:

1 Flat top desk, 2-1/2 x 4-1/4 feet, with drawers at each end
1 Plywood drawing table, 3 feet x 6 feet top
3 Straight chairs, 1 suitable for use with drawing table
1 4 drawer steel filing cabinet with lock and key
1 Swivel desk chairs
1 Bookcase
2 Large waste baskets
1 Rack for drawings, including related appurtenances
1 Wall mounted fire extinguisher
1 36 unit industrial quality first aid kit

1 Desk-top tape calculator

G. On completion of the project, remove from the site.

H. Provide yard lighting of Contractor and Engineer headquarters areas as the project and location require.

2.03 SANITARY FACILITIES:

A. Sanitary Conveniences:

1. Provide chemical type toilets and maintain in sufficient numbers for the use of all persons employed on the job, and properly screen from public observation at suitable locations, in accordance with State and Local ordinances.
2. Empty periodically as required and dispose of in a timely manner satisfactory to the Engineer.
3. When no longer required, remove from the site and dispose of the contents in a manner satisfactory to the Engineer.

2.04 TRASH REMOVAL:

A. Provide dumpsters for general site trash collection with minimum weekly disposal. The capacity of the dumpster shall be at least 6 cubic yards.

B. Dumpsters shall not be used for disposal of hazardous or special waste materials.

C. Provide separate containers (e.g., drums) for storage and disposal of hazardous trash such as contaminated personal protective equipment, rope, or wire. Clearly label containers as hazardous waste.

2.05 SECURITY:

A. Provide security and facilities to protect Work and operations from unauthorized entry, vandalism, or theft.

B. Provide and maintain a Daily Employee/Visitor Register. All project personnel and all visitors are required to sign-in upon arrival to the site and sign-out upon leaving the site.

2.06 PERSONNEL SAFETY EQUIPMENT:

A. Furnish in compliance with State and Federal requirements, including OSHA and the Contractor's site-specific Health and Safety Plan.

2.07 SIGNS, BARRICADES, WARNING LIGHTS:

A. All necessary equipment for the protection of the traveling public shall be furnished and maintained.

2.08 DEWATERING PUMPS:

A. Provide and maintain as necessary to remove precipitation and groundwater from excavations.

2.09 EQUIPMENT DECONTAMINATION AREA:

A. Furnish with a portable wash unit(s), a decontamination pad(s), and storage tank(s) as required for proper equipment decontamination. Refer to Section 02021, Decontamination Procedures.

PART 3 - EXECUTION

3.01 PERFORMANCE:

A. Field Office and Storage Trailers: Site in locations approved by the Engineer and properly set up for all anticipated weather conditions.

B. Obey and enforce other local sanitary regulations and orders, taking such precautions against infectious diseases as may be deemed necessary.

E. All vehicles leaving the sites shall be inspected by the Contractor to ensure that no soil adheres to its wheels, tracks, undercarriage, or bucket.

F. Remove all soil using high pressure water, steam, or other appropriate method.

G. All structures other than storage sheds installed under this Section shall be provided with, as a minimum, the following services:

1. Lighting: Electric light, non-glare type luminaries to provide a minimum illumination level of 100 ft. candles at desk height level.
2. Heating: Adequate equipment to maintain an ambient air temperature of approximately 70 deg. F.
3. Fire Extinguisher: Non-toxic, dry chemical, fire extinguisher meeting Underwriters Laboratories, Inc. approval for Class A, Class B, and Class C fires with a minimum rating of 2A, 10B, 10C.

END OF SECTION

SECTION 01560

ENVIRONMENTAL PROTECTION

PART 1-GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Special Project Procedures: Section 01125.
B. Dust Control: Section 01562.
C. Decontamination Procedures: Section 02021.
D. Erosion Control: Section 02271.
E. Seeding: Section 02931
F. Handling and Disposal of Contaminated Material: Section 02990

1.02 DEFINITIONS:

A. Sediment - Soil and other debris that have eroded and have been transported by runoff water or wind.
B. Solid Waste - Rubbish, debris, garbage, and other discarded solid materials, except hazardous waste as defined in paragraph entitled "Hazardous Waste," resulting from industrial, commercial, and agricultural operations and from community activities.
C. Rubbish - Combustible and noncombustible wastes such as paper, boxes, glass, crockery, metal, lumber, cans, and bones.
D. Debris - Combustible and noncombustible wastes such as ashes and waste materials resulting from construction or maintenance and repair work, leaves, and tree trimmings.
E. Chemical Wastes - This includes salts, acids, alkalies, herbicides, pesticides, organic chemicals, and spent products which serve no purpose.
F. Sanitary Wastes
    1. Sewage - Wastes characterized as domestic sanitary sewage.
    2. Garbage - Refuse and scraps resulting from consumption of food.
G. Hazardous Waste - Hazardous substances as defined in 40 CFR 261 or as defined by applicable state and local regulations.
H. Oily Waste - Petroleum products and bituminous materials.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 PROTECTION OF NATURAL RESOURCES:

A. Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified.
B. Land Resources:

1. Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Engineer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Engineer. Where such use of attached ropes, cables, or guys is authorized, the Contractor shall be responsible for any resultant damage.
2. Protect existing trees and shrubs which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.
3. Remove traces of temporary construction facilities such as haul roads, work areas, stockpiles of excess or waste materials, and other signs of construction. Grade temporary roads and similar temporarily used areas to conform with surrounding contours.

C. Water Resources:
1. Oily Wastes - Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water.

D. Fish and Wildlife Resources - Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

3.02 HISTORICAL AND ARCHAEOLOGICAL RESOURCES:

Carefully protect in-place any historical and archaeological items or human skeletal remains discovered in the course of work and report immediately to the Engineer. Stop work in the immediate area of the discovery until directed by the Engineer to resume work.

3.03 EROSION AND SEDIMENT CONTROL MEASURES:

A. Refer to the Drawings and Section 02271, Erosion Control for additional requirements.

B. Burnoff - Burnoff of the ground cover is not permitted.

C. Protection of Erodible Soils - Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

D. Temporary Protection of Erodible Soils - Use the following methods to prevent erosion and control sedimentation.
1. Mechanical Retardation and Control of Run-on and Runoff - Mechanically retard and control the rate of run-on and runoff at the construction site. This includes construction of diversion ditches, benches, and berms to retard and divert run-on away from the area of work and runoff to protected drainage courses.
2. Borrow - Permit only in areas where suitable environmental controls are possible.
3. Vegetation and Mulch - Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, or mulching. Stabilize slopes by hydroseeding, anchoring mulch in place or such combination of these and other methods necessary for effective erosion control.
a. Seeding: Provide new seeding where ground is disturbed. Include topsoil or nutriment during the seeding operation necessary to establish a suitable

stand of grass. The seeding operation shall be as specified in Section 02931, Seeding.

3.04 CONTROL AND DISPOSAL OF SOLID AND SANITARY WASTES:

A. Pick up solid wastes, and place in containers which are regularly emptied. Do not prepare, cook, or dispose of food on the project site. Prevent contamination of the site of other areas when handling and disposing of wastes. On completion, leave the areas clean. Control and dispose of waste off site.

B. Disposal of Rubbish, Garbage, and Debris - Remove and dispose of rubbish and debris from property.

C. Sewage, Odor, and Pest Control - Because a sanitary sewage system is not available, use chemical toilets or comparably effective units, which are properly secluded from public observation, for the use of persons employed on the work. These facilities shall be maintained at all times without nuisance. The Contractor shall periodically empty wastes at an approved facility or system or construct and maintain an approved type of adequate sanitary convenience. Include provisions for pest control and elimination of odors. Upon completion of the work, the conveniences shall be removed by the Contractor from the premises, leaving the premises clean and free from nuisance.

3.06 DUST CONTROL:

Provisions shall be taken during all construction activities. Keep dust down at all times, including during nonworking periods. Sprinkle or treat the soil, haul roads, and other areas disturbed by operations at the site, with dust suppressants. Refer to Section 01562, Dust Control for additional requirements.

3.07 NOISE:

Make the maximum use of low-noise emission equipment according to USEPA regulations. Blasting or use of explosives will not be permitted.

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Special Project Procedures: Section 01125.

D. Construction Facilities and Temporary Controls: Section 01510.

E. General Requirements, Safety, Health, and Emergency Response: Section 01620.

1.02 DESCRIPTION:

A. Furnish and apply water or calcium chloride on the roadway or haul roads, where construction equipment are operating, or disturbed areas for dust control as required or as directed by the Engineer. When no items for dust control are included in the Contract, such work shall be considered incidental to the Contract.

B. Water source to be provided by the Contractor, coordinate with the Engineer.

C. Contractor assumes responsibility for any Contract delays or work stoppages due to inappropriate dust control measures.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Water: Shall not be salt or brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.

B. Calcium chloride: Conform to the requirements of AASHTO M144-86, except that the requirements for "total alkali chloride" and "impurities" do not apply.

PART 3 - EXECUTION

3.01 SPRINKLING:

A. Apply by approved methods and with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.

B. Disperse through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

3.02 CALCIUM CHLORIDE:

A. Apply by mechanical spreaders or by hand at the rate designated.

B. Use when authorized by the Engineer for controlling dust on the roadway under construction, on approved haul roads from borrow, or gravel pits to the project, in front of dwellings, and where dust constitutes a hazard to traffic.

3.03 AIR MONITORING:

A. Air monitoring for dust particulates and VOCs shall be conducted by the Contractor during excavation, relocating, and consolidation of waste materials. Refer to additional requirements for air monitoring in Section 01620, General Requirements, Safety, Health, and Emergency.

B. Air monitoring results shall be submitted to the Engineer. The Contractor shall take measures to reduce emissions or visible dust clouds as directed by the Engineer.

END OF SECTION

SECTION 01620

GENERAL REQUIREMENTS,
SAFETY, HEALTH, AND EMERGENCY RESPONSE

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Scope
B. Analytical Characterization Summary
C. Submittals
D. Safety & Health Program
E. Health and Safety Plan
F. Local Authorities
G. Training
H. Medical Surveillance
I. Substance Abuse Program
J. Medical Record Keeping
K. Logs, Reports and Record Keeping

1.02 RELATED SECTIONS:

A. Measurement and Payment : Section 01025
B. Submittals: Section 01340
C. Contract Closeout: Section 01700
D. Decontamination Procedures: Section 02021

1.03 REFERENCES:

Work performed shall be consistent with the following guidelines and references and in compliance with all applicable regulations and standards including, but not limited to, those listed below. In the case that these requirements are conflicting, the one which offers the greatest protection shall be followed, unless there is specific agreement between Engineer and Contractor to the contrary.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z358.1	(1990) Emergency Eyewash and Shower Equipment

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REGULATIONS

29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1926	(All) Construction Industry Standards
29 CFR 1910	(All) General Industry Standards

29 CFR 1910.120 Hazardous Waste Operations & Emergency Response

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH) PUBLICATIONS

90-117 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities

U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA) PUBLICATIONS

Standard Operating Safety Guidelines (OSWER, 1988)

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH) PUBLICATIONS

Threshold Limit Values and Biological Exposure Indices for 1996

1.04 SCOPE:

A. The remedial action at the Sidney Landfill site consists of construction of landfill cover systems at four (4) waste disposal areas. The work includes excavation, relocation, and consolidation of some waste materials onsite. Soils and groundwater are contaminated with organic and inorganic constituents which are the result of the former waste disposal activities conducted on the site. Harding Lawson Associates (HLA), formerly ABB Environmental Services (ABB-ES), prepared a Health and Safety Plan dated June, 1997 for the Pre-Design Investigation activities. A copy of this plan will be made available to the Contractor to assist in preparation of the Contractor's Site Specific Safety and Health Plan.

B. The provisions of 29 CFR 1910.120, Subpart H "Hazardous Waste Site Operations and Emergency Responses" will be required to be followed for construction activities performed as part of this contract.

C. The Contractor shall be responsible for preparation of a Site Specific Safety and Health Plan, its implementation, and related requirements as specified herein. The Engineer's employees and/or representatives will abide by the Contractor's safety and health requirements.

1.05 ANALYTICAL CHARACTERIZATION SUMMARY:

A. Table 01620-1 (Attached at the end of this specification) summarizes the detected pollutants and range of organic and inorganic concentrations in soil and groundwater. The tabulated pollutants were incorporated as part of the Sidney Landfill, Town of Sidney, Delaware County, New York Record of Decision (ROD) dated September 28, 1995 prepared by the United States Environmental Protection Agency - Region II and the new York State Department of Environmental Conservation (NYSDEC). The Contractor shall make use of the ROD which presents a media specific tabulation (Tables 1 through 5) of detected contaminants and provides the frequency of detection.

B. Drawing C-108 provides Groundwater Analytical data from the "Draft Pre-Design Investigation Report" dated December 1997, prepared by ABB-ES.

1.06 SUBMITTALS:

The Contractor shall submit the following items. Details for their contents are described in following paragraphs.

A. Safety and Health Program covering workers engaged in hazardous waste work
B. Site Safety and Health Plan
C. Certification of Employee Fitness
D. Safety & Occupational Health Compliance
E. Contractor's Safety Declaration
F. Contractor's Employee Safety Declaration
G. Daily Safety Reports
H. Safety Incident Reports (Environmental Excursion, Vehicle and Worker Forms)
I. Employee/Visitor Register
J. Monitoring/Sampling Results
K. Training Logs
L. Monthly Man-Hours
M. Phase-Out Report

1.07 SAFETY AND HEALTH PROGRAM:

A. All contractors performing on-site activities at hazardous waste sites are required by regulation to develop and maintain a written Safety and Health Program in compliance with OSHA standard 29 CFR 1910.120 (b) (1) through (b) (4). Written certification that such a program has been prepared and implemented shall be submitted to The Engineer as a preface to the required Site Health and Safety Plan (HASP). The program including updates shall be submitted to The Engineer.

1.08 HEALTH AND SAFETY PLAN (HASP):

A. General: The Contractor shall prepare a Site Health and Safety Plan (HASP) covering all work to be performed under this Contract. The HASP shall establish, in detail, the protocols necessary for the recognition, evaluation, and control of all hazards associated with each task performed by the Contractor and all Subcontractors. The HASP shall address site-specific safety and health requirements and procedures based upon site-specific conditions. Duplication of the general information contained in the Safety and Health Program is unnecessary. The level of detail provided in the HASP shall be tailored to the type of work, complexity of operations to be accomplished, and hazards anticipated.
B. Topics: All topics required by OSHA standard 29 CFR 1910.120(b) (4) 29 CFR 1910.1200 and those discussed below shall be addressed in the HASP. Where the use of a specific topic is not applicable to the project, the HASP shall include a statement to justify its omission and establish that adequate consideration was given the topic.
C. Review and Modifications: A Draft HASP shall be submitted to the Engineer for review at a minimum twenty (20) business days prior to Contractor's mobilization. The Engineer will either approve or return the HASP to the Contractor for revision within ten (10) business days of The Engineer's receipt. Contractor is responsible for revising the HASP for finalization and approval by The Engineer. The Contractor will not be allowed to perform any on-site work until this plan has been approved in writing by The Engineer.
D. Should any unforeseen hazard become evident during the performance of the work, the Site Safety and Health Officer (SSHO) shall bring such hazard to the attention of The Engineer, both verbally and in writing, for resolution within one (1) business day of

unforeseen hazard detection. In the interim, the Contractor shall take necessary action to re-establish and maintain safe working conditions in order to safeguard on-site personnel, visitors, the public, and the environment. Should the Contractor seek major modification of any portion or provision of the HASP, such major modification shall be performed by the contractor's SSHO and approved in writing by The Engineer. Any disregard for the provisions of these Safety, Health, and Emergency Response specifications and the contractor's approved HASP shall be deemed just and sufficient cause for The Engineer ordering the stopping of all work beyond the Support Zone until the matter has been rectified to The Engineers satisfaction.

E. Site Description and Characterization: The HASP shall include a site description and contamination characterization that addresses the following elements, as a minimum:

1. Location and approximate size of the site.
2. Site topography and accessibility by road.
3. Present status and capabilities of emergency response teams that would provide assistance to hazardous waste site employees at the time of an emergency.
4. A list of the contaminants and their concentrations found or known to be present in site areas to be impacted by the work to be performed.
5. A select list of contaminants which are of greatest occupational health and safety concern. Concern shall be established by evaluating a contaminant's potential for causing exposure above OSHA PELs or ACGIH TLVs. The select list shall be created by evaluating the detected pollutants presented in Table 01620-1 and by researching the information documented in the referenced ROD and in the "Draft Final Feasibility Study" prepared by Malcom Pirnie, Inc. (MPI) dated July 1995.

F. Hazard/Risk Analysis: The Hazard/Risk Analysis shall be presented by both text and in tabular format. The HASP shall include a hazard/risk analysis that addresses the following elements, as a minimum:

1. Description of on-site jobs/tasks to be performed.
2. Duration of planned site activities.
3. Chemical, physical, biological, and safety hazards of concern for each site task and/or operation to be performed (Activity Hazard Analysis). The Contractor shall research and use additional sources of information when preparing the "Hazard/Risk Analysis" section of the HASP.
    a. Normal construction hazards.
    b. Hazards from construction and heavy equipment.
    c. Exposure to the site chemicals of concern, including those chemicals used as part of the construction operations, via handling contaminated soil or groundwater during site work involving intrusive operations i.e., trenching, excavation, drilling, and grading operations.
    d. Exposure to the site chemicals of concern by inhalation or dermal contact during normal construction operations, i.e., dust, surface seeps or stormwater handling.
    e. Exposure to physical hazards of heat, cold and noise.
4. Pathways for hazardous substance dispersion.
5. Chemical, physical, and toxicological properties of the contaminants on the select list, sources, and pathways of employee exposures, anticipated on and off-site

exposure level potentials, and regulatory (including Federal, State, and local) or recommended protective exposure standards.

6. Exposure to hazardous substances brought on-site for the purpose of executing this Contract. If hazardous substances are used in executing the Contract, the Contractor shall comply with the requirements of 29 CFR 1910.1200, Hazard Communication.
7. Recommended Personal Protective Equipment for each Work Task and associated hazards.

G. Staff Organization, Qualification, and Responsibilities

1. General: The Contractor shall develop an organizational structure that sets forth lines of authority, responsibility, and communication. The HASP shall include a description of this organization, qualifications, and responsibilities of each of the following individuals.
2. Certified Industrial Hygienist (CIH)
   a. Qualifications: The Contractor shall utilize the services of an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. A resume of the proposed CIH shall be submitted with this bid. The CIH shall:
      1) Possess a minimum of three years experience in developing and implementing health and safety programs at hazardous waste sites or in the chemical or petroleum industry,
      2) Have demonstrable experience in supervising professional and technical level personnel,
      3) Have demonstrable experience in developing worker exposure assessment programs and ambient air monitoring programs, and
      3) Have working knowledge of State and Federal occupational safety and health regulations.
   b. Responsibilities - The CIH shall:
      1) Be responsible for the development, implementation, oversight, and enforcement of the HASP.
      2) Sign and date the HASP prior to submittal,
      3) Conduct initial site-specific training,
      4) Be present on-site during the first week (one to three days) of construction activities,
      5) Visit the site at least once every other month for the duration of activities,
      6) Be available for emergencies,
      7) Provide on-site consultation as needed to ensure the HASP is fully implemented,
      8) Coordinate any necessary modifications to the HASP with The Engineer,
      9) Sign and date a Hazard/Risk Analysis for the selection of Personnel Protective Equipment.
      10) Serve as a member of the quality control staff, and
      11) Provide the safety phase-out report as required by Part 1.14-I.
   c. Obligations to Engineer: The Contractor shall comply with The Engineer safety and occupational health requirements. It is the CIH's responsibility

to be briefed by The Engineer prior to initiating work and made aware of the rules and emergency procedures of The Engineer. The Contractor will be obligated to bring to the attention of The Engineer any deviations or obstacles to comply with The Engineer's intention of safe, productive work with minimal occupational risk. The Contractor will be required to provide and sign a safety declaration and will be responsible for furnishing to The Engineer the names of all employees working on site.

3. Site Safety and Health Officer (SSHO)

a. Qualifications: The Contractor shall designate an individual to be the Site Safety and Health Officer (SSHO). The SSHO shall:

1) Possess a minimum of one year experience in developing and implementing health and safety programs at hazardous waste sites or in the chemical or petroleum industry,

2) Possess demonstrable experience in construction safety techniques and procedures,

3) Have working knowledge of State and Federal occupational safety and health regulations,

4) Have specific training in personal and respiratory protective equipment program implementation and in the proper use of air monitoring instruments, air sampling methods, and procedures, and

5) Be certified in first aid/CPR by the Red Cross, or equivalent agency.

b. Responsibilities - The SSHO shall:

1) Convey The Engineers safety rules and emergency procedures to the Contractor's workers.

2) Assist and represent the CIH in the continued on-site implementation and enforcement of the HASP,

3) Be assigned to the site on a full-time basis for the entire duration of field activities, and shall have no duties other than Health and Safety related duties.

4) Perform and document daily "tailgate" safety meetings.

5) Ensure that all aspects of the HASP are complied with including preparation of records, air monitoring, daily visitor and worker logs, use of PPE, decontamination, and site control,

6) Consult with and coordinate any necessary modifications to the HASP in accordance with Part 1.08-C, with the CIH and the Engineer.

7) Serve as a member of the quality control staff on matters relating to safety and health,

8) Provide the information and perform the activities as required by part 1.08-M,

9) Have authority to stop work if unacceptable health or safety conditions exist, and

10) Provide the documentation as required by Parts 1.10-A, 1.14-B, C, D, E, F, G and H.

4. Health and Safety Support Personnel: Where appropriate for each work crew, the Contractor shall designate one person as a Health and Safety support person. These individuals shall perform activities at their location consistent with the HASP such as air monitoring, decontamination, and safety oversight on behalf of the SSHO. They shall have appropriate training equivalent to the SSHO in the specific area(s) for which they have responsibility. They shall report to and be under the supervision of the SSHO.

5. Occupational Physician: The Contractor shall utilize the services of a licensed physician who is certified in occupational medicine by the American Board of Preventive Medicine, or who, by necessary training and experience is Board eligible. The occupational physician shall be responsible for developing a medical monitoring program in compliance with 29 CFR 1910.120(f). The Contractor's occupational physician shall be responsible for providing the documentation as required by Part 1.11-C and 1.12-B and 1.13.

H. Personal Protective Equipment

1. General: In accordance with 29 CFR 1910.120(g)(5), a written personal Protective Equipment (PPE) program which addresses all the elements listed in that regulation, and which complies with respiratory protection program requirements of 29 CFR 1910.134 is to be included in the Safety and Health Program. Therefore, the Site Health and Safety Plan (HASP) shall detail the minimum PPE ensembles (including respirators), appropriate contaminant specific action levels, and specific materials from which the PPE components are constructed for each anticipated site-specific hazard as well as task/operation to be performed. The above information shall be presented in both a text and a tabular format and signed and dated by the contractor's CIH. Components of levels of protection (B, C, D and modifications) must be relevant to site-specific conditions, including heat stress potential and safety hazards. The PPE section of the HASP shall include site-specific procedures for on-site fit-checking, cleaning, maintenance, inspection, and storage.

2. Components of Levels of Protection

a. Level D

Level D Protection shall consist of:

- Hard hat
- Safety glasses with side shields or safety goggles
- Work clothing as prescribed by weather (long sleeved)
- Steel toe work boots
- Hearing protection (if needed)

b. Modified Level D

Modified Level D Protection shall consist of all elements of Level D above plus:

- Disposable outer coveralls (chemical resistant, Tyvek or equivalent)
- Disposable chemical resistant boot covers or chemical steel toe, steel shank boots

- Disposable inner gloves
- Chemically protective outer gloves (as per PPE program)
- Air purifying respirator (APR) shall be readily available at all times and be available for immediate donning when required.

c. Level C

Level C Protection shall consist of:

- Hard hat
- Eye protection (if needed)
- Work clothing as prescribed by weather
- Disposable outer coveralls (chemical resistant, Saranex or equivalent) of adequate design to prevent skin contact with site contaminants
- Disposable chemical resistant boot covers or chemical steel toe, steel shank boots
- Steel toe work boots
- Hearing protection (if needed)
- Disposable inner gloves
- Chemically protective outer gloves (as per PPE program)
- APR with appropriately selected cartridges.
- Cooling vests (if necessary)

d. Level B

Level B Protection shall consist of all elements of Level C except substitution of Supplied Air Respirators (SAR) with 5 minute escape SCBA or Self Contained Breathing Apparatus (SCBA) for APR. All SAR or SCBA must be positive pressure/pressure demand.

3. Initial Minimum Levels of PPE by Task

a. The Contractor's CIH shall establish appropriate levels of protection for each work task based on historical site information, air monitoring results, and an evaluation of the potential for exposure during each task. Protocols formally changing the level of protection and the communication network for doing so shall be described in the HASP and presented in a text and tabular format. Any downwind change or adjustment to the levels of PPE shall be approved by The Engineer' Representative. Upwind changes shall be done by the Contractor based on air sampling.

b. The following work tasks and minimum level of protection are provided to assist in the development of bids and in HASP preparation.

Work Task	Minimum Level of Protection*
Site Preparation	
Mobilization	D
Erosion and Sedimentation Control Installation	D
Maintenance i.e., Equipment, Erosion Control	D
Survey, Site Layout	D
Final Grading/Demobilization	D
Intrusive Construction	
Waste Excavation	Mod. D/C
General Soil Excavation	Mod. D
Well Installation	Mod. D
Waste Relocation and Consolidation	Mod. D/C
Soil Placement & Compaction	Mod. D
Decontamination, Development, Stockpile	
Dewatering and Groundwater Handling	Mod. D
Drainage Culvert Installation	D
Uncontaminated Soil Handling	D
Landfill Cap Construction	
Compacted Soil Subgrade Placement	Mod. D
Gas Vent Columns into Waste	Mod. D/C
Gas Venting Sand Placement	D
FML Installation	D
Protective Soil and Topsoil Layer	D
Seeding and mulch with jute matting, hay	D
Fence Installation	D

*Upgrades/downgrades determined by air sampling results and potential for dermal contact.

Other tasks which are non-intrusive or performed in the Support Zone may be performed by non-hazardous waste trained workers (at the discretion of the Contractor's CIH).

I. Exposure Monitoring/Air Sampling

1. General: The Contractor shall write and include in the HASP (text and table) an exposure monitoring/air sampling program for all operations performed on the site. The program shall establish reporting requirements and notification procedures. Modifications of the programs shall have the concurrence of The Engineer. The Contractor shall monitor/sample air quality to establish:
   a. Concentrations of air contaminants in the workers' breathing zones (BZ),
   b. Levels of oxygen, flammable or explosive materials, and toxic substances in confined spaces and in the atmosphere; and
   c. Concentrations of air contaminants along the site perimeter.

2. Baseline Air Monitoring

   a. Baseline air monitoring data shall be collected for three days during site mobilization. Baseline air monitoring data shall be used to determine increases in air emissions during the construction activities at the site, and will be used to ascertain the necessity for upgrading the respiratory protection levels. At a minimum baseline air monitoring shall be performed for dust and total volatile organic compounds (VOC). The contractor's CIH shall establish appropriate baseline air monitoring based on its review of the site specific contaminants of concern, prevalence and contractor's operations.

   b. The VOC data shall be collected using an Organic Vapor Detector (OVD) such as an HNu photoionization detection meter (PID), or equivalent. The site boundary shall be surveyed with the OVD three times, morning, afternoon and evening, during each testing day. Monitoring shall be conducted at 250-foot maximum intervals along the entire site boundary. Closer intervals of 100 feet shall be used for monitoring downwind levels during collection of baseline data.

   c. Measurements shall be collected for a maximum period of five minutes at each station. The highest OV reading shall be recorded for each station.

   d. Air monitoring data shall be documented and submitted to The Engineer within three days at the end of monitoring period.

3. Monitoring and Sampling for Breathing Zone (BZ) Concentrations

   Breathing zone concentrations shall be determined to establish proper levels of PPE and to document employee exposure levels. The HASP shall include a table showing task BZ monitoring instrument, BZ monitoring frequency, and the BZ action level with units.

   a. Real time (direct reading) monitoring: The Contractor shall utilize direct reading instruments to monitor for contaminants in workers' breathing zones. The following direct reading instruments shall be utilized, as appropriate:

      1) Organic vapor monitor utilizing either a photoionization detector or a flame ionization detector.
      2) Total dust monitor.
      3) Colorimetric detector tubes.
      4) Oxygen and combustible gas meter.
      5) Decibel meter.

   b. Personnel exposure monitoring:

      1) The CIH or SSHO shall perform monitoring and will be responsible for ensuring compliance with all requirements of 29 CFR 1910.120(h). Personal air sampling shall be performed at a minimum during the installation of extraction wells and excavation of contaminated. In order for the sampling to be meaningful for establishing the level of PPE needed for this contract the air sampling must be conducted in contaminant source areas. Therefore, the initial operations shall be performed in the most highly contaminated areas.

2) Personal air monitoring frequencies after the first week of operations shall be designated in the approved HASP. The individual(s) selected for personal air monitoring shall be the individual(s) expected to have the greatest exposure during the initial activities. Full-shift or near-full-shift breathing zone samples shall be collected. Sampling shall utilize personal sampling pumps with sorbet tubes and filter cassettes, using NIOSH methods.

3) Samples shall be collected by the contractor's SSHO and analyzed by an American Industrial Hygiene Association accredited laboratory. NIOSH sampling and analytical methods for monitoring employee exposure shall be chosen by the CIH after initial air sampling results have been reviewed. The site specific personal exposure monitoring sampling and analysis shall be selected and determined by the contractor's CIH.

4. Monitoring at the Site Perimeter: At a minimum perimeter monitoring shall be performed three times daily during the morning, midday and afternoon. Perimeter monitoring shall be performed at three downwind and one upwind location. The locations are approximate and may be moved from day to day depending on prevailing wind conditions and position of the work activity relative to the nearest residential dwellings. In cases where contamination is detected during remedial activities, continuous perimeter air not occurring. At a minimum perimeter monitoring shall include measurements for noise, dust and total VOC levels. The following lists the recommended type of equipment and action levels to be established for site perimeter monitoring:

Parameter	Monitoring Equipment	Action Level	Guidance Reference
Organic Vapors	Organic Vapor Meter (PID)	5 ppm	New York State Dept. of Health Guidance- Draft Community Air Monitoring Plan, 1992
Dust	Real-time Particulate Monitor	150 mg/m^3	New York State Dept. of Environmental Conservation TAGM on Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites, Oct. 1989.
Noise	Sound Level Meter	85 dBA	OSHA - 29 CFR 1910.95

Note:

ppm	parts per million
PID	photoionization detector
mg/m^3	micrograms per cubic meter
dBA	decibels-A-weighted scale

Contractor's CIH shall determine what additional perimeter analysis/monitoring shall be performed. Contractor as part of the HASP shall indicate (text and table) what perimeter action levels will be obtained. The contractor's HASP shall

specify all sampling and analytical methods. Contractor shall describe appropriate corrective action to be taken in the event a perimeter action level is exceeded.

5. Heat/Cold Stress Monitoring
   a. General: The Contractor's CIH shall develop a heat stress/cold stress monitoring program for on-site activities. Details of the monitoring program, including work/rest schedules and physiological monitoring requirements, shall be described in the HASP. Monitoring shall be performed by a person with a current first aid/CPR certification who is trained to recognize the symptoms of heat and cold stress.
   b. Heat Stress: The climate at the site combined with the requirements for personal protective equipment may create heat stress. For workers who wear permeable clothing, the Contractor shall follow recommendations for monitoring requirements and suggested work/rest schedules in the current ACGIH Threshold Limit Values for Heat Stress. For workers who wear semipermeable or impermeable clothing, the Contractor shall follow the technical guidelines in "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" (NIOSH Publication 90-117).
   c. Cold Stress: To guard against cold injury the Contractor shall provide appropriate clothing and warm shelter for the rest periods. Procedures to monitor and avoid cold stress shall be followed in accordance with the current TLVs for Cold Stress as recommended by the ACGIH.

J. Standard Operation Safety Procedures, Engineering Controls, Work Practices. The HASP shall address the engineering controls and safe work practices to be implemented for the work covered by these specifications. These shall include, but not be limited to the following:
   1. Part 3 "Execution" of this Specification.
   2. Site rules/prohibitions (buddy system, eating/drinking/smoking restrictions, etc.)
   3. Protocols for operation of heavy construction equipment in accordance with 29 CFR 1926.
   4. Descriptions of safety inspection and preventative maintenance requirements for the operation of machinery or mechanized equipment, including written inspection reports.
   5. Utility clearances.
   6. Site "housekeeping".
   7. Fall protection.
   8. Safe clearance.
   9. Sanitation (In accordance with 29 CFR 1910.120(n)).
   10. Electrical hazards.
   11. Communication.
   12. Excavation and trenching. Include provisions to maintain dust emissions at a minimum level.
   13. Solidification. Include provision to maintain dust emissions at a minimum level.
   14. Flexible membrane liner installation.
   15. Well Installation, including vaults.

K. Site Control and Work Zones.
   1. General: In order to control the spread of contamination and the flow of personnel and materials into and out of the work area, the Contractor shall establish a site

control section in the HASP. This section shall describe the methodology to be used by the SSHO in determining the modification of work zone designations, procedures to limit the spread of contamination, and general limitations to be observed by site personnel. The Contractor shall clearly lay out and identify the work zones in the field and shall limit equipment, operations, and personnel in the zones as required by these specifications and described in the HASP.

2. Support Zone: The Support Zone (SZ) shall be established on the site and is defined as the area outside the zone of significant contamination. The Support Zone shall be clearly delineated and shall be secured against active or passive contamination from the work site. The function of the Support Zone is to provide:
   a. An entry area for personnel, material, and equipment into the Exclusion Zone of site operations.
   b. Location for support facilities.
   c. A storage area for clean safety and work equipment.
3. Contamination Reduction Zone (CRZ): The CRZ shall serve as the personnel and equipment decontamination area.
4. Exclusion Zone (EZ): The EZ boundary shall be set by the Contractor so that it encompasses areas around individual intrusive construction activities being performed. The Contractor shall control entry into this area and exit may only be made through the CRZ.

L. Decontamination
   1. General: The Contractor shall establish decontamination procedures for on-site personnel who perform activities in the Exclusion Zone and for equipment utilized in the Exclusion Zone. Decontamination shall be performed in the CRZ prior to entering the Support Zone from the Exclusion Zone. The Contractor shall refer to Chapter 10.0 of the technical guidance publication "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" (NIOSH 85-115) when preparing these procedures. Procedures shall be described in the HASP. The Contractor shall train employees in the procedures and enforce the procedures throughout site operations.
   2. Decontamination Pads: All contaminated soils and decontamination fluids shall be contained and collected to prevent contaminant migration. A decontamination pad shall be constructed for heavy equipment decontamination as needed by the Contractor. The Contractor's planned location for a decontamination pad and construction details of a new pad shall be provided to The Engineer prior to construction.
   3. Waste Disposal: Liquid and solid waste generated during construction activities shall be managed in accordance with local, state, and federal regulations and Section 02082, Offsite Disposal.
   4. Fuel & Lubricant Storage: Contractor shall designate an area for fuel and liquid storage. The HASP shall describe the procedure for safe handling during filling and refueling operations.

M. Emergency Equipment and First Aid - The HASP shall describe the emergency and first aid equipment to be utilized. The following items, as a minimum, shall be immediately available for on-site use:
   1. First aid equipment and supplies approved by the Consulting physician.
   2. Emergency eyewashes/showers (comply with ANSI Z-358.1).

3. Two Self-Contained Breathing apparatuses shall be dedicated for emergency use only, maintained on-site, and located in an area that is immediately accessible to the CRZ and the SZ.
4. Spill control materials and equipment.
5. Fire extinguishers with a minimum rating of 2A-10B:C shall be provided at all site facilities and at any other site locations where flammable or combustible materials present a fire risk.

N. Emergency Response and Contingency Procedures

1. General: The Contractor shall include in the HASP an Emergency Response Plan in compliance with 29 CFR 1910.120(1), which addresses the following elements, as a minimum:
   a. Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposures, personal injuries, fire/explosions, environmental spills, and releases.
   b. Personnel roles, lines of authority, communications.
   c. Posted instructions and a list of emergency contacts (physician, nearby medical facility, fire and police departments, ambulance service, federal/state/local environmental agencies, CIH, Engineers).
   d. Emergency recognition and prevention.
   e. Contingencies to combat spills and releases of hazardous chemicals.
   f. Site topography, layout, and prevailing weather conditions.
   g. Criteria and procedures for site evaluation (emergency alerting procedures)
   h. employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security and control.
   i. Specific procedures for decontamination and medical treatment of injured personnel.
   j. Route maps to nearest pre-notified medical facility.
   k. Criteria for initiating community alert program, contacts, and responsibilities.
   l. Procedures for critique of emergency responses and follow-up.

1.09 NOTIFICATION OF AUTHORITIES:

A. The Contractor shall contact and meet with both the Engineer and with the local emergency response agencies prior to start of construction. The purpose of the meeting is for the resolution of conflict (if conflict exists) and to insure that the emergency responders are equipped to respond to an emergency on the site.

1.10 TRAINING:

A. General

1. All employees working on-site with the potential for exposure to hazardous substances, health hazards, or safety hazards shall meet the minimum training requirements as specified in 29 CR 1910.120. These employees shall have completed the required 40 hours of hazardous waste training and shall have three days of field experience in hazardous waste work.
2. All other employees working on site shall receive 24-hour training as required in 29 CFR 1910.120(e)(3)(ii) and (iii). All supervisory personnel shall have received

an additional eight hours of training as required for management of personnel and activities associated with hazardous waste site activities. Employees shall also receive a minimum of eight hours refresher training annually as needed based on their anniversary of 40-hour or 24-hour training.

3. A copy of the certifications for all hazardous training undergone by employees must be kept on site, and should be made part of the CD-13-1 submittal.

B. Site-Specific

1. Initial Training: An initial site-specific training session shall be conducted by the CIH prior to commencement of work or entering the site. This training shall cover site hazards, procedures, and all contents of the approved HASP. All site employees, including those working in the support zone, shall attend this training. Elements to be covered as part of the site specific training are:
   a. Names of personnel and alternates responsible for site safety and health and emergency response for hazardous waste operations.
   b. Safety, health and other hazards present on the site.
   c. Location of subsurface utility lines
   d. Use of personal protective equipment.
   e. Work practices by which the employee can minimize risks from hazards.
   f. Safe use of engineering controls and equipment on the site.
   g. Medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards.
   h. Use of monitoring equipment.
2. Periodic Training: Periodic on-site training shall be provided by the Contractor at least weekly and prior to each change in operation.
3. New Employees: Training of new employees shall be conducted prior to allowing them to work in the Contamination Reduction Zone or the Exclusion Zone.

1.11 MEDICAL SURVEILLANCE:

A. General: The CIH, in conjunction with the Occupational Physician, shall detail, in the HASP, the medical monitoring program that includes scheduling of examinations, certification of fitness, compliance with OSHA requirements, and information provided to the physician. The program shall, as a minimum, outline the requirements specified below:

B. Compliance with OSHA: The Contractor shall ensure the physician performs the medical examination prescribed in 29 CFR 1910.120 for workers performing work in areas other than the Support Zone. Accordingly, the Contractor shall furnish the physician with:

1. Information on the employee's anticipated or measured exposure;
2. PPE Use;
3. A description of the employee's duties;
4. A copy of 29 CFR 1910.120
5. Information from previous examinations not readily available to the examining physician.
6. A copy of NIOSH Publication 90-117.

C. Physician's Opinion: The Contractor shall obtain a copy of the occupational physician's written opinion about employees' ability to perform hazardous waste site work (Certification of Employee Fitness) and furnish copies to the CIH, SSHO and the employee before work begins. The opinion shall contain:

1. The physician's recommended limitations upon the employee's assigned work;
2. The physician's opinion about increased risk to the employee's health resulting from work; and
3. A statement that the employee has been informed and advised about the results of the examination.

D. Frequency of Examinations: Contractor shall provide the Engineer with a written summary of the fitness for all Contractor's on-site employees. The Contractor shall make medical examinations available to employees:
1. Before they start work;
2. Annually thereafter;
3. On termination of employment;
4. On completion of work on this contract;
5. If the employee develops signs or symptoms of illness relating to work place exposures;
6. If the physician determines examinations need to be conducted more often than once a year, and
7. When an employee develops a lost time injury or illness during the period of this contract. The Contractor must be provided with a written statement signed by the physician prior to allowing the employee to return to the work site after injury or illness resulting in a lost time workday. The written statement shall be submitted to the Engineer as part of the weekly safety report (see also Part 1.14-B & C: LOGS, REPORTS, AND RECORDKEEPING).

E. Content of Examination: The following parameters shall be included in the medical surveillance program as a minimum. The actual parameters selected shall be the responsibility of the Occupational Physician and shall meet the requirements of 29 CFR 1910.120, 1910.134 and ANSI Z88.2.
1. Complete medical and occupational history (initial exam only).
2. General physical examination including an evaluation of all major organ systems.
3. Pulmonary function testing including FVC and FEV1.0.
4. CBC with differential.
5. Biological blood profile (SMAC-21 or equivalent).
6. Urinalysis with dipstick or microscopic examination.
7. Audiometric testing (as required by Hearing Conservation Program).
8. Visual acuity.
9. Chest x-ray. (This test to be performed no more frequently than every four years, unless directed by Occupational Physician.)
10. Electrocardiogram (as directed by Occupational Physician).
11. Other testing/analysis, as needed, for site specific chemical and/or physical hazards (as directed by occupational physician and CIH).

1.12 SUBSTANCE ABUSE PREVENTION PROGRAM:

A To promote a safe environment for employees of The Engineer, its clients, suppliers, and contractors, certain behavior is prohibited in the work place. Suppliers and Contractors under contract with The Engineer in any capacity are required by contract to prohibit that behavior of their employees when their employees are present on The Engineer's work places. Prohibited behaviors are the use, manufacture, sale, possession or transfer of

illegal drugs, alcohol and controlled substances in the work place on The Engineer's premises.

B. Violation of this contract requirement, may be considered by The Engineer to be a material breach of contract and subject the Contractor to all remedies available to The Engineer at equity, contract, and law. In addition, Contractor is advised that violation of this contract requirement shall be considered in the evaluation of the Contractor as being qualified to supply personnel under future contracts with The Engineer. Contractor's attention is invited specifically to those articles in the terms of the contract related to drug abuse prevention, indemnity and termination.

C. Substance Abuse Prevention

1. The possession, use, manufacture, distribution or dispensation of any illegal drug, alcohol or controlled substance is prohibited on the site. In addition, Contractor personnel working on the site are expected to report to work in proper condition and not under the influence of any controlled substance.
2. The Contractor agrees to provide for work on the site, only those personnel who understand the requirements of Part 1.12 and who will comply. Contractor agrees that such personnel shall be chemically screened in accordance with all applicable Department of Transportation Regulations.
3. Violation of this article may, as The Engineer's option, be deemed by The Engineer to be a material breach of this contract and subject the contract to termination for default, as well as other remedies at contract, law, or equity.

D. Drug Screening

1. Prior to having employees perform work on the site, Contractor shall provide documentation that these employees have undergone and passed a screening test for illegal/unauthorized substances (alcohol, marijuana, cocaine, opiates, amphetamines and phencyclidine) not more than two (2) weeks prior to their initial assignment for work at The Engineer's property. Contractor's drug screening program and reporting shall comply and be in accordance with Parts 382 and 40 of the Federal Motor Carrier Safety Regulations, Department of Transportation.
2. The Contractor must insure that breath or specimen and blood sample collection procedures are consistent with Part 40 of the Department of Transportation (DOT) requirements. A Department of Health and Human Services (DHHS) certified laboratory performs (Part 40.39) the screening and the laboratory results are reviewed by a qualified medical review officer (occupational physician). (Part 382.407 and Part 40.29 (g)). Illegal/unauthorized substances tested for and cut off levels shall be consistent with DOT requirements as provided in Part 40.29. Alcohol cut-off levels shall be consistent with parts 382.201 and 382.301.
3. In addition to Pre-employment testing, the Contractors HASP shall provide for Post-accident (Part 382.203) and Reasonable Suspicion Testing (Part 382.307). If any worker reporting to work appears to be "under the influence", contractor shall be required to screen subject worker "for reasonable suspicion" drug and alcohol testing consistent with DOT requirements. Following an accident or incident, contractor shall be required to screen worker(s) involved in the accident or incident for drug and alcohol testing consistent with DOT requirements. Contractor as part of its HASP shall identify what physical symptoms and actions constitute "under the influence."

1.13 MEDICAL RECORDKEEPING:

A. Medical records must be retained in accordance with CFR 1910.120.

B Contractor must maintain records as follows:

1. The name and Social Security Number of the Employee.
2. Physician's written opinions, recommended limitations and results of examinations and tests.
3. Any employee medical complaints related to exposure to hazardous substances.
4. A copy of the information provided to the examining physician by the contractor (with the exception of the standard and its appendices).

C. The physician's written opinions and recommended limitations documents for all employees are to be on site and documented in accordance with 1.14-I and made part of the recordkeeping.

1.14 LOGS, REPORTS, AND RECORDKEEPING:

A. General: The Contractor shall maintain logs and reports covering the implementation of the HASP and other requirements of this section. The formats shall be developed by the Contractor and submitted as part of the HASP.

B. Contractor's Safety Declaration Forms:

1. The Engineer will arrange for indoctrination of special Site safety requirements for all Contractor personnel, including subcontractors. The Contractor's SSHO shall sign and will submit Form CD-13-2 5/88 to the Engineer signifying that the duly authorized and designated representative and agent of the Contractor has been properly trained.
2. The Contractor will be responsible for the safety indoctrination of each of his employees and the employees of his subcontractors. The Contractor's Safety and Occupational Health Compliance form is to be submitted to the Engineer following the kick-off meeting, then weekly, for all new employees, by the Contractor's SSHO.
3. The Contractor shall require all Contractor personnel, including subcontractors to sign "Contractor's Employee Safety Declaration", to be submitted to the Engineer weekly, for all new employees. All governmental inspectors and agents that required access into the CRZ and EZ shall be required to complete and sign this form.

C. Daily Safety Log and Inspection Report: The daily safety log and inspection report shall include practices and events that affect safety and health, safety and health discrepancies encountered, and safety and health issues brought to the supervisor's attention. Each entry shall include:

1. Date.
2. Work area checked.
3. Employees present in work area.
4. PPE and work equipment being used in each area.
5. Special health and safety issues and notes.
6. Signature of preparer.

D. Safety Incident Reports: Accident, Excursion or Injury reports shall be submitted to the Engineer immediately (within 15 minutes) of the incident reported. When required information shall be recorded on the attached forms where appropriate. The completed Forms or Reports shall be submitted to The Engineer within one business day of the

incident. Within three business days of an incident Contractor shall provide a written corrective action and findings summary to the Engineer .

1. Vehicle Accident Report - Exhibit 1
2. TELCON, Injury, Illness, Incident Summary Sheet - Exhibit 2
3. Form C-155694A Investigation and Findings of Injury/Illness - Exhibit 3
4. Form C49 Environmental Excursion/Incident Report Form - Exhibit 4

E. Worker/Visitor Register: Contractor shall require all on-site workers, visitors, suppliers and governmental agents and inspectors to sign a daily register. Contractor shall maintain a separate daily register for workers entering to and from the EZ.

1. Date.
2. Name.
3. Agency or company.
4. Purpose
5. Time entering site.
6. Time exiting site.

F. Monitoring/Sampling Results:

1. Date.
2. Type of equipment utilized and calibration procedures.
3. Equipment I.D. number.
4. Monitoring results for each work location or monitoring station with time of readings.
5. Analytical results for personal exposure sampling.
6. Personnel or location monitored/sampled with description of activity being performed.
7. Sample numbers.
8. Miscellaneous information related to monitoring/sampling performed.
9. Analytical and sampling methods.

G. Training Logs: Training logs shall be completed by the SSHO and submitted to the Engineer upon request and at the completion of the work. These logs shall be used to document all on-site training. The format to be used for reporting shall be shown in the HASP. The following information shall, at a minimum, be included:

1. Date.
2. Employees in attendance and signature.
3. Visitors in attendance.
4. Description of training activity and/or topics covered.
5. Equipment utilized.
6. Signature of instructor.

H. Manhours: At the completion of each month of work, the Contractor shall provide The Engineer with a summary of the total manhours worked, including all Subcontractors. Monthly summaries shall be entered on the Remediation Project Manhours Form - Exhibit 5. Forms shall be submitted by the 5th calendar day of the subsequent month.

I. Safety Phase-Out Report: At the completion of the on-site work, the Contractor shall submit a phase-out report. The report shall be submitted to The Engineer within 20 working days following completion of the on-site work, prior to final acceptance by The Engineer and final payment. The following minimum information shall be included:

1. Summary of the daily safety reports which outlines the overall performance of Health and Safety by the Contractor.

2. Documentation of medical certifications for site personnel. (Initial and Close-out)
3. Final decontamination documentation including procedures and techniques used to decontaminate equipment, vehicles, and on-site facilities.
4. Complete summary of personnel monitoring.
5. Complete summary of air monitoring accomplished during the project.
6. Signature of the Contractor and the CIH (and date signed).

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 SECTION INCLUDES:

A. Forbidden Activity
B. Housekeeping and General Rules;
C. Permits - Work, Burning & Welding, Confined Space Entry
D. Ladders and Scaffolding
E. Valves and Electrical Switches
F. Opening and Hoistways
G. Ropes and Cables
H. Protective Clothing and Equipment
I. First Aid
J. Fire Protection
K. Safety Locks, Tags and "Operation" Tags
L. Hand and Power Tools

3.02 FORBIDDEN ACTIVITY:

A. The use of intoxicating liquors or controlled substances in any form, horseplay of any description, running from work areas at quitting time are positively prohibited. Violation of any kind will be cause for disciplinary action including immediate dismissal. Any new hire or employee reporting for work "under the influence" of liquor, or controlled substances will not be admitted to the site. Contractor shall obtain The Engineer's approval whether this person may return at a later date.
B. Defective or improperly maintained tools or equipment are not to be used.
C. Workers deliberately dropping or throwing tools and material from ladders, scaffolds or work platforms to underlying work areas, will be liable to immediate dismissal.
D. Use of "cheater bars" and "homemade" equipment and tools.
E. Matches, cigarettes, lighters or hot work shall not be used to light a torch.

3.03 HOUSEKEEPING AND GENERAL RULES:

A. Good housekeeping is considered synonymous with safety and shall be policed on a daily basis. Debris and garbage on the site must be avoided where possible and when not possible should be removed weekly and not allowed to accumulate.

B. Tools, supplies and materials must be maintained in an orderly fashion. Walkways and work areas must be kept free of obstacles. Smooth ragged metal edges.

C. Boards containing nails must not be discarded unless the nails are bent over or removed. Good housekeeping must be maintained in the interest of safety and fire protection.

D. Notify The Engineer immediately (15 minutes) of all injuries.

E. Know the weight of an object to be handled. Use proper lifting techniques.

F. Put trash, waste, scrap and recyclable material in proper containers and or storage areas.

G. All gears and moving parts of power equipment in shops or construction area are to be fitted with satisfactory guards.

H. When necessary to place motor trucks inside of building for loading and unloading of materials and equipment by overhead crane, the craftsmen performing the rigging and the truck driver should move a safe distance from the truck until load is safely lowered or raised to location.

I. Handle all welding, gauges, cutting and welding heads and hose with care. Do not throw or drop carelessly. Each welding machine and lead should be tagged with an identifying number and assigned to a welder. Retain all welding leads in orderly fashion. When possible, secure and place leads overhead or in other manner to prevent a tripping hazard.

3.04 PERMITS:

A. Burning and Welding Permits (Hot Work)

1. Hot Work Permits (includes welding and burning permits) are required before the following equipment may be used at work in an project site (separate permits must be secured for each area and/or shift):
   a. Equipment utilizing an open flame such as acetylene burning or welding, lead burner's torch, propane torch, melting pot and similar devices.
   b. Arc-producing equipment such as arc welding or cutting electrodes and similar devices.
   c. Spark producing equipment such as portable grinders, abrasive saws, jack hammers and similar devices.
   d. Welding/Repair of pipe lines under pressure above 5 psi.
2. Welding leads must not be attached to railroad tracks anywhere on site at any time. Welding leads shall not be attached to steel work or any operating vessel or pipeline without the written permission of The Engineer Construction Superintendent or persons authorized to issue Hot Work Permits.
3. All welding machines are to be grounded directly to object being welded within ten (10) feet of weld being made, unless prescribed otherwise. All weld arcs shall be shielded and welding machine shall be operated in a well ventilated area.
4. When any welding or cutting operating is in progress, proper precautions must be taken to prevent the ignition of materials, equipment and building. Fire extinguishers (within 20 feet) are to be accessible at all times to prevent any possibility of fire during cutting or welding operations. Each truck or movable piece of power equipment shall be equipped with working fire extinguishers. Do not exceed 15 psi. on the tank side of the gauge when using acetylene.
5. Oxygen or other pressure cylinders must not be moved from one location to the other without the gauges being removed and the valve caps being in place. Such cylinders must not be raised by crane or winch except when a regular cradle is used. Do not use any type of choker to hoist bottles. Throughout the work area

where bottles are temporarily stored prior to using same, set all bottles in upright position with caps in position and chained or tied at all times. Do not store or use in horizontal position. Do not permit empty bottles to accumulate on the job site. Remove to empty storage location, place in upright position and cap. Also maintain storage facilities for full bottles.

6. Welding hoods and welding goggles to be worn at all times during welding, cutting or heating operations. Craftsmen assisting welders are to wear flash goggles. Welding shields are to be used. Eye protection and hard hats shall be worn where required.
7. Upon completion of any type welds, mark HOT with soapstone or chalk to prevent burns to personnel.

B. Confined Space Entry

1. A Confined Space Entry (CSE) Permit is required for any operation that requires an authorized individual to enter or work inside any existing tank, sump, tank car, tower, fire box, sewer or gas manhole that has been in service or is connected to plant service or process lines. A CSE Permit is required for any operation that requires an authorized individual to enter an excavation of 4 foot depth or deeper.
2. On construction or installation of new equipment, a CSE Permit is required by construction personnel only when the new installation is located within an operating area or is connected to active service or process lines.
3. Preparatory measures necessary to make the tank or confined space safe for entry before the CSE Permit is issued shall include the following and will be done by the Contractor:
   a. Vessels or tanks, that contain hazardous solvents, or residue shall be cleaned or washed in a manner acceptable for cleaning the particular vessel. All cleaning fluids and residues, sludges shall be properly containerized.
   b. All service and process lines that transport solvents, corrosive liquids, gas or other hazardous materials must either be disconnected, or blanked with metal blanks of sufficient thickness to withstand any pressure that may develop in the lines. Steam lines may be left intact provided the line can be double blocked and an open bleed line is located between the two valves. Water lines may be left in place, but must be valved off.
      1) When valves are used as blocks, they shall be tagged and chained in the closed position in accordance with the standing tagging procedures.
      2) Valves that are pneumatically or electrically operated, are not to be considered block valves.
   c. All electrically powered stirrers, agitators or similar mechanisms designed to operate inside the vessel are to be locked out and tagged in accordance with standing procedures covering the subject. When such stirrers or agitators are pneumatically driven, the air supply must be disconnected at the motor.
   d. Atmospheric tests shall be made to determine the presence of flammable and toxic vapors. An additional test shall be made to determine the presence of sufficient oxygen to sustain life. Atmospheric and vapor tests shall be made by assigned personnel and recorded.

e. Attention shall be given the surrounding area to correct any conditions and suspend adjacent operations that could create a hazard to personnel while inside the vessel or confined space.

f. Vessels equipped with radioactive controls or sensing devices will have the radioactive source rendered safe according to manufacturer's recommendations. After shielding the radio-active source, locks are to be applied to units.

1) When shielding has been completed, the standard danger tag shall be affixed to all radioactive source holders.

2) After radioactive sources have been rendered safe, entry into the vessel may be made only after the interior of the vessel has been checked with a source detection instrument and found to be within permissible ranges of radioactivity.

g. An outside source for fresh air shall be provided for the vessel or confined space. It is permissible to use a blower for this source; however, an air mover is acceptable if surrounding atmosphere is not contaminated and after atmospheric tests have been made to assure the air mover has been connected to a source of compressed air.

h. A life line and safety harness shall be used.

i. A ladder and a self-contained gas mask shall be available at the manhole or access for emergency use.

j. A standby observer shall be stationed at the manhole or access and instructed to remain at his station until the vessel or confined space is clear of personnel. The watcher shall be instructed to keep a visual contact with those inside the vessel, or, if vision is obstructed, to make frequent verbal checks with those on the inside.

k. Special protective clothing or other personal protective equipment shall be provided for personnel assigned to enter or work in vessels that have contained materials of a corrosive nature, when entry is being made for the propose of washing the vessel, or when the unusual nature of the entry indicates a need for special clothing or equipment.

l. When entry is to be made in a vessel located in an area housing other activities or operations, employees in the immediate area are to be made aware of the intended entry.

m. When the Engineer's Superintendent responsible for issuing the Confined Space Entry Permit feels a particular job needs special precautions beyond the ones prescribed, he may require these additional precautions before issuing the permit.

4. After approvals have been given to enter a confined space - i.e., tank, deep trench, all persons authorized to enter the confined space must sign the permit in the space provided for their signature, and the standby observer must sign in the space provided for his signature.

5. When the Confined Space Entry Permit has been completed, it shall be affixed to the equipment or a suitable mounting location, normally in the vicinity of the manhole or access, and entry into the confined space may be made.

6 The Confined Space Entry Permit does not constitute approval for use of open flames or spark-producing tools inside a tank, vessel or confined space. For jobs

requiring the use of open flames or spark-producing tools within a tank, vessel or confined area the regular Flame Permit shall be issued in addition to the Confined Space Entry Permit.

3.05 LADDERS AND SCAFFOLDING:

A. Ladders and scaffolding of all types must conform to OSHA standards and are to be checked regularly and maintained in good repair. All work scaffold planks are to be free of knots, defects and other tripping hazards. Scaffolds shall be tied off or stabilized with outriggers when its height exceeds three (3) times the smaller dimension of its base. Tie-offs must not exceed 26 feet vertically and 30 feet horizontally.

B. Planks used on top of scaffolds for a work platform are to have cross members at each end to prevent planks from creeping or sliding. Straight and extension ladders are to have safety shoes on lower section. Single straight or extension ladders must be tied securely to prevent the ladder from slipping.

C. Type 1 ladder with a minimum rating of 250 lb. are recommended. All ladders shall have tie-off rope non-skid safety feet. Tie-off ladders for eight (8) feet or taller.

3.06 OPENINGS AND HOISTWAYS:

A. All excavations or other openings, where persons might fall through or into, must be barricaded and posted in an acceptable manner when left open at night or unattended for an 8-hour duration or greater. Protective barricades shall be 42-inches in height and withstand 200 lbs. of force in any direction.

B. When working overhead, the area underneath must be protected at all times to prevent personnel from walking below. All swing radiuses of stationary cranes shall be posted and barricaded.

C. Hoist areas for materials and equipment throughout construction area are to be roped off and marked with a "Danger" sign. Overhead working areas are to be marked "Danger - Men Working Above". None of these designated areas are to be used as a thoroughfare or working area.

D. Hole covers must be installed immediately 3/4-inch plywood for opening 18-inches and less. Openings greater than 18-inches, 2-inch lumber of doubled 3/4-inch plywood is required.

3.07 ROPES AND CABLES:

A. All rope blocks and hand lines are to be in good condition at all times and stored out of weather. Be cautious where chemicals of any type exist which might weaken the rope.

B. All cables and rigging equipment must be in good condition at all times and inspected, set up and maintained. Only one eye in a hook . Use a shackle to hold two (2) or more eyes.

C. Proper type and sized chokers and slings to be used on all types of hoisting equipment. Wood softeners to be placed between metal and chokers to prevent slippage of load. Be positive load is secure and balanced before hoisting.

D. Chainfalls and come-a-longs must have OSHA approved safety spring return latches on all hooks. Chain hoist must be used within the rated capacity.

3.08 PROTECTIVE CLOTHING AND EQUIPMENT:

A. Proper respiratory equipment is to be used for spray painting or other operations hazardous to health. Provide as much ventilation as possible in these areas. Safety belts

are to be worn for painting of steel structures where height prevents using ladders or scaffolds. A good facial seal is necessary when wearing respiratory equipment. This cannot be attained with a beard or excessively long sideburns which cover the sealing surfaces. Mustaches and goatees do not generally interfere with the facial seal. Hair on facial sealing surfaces (beards, long sideburns, etc.) will not be allowed on personnel subject to respirator use.

B. Eye protection, which complies with OSHA Standard 1910.133, must be worn by personnel engaged in the following jobs:
   1. Welding or cutting.
   2. Repairing, connecting or disconnecting chemical lines and pumps from service.
   3. Use of pneumatic impact tools or use of chisels for cutting or chipping masonry or metal.
   4. Grinding, buffing and polishing operations.
   5. Handling corrosive chemicals - acids, caustics, solvents, Dowtherm, ethylene glycol.
   6. Contractors shall wear approved ANSI 287.1 safety glasses with rigid side shields.

C. In addition to minimum protection, additional protection is pre-scribed when a person is engaged in work of a known hazardous nature. The following jobs are among those that require additional protection, together with the required protection:
   1. When handling corrosive materials or irritants such as acids, caustics, Dowtherm or solvents. - PLASTIC OR RUBBER SPLASHPROOF MONOGOGGLE.
   2. When working on pipelines, valves, pumps and similar equipment that may contain hazardous materials under pressure such as acids, caustics, steam, hot water, Dowtherm, molten polymer, or ethylene glycol. - PLASTIC FACE SHIELD.
   3. Welding, cutting, burning. - CUP GOGGLE WITH A MINIMUM NO. 10 FILTER PLATE OR WELDING HOOD.
   4. Cleaning with compressed air. - DUST TIGHT COVER GOGGLES.
   5. Chipping metal, breaking masonry using pneumatic impact tools, stud guns, grinding with portable grinders, and miscellaneous heavy work. - IMPACT CUP GOGGLES OR IMPACT MONOGOGGLE.
   6. Protective clothing, face shields or masks and gloves are to be worn at all times in any type of acid cleaning and wash for cleansing metal parts, valves, etc.

3.09 FIRST AID:

A. Regardless of how slight an injury may be, relating to cuts, bruises or eye injuries, or symptoms due to acute exposures to chemicals or fumes, they must be reported immediately (15 minutes) to the Engineer .

B. In Contractor's Field Office and/or First Aid Facilities, names, addresses and phone numbers of the following are to be placed on wall where they may be accessible without delay: Ambulance Service, Hospitals, Fire Department, all doctors designated by Insurance Company to perform medical services for Contractors.

3.10 FIRE PROTECTION:

A. The use of gasoline for cleaning purposes is prohibited. Gasoline or other flammable liquids must be handled and stored in an approved manner. Approved safety cans must be

used for small quantities of gasoline. All outside storage tanks and drums used for storage of gasoline, fuels, oils, cleaning solutions of any type are to be well marked identifying contents and stored in a containment area. Use lock type faucets or nozzles. Be sure to place and retain at all times proper type extinguisher at gasoline storage. Also be sure to post "No Smoking" signs.

B. For any "Hot Work" a functioning fire extinguisher (ABC Type) shall be within twenty (20) feet of the work area. Combustible material shall be segregated and stored in properly labeled containers away from all ignition sources.

C. Multi-purpose (ABC Type) fire extinguishers shall be provided and maintained at a minimum within all site trailers, fuel and lubricant storage areas, combustible gas storage areas and on all heavy equipment including drill rigs.

3.11 SAFETY LOCKS, TAGS AND "DO NOT ADJUST OR OPERATE" TAGS:

A. Safety Locks will be used in an operating area to provide a safety lock-out system to insure the safety of any employee against the accidental start-up of machinery, or electrical equipment on which he may be working.

1. Safety locks shall be issued to individual employees and shall be used by them to lock electric power disconnect switch or breaker of the equipment in the open position so that the switch cannot be operated and the machine cannot be started.
2. In cases where the electrical breaker cannot be locked in an open position, or on interlocked equipment, fuses must be removed from the circuit by an electrician or a qualified member of supervision and tagged out.
3. After locking the breaker, the person applying the lock shall attempt to start the unit at the starter switch to insure that the circuit is clear. Work may then begin on the unit.
4. Lock will remain in place as long as the employee is working on the unit. It will be removed from the breaker by the lock owner, after completion of his part of the job.
5. When more than one person is working on a single machine, a multiple lock-out device will be applied so that each man can affix his personal lock to the beaker. When multiple locks are used, the lock owner must remove his lock as he leaves the job.

B. Safety Tags will be used:

1. On valves that have been closed because of leakage in process lines or in equipment.
2. On valves that are closed to separate operating equipment scheduled for repair, alterations, special tests or inspections.
3. On valves that have been closed to separate new installations from operating units.
4. On all new valves that are inserted or added to an existing operation by either Maintenance or Construction personnel.: While the tagging of valves, electrical breakers, and operating of Controllers that connect with existing operating equipment are the responsibility of operating personnel, the tagging of key valves and key points within the new construction is the responsibility of Construction Supervision responsible for the installation. The Contractor shall not close existing valves, breakers, and operating controllers without the approval of operating personnel.

C. Do Not Adjust or Operate Tags: When machinery and equipment are not to be operated or adjusted for operational reason, the "Do Not Operate or Adjust Tag" will be used.

3.12 HAND AND POWER TOOLS:

A. All tools and equipment must be in good condition and maintained in such condition. Only use appropriate tools for the work at hand and tools intended use.

B. Keep all impact tools (chisels, stardrills and welding irons) dressed to avoid spalling.

C. Portable electrical equipment and tools shall be grounded unless "double insulated". A ground fault circuit interrupter (GFI) shall be used.

D. Any pneumatic hoses exceeding 1/2-inch diameter shall have a pressure reduction relief device in the event of hose failure.

END OF SECTION

Table 01620-1
Detected Pollutants
Surface Soils (0-2') mg/kg

Pollutant	Formula Weight/ Specific Density*	Number of Analysis	Number of Detections	Minimum Concentration	Maximum Concentration	Average Concentration
Volatile Organics						
Acetone	58.08/0.79	11	3	0.018	0.028	0.023
1,1-Dichloroethane	98.96/1.18	11	3	-	-	0.009
1,2-Dichloroethene	96.94/1.22	11	4	-	-	0.038
Methylene chloride	84.93/1.33	11	4	0.002	0.004	0.003
Toluene	92.14/0.87	11	1	-	-	0.002
1,1,1-Trichloroethane	133.4/1/34	11	1	ND	ND	ND
Trichloroethene	131.39/1.46	11	3	ND	ND	ND
Vinyl chloride	62.5/0.91	11	1	-	-	0.021
Semivolatile Organics						
bis(2-Ethylexyl) phthalate	390.57/0.99	21	8	0.35	3.7	2.025
Butyl benzyl phthalate	312.37/1.12	21	1	-	-	0.011
1.4-Dichlorobenzene	147.00/1.25	21	1	-	-	0.068
4-Methylphenol	108.14/1.02	21	2	-	-	0.39
CPAHs	N/A	21	2	-	-	0.069
TPAHs	N/A	21	2	-	-	0.157
Pesticides/PCBs						
Aldrin	364.92/1.70	21	1	-	-	0.051
4,4'-DDD	320.05/1.48	21	3	0.015	0.099	0.057
4,4'-DDE	319.03/N/A	20	10	0.012	2.2	1.106
4,4'-DDT	354.49/1.56	19	8	0.0071	0.64	0.32355
Endosulfan II	406.92/1.75	21	1	-	-	0.043
Endrin aldehyde	380.92/-	21	2	0.0092	0.081	0.0451
Endrin ketone	-	21	1	-	-	0.019
Heptachlor epoxide	389.32/-	21	1	-	-	0.017

Table 01620-1
Detected Pollutants
Surface Soils (0-2') mg/kg

PCBs	N/A	22	17	0.038	158	79.019
Inorganics						
Aluminum	26.97/2.70	22	22	13300	36200	24750
Arsenic	299.64/4.7	22	21	31.	51.4	27.25
Barium	137.36/3.5	22	22	66.9	358	212.45
Beryllium	9.02/1.82	22	15	0.33	1.1	0.715
Cadmium	112.41/8.65	22	5	0.9	14.8	7.85
Calcium	40.08/1.55	22	22	397	3130	14.8
Chromium	52.01/7.1	22	22	18	131	74.5
Cobalt	58.94./8.9	22	22	12.7	21.9	17.3
Copper	63.57/8.92	15	13	20	12300	6160
Iron	58.85/7.86	22	22	22400	74700	48550
Lead	207.21/11/34	22	22	6.3	53800	26903.15
Magnesium	24.32/1.74	22	22	3770	6470	5120
Manganese	54.93/7.2	22	22	434	1610	1022
Mercury	200.61/13.55	18	1	-	-	0.14
Nickel	58.69/8.90	22	22	24.1	95.1	59.6
Potassium	39.10/0.86	22	22	829	2540	1684.5
Selenium	631.68/4.8	22	2	ND	ND	ND
Silver	107.88/10.5	22	4	-	-	19.4
Sodium	23.00/0.97	22	19	9.5	390	199.75
Thallium	204.39/11.85	22	1	-	-	0.4
Vanadium	50.95/5.96	22	20	18.2	45.6	31.9
Zinc	65.38/7.14	19	19	76.7	783	429.85
Other						
Cyanide	-	22	4	0.69	1.3	0.995

Table 01620-1
Detected Pollutants
Surface Soils (0-2') mg/kg

NOTES:

Data for these columns are from the following references.
Malcolm Pirnie, Inc. Draft Final Feasibility Study Report, Sidney Landfill, Delaware County, NY. White Plains: Malcolm Pirnie, Inc., 1985.
United States Environmental Protection Agency, Region II. Sidney Center Landfill Record of Decision. New York: USEPA, 1995.
*Data for this column are from the following references.
Montgomery, John H. and Linda M. Welkom. Groundwater Chemical Desk Reference. Chelsea, Michigan: Lewis Publishers, Inc., 1989.
Perry, Robert H. and Cecil H. Chelton. Chemical Engineers' Handbook. 5th Edition. New York: McGraw-Hill Book Company, 1973.

{ND} Not Detected.
{N/A} Not Applicable.
{-} No data found.

Table 01620-1
Detected Pollutants
Groundwater (ug/l)

Pollutant	Formula Weight/ Specific Density*	Number of Analysis	Number of Detections	Minimum Concentration	Maximum Concentration	Average Concentration
Volatile Organics						
Acetone	58.08/0.79	50	4	9	29	19
Benzene	78.11/0.88	57	4	3	4	3.5
Carbon disulfide	76.13/1.26	57	4	39	55	47
Chlorobenzene	112.56/1.11	57	4	1	10	5.5
Chloroform	119.38/1.48	57	3	6	10	8
1,1-Dichloroethane	98.96/1/18	57	15	2	13	7.5
1,3-Dichloroethene	96/94/1.26	57	37	5.7	207	106.35
Ethylbenzene	106.17/0.87	57	4	1	37	19
Tetrachloroethene	165.83/1.62	57	4	1	4	2.5
Toluene	92.14/0.87	57	10	2	61	31.5
1,1,1-Trichloroethane	133.4/1.34	57	15	3	51	27
Trichloroethene	131.39/1.46	57	46	10	1376	693
Vinyl chloride	62.50/0.91	57	8	2	60	31
Xylenes (total)	N/A	57	5	4	17	10.5
Semivolatile Organics						
bis(2-Ethylhexyl) phthalate	390.57/0.99	66	19	1.8	61	31.4
4-Chloro-3-methylphenol	142.59/-	65	2	0.9	1	0.95
1,3-Dichlorobenzene	147.00/1.29	65	1	-	-	5
1,4-Dichlorobenzene	147.00/1.25	65	2	3	4	3.5
Diethyl phthalate	222.24/1.12	65	4	1	4	2.5
Di-n-butyl phthalate	278.3/1.05	65	6	0.6	1	0.8
2-methylphenol	108.14/1.03	65	1	-	-	2
Phenol	94.11/1.06	65	2	1	3	2
TPAHs	N/A	65	3	1	2	1.5

Table 01620-1
Detected Pollutants
Groundwater ug/l

Pesticides/PCBs						
Aldrin	364.92/1.70	59	4	0.0103	0.0177	0.014
Dieldrin	380.91/1.75	64	1	-	-	0.022
4,4'-DDT	354.49/1.56	64	1	-	-	0.0091
Heptachlor epoxide	389.32/N/A	60	5	0.0055	0.031	0.01825
PCBs	N/A	64	4	0.31	9.3	4.805
Inorganics						
Aluminum	26.97/2.70	66	61	2499.9	599485	300992.45
Antimony	121.76/6.68	66	11	15.6	104.35	59.975
Arsenic	299.64/4.7	66	45	6.1	1798.1	902.1
Barium	137.36/3.5	66	65	184.2	12419	6301.6
Beryllium	9.02/1/82	66	20	6.1	43.3	24.7
Cadmium	112.41/8.65	66	8	4.6	14.1	9.85
Calcium	40.08/1.55	66	66	9777	822500	416138.5
Chromium	52.01/7.1	66	51	15.8	879	447.4
Cobalt	58.94/8.9	66	45	13.1	1620	816.44
Copper	63.57/8.92	66	48	20.2	1443	731.6
Iron	58.85/7.86	66	66	4931.8	1236890	620910.9
Lead	207.21/11/34	66	56	9.3	1163.8	586.55
Magnesium	24.32/1.74	66	66	5561	298090	151825.5
Manganese	54.93/7.2	66	65	419.7	47680	24049.85
Mercury	200.61/13.55	66	3	0.25	0.54	0.395
Nickel	58.69/8.90	66	44	24.2	1726	875.11
Potassium	39.10/0.86	66	65	2576	60760	31668
Sodium	23.00/0.97	66	66	4062	117050	60556
Thallium	204.39/11.85	66	6	1	8.4	4.7
Vanadium	50.95/5.96	66	33	17.3	617	317.15
Zinc	65.38/7.14	61	58	98.8	3484.6	1791.7

Table 01620-1
Detected Pollutants
Groundwater ug/l

NOTES:
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United States Environmental Protection Agency, Region II. Sidney Center Landfill Record of Decision. New York: USEPA, 1995.
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{ND} Not Detected.
{N/A} Not Applicable.
{-} No data found.

Table 01620-1
Detected Pollutants
Leachate (ug/L)

Pollutant	Formula Weight/ Specific Density*	Number of Analysis	Number of Detections	Minimum Concentration	Maximum Concentration	Average Concentration
Volatile Organics						
Benzene	78.11/0.88	5	1	-	-	1
Chlorobenzene	112.56/1.11	5	1	-	-	13
Chloroethane	64.52/0.90	5	1	-	-	12
Chloromethane	50.48/0.92	5	1	-	-	1
1,1-Dichloroethane	98.96/1.18	5	3	2	4	3
1,2-Dichloroethene	96.94/1.22	5	3	25	7	49
Ethylbenzene	106.17/0.87	5	1	-	3	49
Toluene	92.14/0.87	5	1	-	-	320
1,1,1-Trichloroethane	133.40/1.34	5	1	ND	-	ND
Trichloroethene	131.39/1.46	5	2	-	ND	4
Vinyl chloride	62.50/0.91	5	3	4	-	10
Xylenes (total)	N/A	5	1	-	16	120
Semivolatile Organics						
Butyl benzyl phthalate	312.37/1.12	5	1	-	-	0.3
Carbazole**	167.21/-	5	1	-	-	0.1
4-Chloro-3-Methylphenol	142.59/-	5	1	-	-	6
Di-n-butyl phthalate	278.35/1.05	5	1	-	-	1
1,4-Dichlorobenzene	147.00/1.24	5	1	-	-	24
Diethyl phthalate	222.24/1.12	5	1	-	-	12
2-Methylphenol	108.14/1.03	5	1	-	-	3
4-Methylphenol	108.14/1.02	5	1	-	-	29
N-nitrosodiphenylamine	198.22/-	5	1	-	-	0.5
TPAHs	N/A	5	1	-	-	8
Pesticides/PCBs						
PCBs	N/A	5	1	-	-	3.6

Table 01620-1
Detected Pollutants
Leachate (ug/L)

Pollutant	Formula Weight/ Specific Density*	Number of Analysis	Number of Detections	Minimum Concentration	Maximum Concentration	Average Concentration
Inorganics						
Aluminum	2697/2.70	5	2	549	1060	804.5
Arsenic	299.64/4.7	5	2	-	-	5.3
Barium	137.36/3.5	5	4	35.4	268	151.7
Calcium	40.08/1.55	5	5	4020	17600	10810
Chromium	52.01/7.1	5	1	-	-	22.1
Cobalt	58.94/8.9	5	1	-	-	22.6
Copper	63.57/8.92	5	5	7.3	45.8	26.55
Iron	58.85/7.86	5	5	1590	106000	53795
Magnesium	24.32/1.74	5	5	2100	6590	4345
Manganese	54.93/7.2	5	5	76.2	3440	1758.1
Nickel	58.69/8.90	5	2	22.2	86.3	54.24
Potassium	39.10/0.86	5	5	1100	1900	1500
Silver	107.88/10.5	5	3	11.8	19.9	15.85
Sodium	23.00/0.97	5	5	1050	360	2355
Thallium	204.39/11.85	5	1	ND	ND	ND

NOTES:
Data for these columns are from the following references.
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{ND} Not Detected.
{N/A} Not Applicable.
{-} No data found.

Table 01620-1
Detected Pollutants
Sub-Surface Soils (<2') mg/kg

Pollutant	Formula Weight/ Specific Density*	Number of Analysis	Number of Detections	Minimum Concentration	Maximum Concentration	Average Concentration
Volatile Organics						
Benzene	78.11/0.88	33	1	-	-	-
Carbon Disulfide	76.13/1.26	33	1	-	-	-
Chlorobenzene	112.56/1.11	33	3	-	-	-
1,2-Dichloroethane	98.96/1.24	33	1	-	-	-
1,2-Dichloroethene	96.94/1.26	33	2	-	-	-
Ethylbenzene	106.17/0.87	33	9	-	-	-
2-Hexanone	100.16/0.81	33	3	-	-	-
Methylene Chloride	84.93/1.33	33	2	-	-	-
Tetrachloroethene	165.83/1.62	33	3	-	-	-
1,1,1-Trichloroethene	133.40/1.34	33	1	-	-	-
Trichloroethene	131.39/1.46	33	5	-	-	-
Toluene	92.14/0.87	33	10	-	-	-
Xylenes (total)	N/A	33	10	-	-	-
Semivolatile Organics						
Bis(2-ethylhexyl)phthalate	390.57/0.99	33	8	0.15	0.47	0.31
Butyl benzyl phthalate	312.37/1.12	32	3	ND	ND	ND
Carbazole**	167.21/-	32	1	ND	ND	ND
Di-n-butyl phthalate	278.35/1.05	33	1	ND	ND	ND
1,4-Dichlorobenzene	147.00/1.25	32	6	ND	ND	ND
Di-n-octyl phthalate	390.57/0.99	32	2	ND	ND	ND
4-Methylphenol	108.14/1.02	32	1	ND	ND	ND
CPAHs	N/A	32	5	-	-	0.4
TPAHs	N/A	32	14	-	-	0.4

Table 01620-1
Detected Pollutants
Sub-Surface Soils (<2') mg/kg

Pesticides/PCBs						
y-Chlordane	409.78/1.59-1.63	33	3	ND	ND	ND
4,4'-DDD	320.05/1.48	31	11	ND	ND	ND
4,4'-DDE	319.03/-	33	2	ND	ND	ND
4,4'-DDT	354.49/1.56	32	3	ND	ND	ND
Endosulfan Sulfate	422.92/-	33	1	ND	ND	ND
Methoxychlor	345.66/1.41	32	1	ND	ND	ND
PCBs	N/A	33	22	ND	ND	ND
Inorganics						
Aluminum	26.97/2.70	33	32	13100	18400	15750
Arsenic	299.64/4.7	31	28	8.5	17	12.75
Barium	137.36/3.5	33	31	65.6	172	118.8
Beryllium	9.02/1.82	33	31	0.24	0.37	0.305
Cadmium	112.41/8.65	33	3	ND	ND	ND
Calcium	40.08/1.55	33	32	188	1090	639
Chromium	52.01/7.1	33	31	17.9	21.5	19.7
Cobalt	58.94/8.9	33	31	11.3	18.7	15
Copper	63.57/8.92	32	31	18.3	36.1	27.2
Iron	58.85/7.86	33	32	24900	32000	28450
Lead	207.21/11/34	14	13	10.9	21.4	16.15
Magnesium	24.32/1.74	33	31	4240	5990	5115
Mercury	200.61/13.55	33	31	443	925	684
Manganese	54.93/7.2	33	3	-	-	0.12
Nickel	58.69/8.90	33	31	23.6	41.3	32.45
Potassium	39.10/0.86	33	32	901	1710	1305.5
Selenium	631.68/4.8	33	7	-	-	0.45
Silver	107.88/10.5	33	3	ND	ND	ND
Sodium	23.00/0.97	33	32	13.1	71.3	42.2

Table 01620-1
Detected Pollutants
Sub-Surface Soils (<2') mg/kg

Inorganics						
Thallium	204.39/11.85	33	3	ND	ND	ND
Vanadium	50.95/5.96	15	14	14.4	21.4	17.9
Zinc	65.38/7.14	31	30	67.6	90.7	79.15

NOTES:
Data for these columns are from the following references.
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Perry, Robert H. and Cecil H. Chelton. Chemical Engineers' Handbook. 5th Edition. New York: McGraw-Hill Book Company, 1973.
** Data for carbazole is from the following reference.
Dean, John A. Lange's Handbook for Chemistry. 12th Edition. New York: McGraw-Hill Book Company, 1979.

{ND} Not Detected.
{N/A} Not Applicable.
{-} No data found.

SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Closeout procedures.
B. Final cleaning.
C. Adjusting.
D. Project record documents.
E. Operation and maintenance data and manual.
F. Spare parts and maintenance Products.
G. Warranties and bonds.
H. Maintenance service.

1.02 RELATED SECTIONS:

A. Submittals: Section 01340
B. Construction Facilities and Temporary Controls: Section 01510
C. General Requirements, Health, Safety and Environmental Protection: Section 01620
D. Cleaning: Section 01710
E. Project Record Documents: Section 01721

1.03 CLOSEOUT PROCEDURES:

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready Engineer's review.
B. Provide submittals to Engineer that are required by Specification 01300 and by governing or other authorities.
C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. Final application for payment shall include stamped As-Built survey showing final grades and lines.

1.04 FINAL CLEANING:

A. Execute final cleaning of site prior to final project assessment.
B. Clean debris from culverts, ditches, and drainage systems.
C. Clean site; sweep paved areas, rake clean landscaped surfaces.
D. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 PROJECT RECORD DOCUMENTS:

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. As-Built Drawings.
   2. Specification Revisions.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.

5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.
7. Third Party Inspection Reports.

B. Ensure entries are complete and accurate, enabling future reference by Engineer.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record for each Product section a description of actual Products installed, including the following:
1. Manufacturer's name, address and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. As-Built Drawings: Legibly mark each item to record actual construction including:
1. As-built final grade contour information.
2. Measured horizontal and vertical locations of wells, foundations, underground utilities, culverts and ditches, referenced to permanent surface improvements.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.
5. Additional equipment installed.
6. Updated, Contractor certified electrical drawings including pannel layouts with numbered contact points and schematic drawings for underground utilities as well as treatment facility cross-referanced to Operation and Maintenance Manuals and manufacturer's data.
7. Floor plan of treatment building, skid or trailer.
8. Updated and field adjusted piping schematics for all equipment referanced to O&M Manuals.
9. Provide reduced sized (11" - by - 17") copies for each O&M manual and standard size drawings for project and O&M files.

G. Submit documents to the Engineer with claim for final Application for Payment.

1.06 OPERATION AND MAINTENANCE DATA:

A. Submit data and As-Built Drawings bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder if multiple binders are required.

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on white paper, in three parts as follows:
1. Part 1: Directory, listing names, addresses, and telephone numbers of the Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   a. Significant design criteria.
   b. List of equipment.
   c. Parts list for each component.

d. Operating instructions.
e. Maintenance instructions for equipment and systems.
f. Maintenance instructions, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:
a. Shop drawings and product data
b. Off-site Disposal Record
c. Health & Safety Closeout
d. Final OSHA Man Hours
e. Certificates.
f. Copies of warranties and bonds.
g. Project Photographs.

E. Submit 1 draft copy of completed volumes 14 business days prior to final inspection. This copy will be reviewed and returned after final inspection, with the Engineer's comments. Revise content of all document sets as required prior to final submission.

F. Submit 3 bound sets of revised final volumes, within 10 business days after final inspection.

1.07 WARRANTIES AND BONDS:

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in 3-ring binder with durable cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 14 business days after acceptance, listing date of acceptance as start of warranty period.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01711

SITE MAINTENANCE

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Construction Facilities and Temporary Controls: Section 01510.
B. Dust Control: Section 01562.
C. Clearing and Grubbing: Section 02102.

1.02 DESCRIPTION:

A. Maintain project area free from accumulations of waste, debris, and rubbish caused by operations.
B. Provide a dumpster with call service for disposal.

1.03 SAFETY REQUIREMENTS:

A. Maintain project in accordance with the Manual of Accident Prevention in Construction-AGC and the National Occupational Safety and Health Act (OSHA).

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Dumpsters for general trash as specified in Section 01510, Construction Facilities and Temporary Controls.
B. Containers for hazardous waste as specified in Section 01510, Construction Facilities and Temporary Controls

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION:

A. Execute cleaning to ensure that the site and adjacent areas are maintained free from waste, debris, and rubbish caused by operation.
B. Provide on-site dumpster with call service for disposal.
C. Wet down dry materials to control blowing dust.
D. Do not burn rubbish and waste materials on Sidney landfill site. Burning of trees and brush may be permitted under certain conditions. See Section 02102, Clearing and Grubbing.
E. Sweep paved roads affected by excavation and hauling on a daily basis.

3.02 FINAL CLEANING:

A. In preparation for substantial completion, conduct final inspection of the site with Engineer. Remove all waste, debris, and trash, leaving the site orderly as approved by the Engineer.

END OF SECTION

SECTION 01712

DEMOBILIZATION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Special Project Procedures: Section 01125.

B. Construction Facilities and Temporary Controls: Section 01510.

C. Seeding: Section 02931.

1.02 DESCRIPTION:

A. Work activities will include the following:

1. Removal of all Contractor equipment and materials from the Sidney Landfill site.
2. Removal and disposal or return of temporary facilities specified in Section 01510, Construction Facilities and Temporary Controls.
3. Disconnection and removal of temporary utilities.
4. Removal and disposal of trash from all sites.
5. Regrading, seeding, repaving, and restoring other disturbed areas.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 RETENTION ON SITE:

A. In general, all small tools and materials for which decontamination is difficult or uncertain shall remain on site until completion of the work for subsequent packaging and disposal by the Contractor at a secure landfill approved by the Engineer. Examples of such equipment or materials are wire, rope, lumber, sorbent pads, personnel protective equipment and apparel, etc.

B. On-site storage of contaminated materials shall be in drums, plastic bags, or otherwise contained and covered to prevent contaminating uncontaminated areas.

3.02 FINAL APPROVAL:

A. Prior to removal from site, all contaminated equipment and materials shall be inspected and approved for removal by the Engineer.

3.03 UTILITIES:

A. All lighting and electrical equipment required for the field office trailer shall be disconnected at the source.

B. All heating equipment and accessories for the field office trailers shall be disconnected and removed.

3.04 STAGING, LOADING, AND WASTE BULKING AREAS:

A. All staging, loading, and waste bulking areas shall have sediments, liquids, and absorbents removed for subsequent disposal prior to site closeout.

3.05 FINAL SITE WORK:

A. Final work items to be completed are regrading of the disturbed areas of the site, application of topsoil and reseeding with grass in accordance with Section 02931, Seeding.

END OF SECTION

SECTION 01721

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

A. Special Project Procedures: Section 01125.
B. Contractor Quality Control: Section 01440.
C. Project Closeout: Section 01700.

1.02 DESCRIPTION:

A. Keep accurate record documents for all additions, substitution of material, variations in work, and any other revisions to the Contract Documents.
B. Final survey of project site.

1.03 MAINTENANCE OF RECORD DOCUMENTS:

A. Maintain at job site, one copy of:
   1. Drawings showing progress of work.
   2. Specifications.
   3. Addenda.
   4. Reviewed Submittals.
   5. Change Orders.
   6. Other Modifications to Contract.
   7. Progress payment quantity field notes and records.
   8. Manifest documents.
   9. Health and Safety Plan.
   10. Contractor Quality Control Plan.
   11. Deficiency Reports.
   12. Contractor's daily reports, including:
      a. Records of all site work.
      b. Inspection records.
      c. Reports on any emergency response actions.
   13. Sampling documentation.
   14. All laboratory data packages including field test results.
   15. All survey data required for measurement and payment.
   16. Project photographs.
   17. Soil and pavement material and field test results.
   18. Contractor Quality Control Project Summary compiled upon project completion.
   19. As-Built Drawings: Legibly mark each item to record actual construction including:
      1. As-built final grade contour information.
      2. Measured horizontal and vertical locations of wells, foundations, underground utilities, culverts and ditches, referenced to permanent surface improvements.
      3. Field changes of dimension and detail.

4. Details not on original Contract drawings.
5. Additional equipment installed.

B. Provide files and racks for storage of documents. Documents shall be stored in a dry, safe place apart from construction documents, and be available for inspection by the Engineer.

C. The record documents shall not be used for construction purposes.

1.04 FINAL SURVEY:

A. The Contractor shall provide a topographic survey of the site at the completion of field operations. The survey shall be performed by a Land Surveyor registered in the State of New York. The survey shall consist of both aerial photographic survey and ground control survey and shall include the following:

1. Photogrammetrically-interpreted planimetric base map (covering approximately 35-acres) of the Sidney Landfill site at a scale of one inch equals 50 feet (1"=50').
2. Topographic contours shall be provided at 2-foot intervals.
3. Establish appropriate horizontal and vertical control at the site (i.e., locating existing/new benchmarks.
4. The map shall contain all roadways, ditches, culverts, surface water, and other pertinent features.
5. Provide Engineer with computer disk files of digital mapping data compatible with AutoCAD Release 14 computer software on 3.5-inch, high density, 1.44 megabyte computer disks.

B. Technical Requirements of Survey:

1. Horizontal ground control shall originate and terminate on existing U.S. Coastal and Geodetic Survey (USC&GS) triangulation stations or equivalent, in order to place the project on the New York State Plane Coordinate System. Vertical control shall be tied to the 1929 North American Datum.
2. Map Accuracy - Ninety percent of the elevations determined from the solid-line contours for the topographic maps shall have an accuracy with respect to true elevation of 0.5 contour interval (0.5 foot) or better, and the remaining 10 percent of such elevations shall not be in error by more than one contour interval (1 foot). This accuracy shall apply only to the contours which are on each map. Thus, in each particular area where the intermediate contours have had to be omitted due to the steepness of the ground slopes and only the index contours are not omitted, the accuracies are applicable to the contour interval specified for the topographic maps. In densely wooded areas where the heavy brush or tree cover fully obscures the ground and contours are shown on dashed line, contours shall be plotted as accurately as possible from the stereoscopic model, while making full use of all spot elevations measured photogrammetrically in places where the ground is visible. If necessary, surveyor shall verify elevations in the field.
3. Coordinate Grid Lines - The plotted position of each plane-coordinated grid line shall not vary by more than one one-hundredth inch (0.01") on each map manuscript.
5. Establish a permanent project benchmark for vertical control.
6. Horizontal Control – Each horizontal control point shall be plotted on the map manuscript within the coordinate grid in which it should lie to an accuracy of one one-hundredth in (0.01") of its true position as expressed by the plane coordinates computed for this point.

7. Planimetric Features - Ninety percent of all planimetric features which are well defined on the photographs shall be plotted so that their position on the finished maps shall be accurate to within at least one-fortieth inch (0.025") of their true coordinate position. The true coordinate position shall be determined by making accurate measurements originating and closing on station markers of the project basic control survey, which shall have a closure accuracy conforming with the requirements for the basic control.
8. Spot Elevations - Ninety percent of all spot elevations placed on the maps shall have an accuracy of at least one-fourth (1/4) the contour interval (0.25'), and the remaining 10 percent shall not be in error by more than one-half (1/2) the contour interval (0.5').
9. Accuracy - Accuracies and accuracy tests apply to the stereo compilation scale of the original manuscript (i.e., if the manuscript is compiled at a scale of 1" = 100' and then reduced to 1"=200', then the accuracies will apply to the original 1"=100' scale). This is also true if the manuscript is enlarged to 1"-50' or some larger scale.
10. Map Check by Test Profile - The surveyor shall field test the topography for accuracy by the test profile method. The test profile method measures a profile on the ground along a traverse staked anywhere within the mapped area and compares the profile elevations so obtained with the profile elevations determined from the map. The length of a single test traverse and profile shall be not less than 5 inches long at map scale, and shall contain no less than 10 contour crossings. In the event a comparison of the profile measured on the ground and the profile measured from the map indicates the map does not meet the accuracy specified, the surveyor will be required to revise the rejected map to the specified accuracy at his own expense within 15 days after notification or corrections, and additions shall be made to assure that the entire area of the sheet, as well as the locally tested traverses, spots, or areas will comply with the specified accuracies.

1.05 PROJECT PHOTOGRAPHS

A. The Contractor shall provide professional quality color prints and slides for every photograph taken during the project.

B. Areas and Activities – The following work tasks and areas are to be photographed:
   1. Staging areas and activities.
   2. Sampling techniques.
   3. Erosion and sediment control measures.
   4. Stormwater conveyance measures (ditches, culverts, level spreaders).
   5. Waste excavation and re-consolidation.
   6. Landfill cover construction during each layer placement.
   7. Monitoring well installation.
   8. Completion of work.

C. Progress – Photograph from various locations to illustrate condition of work and state of progress. As a minimum, photographs shall be taken twice a month with a minimum of 24 photographs taken each time the photographer is at the site.

D. Successive views – At successive periods of photography, take at least one photograph from the same overall view used previously.

E. Furnish three (3) prints and one set of slides of each photograph to the Engineer as soon as

they are available from the photographer along with the negatives for each photograph.

F. Provide high quality 5-inch by 7-inch standard weight prints with glossy finish. Prints and slides will be placed in plastic photo archive sheets and 3-ring binders with descriptive cataloging.

G. Place the following information on the back of each print:
   1. Title of project;
   2. Date photograph was taken;
   3. Descriptive view depicted in photograph; and
   4. Photographer's numbered identification of exposure.

1.06 SUBMITTALS:

A. At completion of field operations, the Contractor shall deliver 2 sets of record documents to the Engineer.

B. Accompany submittal with transmittal letter containing:
   1. Date.
   2. Project title and number.
   3. Contractor's name and address.
   4. Title and number of each record.
   5. Certification that each document as submitted is complete and accurate.
   6. Signature of Contractor, or his authorized representative.

C. Documents must be submitted to the Engineer at project completion as a condition of final payment.

1.07 RECORDING:

A. Clearly label each document "PROJECT RECORD".

B. Keep record documents current.

C. Specifications and Addenda shall be legibly marked up to record changes made by change or field orders, or other matters not originally specified.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION

DIVISION 2

SITE WORK

SECTION 02015

SUBSURFACE INFORMATION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Section 01040: Project Coordination
B. Section 02160: Existing Utilities and Underground Structures
C. Section 02221: Excavation, Backfill and Compaction
D. Section 02611: Pipe and Fittings
E. Section 02670: Groundwater Monitoring Wells

1.02 DESCRIPTION:

A. Subsurface explorations, including soil borings, test pits, and geophysics, have been conducted at Sidney Landfill to determine subsurface geology and hydrogeology and determine the lateral and vertical limits of the landfilled waste. Locations and results of all soil explorations and analytical results are included in the "Draft Final Remedial Investigation Report" for Sidney Landfill, July 1995 (Malcolm-Pirnie, 1995), the "Draft Pre-design Investigation Report" for Sidney Landfill, December 1997 (ABB Environmental Services, 1997), and the "Draft Blasted-Bedrock Trech Pilot Test Report", for Sidney Landfill, July, 1998 (HLA, 1998). The native soil material across the site is described as glacial till: clayey silt, some gravel and trace sand.
B. Explorations indicate subsurface conditions at the investigation locations only, and are based on the information available and interpretations at the time explorations were made.
C. Explorations were not made for, nor intended to be used by the Contractor for purposes of determining or facilitating the constructability of the project or the cost thereof.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION

SECTION 02016

EXISTING UTILITIES AND UNDERGROUND STRUCTURES

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Project Coordination: Section 01040.

B. Excavation, Backfill and Compaction: Section 02221.

1.02 DESCRIPTION:

A. There are no known underground existing utilities located on the Sidney Landfill site. Electric and telephone service are present within the Richardson Hill right of way. No water or sewer service is available in Richardson Hill Road. It is the Contractor's responsibility to coordinate with the utility companies to extend services to the job site necessary to complete the work.

B. Excavation Permit(s): The Contractor shall determine the appropriate excavation permits required by local governing authorities and obtain such excavation permit(s) before commencing any excavation.

C. The Contractor shall coordinate with the Engineer prior to commencing excavation activities at the site.

D. The Contractor shall be responsible for verifying the existence of underground utilities prior to conducting excavation activities: DIG SAFE : 1-888-344-7233. The Contractor shall be responsible for all damage to existing utilities caused by his efforts. The Contractor shall be responsible for the restoration of the damaged existing utilities to their original status. Damage to existing utilities shall be repaired prior to commencement of regular Contract work. The cost resulting from damage to charted or located utilities shall be incidental to the contract. The cost resulting from damage to unchartered utilities will be paid by the terms stated in the contract.

E. Contact the Engineer as soon as any damage is uncovered.

F. The Engineer shall make the determination as to who will make the necessary repairs.

G. In areas where existing underground structures are shown or suspected, carefully uncover such structures to such extent as to enable the Engineer to determine what adjustments, if any, need to be made to accommodate the presence or removal of such structures.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION

SECTION 02021

DECONTAMINATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

A. Submittals: Section 01340
B. Construction Facilities and Temporary Controls: Section 01510
C. Handling and Disposal of Contaminated Material: Section 02990
D. General Requirements, Safety, Health, and Emergenct Response: Section 01620

1.02 DESCRIPTION:

A. Perform decontamination of equipment as specified in Part 3 - Execution. The Contractor shall be responsible for submission of a Decontamination Plan and shall supply required equipment and a potable water. Decontamination wash water shall be disposed of within the limits of the landfill that is to be covered.

1.03 SUBMITTALS:

A. The Contractor shall submit a Decontamination Plan in accordance with Section 01340, "Submittals."
B. The Decontamination Plan shall be submitted for approval prior to the start of work. The Decontamination Plan shall detail equipment (catalog cuts shall be provided) and procedures proposed for the decontamination of equipment. At a minimum, the Decontamination Plan shall include:
    1. Proposed water supply source and method.
    2. Analytical results of water supply chemical testing.
    3. Proposed pressure washing equipment and procedures.
    4. Proposed temporary decontamination pad construction details.
    5. Proposed decontamination procedures including:
        a.. Pressure washer flow rate.
        b. Minimum allowable decontamination time.
        c. Temperature of decontamination water.
        d. Criteria defining decontamination area and extent of decontamination to be achieved.
        e. Methods for collecting and containerizing wash water.
        f. Identification of proposed decontamination technicians.

1.04 CONTRACTOR RESPONSIBILITY:

A. The Contractor shall be responsible for provision and maintenance of the equipment required for decontamination. The Contractor shall decontaminate appropriate equipment after each use.
B. Water Supply: The Contractor shall furnish his own potable water supply for decontamination.
C. Decontamination procedures shall only be required until waste excavation, relocation, and consolidation is complete.

PART 2 - PRODUCTS

2.01 PRESSURE WASHER:

A. The Contractor shall provide potable pressure washer unit(s). The pressure unit(s) shall be capable of supplying low volume, high pressure steam for equipment decontamination. The pressure washer(s) shall be the property and responsibility of the Contractor.

2.02 HOSING AND FITTINGS:

A. The Contractors shall provide all necessary hosing and fittings necessary to connect the pressure washer (s) to the water supply source.

2.03 MISCELLANEOUS EQUIPMENT:

A. The Contractor shall be responsible for providing all scrub brushes or other equipment necessary to remove caked or hardened material. Disposal of all miscellaneous equipment shall be in accordance with Section 02990, "Handling and Disposal of Contaminated Material".

PART 3 - EXECUTION

3.01 GENERAL:

A. Decontamination consists of the proper cleaning of equipment and tools to prevent the spread of possible contamination from area to area on-site, or off-site. Decontaminate equipment and tools used during excavation, relocation, and consolidation of waste.

3.02 DECONTAMINATION OF EQUIPMENT:

A. Equipment will be decontaminated after excavation, relocation, and consolidation of waste is complete. Equipment decontamination shall consist of the following general procedures:
   1. Pressure cleaning (by steam cleaning),
   2. Scrubbing with brushes to remove remaining material on equipment, and
   3. High pressure rinsing with potable water.

3.03 DECONTAMINATION WASH WATER:

A. Remove decontamination water from the decon pad(s) using a vacuum truck or other method approved by the Engineer. Dispose of decontamination wash water and sediment within the limits of the landfill that is to be covered, in accordance with applicable Federal, State, and local regulations.

END OF SECTION

SECTION 02081

OFF-SITE TRANSPORTATION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Regulatory Requirements: Section 01060
B. Special Project Procedures: Section 01125
C. General Requirements, Safety, Health, and Emergency Response: Section 01620
D. Off-site Disposal: Section 02082
E. Handling and Disposal of Contaminated Material: Section 02990

1.02 DESCRIPTION:

A. Off-Site transportation requirements, specified herein, are for drums which may be encountered during excavation activities as well as drums of solid material generated during construction, which contain hazardous waste materials and shall require off-site disposal.
B. Mark, label, placard, and package all waste materials in addition to providing equipment, personnel and facilities necessary to handle/load and transport the waste materials.
C. Comply with all applicable regulatory requirements listed as well as other applicable Federal, State, or local laws, codes and ordinances which govern or regulate hazardous wastes.
D. Obtain all the required permits.
E. Contact the Engineer at least 3 days in advance of moving any hazardous materials on-site or off-site.
F. Insure that all vehicles entering and leaving the site comply with all safety requirements.
G. Prepare vehicles to prevent spillage or contamination.
H. Inspect vehicles before leaving the site.
I. Transport equipment and materials from the site to a Special Waste, Hazardous Waste, or other disposal facility permitted to accept the waste and approved by the Engineer.
J. Conduct all sampling and analysis required for transportation and disposal.
K. All contaminated materials, including solids and liquids, from the Sidney Landfill Site are to be manifested in conformance with 6 NYCRR Part 372.

1.03 SUBMITTALS:

A. Submit to the Engineer an Off-Site Transportation Plan: The plan shall include at a minimum:
   1. Types of vehicles proposed for transport.
   2. Hauling or transport schedule.
   3. Proposed route of travel for all vehicles going to or from the site.
   4. Proof that necessary permits have been obtained.
B. No transportation of hazardous materials shall take place until the Off-site Transportation Plan has been approved by the Engineer.

1.04 SITE ENTRY:

A. Require all transporters to follow the appropriate Health and Safety protocols established for the site.

B. Normal Operating Procedure:

1. Contact the Engineer and Contractor at least 24 hours in advance of first arrival on-site.
2. Enter site in the appropriate level of protection and proceed to area as designated by the Contractor.

1.05 VEHICLE REQUIREMENTS:

A. Waste Transportation:

1. The following category of waste may require loading and handling:
   a. Drums and containers with solids, semi-solids, or liquids.
2. Use vehicles licensed under the State of New York, other applicable states, and appropriate Federal regulations.

B. All vehicles will have identification numbers displayed as per USDOT Specification 49 CFR 172.336 a,b.

C. Transporter will provide placards or identification number as required.

D. Transporters of hazardous wastes off-site shall be in full conformance and have current permits in accordance with 40 CFR 263, 6 NYCRR Part 364 and Part 372, as well as other applicable laws including U.S. Department of Transportation requirements.

E. All trucks shall be washed and clean prior to arriving at the site.

1.06 SPILL CONTROL:

A. The Contractor is responsible for any and all actions necessary to remedy situations involving waste spilled in loading or transit.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 LOADING:

A. The driver shall comply with requirements of the Contractor's approved Health and Safety Plan and must have any protective equipment required by the Health and Safety Plan for on-site work.

3.02 HAULING:

A. Any waste classified as hazardous shall be transported in containers that are in conformance with Federal DOT regulations, and any other applicable regulations.

B. Implement a hauling or transport schedule that allows for removal of the waste from the site at a rate commensurate with the waste handling schedule.

C. Identify the route of travel for all vehicles going to or from the site to the final disposal area identified.

D. Normal Operating Procedure:

1. Coordinate with the Engineer for vehicle inspection and recording of quantities and types of wastes leaving the site.
2. Prior to leaving the site, transporter shall submit a copy of the completed manifest to the Engineer.

END OF SECTION

SECTION 02082

OFF-SITE DISPOSAL

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Regulatory Requirements: Section 01060
B. Special Project Procedures: Section 01125
C. Submittals: Section 01340
D. Project Record Documents: Section 01721
E. Off-site Transportation: Section 02081
F. Handling and Disposal of Contaminated Material: Section 02990

1.02 DESCRIPTION:

A. Provide for off-site disposal of hazardous wastes, solid wastes, and all other construction-generated debris.
   1. It is anticipated that no wastes encountered onsite will require off-site disposal. In the event waste will require off-site disposal, as determined by the Engineer, payment shall be through a Change Order from costs negotiated between the Contractor and Engineer. No additional payment shall be provided for disposal of construction-generated debris.
   2. Record volumes and character of materials disposed.
   3. Identify the location of truck scales that will be used. Ensure that measuring devices used are certified by the appropriate state inspection agency.
   4. Provide for metal debris to be recycled for scrap (destruction by smelting).

1.03 REFERENCES:

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

CODE OF FEDERAL REGULATIONS (CFR) CITATIONS

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 261	Identification and Listing of Hazardous Wastes
40 CFR 262	Generator Standards
40 CFR 263	Transporter Standards
40 CFR 264	TSDF Standards
40 CFR 268	RCRA Land Disposal Restrictions

40 CFR 270	Hazardous Waste Permit Program
49 CFR 171	General Information
49 CFR 172	Hazardous Materials
49 CFR 173	General Shipping Requirements
49 CFR 177	Transporter Requirements
49 CFR 178-79	Container Specifications
29 CFR 1910.1200	Hazard Communication Standard
29 CFR 1926	Construction Standards

NEW YORK CODES, RULES, AND REGULATIONS

Title 6 Part 360	Solid Waste Management Facilities
Title 6 Part 373	Hazardous Waste Management Facilities

1.04 SUBMITTALS:

A. Include as part of the Work Plan an Off-Site Disposal Plan to be approved by the Owner's Representative: The plan shall include at a minimum:

1. Proposed disposal facility for each category of waste, including ownership, location, treatment methods, disposal methods, and storage methods, and USEPA identification code, and if applicable, State identification code.
2. Materials to be disposed at each proposed facility.
3. Materials to be salvaged or recycled and the method and destination or use of salvaged or recycled materials.

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.01 COORDINATION:

A. Prior to the commencement of work, acceptability of the proposed off-site disposal facilities will be required by the Owner's Representative.

3.02 MANIFEST RECORDS:

A. Originate, maintain, and provide Transporter with copies of waste shipment manifests and/or bills of lading records for all wastes; verify wastes and quantities of each load shipped.

B. The manifest forms and records shall be consistent with the State of New York, USEPA and U.S. Department of Transportation requirements.

C. The Owner's Representative will sign the hazardous waste manifest. The Owner's Representative will review the manifest for completeness and accuracy prior to final release.

D. The Owner's Representative will supply the generator number for the site.

3.03 DISPOSAL FACILITY:

A. For off-site disposal of wastes which are not disposed onsite under a landfill cover.

B. The Contractor shall be responsible for ensuring:

1. Selection and acceptance of the specified waste at an approved treatment or disposal facility.
2. That the facility is properly permitted to accept the stated waste.
3. That the facility provides the stated disposal services.
4. That the disposal facility is in compliance with its permit(s) at the time of waste disposal.

C. Disposal of Solid Wastes - Handling and disposal of solid waste material shall be in strict accordance with 6 NYCRR Part 360.

D. Disposal of Hazardous Wastes - Handling and disposal of hazardous waste material, including sampling and testing, shall be in strict accordance with 40 CFR 160 and 268 and 6 NYCRR Part 373.

E. Construction-Generated Debris - Contaminated scrap, debris, bags, containers, disposable equipment, and contaminated clothing shall be transported and disposed of in accordance with Federal and state requirements. All hazardous materials that are to be removed as part of this Contract shall be disposed of at an EPA-approved TSDF and must follow all applicable Federal, state, and local regulations for transport and disposal. The Contractor shall be responsible for all aspects of the disposal. The Contractor shall prepare all required manifests and disposal documents for the transportation and disposal of hazardous items produced as part of this Contract. These manifests and documents shall be submitted to the Owner's Representative for Generator's signature. The Owner's Representative must be notified by the Contractor two days prior to the shipping of any waste hazardous material from the project site.

F. The Contractor shall conduct all sampling and analysis for profiling of wastes required by the disposal facility.

3.04 RECORDKEEPING:

A. Provide a final report to the Owner's Representative with written documentation and records verifying receipt and the quantity received of each load at each disposal facility and verification of proper disposal within 5 days of disposal. Copies of the manifest and actual disposal receipt shall be provided to the Owner's Representative.

B. Provide evidence for recycling of scrap metal by smelting (destruction).

END OF SECTION

SECTION 02102

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Excavation, Backfill, and Compaction: Section 02221.

B. Erosion Control: Section 02271.

1.02 DESCRIPTION:

A. Work Included:

1. Clearing and grubbing work, when applicable, includes but is not limited to, removal of trees, brush, stumps, wooded growth, grass, shrubs, poles, posts, signs, fences, culverts, and minor structures.
2. Protection of designated wooded growth.
3. Protection of existing gas probes and monitoring wells which are to remain.
4. Storage and protection of minor structures and materials which are to be replaced.
5. Disposal of nonsalvageable structures and materials at an approved off-site disposal facility, and necessary preliminary grading.
6. Disposal of trees, brush and shrubs by chipping and spreading onsite or removal to an approved off-site disposal facility.

B. Limits of Work:

1. Perform clearing work within the areas required for construction or as shown on the Drawings. Grubbing of stumps or roots smaller than 2 inches within the limits of landfill areas will not be required.

C. Work Not Included: Clearing and/or grubbing work performed for the convenience of the Contractor will not be considered for payment.

1.03 QUALITY CONTROL:

A. Requirements of Regulatory Agencies: Dispose of trees, shrubs, and brush by burning will not be permitted.

B. Remove and dispose of nonsalvageable structures and material in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 PREPARATION:

A. Protect existing trees and other vegetation indicated or directed by the Engineer to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising

of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line.

B. Roads, Adjacent Property and Other Works to Remain: Protect throughout the work by fences, barricades, and exercise special care to avoid unnecessary damage.

3.02 PERFORMANCE:

A. Clearing:
   1. Limits of clearing shall be all areas within contract limit lines, and as directed by the Engineer.
   2. Remove trees, shrubs, grass, weeds and other vegetation, improvements, or obstructions that interfere with installation of new construction.
   3. Remove such items elsewhere on the site or premises as specifically indicated.
   4. Removal includes new and old stumps of trees and their roots.
   5. Remove root systems to avoid regrowth and maintenance problems except in areas where erosion is likely.

B. Grubbing:
   1. Limits of grubbing: Coincide with the limits of clearing in access road areas and where shown on the Drawings.
   2. Remove all stumps, roots over 2 inches in diameter, and matted roots within the limits of grubbing to the depths below:
      a. Roads: All.
      b. Fills: 12 inches.
      c. Pipelines and treatment plant site: All
      d. Wells: All
   3. Stumps and roots are not to be chipped.

C. Topsoil Removal:
   1. Definition of Topsoil:
      a. Friable clay loam surface soil found in a depth of not less than 4 inches.
      b. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
   2. Strip topsoil to whatever depths encountered, avoiding its intermingling with the underlying subsoil or other objectionable material.
   3. Remove heavy growths of grass from areas before stripping.
   4. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance from such trees to prevent damage to the main root system.
   5. Stockpiling:
      a. In storage piles in areas on-site as directed.
      b. Construct to freely drain surface water.
      c. Cover if required to prevent wind-blown dust.

D. Salvage of Timber:
   1. Chip all trees, brush, and branches.
   2. Where chips are not to be salvaged, distribute in a thin layer over the ground within the limits of the landfill cap, use on-site as approved by the Engineer, or remove and dispose of them off-site.

E. Disposal:
   1. Burning of trees, shrubs, and brush will not be permitted.

2. Dumping: Dispose of material as directed by the Engineer within the limits of the landfill. Dispose of the cleared and grubbed materials by spreading in layers less than 3 inches in depth.
3. Chipping:
   a. Reduce to dimensions of less than 2 inches by the use of an approved chipping machine.
   b. Chipped material generated as part of clearing operations for the project is to be spread in a thin layer over areas to be capped by the Contractor.

3.03 RESTORATION:

A. Restore any items damaged by this work to their original condition, as acceptable to the Engineer.

B. Repair or replace trees and vegetation damaged by construction operations in a manner acceptable to the Engineer.

END OF SECTION

SECTION 02221

EXCAVATION, BACKFILL, AND COMPACTION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Existing Utilities and Underground Structures: Section 02016.
B. Clearing and Grubbing: Section 02102.
C. Erosion Control: Section 02271.
D. Geotextiles: Section 02272.
E. HDPE Geomembrane: Section 02776.
F. Chain Link Fences and Gates - Steel: Section 02832.
G. Handling and Disposal of Contaminated Material: Section 02990.

1.02 DESCRIPTION OF WORK:

A. This work pertains to the excavation, backfill, and compaction of soils at Sidney Landfill site.
B. Work Included:
   1. Trench excavation in earth.
   2. Earthwork for site work.
   3. Regrading of landfills.
   4. Borrow pit excavations.
   5. Finish grading for access roads.
   6. Gas venting and common borrow layers construction.
   7. Barrier soil and vegetative layers construction.
   8. Compaction of backfill materials.
   9. Backfill for culverts.
   10. Grading of borrow pit areas.
   11. Soil materials testing.
   12. Borrow study requirement plan preparation for borrow source(s).
   13. Installation and monitoring of settlement platforms.
   14. Topographic survey of existing cell conditions and final common borrow subgrade layers.
   15. Attendance at soils construction conference prior to borrow or landfill site soils construction activity.

1.03 REFERENCES:

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the test by the basic designation only.
B. For all test methods specified, the most recent revision shall apply if different from that listed.
C. American Society for Testing and Materials (ASTM):
   1. ASTM C 117-95, Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing.

2. ASTM C 136-95a, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
3. ASTM D 1557-91, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft^3) (2,700 kN-m/m^3).
4. ASTM D-1556-90, Test for Density of Soil in Place By the Sand Cone Method.
5. ASTM D-2922-91, Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D-3017-88, Test Method for Moisture Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
7. ASTM D-2434-68 (R1994), Test Method for Permeability of Granular Soils (Constant Head).

D. New York State Department of Transportation (NYSDOT), Standard Specifications, Construction and Materials.

E. Corps of Engineers (COE) Engineering Manual:
1. EM 1110-2-1906, Appendix VII, Hydraulic Conductivity Tests.

1.04 QUALITY CONTROL:

A. Codes and Standards:
1. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Contractor Provided Soil Testing Service:
1. The Contractor shall provide an independent third-party soil testing service for quality control during source testing. The testing service company shall be approved by the Engineer. The testing service company must demonstrate geotechnical testing experience and shall have sufficient facilities to perform the required quantity of tests at a rate commensurate with the proposed work schedule. The testing service company shall provide access to the Engineer for observation of the facilities and methods used in the geotechnical testing. Source testing is described in Part 2 of this Section.

C. Contractor Provided Registered Land Surveyor:
1. Before starting any work, the Contractor shall verify existing elevations and report findings to the Engineer for both landfill and proposed borrow source areas at two foot contour intervals.
2. Surveys for elevation and location of the work shall be performed and sealed by a Land Surveyor registered in the State of New York who is approved by the Engineer.
3. Borrow source areas will be sectioned at 50 foot intervals prior to and at the completion of mining activities for as-built documentation. Payment estimate verification will be provided through contractor daily documented load counts or survey sectioning. Final payment will be based on reconciliation of the before and after sections by the Land Surveyor and approved by the Engineer.

1.05 QUALITY ASSURANCE:

A. Engineer - Provided Soil Testing Service:

1. The Engineer will provide independent third-party testing service for quality assurance testing of source material and to measure compaction and permeability of materials placed. Compaction testing is described in Part 3 of this Section.
2. The Contractor shall provide assistance to the testing service to include sampling of soil materials and provide split samples, when requested by the Engineer.

1.06 SUBMITTALS:

A. The Contractor shall submit the following items:
   1. Prior to removal of material from borrow source(s):
      a. Borrow study testing results as specified in Article 2.03.
      b. A source quality control tracking plan specified in Article 2.04.
      c. Documentation of mining and/or other borrow site permits for off-site sources as required by regulatory agencies having jurisdiction.
      d. Estimated available and required volume of specified soil.
   2. During earthwork operations:
      a. Daily logs - 2 copies of the daily logs kept by the Contractor and described in the Article entitled Field Quality Control in Part 3 of this Section. Completed daily logs shall be submitted on a daily basis.
   3. Prior to transporting off-site soil to site:
      a. Method of tracking off-site soil.
      b. Method shall document the transportation, stockpiling and identify location of placement of soil within the landfill cap structure by the Contractor on a daily basis.

1.07 ENGINEER APPROVAL:

A. The Engineer will assess the test results submitted by the Contractor for conformance with materials requirements given in this Section. Earthwork operations involving the use of materials from a particular borrow source will not be allowed until the Contractor receives written notification by the Engineer indicating that the source has been accepted for use.
B. No soil or waste materials may be taken off-site without prior approval by the Engineer.

1.08 JOB CONDITIONS:

A. Existing Utilities:
   1. Should uncharted piping or other utilities be encountered during excavation, consult the Engineer immediately for directions.
B. Protection of Persons and Property:
   1. Barricade open excavations occurring as part of this work and post with warning lights.
   2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

PART 2 - PRODUCTS

2.01 DEFINITIONS:

A. Cohesionless Soil Materials: Gravels, sand-gravel mixtures, sands, and gravely-sands.

B. Cohesive Soil Materials: Clayey and silty gravels, and sand-clay mixtures, gravel-silt mixtures, clayey and silty sands, sand-silt mixtures, clays, and silts.

C. Unsatisfactory Soil Materials: Peat, highly organic soils, frozen soils, and soils which when left in place are too wet or dry to compact.

D. Suitable Excavated Material: Materials which meet the requirements of Common Borrow.

2.02 SOIL MATERIALS:

A. Common Borrow:

1. Soil suitable for subgrade construction, maximum 4-inch stone size.
2. Free of frozen material, perishable rubbish, peat and other unsuitable material.
3. Moisture Content: Sufficient to provide the required compaction and stable embankment and in no case shall the moisture content exceed 4 percent above optimum.

B. Gas Venting Sand:

1. Gas venting sand shall be non-angular, well-graded sand or gravel free from vegetative matter, lumps or balls of clay and other deleterious substances.
2. Gas venting sand shall provide a minimum compacted permeability of $1x10^{-3}$ cm/sec for the density range(s) determined from testing described in Section 2.03.
3. Meet the following gradation requirements:

Sieve Designation	Percent Passing by Weight
3/8 in.	100
No. 4	35-100
No. 10	20-100
No. 40	0-40
No. 200	0-10

4. Meet the interface frictional requirements, as described in Section 02776 - HDPE Geomembrane.

C. Barrier Protection Soil:

1. Barrier protection soil shall be non-angular, well-graded, free from vegetative matter, lumps or balls of clay, and other deleterious substances.
2. Meet the following gradation requirements:

Sieve Designation	Percent Passing by Weight
3/8 in.	100
No. 10	40-100
No. 50	15-50
No. 200	0-20

3. Meet the interface frictional requirements, as described in Section 02776 - HDPE Geomembrane.

D. Vegetative Soil:

1. Segregate approved material removed within the confines of the project into piles, clean sufficiently and re-use if meeting the requirements of this Section.
2. Good quality friable soil free of stones over 2 inches with a minimum 35% and a maximum of 85% passing the No. 200 sieve.
3. NYSDOT specification 713-01. Reasonably free from subsoil, clay lumps, stones, brush, objectionable stumps, roots, litter, toxic substances, and other material or substances which may be harmful to plant growth or be a hindrance to grading, planting and maintenance operations.

4. The pH of the material shall be between 5.5 and 7.6.
5. The organic content shall be not less than 2 percent nor more than 20 percent.
6. Meet the following gradation:

Sieve Designation	Percent Passing by Weight
2 in.	100
1 in.	85-100
1/4 in.	65-100
No. 200	35-85

E. Aggregate Subbase:
1. Aggregate for site access road improvements.
2. Sand and gravel free from vegetative matter, lumps or balls of clay and other deleterious substances.
3. NYSDOT Specification 304-2.02 Type 2, meeting the following gradation requirements:

Sieve Designation	Percent Passing by Weight
2 in.	100
1/4 in.	25-60
No. 40	5-40
No. 200	0-10

F. Filter Stone:
1. Stone for perimeter drain pipes, gas venting system and pipe bedding.
2. Coarse aggregate consisting of NYSDOT Specification 605-2.02 underdrain filter Type 1 except stone shall be rounded with the following gradation:

Sieve Designation	Percent Passing by Weight
1 in.	100
1/2 in.	30-100
1/4 in.	0-30
No. 10	0-10
No. 20	0-5

2.03 BORROW STUDY:
A. A borrow study shall be conducted on all soil materials proposed for construction.
B. Contractor shall provide the following information with respect to the use of borrow sources:
1. Estimated volume of material per source.
2. Test pit logs.
3. Plans, maps identifying locations of test pits and aerial extent of borrow source.
4. Interpretation of testing data.
C. The testing requirements for soils obtained from off-site sources are listed in Table 02221-1 below.

TABLE 02221-1

OFF-SITE BORROW STUDY
TESTING REQUIREMENTS

SOIL MATERIAL	MINIMUM TESTING FREQUENCY		
	GRADATION (ASTM C-117, C-136)	MOISTURE DENSITY (ASTM D-1557)	PERMEABILITY (EM 1110-2-1906 App. VII or ASTM D-2434)
Vegetative Soil	1/2,000 cy	NR	NR
Common Borrow	1/5,000 cy	1/10,000 cy	NR
Gas Venting Sand	1/5,000 cy	1/5,000 cy	1/3,000 cy [2]
Barrier Protection Soil	1/5,000 cy	1/10,000 cy	NR
Aggregate Subbase	3 tests/source	2 tests/source	NR
Filter Stone	3 tests/source	NR	NR

Notes:

NR = Not Required.

2 = Tests shall be conducted at a range in densities. At a minimum, include tests at 85, 90 and 95 percent of maximum dry density developed from Proctor curve to determine the range in densities and moisture content that produce the specified permeability.

D. Vegetative Soil:

1. Following are additional requirements for the vegetative soil.
   a. Classify the material according to the Unified Soil Classification System.
   b. Forward representative sampling of the vegetative soil to the local Soil Conservation Service or equivalent testing facility for nutrient analyses. The nutrient analyses will report at a minimum the water pH, soil buffer pH, and biologically available P, Mg, Ca, and K. Submit testing results to the Engineer. Based on the nutrient testing results and recommendations by the testing facility, add soil amendments and conditioners, as required for sustained grass growth. Amendments and conditioners shall be approved by the Engineer. Perform nutrient analyses at a minimum testing frequency of 1 per borrow source.

2.04 SOURCE QUALITY CONTROL:

A. Conduct periodic testing of borrow source soil proposed for use. Sampling and testing shall be performed by the Contractor and at the frequencies listed in Table 02221-2.

B. Prepare source quality control plans for all soil materials to be used for backfill and submit for approval. These plans shall specifically address:
   1. Tests proposed for each sample;
   2. Estimated length of time between sampling and submittal of written test results;
   3. Description of the method used to track borrow volumes represented by each sample from excavation through processing, transportation, and placement, and;
   4. Proposed schedule for testing, excavation, and placement of borrow.

C. Prepare and maintain a tracking plan for supplied materials. The plan will address:
   1. The source location and characteristics of borrow material on a daily basis.
   2. The daily volume of borrow material.

3. The placement location on a daily basis. Location will be referenced to a 100 foot grid and baseline and to lift elevations.
4. The above information will be tabulated on a tracking chart and will be accompanied by a plan showing daily placement location.

D. Collect samples at the soil borrow source(s) for determination of the parameters listed in Table 02221-2 and demonstration of specification compliance by the Contractor's testing service.

TABLE 02221-2

CONSTRUCTION-PHASE SOURCE
QUALITY CONTROL TESTING

	MINIMUM TESTING FREQUENCY		
SOIL MATERIAL	GRADATION (ASTM C-117, C-136)	MOISTURE DENSITY (ASTM D-1557)	PERMEABILITY (EM 1110-2-1906 App. VII or ASTM D-2434)
Vegetative Soil	1/2,000 cy	NR	NR
Common Borrow	1/5,000 cy	1/10,000 cy	NR
Gas Venting Sand	1/1,000 cy	1/10,000 cy [1]	1/10,000 cy [1]
Barrier Protection Soil	1/5,000 cy	1/10,000 cy or 2 per change in gradation	NR
Aggregate Subbase	1/300 cy		NR
Filter Stone	NR		NR

Note: NR = Not Required.
1. Should change in gradation occur, minimum of 3 tests per change in gradation plus 1 test per 10,000 cy

PART 3 - EXECUTION

3.01 PREPARATION:

A. Examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work.

B. Prior to beginning of excavation, grading, and embankment operations, perform all necessary grubbing. Grubbing will not be required within the landfill limits.

C. Existing wells that are to remain shall not be disturbed unless they require further extension above the new subgrade and cover by the Contractor. The Engineer shall specify which structures are to remain. Any existing wells or other structures which are to remain that are disturbed by the Contractor shall be replaced by the Contractor at the Contractor's expense.

D. Prior to placement of gas venting layer, install gas stone columns through the subgrade and into the waste material as shown on the drawings.

E. Topographical surveys will be provided by the Contractor's Land Surveyor for the existing landfill conditions at two foot intervals. Final common borrow subgrade elevations will be verified after grading by topographical survey.

F. The contractor shall place settlement platforms upon the landfill subgrade (prior to placement of common borrow or relocation of waste) as depicted in the design and provide for initial and follow-on survey point capture to track and verify settlement activity during

common borrow placement. Written approval will be provided by the Engineer relative to settlement stabilization evaluation prior to removal of platforms and composite cap layer construction.

3.02 EXCAVATION:

A. Classifications:

1. Earth Excavation: Removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.
2. Rock Excavation:
   a. Removal and disposal of materials encountered that cannot be excavated without continuous and systematic drilling and blasting or continuous use of a ripper or other special equipment except such materials that are classed as earth excavation.
   b. Typical Materials: Boulders 3 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.
   c. Intermittent drilling performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
3. Unauthorized Excavation:
   a. Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer.
   b. Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Engineer.

B. Stability of Excavations:

1. The Contractor is responsible for maintaining safe excavation sideslopes.
2. Slope sides of excavations to comply with local codes and ordinances having jurisdiction.
3. Sheet, shore, and brace where sloping is not possible either because of space restrictions or stability of material excavated.
4. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

C. Material Storage:

1. Stockpile satisfactory excavated materials where directed, until required for backfill or fill.
2. Place, grade, and shape stockpiles for proper drainage.

D. Relocation of Unsatisfactory Soil Materials:

1. No relocation of unsatisfactory materials are anticipated, as part of the work.
2. Excavate unsatisfactory soil materials encountered that extend below required elevations, to additional depth directed by the Engineer.
3. Such additional excavation, provided it is not due to fault or neglect of Contractor, will be measured as directed by the Engineer and paid for under a change order with costs mutually acceptable by the Engineer and the Contractor.
4. Relocate unsatisfactory soil, as approved by the Engineer.

E. Excavation of Contaminated Soil and Debris:
   1. Excavation of contaminated soil and debris shall be performed in accordance with Section 02990.

F. Cold Weather Protection:
   1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.
   2. Do not place fill or backfill on frozen soil or use frozen material for backfill.

G. Settlement Platform Monitoring:
   1. Establish settlement platforms as shown on the Drawings.
   2. Establish a numbering system to identify each settlement platform and label each, as approved by the Engineer.
   3. Clearly identify the survey point on each settlement platform. The survey point may be either an "X" etched into the side or a notch cut from the top of the vertical black iron pipe, as approved by the Engineer.
   4. All measurements shall be taken with a minimum vertical accuracy of +/- 0.01 feet.
   5. The Contractor's Land Surveyor shall establish a baseline measurement on all settlement platforms prior to the addition of subgrade material within 25 feet of each settlement platform. The baseline survey shall include horizontal location to a minimum accuracy of +/- 0.5 feet.
   6. The Contractor's Land Surveyor shall survey each settlement platform weekly (at a minimum), starting on the first day materials are placed within 25 feet of the settlement platform.
   7. In the event the settlement platform is damaged, repair and reestablish a new baseline, as approved by the Engineer.
   8. Maintain records of survey results on-site, including plots of settlement versus time plots for each settlement platform. Records shall be updated and available within 5 working days of the survey date.
   9. The Contractor shall make a conscious effort to observed settlements at locations which are not being monitored by settlement platforms and report them to the Engineer.

3.03 BACKFILL AND FILL:

A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below:
   1. In excavations, use satisfactory excavated material or common borrow.
   2. Under grassed areas, use satisfactory excavated material or common borrow.
   3. For landfills, use common borrow meeting the requirements of this Section.

B. Backfill excavations as promptly as work permits, but not until completion of the following:
   1. Acceptance by the Engineer of construction below finish grade.
   2. Removal of sheeting, shoring and bracing, and backfilling of voids with satisfactory materials.
   3. Removal of trash and debris.

C. Ground Surface Preparation:
   1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills in

conformance with Section 02102, Clearing and Grubbing. Grubbing is not required within landfill limits.

D. Placement (all backfill material):
   1. Place backfill materials in lifts having a loose thickness such that when compacted, the lifts will have the following maximum thickness:
      a. Common Borrow: 12 inches
      b. Barrier Protection Soil: 12 inches
      c. Vegetative Soil Layer: 6 inches
      d. Aggregate Subbase: 6 inches
      e. Filter Stone: 12 inches
      f. Gas Venting Sand: 12 inches
   2. Before compaction, moisten or aerate each lift as necessary to provide the moisture content required to meet the specified compaction requirements.
   3. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   4. Place backfill and fill materials evenly adjacent to structures, to required elevations.
   5. Take care to prevent wedging action of backfill against structures.
   6. Place the material uniformly around the structure to approximately the same elevation in each lift.
   7. Prior to placement of backfill materials proof roll areas, as approved by the Engineer.
   8. Proof roll relocated waste materials, as approved by the Engineer.

E. Placement of Barrier Protection Soil Above Geomembrane:
   1. Placement of barrier protection soil shall proceed from a stable working area adjacent to the deployed geomembrane and gradually progress outward.
   2. Soil is never to be dropped from dump truck or front end loaders directly onto the geomembrane.
   3. The soil shall be pushed forward in an upward tumbling action so as not to impact directly on the geomembrane.
   4. Soil shall be placed by low ground pressure placement equipment (contact pressures less than 5 psi).
   5. Construction equipment including rubber tired vehicles such as automobiles and pickup trucks are not allowed to move directly on the deployed geomembrane.
   6. Barrier protection soil shall be deployed starting at the bottom of all slopes and proceed upward.

3.04 COMPACTION:

A. General:
   1. Control soil compaction during construction and provide minimum percentage of density specified for each area classification.
   2. Proof roll all areas, including relocated waste, as approved by the Engineer.

B. Density Requirements:
   1. Compact soils placed, to meet minimum required percent maximum dry density specified in the Article entitled Field Quality Assurance in Part 3 of this Section.
   2. If, in the opinion of the Engineer, based on testing and inspection, subgrade or fills are below specified density or thickness, provide additional compaction, and

undertake necessary corrective actions and testing at no additional expense to the Contract.

C. Moisture Requirements:

1. General:

a. Provide moisture control to the extent that the soil remains in a workable state during placement.

b. Where subgrade or layer of soil material must be moisture-conditioned by increasing the moisture content before compaction, uniformly apply water to surface of subgrade, or layer of soil material at such a rate as to avoid free water from appearing on surface during or subsequent to compaction operations.

c. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

d. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing, until moisture content is reduced to a satisfactory value, as determined by moisture-density relation tests.

3.05 GRADING:

A. General:

1. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas, and in conformance to the Drawings.

2. Smooth finish surface, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

3. Grade areas to drain and to prevent ponding.

4. Elevations shall be within ±0.10 feet.

3.06 FIELD QUALITY CONTROL:

A. Material Thickness:

1. The Contractor shall maintain daily logs of measurements of soil lifts, soil characteristics, and other observations. Installation of a layer measured at 90 percent or less of the required thickness will not be accepted. A running average of 100 percent of the required thickness shall be maintained. Thickness of common borrow, barrier protection soil, and vegetative material shall be checked at 100-foot grid intervals. Thickness of aggregate subbase material shall be checked at a minimum once per 100 linear feet of material placed.

3.07 FIELD QUALITY ASSURANCE:

A. General:

1. The Engineer will inspect, review test results, and approve subgrades before further construction work is performed thereon.

2. The Contractor shall cooperate with and assist with Field Quality Assurance in-place testing, and sampling for laboratory testing as described below.

B. Compaction:

1. The Engineer will evaluate compaction as in-place density using ASTM D-2922 (nuclear methods) or ASTM D 1556 (sand cone method) and according to the following schedule:

Material	Required Percent of Maximum Dry Density	Minimum Frequency
a. Common Borrow	Min. 90%	5 per acre per lift
b. Barrier Protection Soil	Min. 90%	5 per acre per lift
c. Aggregate Subbase		
Roadways	Min. 95%	1/200 L.F.
e. Gas Venting Sand	See 3.07.B.6	5 per acre per lift

2. Landfill subgrade fill shall be compacted with a heavy vibratory roller making a minimum of 4 passes per lift.
3. Vegetative soil shall be compacted with a bulldozer making a minimum of 4 passes per lift.
4. Testing locations will be selected at random by the Engineer.
5. Determine maximum dry densities and optimum moisture contents in accordance with ASTM D 1557-91 as specified in Section 2.03.
6. Gas venting sand shall be compacted to an in-place density that meets or exceeds the minimum permeability requirements. The compaction requirement will be established from the results of the borrow study. Compaction testing shall occur at a minimum frequency of 5 per acre lift.

D. Moisture:

1. The Engineer shall evaluate moisture content at all locations chosen for density testing and at other locations deemed appropriate by the Engineer.
2. Moisture content shall be measured by nuclear methods, ASTM D 3017-88.

E. Permeability:

1. The Contractor's Testing Service will measure the permeability of remolded samples taken from the gas venting layers. The Contractor shall cooperate and assist in accessing and obtaining samples.
2. Permeability testing shall be performed on the gas venting sand at a minimum frequency of 5 tests per acre per lift.
3. Remolded permeability of the gas venting layer shall be determined by the constant head or falling head method described in U.S. Army COE EM 1110-2-1906 (Appendix VII, Chapters 3 and 4) or ASTM D-2434.
4. The remolded permeability will be measured at densities representative of the in-place density (as determined by ASTM D-2922 or ASTM D-1556) for each location selected for testing.

5. Conformance Requirements.

b. Gas Venting Layer - For each acre the mean of the 5 required permeability tests must be equal or be greater than $1x10^{-3}$ cm/sec with no test less than $5x10^{-4}$ cm/sec.

F. Deficient Areas of Work:

1. If, in the opinion of the Engineer, based on reports of testing service and inspection, the subgrade or fills are below specified permeability, density or thickness, the Contractor shall undertake necessary corrective actions and conduct additional testing at his expense. The Engineer may retest a rejected area once prior to the Contractor undertaking additional corrective actions. If the Contractor chooses to rework an area which has been rejected for nonconformance with the density criteria a second time, and it fails testing once again, the Contractor shall excavate the rejected area and reconstruct it with new material. The Contractor may rework an area rejected for nonconformance with the specified thickness or grading requirements until it meets the specification, provided such work does not cause the area to deviate from the other requirements of conformance.

3.08 VEGETATIVE SOIL:

A. Deposit on prepared areas to obtain a reasonable uniform compacted depth as shown on the Drawings. Spread and till, raking out all pieces of sod, roots, and grass.

B. Compact into an even uniform layer by rolling to prepare for liming, fertilizing, and seeding.

3.09 MAINTENANCE:

A. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion, and keep free of trash and debris.

2. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas:

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

3.10 DISPOSAL OF WASTE MATERIALS:

A. Remove trash, debris, and waste materials, from property and legally dispose of it in a lawful and acceptable manner, at no additional cost to the Contract.

B. Do not dispose in designated flood plain or wetlands area.

C. No materials may be taken off-site without prior approval by the Engineer.

END OF SECTION

SECTION 02271

EROSION CONTROL

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Clearing and Grubbing: Section 02102
B. Excavation, Backfill, and Compaction: Section 02221
C. Geotextiles: Section 02272
D. Rip Rap: Section 02275
C. Seeding: Section 02931

1.02 DESCRIPTION:

A. Work Included: Provide and install all materials, equipment, and labor necessary for the removal of surface water and, as required, to place silt and erosion control structures as specified herein. At the completion of the remedial construction, provide all materials, equipment, and labor necessary for the removal, transport and disposal of silt and erosion control structures not specified to remain. Remove, transport, and dispose of sediment resulting from erosion control measures downgrade from disturbed areas in a manner consistent with overall intent of this specification and which does not result in additional erosion.

B Provide all required county or state erosion and sediment control plan approvals.

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.

D. Landfill Site:

1. Temporary Control:
   a. Furnish and place silt fence, stone check dams, and hay bales as temporary erosion and pollution control devices at locations as shown on the Drawings.
   b. Erosion control devices shall delineate the work exclusion zones for the site wetlands.
   c. Where exposed soil surfaces are to remain as such for a period of 30 days or more, the Contractor shall place temporary seed and mulch within 14 days of completion of earthwork activities.
2. Permanent control shall commence within 14 days of completion of grading activities as follows:
   a. Landfill: All vegetative cover soil surfaces shall be seeded and mulched.
   b. Ditches shall be topped with vegetative soil, seeded, and mulched with erosion control matting or lined with rip rap as shown on the Drawings.

1.03 SEDIMENT CONTROL GUIDELINES:

A. U.S. Environmental Protection Agency Publication 430/9-73-007 Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity.

B. U.S. Department of Agriculture Soil Conservation Service Publication dated July 1975, Standards and Specifications for Soil Erosion and Sediment Control in Developing Areas.

1.04 REVIEW AND/OR INSPECTION OF SEDIMENTATION CONTROL MEASURES:
All construction under this project shall be subject to review and/or inspection by the appropriate State and Federal agencies responsible for ensuring the adequacy of sedimentation control measures.

1.05 SUBMITTALS:
Submit in writing a plan for controlling erosion and siltation before beginning the construction work. Said plan shall also include the methods to be utilized for protecting and stabilizing steep slopes and channels which will be affected by the construction work. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Mulch:
1. Late cut, matured, and cured hay.
2. When air-dried in the loose state, the contents of a representative bale shall lose not more than 15 percent of the resulting air-dry weight of the bale.
3. Free from primary noxious weed seeds and rough or woody materials.

B. Matting for Erosion Control:
1. Jute Mat:
   a. Open weave, single jute yarn averaging 130 pounds per spindle of 14,400 yards.
   b. Yarn: Loosely twisted construction, not varying in thickness by more than 1/2 its normal diameter.
   c. Woven Material: 48 inches wide, plus or minus 1 inch, with approximately 78 warp ends per width of cloth and 41 weft ends per linear yard, weighing 1.22 pounds per linear yard with a tolerance of plus or minus 5 percent.
2. Excelsior Mat (Excelsior Erosion Control Blanket or equivalent):
   a. Wood excelsior, at least 35 inches in width, weighing 0.8 pounds per square yard, plus or minus 5 percent.
   b. Covered with a netting on one side to facilitate handling and to increase strength.
3. Other Types of Matting: Those accepted by the Engineer as equal in effectiveness to one of those specified above.

C. Staples: No. 11 (or heavier) plain iron wire, made from lengths of at least 12 inches.

D. Seed for Erosion Control:
1. Temporary Control: Annual or perennial rye grass or other temporary seed approved by the Delaware County Soil and Water Conservation District and by the Engineer.
2. Permanent Control: Refer to Section 02931, Seeding.

E. Hay Bales:
   1. Consist of rectangular-shaped bales of hay or straw weighing at least 40 pounds per bale.
   2. Free from primary noxious weed seeds and rough or woody materials.

F. Silt Fence: Envirofence as manufactured by Mirafi Inc. (or equal) with an equivalent opening size of 20, or approved equal.

G. Chipped Material: As approved by the Engineer. Refer to Section 02102, Clearing and Grubbing.

PART 3 - EXECUTION

3.01 PERFORMANCE:

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

D. Diverting Surface Water:
   1. Build, maintain, and operate all channels, flumes, sumps, and other temporary diversion and protection works needed to divert surface water through or around the construction site and away from the construction work while construction is in progress.
   2. Storm runoff from disturbed areas must discharge through temporary erosion control measures shown on the Drawings prior to discharge into a natural drainageway.

E. Erosion Control Provisions:
   1. Construct all haul roads of materials specified in Section 02221, Excavation Backfill and Compaction, sufficiently protected from erosion through water and wind action by channeling water flow around the structure, protecting side slopes with rip rap or fiber mats or by using straw bale or timber dikes.
   2. Protect areas where existing banks are to be disturbed by constructing straw dikes at the top of slope to divert storm runoff from the disturbed area or at the toe of the slope to retain sediments, as conditions permit.
   3. Contain discharge from pumping operations during dewatering operations by a dike constructed to prevent siltation of downgradient areas. Protect the area of the outlet pipe against erosion by flowing water by the construction of a rock or timber apron.
   4. Prior to removal of all sediment control dikes, remove all retained silt or other materials at no additional cost to the contract.

F. Mulch:
   1. Refer to the drawings for application and maintenance of Mulching.

G. Matting:
   1. Preparation:
      a. Surfaces of Ditches and Slopes:
         (1) Conform to grades and cross sections shown on the Drawings.

(2) Finish to a smooth and even condition with all debris, roots, stones, and lumps raked out and removed.
(3) Loosen soil surface to permit bedding of the matting.
(4) Unless otherwise directed, apply seed prior to placement.

2. Jute:
   a. Place strips lengthwise in the direction of the flow of water.
   b. Where strips are laid parallel or meet as in a tee, overlap at least 4 inches.
   c. Ends: Overlap at least 6 inches, shingle fashion.
   d. The up-slope end of each strip of the matting shall be turned down and buried to a depth of not less than 6 inches with the soil firmly tamped against it.
   e. The Engineer may require that any other edge exposed to more than normal flow of water be buried in a similar manner.
   f. Check Slots:
      (1) Build at right angles to the direction of the flow of water.
      (2) Space so that one check slot or one end occurs within each 50 foot length of slope.
      (3) Construct by placing a tight fold of the matting at least 6 inches vertically into the ground, and tamp the same as up-slope ends.
   g. Edges of Matting: Bury around the edges of catch basins and other structures.
3. Excelsior:
   a. Unroll in the direction of the flow of water.
   b. Where strips are laid end to end, butt adjoining ends.
   c. When adjoining rolls are laid parallel to one another, butt matting snugly.
4. Laying and Joining:
   a. Except where jute matting is turned down, spread evenly and smoothly in close contact with the ground.
   b. Cut out bulging seams and make joints as described above.
   c. When ordered, additional seed shall be spread over jute matting, particularly at those locations disturbed by building the slots. Jute matting shall then be pressed onto the ground with a light lawn roller or by other satisfactory means.
   d. Drive staples as recommended by manufacturer.
   e. In driving the staples, take care so as not to form depressions or bulges in the surface of the matting.
5. Other Matting: Approved, alternate matting shall be applied in accordance with the recommendations of the manufacturer and as directed by the Engineer.

H. Seed for Erosion Control:
1. Temporary Seeding: Minimum application rate of 50 pounds per acre.
2. Permanent Seeding: Refer to Section 02931, Seeding.

I. Silt Fence:
1. Install per manufacturer's requirements and in locations shown on the Drawings and as directed by the Engineer.

3.02 MAINTENANCE:

A. 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.

B Sediments removed from sediment control devices prior to sand gas venting layer placement shall be placed within the limits of a landfill cover area. Sediments collected after the placement of all sand gas venting layers shall be spread, seeded, and mulched so as not to interfere with surface water drainage or pose a potential erosion problem in the future.

C. If any staples become loosened or raised, or if any matting becomes loose, torn, or undermined, make satisfactory repairs immediately.

D. Maintain areas mulched or matted, with no extra compensation, until the completion of the contract.

E. Maintain the integrity of all erosion control measures throughout construction period.

3.03 HAY BALES FOR EROSION CONTROL:

A. Place as ordered to provide for temporary control of erosion or pollution or both.

B. Stake with the required stakes.

C. Upon acceptance of the contract, the bales shall be left in place unless released to the Contractor.

3.04 SPECIAL CONDITIONS:

A. 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.

3.05 ADJUSTMENT OF PRACTICES:

A. 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.

B. 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.

3.06 REMOVAL OF TEMPORARY WORKS:

A. Remove or level and grade to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

END OF SECTION

SECTION 02272

GEOTEXTILES

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Excavation, Backfill and Compaction: Section 02221.

B. Riprap: Section 02275

1.02 DESCRIPTION:

A. Furnish and install non-woven geotextile fabric at landfill perimeter drain pipe and rip rap installation locations in the manner shown on the Drawings and as specified in this Section or as directed by the Engineer.

1.03 REFERENCES:

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. For all test methods specified, the most recent revision shall apply if different from that listed.

C. American Society for Testing and Materials (ASTM).

1. ASTM D 3786-87, Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method.
2. ASTM D 4491-92, Test Method for Water Permeability of Geotextiles by Permitivity.
3. ASTM D 4533-85, Test Method for Trapezoidal Tearing Strength of Geotextiles.
4. ASTM D 4632-86, Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
5. ASTM D 4751-87, Test Method for Determining the Apparent Opening Size of a Geotextile.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Non-Woven Geotextile Fabric:

1. General:
   a. Produced by heat bonding, needle punching or by the use of external adhesives.
   b. The network of fibers shall be bonded so the fibers will retain their relative position with respect to each other.
   c. Fibers may be polypropylene, polyvinyl chloride, nylon or polyester.
   d. Resistant to rot, mildew, insects, salt water, rodents and any other biological and chemical substances commonly encountered in the ground.
   e. Use a geotextile fabric meeting the following requirements:

PROPERTY	TEST METHOD	MIN. AVERAGE ROLL VALUES PERMISSIBLE
Weight (oz./s.y.)	ASTM D 5261	8
Grab Tensile Strength (lbs)	ASTM D 4632	200
Grab Elongation (%)	ASTM D 4632	50
Mullen Burst Strength (psi)	ASTM D 3786	400
Puncture Resistance (lbs.)	ASTM D 4833	100
Trapezoidal Tear Strength (lbs.)	ASTM D 4533	80
Equivalent Opening Size (Sieve size)	ASTM D 4751	70
Permitivity (gal/min/sf)	ASTM D 4491	90

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Non-Woven Geotextile Fabrics:

1. Place in the manner and at the locations shown on the Drawings.
2. At the time of installation, fabric shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.
3. Place with the long dimension parallel to the centerline of the collection pipes and lay smooth and free of tension, stress, folds, wrinkles, or creases.
4. Provide a minimum width of 12 in. of overlap for bedding fabric applications.
5. For placement on embankment slopes, meet the following:
   a. Place fabric as continuous sections from the anchor trench to the bottom of slope (no end splicing).
   b. Overlap sections a minimum width of 12 inches or sew sections together as recommended by the manufacturer.
6. In the presence of wind, weight the materials with sandbags until final covers are installed.
7. Care shall be taken to assure that any underlying materials are not damaged during placement of geotextiles.
8. Care shall be taken to assure that stones, mud, and dirt are not entrapped in the geotextile during placement and seaming operations.
9. Overlap joints and seams shall be measured as a single layer of cloth.
10. The fabric shall be turned down and buried a minimum of 2 feet at all exterior limits or as indicated on the Drawings.
11. Place so that the upstream strip of fabric will overlap the downstream strip.

12. Protection of Fabrics:
    a. Exercise necessary care while transporting, storing and installing the fabric to prevent damaging it.
    b. Protect from prolonged direct exposure to sunlight.
    c. Repair all damaged areas of the fabric by placing another piece of fabric of sufficient size to extend a minimum of 1.0 foot beyond the limits of the damage in all directions over the damaged area. Sew repairs as described below.
    d. Do not leave exposed more than 5 days without being covered by backfill.
    e. When required, sew overlaps and repairs to damaged fabric using a portable machine to provide a seam strength of at least 90 percent of the filter fabric strength.
    f. Geotextile shall not be exposed to precipitation prior to being installed. Wrappings protecting geotextile rolls shall be removed less than one hour prior to unrolling the geotextile.
13. Bridging of fabric is not allowed.

END OF SECTION

SECTION 02275

RIPRAP

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:
A. Excavation, Filling, and Compaction: Section 02221
B. Erosion Control: Section 02271
C. Geotextiles: Section 02272

1.03 DESCRIPTION:
A. Furnish and place a protective covering of stone riprap for ditch bottoms and side slopes, and for culvert inlet and outlet protection.

PART 2 - PRODUCTS

2.01 MATERIALS:
A. Stone:
1. General:
a. Broken stone or broken concrete of a hard and durable quality approved by the Engineer.
2. Quality:
a. Clean and free from clay pockets, honeycomb structure, seams, or other weakness.
b. Weight by Displacement: Not less than 160 pounds per cubic foot dry.
c. All stone shall have sharp edges and at least 1 plane face.
d. When directed, furnish samples of the materials to Engineer for approval.
3. Grading:
a. No dimension greater than 15 inches. Provide with grading requirements specified below.
b. Spalls: Quarry chips and fines that are retained on a rock fork whose tines are spaced 1 inch in the clear.
c. Light Stone Grading Requirements: (For ditch bottoms and side slopes)

Weight Each Stone (lbs.)	Percent of Total Weight
100-40	10% Maximum
40- 10	50% Average
10-2	30% Average
Spalls Under 2 lbs.	10% Maximum

d. Medium Stone Grading Requirements: (For culvert outlet protection)

Weight Each Stone (lbs.)	Percent of Total Weight
150-100	10% Maximum
100- 25	50% Average
25-2	30% Average
Spalls Under 2 lbs.	10% Maximum

B. Geotextile Fabric:
1. The geotextile fabric for riprap installation shall conform to Section 02272, "Geotextiles".

PART 3 - EXECUTION

3.01 INSTALLATION:
A. Riprap Stones:
1. Individually laid upward from the toe of the slope with the larger stones at the toe of the slope.
2. Lay with close joints roughly perpendicular to the slope.
3. Fill open joints with spalls.
B. Finished Surface: Reasonably uniform in appearance, approximately parallel to and within 6 inches of the lines and grades shown or specified.
C. Geotextile Fabric:
1. Place above prepared subgrade prior to placement of riprap. Place geotextile fabric in accordance with the manufacturer's recommendations and in accordnce with procedures provided in Section 02272, "Geotextiles". Place riprap in a manner to prevent damage to the fabric.

END OF SECTION

SECTION 02611

PIPE AND FITTINGS

PART 1-GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Subsurface Information: Section 02015
B. Earthwork, Excavation, Backfill, and Compaction: Section 02221
C. Erosion Control: Section 02271
D. Groundwater Monitoring Wells: Section 02670

1.02 DESCRIPTION:

A. Work Included: Furnish and install the pipe materials and fittings of the type(s) and size(s) for the installation of landfill perimeter drain pipes and gas venting systems in the location(s) shown and as detailed on the Drawings and as specified herein.
B. The extent of the work is generally shown on the Drawings and shall be extended to accommodate changes which become necessary as a result of encountering unforeseen or changed conditions in the field.

1.03 REFERENCES:

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the test by the basic designation only.
B. For all test methods specified, the most recent revision shall apply if different from that listed.
C. American Society for Testing and Materials (ASTM):
   1. ASTM D 1248-89 Specification for Polyethylene Plastics Molding and Extrusion Materials.
   2. ASTM D 3261-93 Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
   3. ASTM D 3350-96 Standard Specification for Polyethylene Plastic Pipe and Fitting Materials.
   4. ASTM F 714-94 Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

1.04 SUBMITTALS:

A. Furnish the name of the manufacturer to the Engineer prior to commencing work. For any given pipe material, use pipe of the same manufacturer throughout the project.
B. The Engineer may request the Contractor to submit manufacturer's certification that the product meets requirements of the Specification.
C. Documentation that illustrates all field measurements associated with pipe field testing and written certification that all pipe performs in accordance with the specifications.

PART 2-PRODUCTS

2.01 GENERAL:

A. Contractor shall be responsible for all piping and appurtenances for the installation of landfill perimeter drains and gas control vents as illustrated on Drawings.

B. Perimeter drain and gas vent piping and fittings shall be SDR-13.5 High Density Polyethylene (HDPE) manufactured in accordance with ASTM D 3350 and ASTM F 714.

2.02 HIGH DENSITY POLYETHYLENE PIPE FOR LANDFILL DRAINS AND VENTS:

A. Standards:

1. ASTM D 3350 Polyethylene Pipe cell classification PE 345434B.
2. PE 3408 high density, high extra molecular weight polyethylene piping.

B. Pipe:

HDPE pipe dimensions will conform to standards ASTM F 714 and be classified as virgin resin with a maximum of 5% recycled material conforming to ASTM D 3350. All joints will be heat fused as per ASTM D 3261.

C. Joints:

1. Thermal butt fused.
2. Provide and install molded flanges with steel backup rings where specified or required for connection to special equipment.

D. Fittings:

1. Butt fused construction.
2. Same pressure rating as pipe.
3. Reinforced with a bracket per manufacturer's instructions.

PART 3-EXECUTION

3.01 INSTALLATION:

A. General:

1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations.
2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation.
3. Gas Vents:
   a. Drill a total of 12 soil borings using 18-inch ID augers at the locations of the gas vents shown on the Drawings.
   b. Complete the borings to a minimum of 5 feet within the waste of the landfill.
   c. Backfill each gas vent column with filter stone material following installation of vertical perforated gas venting pipes.

B. Pipe Laying:

1. Firmly support the pipe and fittings on filter stone material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.

3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
4. Excavate suitable holes for the joints so that only the barrel of the pipe received bearing pressure from the supporting material after placement.
5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade.
6. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.
7. When each pipe length has been properly set, place and compact enough of the filter stone material to hold the pipe in correct alignment.

C. Temporary Plugs:
1. When pipe installation work is not in progress, close the open ends of the pipe with temporary watertight plugs.
2. If water is in the excavation when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
3. Do not use the pipelines as conductors for drainage during construction.

D. Jointing:
1. Connect pipe in accordance with the latest manufacturer's instructions and recommendations.
2. Clear each pipe length, coupling and fitting of all debris and dirt before installing.

E. Pipe Cutting:
1. Cut in accordance with manufacturer's recommendations.
2. Cut the pipe with a hand saw, metal-inserted abrasive wheel (except asbestos-cement pipe), or pipe cutter with blades (not rollers).
3. Examine all cut ends for possible cracks caused by cutting.

END OF SECTION

SECTION 02670

GROUNDWATER MONITORING WELLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:
A. Measurement and Payment: Section 01025
B. Submittals: Section 01340
C. Sampling and Analysis: Section 01410
D. General Requirements, Safety, Health and Emergency Response: Section 01620
E. Subsurface Information: Section 02015
F. Off-Site Disposal: Section 02082

1.03 DRAWINGS:
The following drawings provide additional information not presented in this specification section:
A. Groundwater Historical Data: C-108

1.04 REFERENCES:
The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ANSI/ASME B1.20.1	1983 Pipe Threads, General Purpose (Inch)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 150-95a	Specification for Portland Cement
ASTM D 5434-93	Guide for Field Logging of Subsurface Explorations of Soil and Rock
ASTM D 5088-90	Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites
ASTM D 5781-95	Guide for Use of Dual-Wall Reverse-Circulation Drilling for Geoenvironmental Explorations and the Installation of Subsurface Water-Quality Monitoring Devices
ASTM D 5782-95	Guide for Use of Direct Air-Rotary Drilling for Geoenvironmental Explorations and the Installation of Subsurface Water-Quality Monitoring Devices
ASTM D 5092-90(1995)	Practice for Design and Installation of Groundwater Monitoring Wells in Aquifers

ASTM D5521-94	Guide for Development of Ground-Water Monitoring Wells in Granular Aquifers

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 570/9-75-001	Water Well Construction Practices

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC)

Decommissioning Procedures	Decommissioning Procedures, New York State Superfund Standby Contract, Work Assignment D002852-3, NYSDEC Monitoring Well Decommissioning, Prepared by Malcolm Pirnie, Inc., April, 1993, (Copy attached to the end of this specification).

1.05 DESCRIPTION OF WORK:

Three (3) existing monitoring wells (MW-8S, MW-13S, and MW-16S) shall be decommissioned and replaced with three new monitoring wells. Decommissioning and well construction procedures are specified in this section.

The Contractor shall maintain thorough and complete records of all field activities.

The Contractor is responsible for locating and supplying any water needed for decontamination and all other uses required to complete the project.

1.06 SUBMITTALS:

A. Work Plan including at a minimum the following:
   1. Drilling procedures, including equipment and drilling techniques.
   2. Water treatment methods.
   3. Development procedures, including method to be used, pumping rates, sampling frequency, and anticipated development times.
   4. Well identification tag materials.

B. Proof of license/registration to install wells and test borings in the State of New York.

C. Statement of qualifications to perform the work.

1.07 FIELD REPORTS:

A. Drilling Logs:
   During advancement of each boring maintain written logs detailing drilling observations, including at a minimum: drilling times per 5 foot interval, soft zones, changes in cutting color, changes in rock type, water, down and rotation pressure and odors. All records shall be based on depth below ground surface and accurate to at least 0.5 feet.

B. Well Installation Records:
   Provide records describing the installation of each well including at a minimum the following: well ID, start and end date for installation, material quantities used, depths of each component to an accuracy of 0.1 feet, and a diagram showing all components of the well.

C. Plumbness and Alignment Test
Provide a complete and accurate report documenting that each well meets the requirements specified herein for plumbness and alignment. Refer to section 3.0.6 of this specification.

D. Well Development Records
Provide a complete and accurate record documenting that each well has been developed to its maximum production capacity. Include all records of the required parameters measured during development and demonstrate that the requirements of these specifications have been achieved.

E. Well Abandonment Records
Provide complete and accurate records of well abandonment for test holes, partially completed wells, decommissioned wells/piezometers as required in the attached NYSDEC decommissioning procedures.

1.08 CERTIFICATES:
Provide certification that each of the following items meet the requirements of these specifications:

A. Casings
B. Cement grout
C. Well screens
D. Gravel pack
E. Drilling fluid additives, including bit lubricants
F. Bentonite seals
G. Protective casings

1.09 DELIVERY, STORAGE, AND HANDLING:
Deliver materials in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact and precipitation. Replace defective or damaged materials with new materials.

1.10 GENERAL REQUIREMENTS:
Provide each system complete and ready for operation. Each system, including equipment, materials, installation, and workmanship shall be in accordance with EPA 570/9-75-001, except as modified herein. In the manual referred to herein, the advisory provisions shall be considered mandatory, as though the word "shall" has been substituted for the word "should" wherever it appears. Reference to "Project Representative", "Purchaser" , and "Owner" shall be interpreted to mean the Engineer.

PART 2 - PRODUCTS

2.01 EQUIPMENT, MATERIALS, TOOLS, CONTAINERS, ETC.:
Equipment, materials and tools shall conform to the respective specifications and other requirements as specified herein and in the Contractors approved Work Plan.

2.02 DRILL RIGS AND TOOLS:
Drill rigs shall be specifically designed and manufactured to perform the work described in this specification Drill rigs, support equipment, pumps, and tools that are not adequate, in the opinion of the Engineer, will not be permitted.

2.03 CASINGS:

Monitoring well casings shall be 2-inch ID Schedule 40 PVC. All casing shall be flush threaded with rubber o-rings.

2.04 WATER LEVEL MEASURING DEVICES:

A. A hand held electronic water level meter with an accuracy of ±0.01 feet shall be provided by the Contractor during drilling, well development, specific capacity testing, and step-drawdown testing.

B. An electronic data collection system with water level sensing probes will be used during step-drawdown testing. The system shall be capable of simultaneously recording water levels at 8 separate channels to an accuracy of 0.01 feet.

2.05 AUXILIARY EQUIPMENT:

As required, provide discharge piping and storage to collect, treat and discharge pumped water during development of each well. Treatment of development water will, at a minimum, consist of pumping water through a series of two (2), 55-gallon drums of granular activated carbon. Treated water may be discharged to the ground surface. The Contractor will be responsible for disposal of the carbon at a facility approved by the Engineer.

2.06 WELL CAPS:

The top of the well shall be provided with a well cap.

2.07 BACKFILL MATERIALS:

Backfill materials shall consist of granular bentonite seal, cement bentonite slurry seal, and well gravel as shown in the drawings.

A. Well Gravel

Provide Morie #1 well gravel, or approved equal, as shown on the Drawings.

B. Granular Bentonite Seal

Provide granular bentonite, either in a pellet or chip form and approved by the Engineer. Hydrate all granular bentonite seals with a minimum of 10 gallons of potable water and allow the bentonite to swell, apply a second 10-gallon volume of potable water one hour after the first. Allow the bentonite to hydrate for 24-hours prior to installation of cement-bentonite seal.

C. Cement Bentonite Seal

Provide cement-bentonite seal, consisting of the following: 20 parts Type 1 or Type 2 Portland Cement; 1 part dry powdered high yield sodium bentonite; and sufficient potable water to produce a pumpable slurry, as approved by the Engineer.

D. Protective Casing

Provide carbon steel protective casings for each well. Protective casings shall be steel, with lockable covers and shall have a diameter (or smallest dimension) equal or greater than 4 inches larger than the well casing. The Contractor shall provide keyed-alike solid brass locks for each protective casing.

2.08 BIT LUBRICANTS:

Use only bit lubricants approved by the Engineer. The use of oil-based lubricants will not be permitted.

PART 3 - EXECUTION

3.01 DECOMMISSIONING OF WELLS:

A. Decommission 3 existing monitoring wells (MW-8S, MW-13S, and MW-16S). The open interval in the wells is as follows: MW-8S = 23.5 to 38.2 ft bgs, MW-13S = 15.0 to 75.0 ft bgs, and MW-16S = 25.0 to 80.0 ft bgs. Copies of the well construction logs of these wells are attached to this Section. Several wells are known to have obstructions, and the size of the wells may be less than those shown on the logs. Therefore, the Contractor should be prepared to have the required tools on hand to accommodate this issue. The wells will be decommissioned as specified in the latest version of New York State Department of Environmental Conservation Guidelines for Monitoring Well Decommissioning Procedures attached to this Section. All solid material (protective casing, well riser material) removed from the wells will be placed beneath the subgrade layer of the North Disposal Area cap.

B. After the protective casing has been removed from a well, the drilling Contractor will use one of two methods for well decommissioning. The first method will include an attempt to pull the 4-inch stainless steel casing with the drill rig. If the casing appears that it will come out of the ground, work will stop in order to tremie grout into the open borehole. The grout will be placed from the bottom of the borehole to a level above the top of rock. Then, the grouting of the borehole will continue as the casing is simultaneously withdrawn from the borehole. As sections of the casing are removed, grout will added to keep the level just below land surface and to fill the space occupied by the material being withdrawn. Grout mixing will involve calculating the volume of grout required to fill the borehole before beginning to mix the grout. The grout basin will be large enough so as to minimize the number of mixes needed to fill the borehole. The following grout mixture will be used: one 94-pound bag of type I Portland cement, added to 3.9 pounds of powdered bentonite, combined with 7.8 gallons of potable water. This mix may be adjusted for water content, to a minimum of 6 gallons of water per bag of cement, if excessive use of grout is observed. The final grout level will terminate at approximately five feet below ground surface, and the site will be left in an acceptable condition as equivalent to the pre-well condition as practical. If the steel casing cannot be pulled out of the borehole with the drill rig, then a second procedure will be performed which will include grouting the casing in place. Water displaced in all boreholes during the grouting procedure will not be collected, but will be allowed to infiltrate into the surrounding ground. The exception to this is for MW-8S; here, all water will be treated by granular activated carbon and discharged onto the surface of one of the areas to be capped, prior to cap construction.

3.02 INSTALLATION OF WELLS:

A. Once all the monitoring wells have been decommissioned, these wells will be replaced with new monitoring wells. The new wells will be installed no sooner than 48 hours after the adjacent well is decommissioned.

B. Install 3 replacement monitoring wells (MW-8SR, MW-13SR, and MW-16SR). These wells are intended to replace 3 existing and like-named wells on site and will be drilled as close as practical to the decommissioned wells. The new wells will be drilled and installed in the same manner as the original wells, except that only a cement/bentonite grout will be used to seat the casing. The 3 new wells shall consist of open boreholes, minimum 4-inch

inner diameter stainless steel riser casing (Schedule 5, type 304), and a locking protective casing. Well installation will involve completion of a minimum 6-inch diameter boring from the ground surface to the top of the open borehole elevation. Bedrock is approximately as shown in the attached well logs. A 4-inch riser will then be set into the rock and pressure-grouted in place with a Portland cement-bentonite grout. The grout will be allowed to set for a minimum of 24 hours. After the grout has set, the borings will then be completed at a minimum diameter of 4 inches (nominal) to the specified depths as shown for each of the drilled borings in the attached well logs. Rock coring will not be conducted in these borings. The monitoring wells will be fitted with concrete ground surface collars (minimum three feet deep) and new lockable carbon steel protective casings a minimum of four inches larger in diameter than the well casing. Protective casings will be installed 3 feet below ground surface and 4 inches above the top of risers.

C. Drill cuttings will be discharged to the ground surface. To the extent possible, drill cuttings will be logged and screened with a hand held PID by the Contractor. At one of the locations (MW-8S), cuttings generated during the drilling of the replacement well will be collected, transported to one of the disposal areas and placed beneath the subgrade fill layer, as directed by the Engineer.

D. The 3 newly installed wells will be developed in accordance with Article 52 USEPA 570/9-75-001. Development shall not occur until a minimum of 48 hours has elapsed after the cement-bentonite grout has been installed. Development will be sufficient to provide at a minimum, turbidity of less then 50 NTUs and field parameters, (pH, dissolved oxygen, conductivity, temperature) stable to within ten percent over four samples at a minimum of one-quarter hour intervals.

The Contractor will use a portable granular activated carbon (GAC) treatment system (e.g., two 55-gallon drums of GAC) capable of managing and treating the extracted groundwater produced during site activities. Groundwater may be treated directly or stored on-site temporarily and then batch treated. The site contaminants include the following chlorinated solvents TCE (360 µg/L), PCE (35µg/L), and 1,2-DCE (8µg/L). Additionally, groundwater analysis for two of four wells in the work vicinity detected PCB concentrations in the groundwater of 8 and 140 µg/L respectively. Treated groundwater shall be discharged a minimum of 250 feet downgradient from the well location. GAC shall be disposed by the Contractor at facility approved by the Engineer.

Provide DOT H-17 55-gallon drums for storage of investigation derived waste, such as PPE, label and stage in a location approved by the Engineer. Disposal of such materials may be allowed beneath the subgrade fill layer of one of the areas to be capped.

3.03 WELL LOGS:

A. During the progress of each boring, the Contractor shall keep a continuous and accurate log of the materials encountered and a complete record of the operation of well installation. Soil samples, including auger cuttings, cuttings observed at the cyclone discharge, and any other soils/rock which may be described for the purpose of developing lithologic logs shall be described on a boring log in accordance with ASTM D-2487 and ASTM D-5434.

B. Records shall include at least the following data:

1. Names of driller and inspector.
2. Dates and times of beginning and completion of work.

3. Identifying number of boring.
4. Diameter and description of casing and drill rods.
5. Total length of each size of casing and drill rods.
6. Length of casing extending below ground surface at the completion of the boring.
7. Depth to top of each different material penetrated.
8. Depth to water surface in borehole at completion and at end of each major work stoppage.
9. Loss or gain of air and water.
10. Sudden dropping of drill rods or other abnormal behavior.
11. Reference point for all depth measurements shall be ground surface.
12. The depth for each bore-hole diameter.
13. Complete well installation details, including: material, size, and quantity of all materials, test results, depth to top of each change in well materials (sump, screen, gravel, and seals, etc.).
14. Any and all pertinent information required as part of these specifications or project Drawings.

3.04 FIELD SAMPLING AND TESTING:

A. Well Plumbness and Alignment Test

Upon completion of each permanent extraction well, provide a well plumbness and alignment test using a plummet in accordance with Article 51 of the EPA 570/9-75-001. Perform the test on the entire depth of the well. The plumb or dummy shall move freely through the entire depth of the well. The well shall not vary from the vertical in excess of two-thirds of the smallest inside diameter of that part of the well being tested per 100 feet of depth. Correct defects in plumbness and alignment, and repeat test until the work is in compliance with contract requirements. Extraction wells shall be surveyed vertically to the nearest 0.01 foot and horizontally to the nearest 1.0 foot.

3.05 CLEAN UP:

Upon completion of the work, the Contractor shall remove its rigs, refuse generated during its work, temporary structures and utilities, and surplus and unused material, and leave the site in a clean condition to the satisfaction of the Engineer.

3.06 DECONTAMINATION:

Drill rigs, pumps, and tools (casing and rods) shall be steam cleaned, and if necessary, scrubbed with tri-sodium phosphate (TSP) and potable water prior to setting up at the drilling location and prior to departure. More frequent decontamination of rigs may be required depending on actual exposure to contaminated conditions. Allow decontamination fluids to infiltrate the ground surface in the RI/FS laydown area, prior to cap placement, indicated on the Drawings, as authorized by the Engineer.

3.7 INSPECTION OF WORK:

The Engineer shall have access to the work, and the Contractor shall provide proper facilities for such access and for inspection. Decommissioning, drilling and well installation shall be in accordance with the requirements of these specifications and authorizations of the Engineer and will be inspected by a representative of the Engineer at its discretion.

END OF SECTION

DISCLAIMER

September 1, 1993

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

Per your request, the enclosed referenced document is being made available to you for informational purposes. These procedures may be used as a guideline when decommissioning a monitoring well. Please note that this document does not address special situations which may be encountered while dealing with the presence of hazardous waste on a site. These procedures have not been formally adopted by the Department of Environmental Conservation. This document does not in any way release the responsibility of the party who decommissions a well using these procedures.

If you have any questions on these procedures please contact A. K. Gupta, of my staff, at (518) 457-0927. If you have any questions on using these procedures, relative to any liability your firm may face, please contact Robert Davies, Esq., at (518) 457-2286.

Sincerely,

Gerald J. Rider, Jr., P.E.
Chief , Operation, Maintenance & Support Section
Bureau of Hazardous Site Control
Division of Hazardous Waste Remediation

Enclosure

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1.0 RATIONALE

These monitoring well decommissioning procedures have been developed by Malcolm Pirnie, Inc. for the New York State Department of Environmental Conservation (NYSDEC) under the New York State Superfund Standby Contract. The procedures were designed to successfully decommission wells that are no longer used for monitoring. A well is successfully decommissioned when:

- The well does not allow migration of existing or future contaminants into an aquifer or between aquifers
- The well does not allow migration of existing or future contaminants in the vadose zone
- The potential for vertical or horizontal migration of fluids in the well or adjacent to the well is minimized
- Aquifer yield and hydrostatic head are conserved, and
- The possibility that the well is used for purposes other than intended is eliminated

Malcolm Pirnie developed these procedures by performing an extensive literature search, consulting industry officials, and consulting the NYSDEC. The literature search included a review of sources from the National Ground Water Association, American Society for Testing and Materials (A.S.T.M.), State and EPA guidance documents, Malcolm Pirnie decommissioning procedures, and various other technical sources. A complete listing of references is included at the end of these procedures. The industry officials that were consulted included drilling contractors, equipment suppliers and manufacturers, and A.S.T.M. members on Soil and Rock (D-18) and Water (D-19) committees.

These procedures are performance oriented. They describe the conditions that must be met to satisfactorily decommission a well without specifying the method. Performance-oriented procedures are best suited for well decommissioning for two reasons. Firstly, there are often several acceptable methods that can be used to accomplish the same end result. Secondly, procedures of this type encourage the development of innovative and cost-saving techniques by the drilling contractor.

To allow these procedures to afford the greatest degree of protection to humans and the environment, Malcolm Pirnie and the NYSDEC decided during development of the procedures that they would be based on two assumptions: 1) well seals are not competent unless documentation is provided that proves otherwise, and 2) any material returned to the surface during the decommissioning process will be treated as a non-hazardous waste. Disposal methods for these materials are contained in the specifications and are dependent on information gleaned from site investigation reports. Unless these assumptions are shown to be invalid, a procedure is followed that is appropriate for the physical and hydrologic setting of the well, and is the most protective of the environment.

2.0 WELL DECOMMISSIONING PROCEDURES

2.1 Description

This section describes the process that is used to determine which *decommissioning method* and which *group of procedures* to use to properly decommission a well, and then presents the procedures.

There are four *decommissioning methods*:

1) Overdrilling,
2) Casing Perforation,
3) Casing Pulling, and
4) Grouting the Well Casing In-Place.

For each decommissioning method there is a *group of procedures* that must be followed. The specific procedures contained in the group are determined by the physical and chemical nature of the materials surrounding the well and by the design of the well. For example, overdrilling a well that penetrates a confining layer can require a different group of procedures than overdrilling an unconfined water table well. Each group of procedures consists of seven items:

1) Reviewing Site Data
2) Determining Materials Handling and Decontamination Procedures

3) Locating and Setting-Up on the Well

4) Selecting the Well Decommissioning Method

5) Removing the Protective Casing

6) Selecting, Mixing, and Placing Grout

7) Backfilling and Site Restoration

The proper method and group of procedures to use to successfully decommission a well are selected by using a flow chart (Figure 1). The flow chart also references the relevant sections in the text. The structure of the flow chart is based on the assumptions discussed in Section 1 of this document.

2.2 Item 1 - Reviewing Site Data

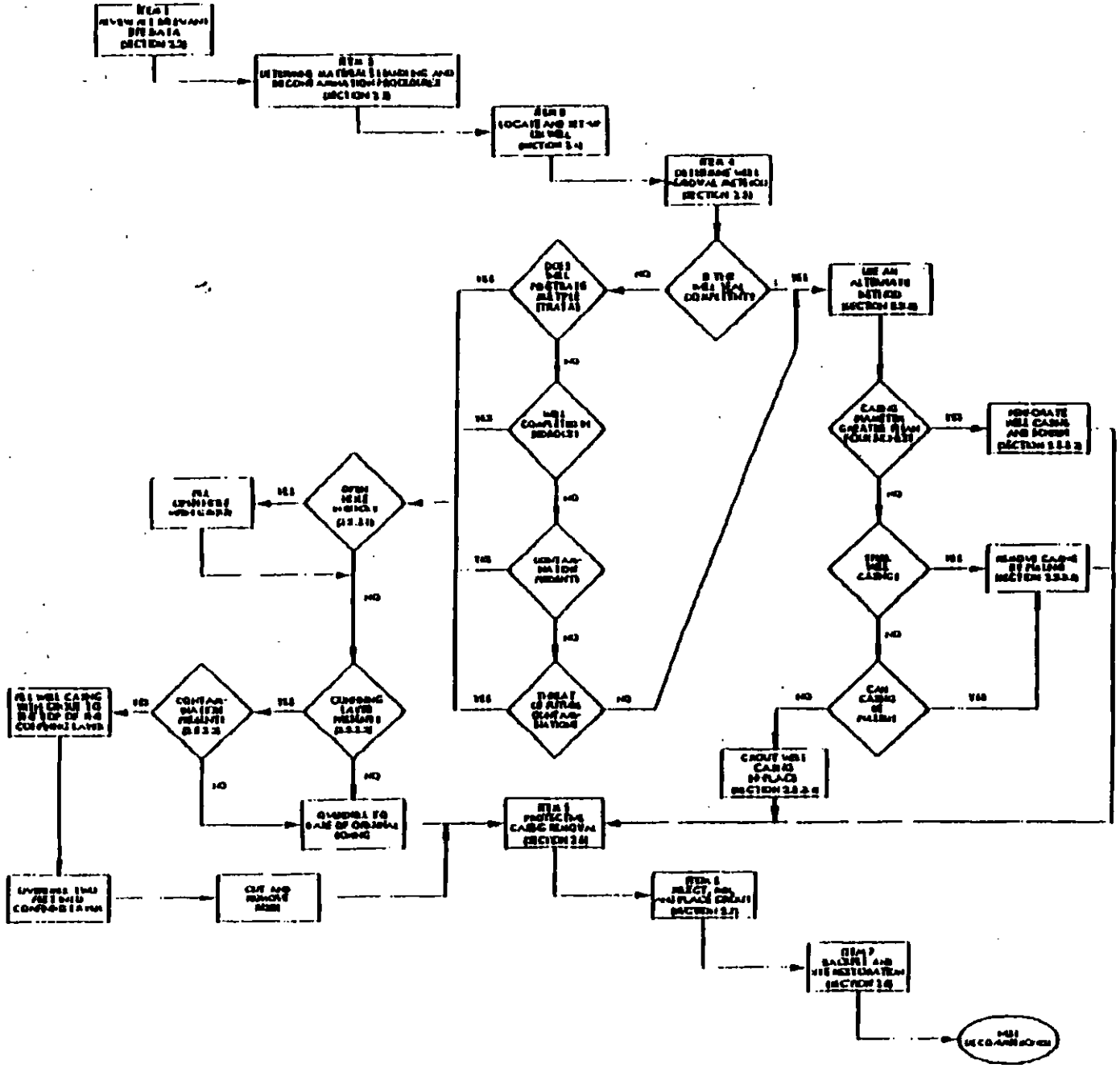
The first item of the flow chart consists of reviewing all pertinent site information, including boring and well logs, field inspection sheets, and laboratory analytical results performed on site soil and ground water samples. These data will be used to make decisions throughout the flow chart. If site data is incomplete, or of insufficient reliability to enable its use, it is recommended that field verification of the characteristics and conditions of the wells be conducted. A sample Monitoring Well Field Inspection Log, indicating information which could be obtained during field verification activities, is included herein.

All of the sites where well decommissioning is scheduled have been delisted. It is therefore assumed that none of the sites contain hazardous materials.

2.3 Item 2 - Determining Materials Handling and Decontamination Procedures

2.3.1 Description

After all available site data have been reviewed, the procedures for handling all materials generated during decommissioning, and decontaminating the drilling rig and tools, must be selected. The specific procedures followed for both materials handling and decontamination are dependent on three factors: 1) whether the site is located within or



MALCOLM PIRNIE

WELL DECOMMISSIONING PROCEDURE DECISION FLOWCHART
NYSDEC WELL DECOMMISSIONING PROJECT

MALCOLM PIRNIE, INC.

FIGURE 1

SITE NAME: _____

WELL I.D.: _____

MONITORING WELL FIELD INSPECTION LOG
NYSDEC WELL DECOMMISSIONING PROGRAM

DATE/TIME: _____

INSPECTOR'S NAME: _____

ITEM	YES	NO
WELL VISIBLE? (If not, provide directions below)		
WELL I.D. VISIBLE?		
WELL LOCATION MATCH SITE MAP? (If not, sketch actual location on back)		
WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL:		
SURFACE SEAL PRESENT?		
SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below)		
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		
HEADSPACE READING (ppm) AND INSTRUMENT USED		
TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable)		
PROTECTIVE CASING MATERIAL TYPE:		
MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches):		
LOCK PRESENT?		
LOCK FUNCTIONAL?		
DID YOU REPLACE THE LOCK?		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes, describe below)		
WELL MEASURING POINT VISIBLE?		
MEASURE WELL DEPTH FROM MEASURING POINT (Feet):		
MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet):		
MEASURE WELL DIAMETER (Inches):		
WELL CASING MATERIAL:		
PHYSICAL CONDITION OF VISIBLE WELL CASING:		
ATTACH ID MARKER (If well ID is confirmed) and IDENTIFY MARKER TYPE		

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

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

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

REMARKS:

near a closed Part 360 landfill. 2) the presence and type of contamination (if present) at the well to be decommissioned. and 3) the use of the land surrounding the well.

2.3.2 Materials Handling Procedures

To determine the proper materials handling procedure to use for a particular well:

1) Determine whether the site is located within or near a Part 360 landfill. If the well is located *near* a closed Part 360 landfill, the materials can be disposed of on the ground surrounding the well. If the well is located *within* a closed Part 360 landfill, the materials must be disposed of at an active Part 360 landfill. If the well is not located on or near a Part 360 landfill, see (2) below.

2) Determine the presence and type of contamination (if present) at the well by reviewing available well data (Section 2.2). From the data, place the well into one of the following categories: a) wells containing contamination in concentrations exceeding the ground water standard, or b) wells containing no contamination. If a determination cannot be made from the existing data, a meeting with the NYSDEC will occur to determine how to obtain the necessary data.

   For wells in the contamination category, all materials returned to the surface must either be disposed of in a Part 360 landfill, or can be left at the surface near the former well. See (3) below to determine which of these options is applicable. For all uncontaminated wells, the materials can be left at the surface, near the former well, unless disposing the materials in this manner would be inconsistent with the surrounding land use, see (3) below.

3) Determine the surrounding land use. If the well is located in an urbanized area, where it is feasible that people could be exposed to the materials left on the surface, or if the leaving the materials at the surface would not be consistent with the intended use of the land, then the materials must be disposed of in a Part 360 landfill.

2.3.3 Decontamination Procedures

The drill rig and all tools must be decontaminated with a pressurized steam cleaner after decommissioning a contaminated well (as determined in 2.3.2 above). Decontamination will take place at each former well location whenever possible. If site conditions preclude performing decontamination activities at the well location, a more suitable location must be selected.

The procedures for handling and disposal of decontamination fluids are the same as for materials returned to the surface, see Section 2.3.2.

2.4 Item 3 - Locating and Setting-Up on the Well

Perform the following tasks to locate the well to be decommissioned:

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

When the well has been located, set the drilling rig up over the well. Consider the selected decommissioning procedures when setting-up over the well.

2.5 Item 4 - Selecting the Well Decommissioning Method

2.5.1 General

The well removal method used to decommission a well depends primarily on the integrity of the well seal. If it can be documented that the seal is competent, one of the three decommissioning methods other than overdrilling can be used. (These three methods are referred to hereafter as *alternate* decommissioning methods.) If no such documentation exists, the well seal is assumed *not* to be competent. In cases where the well seal is not competent, the well must be overdrilled whenever any *one* of the following conditions is true:

- The well penetrates multiple hydraulic strata,
- The well is a bedrock well, and
- The well is located in an area where a significant threat of chemical/biological contamination exists.

If none of these conditions are true, the well can be decommissioned by a method other than overdrilling, even though it cannot be documented that the well seal is competent.

Procedures for all four decommissioning methods are presented below.

2.5.2 Overdrilling

2.5.2.1 Determine if the Well is Constructed as an Open-Hole in Rock

Open-hole wells have no well casing, sand pack, or bentonite seal installed inside the bedrock borehole. Overlying unconsolidated deposits, where present, are usually cased off by grouting a casing into the bedrock before further drilling of the bedrock is performed. Decommissioning wells of this type requires that the hole in rock be filled with sealing grout before overdrilling of the cased portion of the borehole is begun. (If bedrock occurs at the land surface, no overdrilling is required.) This prevents the rock hole from filling with cuttings which would have to be flushed out. The grout must be mixed and placed according to the grouting procedures contained in Section 2.7. After the rock hole is grouted, the cased portion of the well is overdrilled according to the procedures contained in Section 2.5.2.3.

2.5.2.2 Determine Whether a Confining Layer and Contamination Exist

Review site data to determine whether a confining layer is present and, if so, whether contamination was detected during installation or sampling of the well. If a confining layer and contamination are found to exist, then extra care must be used to prevent cross contamination between the water-bearing zones above and below the confining layer.

One acceptable procedure for decommissioning wells where both a confining layer and contamination exist is to: 1) fill the well casing with grout to the top of the confining layer; and 2) overdrill the well according to the overdrilling procedure contained in Section 2.5.2.3 until two feet of the confining layer have been penetrated. If the confining layer is less than two-feet thick, this procedure may not be possible. When overdrilling is completed, the borehole must be grouted according to the procedure contained in Section 2.7. Other acceptable procedures may exist, however they must receive Department approval prior to implementation.

2.5.2.3 Overdrill the Well

This section describes the requirements common to all overdrilling procedures, regardless of whether a well penetrates a confining layer or bedrock.

Select a drilling method that:

1) Follows the original well bore.

2) Creates a borehole of the same or greater diameter than the original boring, and,

3) Removes all of the well construction materials.

Acceptable methods for overdrilling include: 1) using an overreaming tool with a pilot bit which is nearly the same size as the inside diameter of the casing and a reaming bit which has a slightly larger diameter than the original borehole diameter. This method can be used for wells with steel casings. 2) using a hollow stem auger equipped with outward facing carbide cutting teeth with a diameter two to four inches larger than the casing. It is important to use outward facing cutting teeth in order that the cutting tool does not sever the casing and drift off center. An alternative is to install a steel guide pipe inside the casing so that the augers remain centered. The casing guides the cutter head and remains inside the auger. This temporary working pipe should be firmly attached to the inside of the casing by use of a packer, or other type of expansion or friction device. When the full diameter and length of the well has been penetrated, the casing and screen can be retrieved from the center of the auger (American Society for Testing and Materials. Standard D 5299-92., 1992).

After overdrilling is completed, the borehole must be grouted according to the procedures contained in Section 2.7

2.5.3 Alternate Decommissioning Methods

2.5.3.1 General

There are three alternate decommissioning methods: casing perforation, casing pulling, and grouting the casing in-place. A series of decisions are required to determine which of these methods will be used for a particular well (See Figure 1.) The first criterion to determine is whether the inside diameter of the well casing is four inches or greater. If it is determined that the diameter is four inches or greater, casing perforation is selected as the alternate decommissioning method. This is because casing perforation is the most desirable of the alternate decommissioning methods, but it is not practical to perforate casings with a diameter of less than four inches.

If it is determined that the inside diameter of well casing is less than four inches, it must be decided whether the well casing is able to be removed by pulling. This determination is made based on review of the site specific data. If it is determined that the casing can be pulled, casing pulling is selected as the alternate decommissioning method. Casing pulling is the next most desirable alternate decommissioning method.

If it is determined that the casing cannot be pulled, then grouting the casing in-place is the alternate decommissioning method to be used. This is the least desirable alternate decommissioning method.

The procedures for each alternate method are presented below.

2.5.3.2 Casing Perforation

This method consists of perforating the well casing and screen using a suitable tool and grouting the well. A wide variety of commercial equipment is available for perforating casings and screens in wells with four-inch or larger inside diameters. This method should not be used for wells with inside diameters less than four inches. Due to the diversity of application, experienced contractors must recommend a specific technique based on site specific conditions. A minimum of four rows of perforations several inches long and a minimum of five perforations per linear foot of casing or screen is recommended (American Society for Testing and Materials. Standard D 5299-92, 1992).

After perforating is completed, the borehole must be grouted according to the procedures contained in Section 2.7.

2.5.3.3 Casing Pulling

This method consists of removing the well casing by lifting. The method used to remove the casing must allow grout to be added during pulling to fill the space occupied by the material being withdrawn. Grout mixing and placement must be performed according to the procedures contained in Section 2.7.

An acceptable method to remove steel casing consists of puncturing the bottom of the casing, filling the casing with grout tremied from the bottom of the well, using jacks to free casing from the hole, and lifting the casing out by using a drill rig, backhoe, crane, or other suitable equipment of sufficient capacity. Additional grout must be added to the casing as it is withdrawn.

PVC and other low tensile strength materials may not be able to be removed by pulling in certain conditions. Excessive deformation or breakage of the well casing may preclude removal by pulling deep wells in extremely cohesive soils. If pulling a PVC casing is recommended by an engineer or drilling contractor, the pulling method must be approved in advance by the Department.

2.5.3.4 Grouting the Casing In-Place

Grouting the casing in place is the simplest, but least protective of all the decommissioning procedures. The procedure consists of filling the casing with grout to a level of five feet below the land surface, cutting the well casing at a depth of five feet below the land surface, and removing the casing and associated well materials from the ground. The casing must be grouted according to the procedures contained in Section 2.7.

2.6 Item 5 - Removing the Protective Casing

2.6.1 General

The protective casing of a well must be removed in a manner that will not interfere with or compromise the integrity of decommissioning activities performed at the well.

The procedure for removing the protective casing of a well depends upon the decommissioning method used. When a well is being decommissioned by the overdrilling or casing pulling method, the protective casing will, in most cases, be removed before continuing with the decommissioning activity. When the decommissioning procedure calls for the well casing to be perforated or left in place, the protective casing should be removed after grout is added to the well. The protective casing must be disposed of in a manner consistent with solid waste regulations.

2.6.2 Removing the Protective Casing Prior to Sealing the Well Bore

When overdrilling is required, the protective casing must be removed first, unless the drilling tools used to overdrill the well have an inside diameter that is larger than the protective casing. The many different types of protective casings available preclude developing a specific removal procedure. In all cases, however, the specific procedure used must minimize the risk of:

1) Breaking the well casing off below ground, and

2) Allowing foreign material to enter the well casing.

When casing pulling is required, the determination of when to remove the protective casing is not critical. For this reason, the determination can be made by the drilling contractor.

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

2.6.3 Removing the Protective Casing After Sealing the Well

If a decommissioning method is used that allows well casing to remain in the ground, the protective casing should be removed after the well has been filled to the proper level with grout. This will insure that the well is properly sealed even if problems arise when removing the protective casing. Since the well casing must be removed to a depth of five feet below the land surface, this procedure will enable the upper five feet of casing and the protective casing to be removed in one operation if a casing cutter is used. If the height of the protective casing makes working conditions at the well awkward, the casing can be cut off at a lower level as long as the inner well casing remains above ground and is not damaged in a way that prevents the well from being filled with grout.

2.7 Item 6 - Selecting, Mixing, and Placing Grout

2.7.1 Selecting Grout Mixture

There are two types of grout mixes that may be used to seal wells: a standard mix and a special mix. Both mixes use Type 1 Portland Cement and six percent bentonite by weight. The difference between the two mixes is the volume of water used. The special mix uses less water and is used in situations where excessive loss of the standard grout mix is possible, for example in highly-fractured bedrock or coarse gravels.

2.7.1.1 Standard Grout Mixture

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

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

This mixture results in a grout with a bentonite content of four percent by weight, and will be used in all cases except in boreholes where excessive use of grout is anticipated. In these cases a special mixture will be used (see Section 2.7.1.2).

See Section 2.7.2 for grout mixing procedures.

2.7.1.2 Special Mixture

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

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

The special mixture also results in a grout with a bentonite content of four percent by weight, but the amount of added water is decreased to produce a thicker mixture. The least amount of water that can be added for the mixture to be readily pumpable is six gallons per 94-pound bag of cement.

See Section 2.7.2 for grout mixing procedures.

2.7.2 Grout Mixing Procedure

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

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

See Section 2.7.3 for grout placement procedures.

2.7.3 Grout Placement

Grout will be placed in the borehole from the bottom to the top. This will be accomplished by using a tremie pipe of not less than 1-inch diameter. Grout will then be pumped into the borehole at a rate of 5-10 gpm until the grout appears at the land surface. The only exception to this is open hole in bedrock is being grouted. With this situation the grout level must reach above the bedrock surface. At this time the rate of settling should be observed. When the grout level stabilizes, casing or augers will be removed from the hole. As each section is removed, grout will be added to keep the level just below land surface. If the grout level cannot be maintained near the land surface, this will imply excessive loss of grout and an alternate grouting method must be used. One possibility is to grout in stages, whereby the first batch of grout is allowed to partially cure before a second batch of grout is added. Upon completion of grouting, it is important to make sure the final grout level is approximately five feet below land surface. A ferrous metal marker will be embedded in the top of the grout to indicate the location of the former monitoring well.

2.8 Item 7 - Backfilling and Site Restoration

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

3.0 REFERENCES

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MALCOLM PIRNIE	TEST BORING LOG	BORING No. MW-08S

PROJECT SIDNEY LANDFILL	LOCATION SIDNEY, NEW YORK	SHEET 1 OF 2	
'ENT U.S. Environmental Protection Agency		PROJECT No.	8001-05-1
..LLING CONTRACTOR HARDIN-HUBER, INC.		MEAS. PT. ELEV.	1805.91
PURPOSE MONITORING WELL		GROUND ELEV.	1804.0
WELL MATERIAL STAINLESS STEEL		DATUM	U.S.G.S.
DRILLING METHOD(S) HSA, ROLLER BIT	SAMPLE / CORE / CASING	DATE STARTED	9/11/91
DRILL RIG TYPE	TYPE: SS / NX / STEEL	DATE FINISHED	9/16/91
GROUND WATER DEPTH	DIA.: 2" / 2.875 / 6	DRILLER	HARDIN-HUBER
MEASURING POINT	WEIGHT: 140 #	PIRNIE STAFF	D. STREET
DATE OF MEASUREMENT	FALL: 30"		

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
0	S-1	7, 11, 15, 18	1.2		Dark brown fine sand and silt and subangular to subrounded gravel up to 2", organics (top soil).			Moist
2	S-2	10, 85, 100	5.4		Light orangish-brown fine to medium sand, silt and subangular gravel up to 3" in diameter.			Dry
4	S-3	100	–		Light orangish-brown, fine to medium sand, silt and subangular gravel up to 3" in diameter.			
6	S-4	30, 44, 100	0.4		Light brown fine sand, silt and subangular gravel up to 2.5" in diameter.			Dry
8	S-5	100, 18, 32	0.2		Mottled light grayish brown and dark brown clay and silt, trace subangular gravel up to 1/8", dense and compact.			Dry
10	S-6	30, 55, 11, 15	1.8		Gray medium grained rock chips. Weathered reddish and gray shale and siltstone rock chips, some fine sand.			Dry
12	S-7	44, 96, 20, 100	3.0		Reddish-brown fine to medium sand and silt, some subangular gravel up to 2". Weathered gray shale rock chips, some fine to medium.			Dry
14	S-8	20, 100	2.0		Weathered gray shale rock chips, some fine to medium sand, trace red clay in fractures.			Dry
16	S-9	30, 100	1.2					Dry
18	S-10	100	1.0			1785.5 18.5		No recovery

4" diameter Riser | Cement | Bentonite Seal | Cement/ Bentonite Grout

MALCOLM PIRNIE

TEST BORING LOG

BORING No. MW-08S

PROJECT SIDNEY LANDFILL | LOCATION SIDNEY, NEW YORK | SHEET 2 OF 2

IENT U.S. Environmental Protection Agency | PROJECT No. 8001-05-1

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
					Not Sampled			
22							21.5	
							23.5	
24	RUN 1				SILTSTONE - dark red, fine grained, some small green siltstone clasts, 10 horizontal iron-stained fractures at 24.40', 26.25', 26.50', 26.65', 26.80', 26.87', 26.95', 27.20', 27.37' and 28.37'			RQD = 83%
26								
28								
30					SILTSTONE - interbedded red and green, coarse grained, some shallow cross-bedding at 30.0', one horizontal iron-stained fracture at 30.1'			
32								
34	RUN 2				SILTSTONE - interbedded red and green, medium grain,one horizontal iron-stained fracture at 33.57	1769.5		RQD = 92%
					(SILTSTONE)	34.6		
36					SANDSTONE - dark greenish-gray, medium grained, massive, two horizontal iron-stained fractures at 34.68' and 34.80'			
38					(SANDSTONE)	1765.9 38.2	38.2	

4" diameter Riser | Cement | Bentonite Seal | Cement/ Bentonite Grout

MALCOLM PIRNIE	TEST BORING LOG	BORING No. MW-13S
PROJECT SIDNEY LANDFILL	LOCATION SIDNEY, NEW YORK	SHEET 1 OF 4
CLIENT U.S. Environmental Protection Agency		PROJECT No. 8001-05-1
DRILLING CONTRACTOR HARDIN-HUBER, INC.		MEAS. PT. ELEV. 1983.02
PURPOSE MONITORING WELL		GROUND ELEV. 1981.5
WELL MATERIAL STAINLESS STEEL		DATUM U.S.G.S.
DRILLING METHOD(S) HSA, ROLLER BIT	SAMPLE / CORE / CASING	DATE STARTED 10/15/91
DRILL RIG TYPE	TYPE: SS / NA / STEEL	DATE FINISHED 10/17/91
GROUND WATER DEPTH	DIA.: 2" / NA / 6	DRILLER HARDIN-HUBER
MEASURING POINT	WEIGHT: 140 #	PIRNIE STAFF D. STREET
DATE OF MEASUREMENT	FALL: 30"	

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
0	S-1	5, 11, 21, 32	0.2		Moderate reddish-brown fine sand, silt and subangular gravel up to 1/4" in diameter, some clay.			Dry
2	S-2	16, 100	0.6		Light grayish-brown fine sand, silt and subangular gravel up to 1/2" in diameter, trace clay.			Dry
4	S-3	100	0.2		Light to dark grayish-brown fine sand, silt and subangular gravel up to 1/2" in diameter, trace clay.			Dry
6	S-4	100	–					No recovery
8	S-5	16, 100	0.3		Light to moderate gray angular to subangular gravel and rock chips (shale/siltstone), possible weathered bedrock.	1971.0 / 10.5		Dry
10	S-6	100	–					No recovery
12							13.0	
14							15.0	
16					SILTSTONE - mottled red and green, medium grained, one horizontal iron stained fracture at 16.3'	1965.2 / 16.3		
18					(SILTSTONE) SHALE - moderate red, massive, very fractured, 18 horizontal iron stained fractures, one high angle fracture at 17.6', one vertical fracture from 18.1 to 18.8'			RQD = 63%

4" diameter Riser | Cement | Bentonite Seal | Cement/ Bentonite Grout

MALCOLM PIRNIE	TEST BORING LOG	BORING No. MW-13S
PROJECT SIDNEY LANDFILL	LOCATION SIDNEY, NEW YORK	SHEET 2 OF 4
CLIENT U.S. Environmental Protection Agency		PROJECT No. 8001-05-1

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
22	RUN 1				SHALE - dark greenish-gray, massive, two horizontal iron stained fractures at 19.25' and 21.53', one vertical iron stained fracture from 19.95' to 20.70' (SANDSTONE)	1958.6 22.9		
24					SANDSTONE - light gray, medium grained, massive, few dark gray shale partings, one horizontal iron stained fracture at 24.05' (SANDSTONE)	1957.3 24.2 1956.0 24.9		
26					SHALE - light gray, massive, minor carbonized wood fragments, wet at 24.9' (SHALE)			RQD = 89%
28					SANDSTONE - light gray, thin shale interbeds (0.01" thick)	1953.7 27.8		
30	RUN 2				SANDSTONE - light gray, medium grained, some thin shale interbeds (0.01" thick) from 25.0-25.4" some thin carbonized wood seams (0.01" thick) with pyrite from 26.8-27.8', two horizontal iron stined fractures at 26.67' and 27.8' (SANDSTONE)	1953.1 28.4 1950.8 30.7		
32					SHALE - dark gray, massive, one horizontal iron stained fracture at 28.4' (SHALE)			
34					SANDSTONE - light gray, medium grained, some thin carbonized wood seams (<0.01" thick) and dark gray shale clasts (up to 0.02" thick) from 28.4' to 28.9', massive from 28.9' to 30.75', two horizontal iron stained fractures at 29.5' and 29.95', one vertical iron stained fracture from 29.5-29.95' with "halo" effect plus 0.01' on either side, clay filled, one high angle iron stained fracture at 30.0' (SANDSTONE)			RQD = 85%
36					SHALE - greenish-gray, massive, major iron stained fracture zone from 30.9-31.5'			
38					SHALE - moderate red, mottled from 32.5-33.2', one horizontal iron stained fracture at 34.9'			
40	RUN 3				SHALE - moderate to dark red, massive, occasional green shale clast from 39.0-40.0', very			
42								
44								

4" diameter Riser | Cement | Bentonite Seal | Cement/ Bentonite Grout

MALCOLM PIRNIE	TEST BORING LOG	BORING No. MW-13S
PROJECT SIDNEY LANDFILL	LOCATION SIDNEY, NEW YORK	SHEET 3 OF 4
NT U.S. Environmental Protection Agency		PROJECT No. 8001-05-1

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
					fractured, four horizontal iron stained fractures at 36.35', 36.6', 37.8' and 39.4', two vertical fractures from 39.9-40.7' and 42.4-43.15', one high angle iron stained fracture at 39.25'			RQD = 93%
48					SHALE - moderate to dark red, massive, occasional light green shale interbed (up to 0.1' thick), four horizontal iron stained fractures at 47.8', 48.15', 49.0' and 53.8'			
50	RUN 4							
52								
54								
56					SHALE - moderate red, massive, two horizontal iron stained fractures at 55.8' and 57.1'			
					SHALE - moderate red and green, mottled and interbedded (up to 0.4' thick), eight horizontal iron stained fractures at 57.6', 57.75', 57.95', 58.45', 60.25', 60.63' and 61.65'			RQD = 87%
58								
60	RUN 5							
62					(SHALE)	1918.9 62.6		
64					SANDSTONE - light grayish-green, medium grained, massive, one horizontal iron stained fracture at 62.55', one high angle iron stained fracture at 62.65'			
66					SANDSTONE - light to dark greenish-gray, medium grained, massive, two horizontal iron stained fractures at 65.3' and 65.45', two vertical iron stained fractures from 66.2-68.2' and from 67.4-68.7', two high angle iron stained fractures at 65.6' and 65.9'			RQD = 59%
68								
70	RUN 6				SANDSTONE - light gray, medium grained, massive, minor carbonized wood seams with pyrite, few dark gray shale shale clasts	1910.3 71.2		

4" diameter Riser | Cement | Bentonite Seal | Cement/ Bentonite Grout

MALCOLM PIRNIE	TEST BORING LOG	BORING No. MW-13S
PROJECT SIDNEY LANDFILL	LOCATION SIDNEY, NEW YORK	SHEET 4 OF 4
NT U.S. Environmental Protection Agency		PROJECT No. 8001-05-1

DEPTH	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
					(SANDSTONE)			
74					SHALE - dark gray, massive, some carbonized wood fragments SILSTONE - light to moderate gray, fine grained, very bioturbated, few dark gray shale clasts, two horizontal fractures at 72.48' and 74.85' (SILTSTONE)	1906.5 75.0		75.0

4" diameter Riser
Cement
Bentonite Seal
Cement/ Bentonite Grout

MALCOLM PIRNIE — TEST BORING LOG — BORING No. MW-16S

PROJECT	SIDNEY LANDFILL	LOCATION	SIDNEY, NEW YORK
CLIENT	U.S. Environmental Protection Agency		
DRILLING CONTRACTOR	HARDIN-HUBER, INC.		
PURPOSE	MONITORING WELL		
WELL MATERIAL	STAINLESS STEEL		
DRILLING METHOD(S)	HSA, NX CORE		
DRILL RIG TYPE			
GROUND WATER DEPTH			
MEASURING POINT			
DATE OF MEASUREMENT			

	SAMPLE	CORE	CASING
TYPE	SS	NX	STEEL
DIA.	2"	2.875	6
WEIGHT	140 #		
FALL	30"		

SHEET	1 OF 4
PROJECT No.	8001-05-1
MEAS. PT. ELEV.	1947.10
GROUND ELEV.	1945.7
DATUM	U.S.G.S.
DATE STARTED	10/24/91
DATE FINISHED	10/25/91
DRILLER	HARDIN-HUBER
PIRNIE STAFF	C. GAULE

DEPTH FT.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION (KEY - Color, Major, Minor Mositure, Etc.)	ELEV. / DEPTH	WELL Constr.	REMARKS
0	S-1	4, 11, 20, 39	0.4		Red-brown clayey silt, some coarse-medium-fine gravel, little coarse-medium-fine sand.			Moist
2	S-2	21, 22, 26, 100	0.4		Red-brown clayey silt, some medium-fine gravel, little medium fine sand.			Dry
4	S-3	100	--					
6	S-4	100	--					
8	S-5	12, 13, 18, 36	0.4		Red-brown clayey silt, some medium fine gravel; soil shows fine laminations and is fissile due to compaction.			Dry
10	S-6	19, 25, 48, 19	0.4		Red-brown clayey silt, medium-fine gravel			
12	S-7	100	--		Gray clayey silt, some medium fine gravel, little coarse sand; mottled red-brown.			Dry
14	S-8	100	--					
16	S-9	36	0.4		Red-brown clayey silt, medium fine gravel, little coarse sand.			Dry
18	S-10	100	0.4		Red-brown silt, medium fine gravel, little coarse-medium-fine sand.	1927.1 / 18.6		Dry Auger refusal

4 diameter Riser | Cement | Bentonite Seal | Cement/ Bentonite Grout

MALCOLM PIRNIE	TEST BORING LOG	BORING No. MW-16S
PROJECT SIDNEY LANDFILL	LOCATION SIDNEY, NEW YORK	SHEET 2 OF 4
NT U.S. Environmental Protection Agency		PROJECT No. 8001-05-1

DEPTH F.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. / DEPTH	WELL Constr.	REMARKS
22					Not Sampled		22.0	
24							25.0	
26	RUN 1				SANDSTONE - red-brown, med-fine grain, green mottling with vertical and subvertical iron stained fractures (SANDSTONE)	1919.8 25.9 1919.3 26.4		RQD = 81%
28					SILTSTONE - red-brown with horizontal fractures (SILTSTONE)			
30					SANDSTONE - red-brown, green mottling, siltstone layer and horizontal iron stained fracture			
32					SANDSTONE - gray-green, med-fine grain, red-brown mottling 28.4' subvertical iron stained fracture	1913.6 32.1		RQD = 92%
34	RUN 2				SANDSTONE - green-gray, med-fine grain, subvertical fracture SANDSTONE - gray-green, med-fine grain (SANDSTONE)	1911.6 34.1		
36					SILTSTONE - gray, horizontal fractures, grading to a med-fine sandstone with cross-bedding SILTSTONE - green-gray, very fine laminar partings and 45 degree fracture (SILTSTONE)			
38								
40					SANDSTONE - green-gray, fine grain, cross-bedding, numerous carbonized fragments			
42					SANDSTONE - gray-green, coarse-med fine grain, rip clasts and frequent carbonized fragments, clasts range from 0.01' to 0.20' in size 37.1' iron stained horizontal and vertical fracture			RQD = 83%
44	RUN 3				SANDSTONE - gray-green, fine grain, horizontal iron stained fracture which connects to vertical			

4 diameter Riser | Cement | Bentonite Seal | Cement/ Bentonite Grout

MALCOLM PIRNIE	TEST BORING LOG	BORING No. MW-16S
PROJECT SIDNEY LANDFILL	LOCATION SIDNEY, NEW YORK	SHEET 3 OF 4
IENT U.S. Environmental Protection Agency		PROJECT No. 8001-05-1

DEPTH FT	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
					iron iron stained fracture SANDSTONE - green-gray, fine grain, very fractured, iron stained			
48					SANDSTONE - gray-green to gray, fine grain, red-brown mottling SANDSTONE - gray, fine grain, iron stained horizontal fracture, clay filled fracture at 44.4'			
50					SANDSTONE - green-gray to gray, fine grain, cross-bedding			
52					SANDSTONE - green-gray, fine grain, cross-bedding			RQD = 100%
54	RUN 4							
56								
58					57.8' horizontal iron stained fracture 58.5' horizontal iron stained fracture			
60					SANDSTONE - green-gray, fine grain			
					(SANDSTONE)	1884.1 61.6		
62					SILTSTONE - green-gray, frequent fractures			RQD = 71%
					(SILTSTONE)	1881.8 63.9		
64	RUN 5				SANDSTONE - green-gray, med-fine grain, clay filled fracture 0.1' thick 65.5' fracture SANDSTONE - green-gray, med-fine grain, with black carbonized laminations 67.3' iron stained fracture			
66								
68					68.6' fracture			
70					66.9' fracture SANDSTONE - green-gray, med-fine grain, black carbonized laminations			

4 diameter Riser | Cement | Bentonite Seal | Cement/ Bentonite Grout

MALCOLM PIRNIE	TEST BORING LOG	BORING No. MW-16S
PROJECT SIDNEY LANDFILL	LOCATION SIDNEY, NEW YORK	SHEET 4 OF 4
'NT U.S. Environmental Protection Agency		PROJECT No. 8001-05-1

DEPTH F.	SAMPLE TYPE, RECOVERY, NUMBER	BLOWS ON SAMPLE SPOON PER 6"	PID	GRAPHIC LOG	GEOLOGIC DESCRIPTION KEY - Color, Major, Minor Mositure, Etc.	ELEV. DEPTH	WELL Constr.	REMARKS
								RQD = 95%
					(SANDSTONE)	1871.7		
74						74.0		
	RUN 6				SILTSTONE - green, carbonized and pyritized plant material	1870.6		
					(SILTSTONE)	75.1		
76					SANDSTONE - green, coarse to fine, rip clasts			
					SANDSTONE - green-gray, fine grain, iron stained horizontal fracture with vertical fracture			
78					SANDSTONE - green-gray, fine grained			
					(SANDSTONE)	1865.9		
						79.8		80.0
					SILTSTONE - gray, horizontally fractured, uneven ripple conntact	1865.7		
						80.0		

SECTION 02722

CULVERTS

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:
- A. Excavation, Backfill, and Compaction: Section 02221
- B. Erosion Control: Section 02271

1.02 DESCRIPTION OF WORK:
- A. Work Included: Provide and install corrugated metal pipe of the type(s), size(s) and in the location(s) shown on the Drawings and as specified herein.
- B. Work Not Included: Temporary drainage devices used by the Contractor for construction purposes.

1.03 QUALITY ASSURANCE:
- A. Standards:
  - 1. Bituminous Coated Corrugated Metal Pipe:
    - a. AASHTO M190, Type C.
    - b. AASHTO M36, Type I or II.
- B. Meanings: The word "steel" means either iron or steel.

1.05 DELIVERY, STORAGE AND HANDLING:
- A. Exercise care when handling corrugated metal pipe to prevent damage to pipe and finish.
- B. Immediately remove damaged materials and replace at no additional cost to the Owner.
- C. Store materials above ground on platforms, skids, or other adequate supports.

PART 2 - PRODUCTS

2.01 MATERIALS:
- A. Bituminous Coated Corrugated Culvert Pipe:
  - 1. Bituminous Coated Corrugated Steel Pipe and Pipe Arches and Coupling Bands: Conform to AASHTO M190, Type C and AASHTO M36, Type I or II for steel.
  - 2. Size and length as shown on Drawings and specified herein.

PART 3 - EXECUTION

3.01 INSTALLATION:
- A. Pipe:
  - 1. Accurately lay to the line and grades to the satisfaction of the Engineer.
  - 2. The line and grade may be adjusted by the Engineer from that shown on the Drawings to meet field conditions and no extra compensation shall be claimed therefore.

3. Ordinary Bedding: Prepare and shape the bottom of the trench to fit the lower 10 percent of the external height of the pipe with reasonable closeness and with uniform density and stability.
4. First Class Bedding: Bed the pipe on a carefully prepared bed of fine granular material, shaped by means of a template to fit the lower part of the pipe exterior for at least 15 percent of its external height.
5. Provide proper facilities for lowering the sections of pipe where pipe is to be placed.
6. Securely attach each section to the adjoining section by the approved method for the type of joint used.
7. Sections of Corrugated Metal: Join by enclosing joints with coupling bands of the same material as the pipe.

3.02 INSPECTION:

A. Pipe installation shall be subject to inspection by the Engineer for quality, adherence to line and grade, jointing, and proper backfill.

B. Any joint not satisfactory to the Engineer shall be removed and remade to his satisfaction at the Contractor's expense.

C. No pipe shall be backfilled until it has been approved by the Engineer.

END OF SECTION

SECTION 02776

HDPE GEOMEMBRANE

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Excavation, Backfill and Compaction: Section 02221

1.02 DESCRIPTION OF WORK:

A. Furnish all labor, materials, and equipment to install textured High Density Polyethylene (HDPE) geomembrane on the landfill surfaces and sideslopes in conformity with the Drawings and as specified in this section.

1.03 REFERENCES:

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. For all test methods specified, the most recent revision shall apply if different from that listed.

C. American Society for Testing and Materials (ASTM):

1. ASTM D 638-95, Test Method for Tensile Properties of Plastics.
2. ASTM D 746B-95, Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
3. ASTM D 751-95, Test Methods for Coated Fabrics.
4. ASTM D 792-91, Test Methods for Specific Gravity (Relative Density) of Plastics by Displacement.
5. ASTM D 1004-94a, Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
6. ASTM D 1204-94, Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
7. ASTM D 1505-90, Test Method for Density of Plastics by the Density-Gradient Technique.
8. ASTM D 1603-94, Test Method for Carbon Black in Olefin Plastics.
9. ASTM D 1693-95, Test Method for Environmental Stress-Cracking of Ethylene Plastics.
10. ASTM D 3015-95, Practice for Microscopical Examination of Pigment Dispersion in Plastic Compounds.
11. ASTM D 3083-89, Specification for Flexible Poly (Vinyl Chloride) Plastic Sheeting for Pond, Canal, and Reservoir Lining.
12. ASTM D 4437-84 (1988), Practice for Determining the Integrity of Field Seams Used in Joining Manufactured Flexible Polymeric Sheet Geomembranes.
13. ASTM D 5321-92, Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.

D. Federal Test Method Standard (FTMS)
   1. FTMS 101C, Method 2065, Puncture Resistance.

E. United States Environmental Protection Agency (USEPA)
   1. Technical Guidance Document: "Quality Assurance and Quality Control for Waste Containment Facilities." Sept. 1993.
   2. Technical Guidance Document: "Inspection Techniques for the Fabrication of Geomembrane Field Seams." May 1991.

1.04 SUBMITTALS:

The Contractor shall submit an overall plan to address the following requirements.

A. Manufacturer's Data:
   1. Experience information for approval before material shipment.
   2. Supplier's and manufacturer's certificates for approval before material shipment as specified in Quality Control in Part 1 of this Section.
   3. Shipment Warranty for approval before material shipment specified in Manufacturer's Warranty in Part 1 of this Section.
   4. Panel layout with seam locations and details for approval before material shipment.
   5. Quality control testing reports before material shipment as specified in Source Quality Control in Part 2 of this Section.
   6. Field Technical Service reports during installation and before acceptance as specified in Field Quality Control in Part 3 of this Section.

B. Installer's Data:
   1. Experience information for approval before material shipment.
   2. Description of seaming, seaming testing and repair procedures including cold/wet weather seaming procedures for approval before start of installation.
   3. Site preparation certificate before start of installation as specified in Quality Control in Part 1 of this Section.
   4. Warranty before acceptance of installed liner as specified in Manufacturer's Warranty in Part 1 of this Section.
   5. Delivery storage and handling of materials.
   6. Installer's procedures and criteria for existing site conditions.
   7. Protection of geomembrane after deployment and until acceptance of final QA/QC acceptance
   8. Procedures to address deployment to allow for thermal expansion and contraction of the sheet. Production fusion welding shall not be executed when expansion creates excessive wrinkling of the membranes.

C. Contractor Provided Third-Party Independent Geomembrane Testing Service:
   1. Experience information for approval before subcontracting.
   2. Proposed testing procedures for approval before testing.
   3. Survey documentation of completed geomembrane materials.
   4. Proposed documentation and cataloging procedures for daily documentation efforts.

1.05 QUALITY CONTROL:

A. Qualifications:
   1. Manufacturer's Experience:

a. Production and in service use of similar geomembrane materials for not less than 1 year.
b. At least 10 million square feet of HDPE geomembrane has been installed.

2. Installer's Experience:
a. Installation of at least 1 million square feet of HDPE geomembrane using dual hot wedge seaming methods by both company and its field representative.
b. Installation of pipe boots and other penetration fabrications on projects totaling at least 1 million square feet using extrusion welding by both the company and its boot specialists.

B. Certifications:
1. Resin suppliers to manufacturer shall certify resin used contains less than 2% clean recycled polymer by weight, a density between 0.93 to 0.95 g/cc and a melt index between 0.1 to 1.1 gram/10 min.
2. Manufacturer shall certify the geomembranes meet the specifications.
3. Installer shall certify site preparation is acceptable for geomembrane installation and warranty including the following issues:
a. Subgrade directional changes will not create sharp bends in the geomembrane.
b. Subgrade is adequately firm and dry to allow satisfactory seaming.
c. Subgrade surface is free of hard and sharp objects capable of damaging the liner.
d. Appropriate documentation will be provided for signing acceptance of daily deployment area by the Installer and earthworks Contractor. Previous days acceptance will be reapproved on subsequent work days.
4. Furnish test data that the specified geomembranes meet the frictional requirements listed in Table 02776-1.
5. Deployment will not proceed for any material product rolls delivered to the site for which manufacturers certification documents have not been received. Such roll or product will be culled from site inventory at the time of the Contractors subcontract CQA consultant performs delivery inventory and remain separate until such documentation is provided.

1.06 QUALITY ASSURANCE:
A. Contractor-Provided Geosynthetic Inspection and Testing (CQA Representative) Service.
1. The Contractor shall provide an independent third-party consultant to inspect placement of the geomembrane, obtain samples of the geomembranes for testing, perform quality assurance testing of the geomembranes, and to review the results of the quality control and quality assurance testing and survey services for the as-built documentation of the deployed liner material.
2. The Contractor shall provide assistance to the testing and inspection service which may include sampling geomembrane materials and providing split samples, when requested.

1.07 DELIVERY, STORAGE, AND HANDLING OF GEOMEMBRANE:
A. Using indelible marking, identify each roll with:
1. Name of manufacturer

2. Manufacturer's batch code/lot number
3. Physical dimensions (thickness, length, width)
4. Roll number.
5. Date of fabrication.
6. Directions for unrolling and unfolding.

B. Individually package and protect to prevent damage during shipment and storage.
1. Identify each package in the same fashion as the sheet within and show the date of shipment.

C. Storage:
1. Indoors: In original, unopened protective covering.
2. Outdoors:
a. Protected from direct sun rays.
b. Provide heat reflective opaque cover to create free flowing air space.
c. All site delivered material will be palletized and elevated from the subgrade to prevent exposure from precipitation and standing water.

1.08 PROJECT CONDITIONS:

A. Temperature Constraints:
1. Extrusion or Fusion Bonding of Field Seams:
a. Take ambient temperature readings at no longer than two-hour intervals, two inches above the liner, using thermocouples or other acceptable means.
b. If ambient temperature, as described above, is measured above 105°F, seaming shall proceed with increased caution because of difficult working conditions.
c. If ambient temperature, as described above, is measured between 105°F and 40°F, seaming may proceed without additional constraints.
d. If ambient temperature is below 40°F, additional constraints will be imposed in accordance with the approved cold weather procedures.
2. Cold Weather Seaming:
a. Submit for approval cold weather procedures for seaming when temperatures drop below 40°F or any time other than from April 15 to November 1.
b. Cold weather procedures shall include but not be limited to the following:
1) Preheating sheets
2) Providing liner protection with coverings and or tenting work areas will be a requirement during excessive cold weather seaming (below 32'F, during precipitation, or with areas of standing precipitation.
3) Changing test frequencies and thermal production weld rates.
4) Bridging
5) Increasing trial seam welding

B. Contractor-Provided Independent Geosynthetic Testing Service:
1. The Contractor shall provide an independent testing service to perform direct shear tests on both smooth and textured HDPE geomembrane to determine frictional properties.

2. The testing service shall show demonstrated experience in direct shear testing of HDPE geomembranes.
3. The testing service shall provide proposed method of performing direct shear interface testing. Testing requirements are provided in Paragraph 2.03.

1.09 MANUFACTURER'S WARRANTY:

A. Warrant that geomembranes shall be free from defect in materials for a period of 20 years from delivery date.
   1. Will not develop cracks or holes.
   2. Is immune to chemical attack and degradation by chemicals specified in the manufacturer's literature.

B. Should defects or service degradation occur during the 20 year warranty period, the manufacturer shall supply repair or replacement material or refund the pro-rata part of the unexpired term of the warranty at the then-current price.

C. Warranty shall continue in effect on the repaired or replaced material for the unelapsed term of the original warranty.

D. Owner will present in writing to manufacturer and Installer claim for alleged breach of warranty within 30 days after alleged defect is noticed.

1.10 INSTALLER'S WARRANTY:

A. Warrant HDPE Geomembrane, seams, boots, etc. for a period of (5) years to the owner against improper installation.

B. The warranty shall include timely repair or replacement of defective installation workmanship.

C. Owner will present in writing to manufacturer and Installer claim for alleged breach of warranty within 30 days after alleged defect is noticed.

PART 2 - PRODUCTS

2.01 MANUFACTURER:

A. HDPE geomembrane shall be manufactured by GSE Lining Technology Inc., 19103 Gundle Road, Houston, Texas; National Seal Co., 1245 Corporate Blvd. #300, Aurora, IL; or approved substitute.

2.02 HDPE GEOMEMBRANE:

A. Description:
   1. Polyethylene resin density between 0.93 and 0.95 g/cc.
   2. No additives, fillers or extenders unless otherwise specified.
   3. Two percent carbon black in resin for ultraviolet resistance.

B. Physical Characteristics:
   1. Physical properties required of the geomembranes are shown on Table 02776-1.
   2. The textured geomembrane shall be created by impingement to both sides of the geomembrane. Longitudinal edges of the sheet shall be non-textured 12 inches from edges to accomplish thickness measurements and field seaming.

C. Factory Bonded Seam:

1. Fabricate calendered sheeting into large sections by using one of the following seaming techniques:
   a. Hot air/hot wedge.
   b. Flat weld extrusion.
2. Seam strengths shall exhibit the same physical strength as the parent material.
3. Fabricated seams shall pass a 100 percent field vacuum test.

D. Extrusion Joining Resin:
1. Produced and certified by the manufacturer from the same batch material as the sheet resin.
2. Physical properties shall be the same as those of the resin used in the manufacture of the liner.
3. Weldment rod material shall be black in color. During deployment activities resin material shall not be left on the sheet over night exposed to the elements.
4. Color natural resin through addition of 2.0 to 3.5 percent master batch colorant before use.

2.03 GEOMEMBRANE DIRECT SHEAR TESTING:

A. Description:
1. Prior to construction and once soil materials have been selected from borrow studies, perform direct shear testing on geomembranes to determine interface friction values (degrees) between smooth or textured geomembranes and overlying or underlying soil or geotextile materials.
2. Both smooth and textured geomembranes shall be interfaced with the barrier protection soil.
3. Testing shall be performed in accordance with ASTM D 5321 using a 12 in. x 12 in. direct shear box. Testing shall be performed at normal loads between 1 and 5 psi.
4. A minimum of 3 tests per geomembrane per interface soil shall be performed (for a total of 6 tests).
5. Acceptance shall be based on meeting the minimum value listed in Table 02776-1.
6. Testing shall be conducted by the Contractor-Provided Independent Geosynthetic Testing Service.

2.04 OTHER MATERIALS:

A. Pipe Boots, Vents, Patches:
1. Same material and thickness as the geomembrane or a compatible approved equal.
2. Pipe boots shall be factory prefabricated whenever possible, field fabricated applications will be approved by the Engineer prior to deployment.
3. Pipe boots shall not be hydrostatically tested.

B. Mechanical Fastenings:
1. Material, size, and type as detailed on the Drawings or approved Shop Drawings.
2. Mechanical fastening on pipe boots shall be double stainless steel banded and filled with an approved pourable sealant or extruded to the pipe where possible.

2.05 SOURCE QUALITY CONTROL:

A. Manufacturer Testing:

1. Furnish factory quality control test data and certifications on rolls to be shipped with the shipment. Shipments received without certifications will be culled from inventory upon arrival at the site and will not be QA tested or sampled until certification is received. Trucks will be inventoried and rolls cataloged into inventory by the Contractors' CQA consultant upon arrival.
2. Furnish test data on fabricated seams.

2.06 SOURCE QUALITY ASSURANCE:

A. CQA Testing:

1. Rolls delivered to the site:

a. Prior to geomembrane installation the Contractor-Provided Independent Construction Quality Assurance (CQA) Representative shall obtain random samples 3 feet long by roll width from rolls at locations selected by the CQA Representative at a rate of one sample per 40,000 s.f. (or once per change in resin batches if resin change occurs within a 40,000 s.f. unit). Initial roll wrap circumference approximately six linear feet will be discarded unless rolls are shipped with UV protective covering. Samples are to be sent by the CQA Representative to the Contractor-Provided Independent Geosynthetic Testing Service to determine density, carbon black content, thickness and tensile characteristics. Testing shall be performed in accordance with the methods listed in Table 02776-1.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION:

A. Requirements:

1. Remove all sharp objects, debris or foreign matter, creating a smooth surface.
2. Slightly rounded corners shall be provided at directional changes in the area to be covered and in the anchor trench so as to avoid sharp bends in the geomembrane.
3. Surface must be free of standing water and in a dry condition.
4. Maintain surface requirements during geomembrane installation.
5. Ruts in the subgrade created by deployment equipment shall be raked smooth during deployment of sheet.

3.02 HANDLING AND PLACEMENT:

A. Requirements

1. Remove protective wrapping from rolls to be deployed only after subgrade has been approved by the Installer.
2. Geomembranes shall be deployed in strict accordance with good construction practice and in particular in such a manner as to prevent any damage to the material. Deployment shall be provided via tracked equipment to avoid compaction of the gas vent sand and resulting permeability.
3. If possible, actual placement shall proceed from the highest elevation to the lowest to facilitate drainage in the event of precipitation.
4. Methods of deployment shall consist of inserting a steel support pipe through the roll core. The slings or lifting chains shall be attached at one end to the support

pipe and at the other end to the bucket of a front end loader or lifting device. A spreader bar should be used to support and spread the slings. The core pipe and spreader bar shall not bend or flex excessively when a full roll is lifted.

5. The Contractor shall install in one day only the amount of geomembrane that can be 100 percent QA/QC inspected in the established destructive testing cycle. The geomembrane edges shall be left suitably covered and the sheet sand bagged at the end of the day to prevent blowout. Occurrences of blowout will be strictly the responsibility of the Contractor.

3.03 FIELD SEAMS:

A. Preparation:

1. Clean dust and dirt from areas to become seam interfaces. Blowers are acceptable for removal of grit. Hand wiping will be employed where runoff or adhered dirt is visible prior to welding activities.
2. For extrusion bonded seams, roughen slick sheet surfaces to become seam interfaces with a hand-held disk grinder.
   a. The grinder grit paper should be no coarser than #80 or finer than #100.
   b. Grinding depth must roughen membrane surface but must not exceed 10% of the membrane thickness.
   c. The grinder marks shall not appear beyond 1/8 inch on each side of the extrudate after seaming. Place cap strip or patch, over entire seam length where excessive grinding (>1/8 inch beyond weld or >10% of membrane thickness) occurs.
   d. Grinding shall not take place more than 10 minutes before placement of extrudate to prevent surface oxidation of the surface.
3. For hot wedge fusion-bonded seams, sheet surface should not be roughened by grinding or other means. Surfaces to be bonded must be clean and dry.
4. Sheet shall be dry. Seaming shall not occur over fully saturated subgrade soil without appropriate procedures and precautions, as the heat will draw water to the seam.
5. Ambient Temperature: See Article entitled Project Conditions in Part 1 of this Section.

B. Seaming Methods:

1. Make maximum use of large panels unless special requirements are necessary for liner configuration and termination.
2. To the maximum extent possible, field seams shall be made parallel to the slope (i.e., up and down) as opposed to horizontally along the slope. Where horizontal seams are necessary, the higher elevation membrane shall overlap the lower elevation membrane. The number of seams shall be minimized in corners and odd-shaped geometric locations.
3. Overlap adjacent sheets a minimum of 4 inches.
4. Use the following field seaming technique to seam geomembrane panels together:
   a. Dual Hot Wedge Fusion Bonding:
      1) Each seaming unit shall include a giving machine temperature at the metal surface.
      2) Maintain seaming unit at a recordable temperature determined by on-site conditions.

3) Seaming unit temperature shall not vary more than 50°F. above or below recommended temperatures.

4) Press geomembranes together mechanically.

5. Use the following seaming method for repairs or patches and in areas where use of the dual hot wedge is not feasible (e.g., pipe and manhole penetrations):

a. Extrusion Welding:

1) Soften liner material by heated air.

2) Air Temperature Impinging on Sheet: 420°F to 680°F.

3) Installation supervisor shall determine exact temperature used based on scrap welds.

4) Directly following heat application, extrude a 1½ inch minimum width resin strip between overlapped sheets. For flat welds and for flat fillet welds extrude a 1½-inch minimum width resin strip centered over the exposed overlap edge.

5) Extrusion Die Resin Temperature: 428°F to 536°F.

6) Firmly press overlapped sheets together by mechanical means to form the extrusion joint.

7) Technicians will use care to ensure purging of extrudate from welding extrusion tips prior to welding activity.

C. Seaming Wrinkles:

1. Cut fishmouths or wrinkles along the top ridge of the wrinkle, and overlap for a flat surface.
2. Seam the cut fishmouths or wrinkles where the overlap is greater than 3 inches.
3. Where the overlap is less than 3 inches, patch with oval or round patch extending a minimum of 6 inches in all directions.

D. Patching:

1. Use extrusion or fusion welding to bond materials.
2. Clean liner material of all dirt, dust and other foreign material.
3. Roughen smooth surfaces and heat material as required.
4. Cut patch in oval or round shape, extending a minimum of 6 inches beyond hole, in all directions.

E. Surface Dent or Manufacturing Imperfection:

1. Use an extrusion hand welder.
2. Clean liner material of all dirt, dust and other foreign material.
3. Roughen smooth surfaces and air heat to prescribed temperature.
4. Extrude a resin bead over the spot repair.

3.04 PIPE BOOTS, VENTS, AND PATCHES:

A. Construct as shown on Drawings and as recommended by manufacturer.

B. Use seaming techniques to the membrane as recommended by the manufacturer.

C. Install all devices to provide an effective, watertight seal.

3.05 MECHANICAL FASTENINGS:

A. Construct mechanical fastenings and sealing details as shown on Drawings, and as recommended by manufacturer.

B. Sealing Materials and Contact Adhesives:

1. Compatible with membrane and chemical environment of installation.

2. As recommended by manufacturer.

C. Install all devices to provide an effective watertight seal.

3.06 FIELD QUALITY CONTROL:

A. Manufacturer's Technical Service:

1. Provide geomembrane manufacturer technical representative at job site to ensure compliance with installation directions:

a. Pre-construction conference. To be attended by the HDPE geomembrane Manufacturer's Technical Service Representative.

b. When HDPE Geomembrane installation begins.

c. At substantial completion of the installation.

d. After written notification from the Engineer that installation is not in conformance with manufacturer's recommended procedures or specifications.

2. Technical representative shall:

a. Observe work.

b. Report in writing to Contractor and Engineer any unsatisfactory conditions or recommendations for improvement in procedures.

B. CQA Representative shall observe all installation of geomembrane and report progress to Engineer.

C. Tests:

1. Test Welds:

a. Run a test weld from each seaming machine a minimum of 3 times per day, at the beginning of the day, around mid-day, and near the end of the day. In addition, test welds shall be run when a new operator takes over or whenever the welding machines are shut off and allowed to cool down, or when machines are idle for more than 60 minutes. If the ambient temperature, as defined in Project Conditions, Part 1 of this Section, drops 20° or more in 2 hours, a test weld shall also be performed.

b. Test strip should be at least 48 in. for extrusion welds and 96 in. for hot wedge welds measured along the length of the seam and extended at least 6 in. on each side of the seam. Run test weld under the same conditions that exist for welding of the seam.

1) The test weld shall be cut in 14 in. coupons and be distributed to the following parties:

- to the Installer to perform field testing.
- to the CQA Representative for field testing/screening purposes.

2) Each sample coupon shall be marked with test weld date, ambient temperature, and welding machine number and initials of the weld technician.

3) For field testing/screening, a passing test weld for peel shall exhibit Film Tear Bond (FTB) with no brittle cracking and have a peel separation of 10% or less. The peel seam separation is the area of the seam separation expressed as a percentage of the original fused area.

4) For field testing/screening, a passing test weld for shear shall exhibit necking of the parent material prior to any necking or splitting of the weld.

2. Dual Hot Wedge Air Channel Seams:

a. The hot wedge develops 2 welds separated by an air channel. This channel will be used for air testing in both field seams and seams created during manufacturing. The first phase of the test shall be to establish continuity along the entire length of the seam. This will be done by sealing one end of the seam, inserting a manometer (consisting of a hollow needle, pressure gauge and air valve) into the air channel, and pumping air through the channel. The opposite end shall then be inspected for passage of air. Once continuity is established, the opposite end of the seam from the manometer shall be sealed and the channel shall be pumped to 30 psi. The initial start pressure is read once the air in the air channel has had a chance to stabilize at the ambient liner temperature (up to a 5 minute wait). Once the pressure has stabilized (no lower than 25 psi) the test can start. The pressure shall not drop more than 3 psi in 5 minutes. Any leaks found shall be repaired by extrusion welding and vacuum tested. The hole made by the manometer needle will be patched and the patch will be vacuum or spark tested.

b. If the air channel is found to be plugged during the continuity test, then the plug shall be located. The pressure test shall be conducted on each side of a plug. It may be necessary to cut away the plug and patch the area after the pressure test.

c. Subject to approval, those dual hot wedge seams not feasible for air pressure testing shall be 100% vacuum tested.

d. The Contractor shall provide at a minimum, two operational dual hot wedge welders with a third backup welder to be used only in emergencies.

3. Extrusion Seams (Flat Seams and Fillet Seams):

a. Vacuum Test: Perform vacuum test by experienced personnel using vacuum test box or other approved vacuum method where feasible along extrusion or fusion bonds (i.e., patches, pipe boots, etc.)

1) Spread soap solution over seam being tested, press vacuum box down and apply suction for 30 seconds.

2) When the vacuum box is moved along the seam during testing, maintain a 3 inch overlap with section tested.

3) The appearance of bubbles in rapid succession during the test is indicative of a leak.

4) Repair and retest structural faults in the welded seam.

4. Destructive Tests:

a. Samples:

1) Take random weld samples at locations selected by the CQA Representative at a frequency of 1 sample per 500 feet of welded seam, or at a minimum of 1 per seam for seams less than 500 feet, or at least one sample for each welding machine used on the project.

2) The test strip shall be cut in 14 in. coupons and be distributed to the following:
   - the Installer to perform Construction Quality Control (CQC) testing.
   - the CQA Representative for field testing/screening purposes and independent laboratory for testing.
   - the Department for archiving.

3) Each sample coupon shall be marked with date, location of sample, orientation with respect to machine direction, and welding machine number and initials of the weld technician.

b. Field Testing:

1) For field testing/screening, a passing test weld for peel shall exhibit Film Tear Bond (FTB) with no brittle cracking and have a peel separation of 10% or less. The peel seam separation is the area of the seam separation expressed as a percentage of the original fused area.

2) For field testing/screening, a passing test weld for shear shall exhibit FTB with necking of the parent material prior to any necking or splitting of the weld.

c. Patches and Repairs:

1) If the sample of the seam tested fails the criteria, cut samples 10 feet on both sides of failing sample. Send second sample to testing laboratory for analysis.

2) If the criteria is not achieved for the second samples, follow the same procedure outlined above until the entire area of inadequate seaming is identified.

3) Place a patch over the entire failed area of the seam.

4) All repairs require 100% passing by non-destructive vacuum box testing.

d. Visual Inspection:

1) Visually inspect all seams and geomembrane panels in-place for holes, blemishes, pores, penetrations or other detrimental defects.

3.07 FIELD QUALITY ASSURANCE:

A. Cooperation: Contractor shall cooperate with the efforts and schedules of the work performed by the CQA Representative.

B. The CQA Representative will:

1. Observe all non-destructive seam tests described under Field Quality Control.
2. Observe each roll of liner material for defects.
3. Review the manufacturer's quality control certificate for each roll delivered to the site.
4. Mark coupon locations for Contractor collection of samples, conduct field destructive testing of seam samples and forward passing samples to independent laboratory for testing. Perform air testing at boots.
5. Conduct photographic documentation of the geomembrane installation.
6. Keep a logical record of documentation of geomembrane installation. This will include panel placement log, seam testing and inspection log, and liner repair log.

C. Laboratory Testing:

1. From each 14 in. coupon submitted for destructive testing to the Contractor-Provided Independent Geosynthetic Testing Service, five shear tests and five peel tests will be run, each on a 1 in. strip of material. Shear tests will be ASTM D 4437, 6.3 or equivalent and peel tests will be ASTM D 4437, 6.2 or equivalent.
2. Seam samples submitted to the independent laboratory for testing shall conform to the pass/fail criteria for all peel and shear tests.
3. The shear strength (tensile strength) of 4 of the 5 specimens obtained from each sample shall be equal to or exceed 95% of the mean tensile stress at yield of the parent material.
4. The peel test of 4 of the 5 specimens obtained from each sample shall exhibit a Film Tear Bond (FTB) and have a peel seam separation of 10% or less. The peel seam separation is the area of the seam separation expressed as a percentage of the original fused area.

3.08 PROTECTION OF GEOMEMBRANE:

A. Vehicle traffic in direct contact with the installed geomembrane is not allowable and should be reported immediately to the CQA Representative.
B. Placement of soil above installed liner must be done so in a manner so as to not nick, cut, scrape, puncture or otherwise damage the geomembrane.
C. Reasonable care must be taken at all times to protect the geomembrane from any activity with potential to damage the installed geomembrane.
D. All damaged areas noted must be repaired and brought to the attention of the Engineer and the CQA Representative.

3.09 CLEANUP:

A. Dispose of all trash and waste off site in a manner acceptable to the Owner.
B. Remove all excess material and equipment.
C. Leave the premises in a neat and acceptable condition.

TABLE 02776-1

PHYSICAL PROPERTIES OF HDPE GEOMEMBRANE

PROPERTY	TEST METHOD	TEXTURED VALUE
Thickness (mil) - ave/min	ASTM D 751 (conical tip micrometer)	60/54
Minimum Tensile Properties (each direction)	ASTM D 638 Type IV Dumb-bell at 2 ipm	
1. Tensile Strength at Yield (lbs/in-width)		130
2. Tensile Strength at Break (lbs/in-width)		135
3. Elongation at Yield (%)		13
4. Elongation at Break (%)		200
Tear Resistance (minimum) (lbs)	ASTM D 1004	44
Puncture Resistance (minimum) (lbs)	FTMS 101C Method 2065	78
Density (g/cc)	ASTM D 792/ASTM D 1505	0.93-0.95
Dimensional Stability (%) (each direction)	ASTM D 1204 (100°C, 1 hr)	+/- 2
Low Temperature Brittleness (°F) (no failure to this temperature)	ASTM D 746 (Condition B)	-103°F
SEAM STRENGTH (lbs/in min.)		
Shear (fusion and extrusion)	ASTM D 4437	120
Peel (fusion)	ASTM D 4437	90
Peel (extrusion)	ASTM D 4437	78

TABLE 02776-1

PHYSICAL PROPERTIES OF HDPE GEOMEMBRANE

PROPERTY	TEST METHOD	TEXTURED VALUE
ENDURANCE PROPERTIES (minimums)		
Carbon Black Content (%)	ASTM D 1603, modified	2-3
Environment Stress Crack (minimum hours)	ASTM D 1693(B)	1500
Carbon Black Dispersion	ASTM D 3015	A2
FRICTIONAL RESISTANCE		
Interface with both the barrier protection soil and the gas collection sand, normal load of 2 to 5 psi (degrees, min.)	ASTM D5321[(1)]	26.5

Notes:
N/A = Not Applicable
[(1)] = 12 in. x 12 in. size Direct Shear Box

END OF SECTION

SECTION 02832

CHAIN LINK FENCES AND GATES - STEEL

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. Furnish and install new 6-foot-high galvanized steel fence and gates as shown on the Drawings.

1.02 REFERENCES:

A. Publications listed below form a part of this Specification to the extent referenced. Publications are referred to in text by the basic designation only.

B. Chain Link Fence Manufacturer's Institute (CLFMI):

1. Standard Guide for Metallic-Coated Steel Chain Link Fence & Fabric.

C. American Society of Testing and Materials (ASTM):

1. ASTM A 53-89a, Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.
2. ASTM A 123-89a, Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
3. ASTM A 153-82 (1987), Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A 392-89, Standard Specification for Zinc Coated Steel Chain-Link Fence Fabric.
5. ASTM C 33, Specification for Concrete Aggregates.
6. ASTM C 150, Specification for Portland Cement.

1.03 SUBMITTALS:

A. Product Data: For information only, submit manufacturer's technical data and installation instructions for steel fence.

B. Shop Drawings: Submit shop drawings, including plan layout and details illustrating fence height, location and sizes of posts, rails, braces, footings, hardware list, and erection procedures.

C. Submit name of Installer to Engineer for approval.

1.04 QUALITY ASSURANCE:

A. Standards of Manufacture: Comply with standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric" and as herein specified.

B. Provide each type of galvanized steel fence and gates as a complete unit produced by a single manufacturer, including necessary erection accessories, fittings and fastenings.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Pipe sizes indicated are commercial pipe sizes.

B. Tube sizes indicated are nominal outside dimension.

C. Roll-formed "C" section sizes are the nominal outside dimensions.

2.02 FINISH FOR FRAMEWORK AND APPURTENANCES:

A. Furnish the following finishes for steel framework and appurtenances.

1. Galvanized finish with not less than minimum weight of zinc per square foot, complying with the following.

a. Pipe: ASTM A 120 (1.8 ounces zinc per square foot).

b. Square Tubing: ASTM A 123 (2.0 ounces zinc per square foot).

c. C-sections: ASTM A 123 (2.0 ounces zinc per square foot).

d. Hardware and Accessories: ASTM A 153 zinc weight 1.2 ounce per square foot.

2.03 FABRIC:

A. Furnish chain link fabric 6 feet high as follows:

1. One-piece fabric widths, for fence heights up to 12 feet.

a. No. 9 gage (0.148 inch) wires.

b. 2 inch mesh.

c. Top salvages twisted and barbed and bottom salvage knuckled for fabric over 60 inches high.

d. Top and bottom salvages knuckled for fabric 60 inches high and under.

e. Top and bottom salvages knuckled for 1 3/4 inches and 1 inch fabric.

2. Galvanized finish with not less than 1.2 ounces zinc per square foot, complying with ASTM A 392, Class I.

2.04 POSTS, RAILS, AND BRACES:

A. End, Corner, and Pull Posts: Furnish end, corner, and pull posts of minimum sizes and weights as follows:

1. Up to 6 feet fabric height:

a. 2 inch schedule 40 galvanized steel pipe.

b. 2 inch square galvanized steel tubing with 1/8 inch wall thickness.

B. Gate Posts: Furnish gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows: 3 1/2-inch schedule 40 galvanized steel pipe.

C. Line Posts: Furnish line posts of minimum sizes and weights as follows: Space posts 10 feet on center maximum, unless otherwise indicated.

1. Up to 6 feet fabric height:

a. 1 1/2 inch schedule 40 galvanized steel pipe.

b. 1.875 inch by 1.625 inch roll-formed galvanized steel "C" section with 14 gage wall thickness.

D. Top Rail: Furnish top rails of the following:

1. 1 1/4 inch schedule 40 galvanized steel pipe.

2. 1.625 inch by 1.25 inch roll-formed galvanized "C" section with 14 gage wall thickness.
3. Furnish in manufacturer's longest lengths, with sleeved type couplings, approximately 6 inches long, for each joint.
4. Provide means for attaching top rail securely to each gate post.

E. Post Brace Assembly: Furnish bracing assemblies at end and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric.
1. Use 1 1/4 inch schedule 40 galvanized steel pipe for horizontal brace and 3/8 inch diameter galvanized steel rod with turnbuckle for diagonal truss.

F. Tension Wire: Furnish tension wire consisting of galvanized 7 gage coiled spring wire. Locate at bottom of fabric only.

G. Post Tops:
1. Pressed steel, cast iron, or cast aluminum, designed as a weathertight closure cap (for tubular posts).
2. Furnish one cap for each post unless equal protection is afforded by combination post top cap and barbed wire supporting arm, where barbed wire is required.
3. Furnish caps with openings to permit through passage of the top rail.

H. Stretcher Bars:
1. One piece lengths equal to full height of fabric, with a minimum cross-section of 3/16 inch by 3/4 inch.
2. Provide 1 galvanized stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into the post.

I. Stretcher Bar Bands:
1. Steel, wrought iron, or malleable iron, spaced not over 15 inches on center to secure stretcher bars to end, corner, pull, and gate posts.
2. Bands may also be used with special fittings for securing rails to end, corner, pull and gate posts.

2.05 GATES:

A. Frame: Fabricate gate perimeter frames of tubular members. Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space so that frame members are not more than 8 feet apart. Fabricate as follows: 1/2-inch schedule 40 galvanized pipe or 2-inch-square galvanized tubing with 12-gage wall thickness.

B. Gate Frame Assembly: Weld or use special malleable or pressed steel fittings and rivets for rigid connections. Use same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to gate frame at not more than 15 inch on center. Attach hardware with rivets or by other means which will provide security against removal or breakage.

C. Diagonal Cross-Bracing: Install diagonal cross-bracing consisting of 3/8 inch diameter adjustable length galvanized truss rods on gates where necessary to ensure frame rigidity without sag or twist.

2.06 GATE HARDWARE:

A. Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180-degree gate opening.

B. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

C. Keeper: Provide keeper for all vehicle gates which automatically engages gate leaf and holds it in the open position until manually released.

D. Double Gates: Provide gate stops for double gates consisting of mushroom type or flush plate with anchors. Set in concrete to engage center drop rod or plunger bar. Include locking device and padlock eyes as an integral part of latch, using one padlock for locking both gate leaves.

2.07 MISCELLANEOUS MATERIALS AND ACCESSORIES:

A. Wire Ties:

1. For Tying Fabric To:
   a. Line Posts: Use 9 gage wire ties spaced 12 inches on center.
   b. Rails and Braces: Use 9 gage wire ties spaced 24 inches on center.
   c. Tension Wire: Use 11 gage hog rings spaced 24 inches on center.
2. Finish of ties to match fabric finish.
3. Manufacturer's standard procedure will be accepted if of equal strength and durability.

B. Concrete:

1. Provide concrete consisting of portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and water from a portable water supply.
2. Mix materials to obtain concrete with a minimum 28 day compressive strength of 2500 psi, using at least 4 sacks of Type II cement per cubic yards, 1 inch maximum size aggregate, maximum 3 inch slump, and 2 percent to 4 percent entrained air.

C. Signs:

1. Provide 16-inch square warning signs to be mounted every 200 feet on all fence enclosures. Statement on each sign shall be provided by the Engineer.
2. Provide two –color laminated plastic sheets approximately 1/8-inch thick or 24 gauge metal.
3. Colors, letter styles and sizes to be selected by the Engineer from manufacturer's standards.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Examine conditions under which fence and gates are to be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of work.

B. Not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.02 INSTALLATION:

A. General:

1. Do not begin fence installation and erection before final grading is completed, with finish elevations established, unless otherwise permitted.

B. Excavation:
   1. Drill holes for post footings in firm, undisturbed or compacted soil.
   2. Unless otherwise indicated, excavate a 12 inch diameter hole with depths approximately 6 inches lower than post bottom, with bottom of posts set not less than 42 inches below surface for a 6-foot fabric height.
   3. Spread soil from excavations uniformly adjacent to fence line, or on adjacent areas of site, as directed.
   4. When solid rock is encountered near surface:
      a. Drill into rock at least 12 inches for line posts and at least 18 inches for end, pull, corner, and gate posts.
      b. Drill hole at least 1 inch greater diameter than largest dimension of post to be placed.
      c. If solid rock is below soil overburden, drill to full depth required, except penetration into rock need not exceed minimum depths specified above.

C. Setting Posts in Concrete:
   1. Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.
   2. Center and align posts in holes 6 inches above bottom of excavation.
   3. Place concrete around posts in a continuous pour, and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
   4. Trowel finish top of footings 6 inches below final grade, and slope or dome to direct water away from posts.
   5. Keep exposed concrete surfaces moist for at least 7 days after placement, or cure with membrane curing materials, or other acceptable curing method. Backfill over footings.
   6. Grout-in posts set into sleeved holes, concrete constructions, or rock excavations with non-shrink portland cement grout, or other acceptable grouting material.

D. Setting Posts in Ground:
   1. Drive post 48 inches below surface when in firm, undisturbed soil.
   2. Take appropriate measures to prevent top of post from damage during installation.
   3. If solid rock is encountered, see paragraph on excavation in this Article.

E. Concrete Strength:
   1. Allow concrete to attain at least 75 percent of its minimum 28 day compressive strength, but in no case sooner than 7 days after placement, before rails, tension wires, barbed wire, or fabric is installed.
   2. Do not stretch and tension fabric and wires until concrete has attained its full design strength.

F. Top Rails:
   1. Run rail continuously through post caps or extension arms, bending to radius for curved runs.
   2. Provide expansion couplings as recommended by fencing manufacturer.

G. Brace Assemblies:
   1. Install braces so posts are plumb when diagonal rod is under proper tension.

H. Tension Wire:
   1. Install tension wires by weaving through fabric and tying to each post with not less than 6 gage galvanized wire, or by securing wire to fabric.

I. Fabric:
   1. Leave approximately 2 inches between finish grade and bottom salvage, except where bottom of fabric extends into concrete.
   2. Pull fabric taut and tie to posts, rails, and tension wires.
   3. Install fabric on outside of fence, and anchor to framework so that fabric remains in tension after pulling force is released.

J. Repair damaged coatings in shop or during field erection by recoating with manufacturer's recommended repair compound, applied per manufacturer's directions.

K. . Stretcher Bars:
   1. Thread through or clamp to fabric 4 inches on center, and secure to posts with metal bands spaced 15 inches on center.

L. Gates:
   1. Install gates plumb, level, and secure for full opening without interference.
   2. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer.
   3. Adjust hardware for smooth operation and lubricate where necessary.

M. Tie Wires:
   1. Use U-shaped wire, conforming to diameter of pipe. Clasp pipe and fabric firmly with ends twisted at least 2 full turns.
   2. Bend ends of wire to minimize hazard to persons or clothing.

N. Fasteners:
   1. Install nuts for tension band and hardware bolts on side of fence opposite fabric side.
   2. Peen ends of bolts or score threads to prevent removal of nuts.

END OF SECTION

SECTION 02931

SEEDING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Erosion Control: Section 02271

B. Excavation, Backfill, and Compaction: Section 02221

1.02 DESCRIPTION:

A. Where indicated on the Drawings, provide seed as specified herein. Furnish and place lime, fertilizer, seed, and mulch in the areas indicated, and maintain new seeding through the contract maintenance period.

1.03 SUBMITTALS:

A. Grass Seed Vendor's Certificate: Contractor shall submit for approval by the Engineer the seed vendor's certified statement for the grass seed mixture required, showing common name, percentage of seed mix by weight, percentages of purity and germination, year of production, date of packaging, and location of packaging.

B. Fertilizer: Contractor shall submit for approval by the Engineer the fertilizer manufacturer's product data showing chemical analysis and percent composition.

C. Hydraulic Seeding Method:

1. If the Hydraulic Seeding Method is used: Submit a certified statement for approval to the Engineer as to the number of pounds of materials to be used per 100 gallons of water, and specify the number of square feet of seeding that can be covered with the quantity of solution in the hydroseeder.

PART 2 - PRODUCTS

2.01 MATERIALS: Obtain and retain as part of the project records, certifications, and/or labels of materials supplied.

A. Vegetative soil: See Section 02221, Excavation, Backfill, and Compaction.

B. Fertilizer:

1. NYSDOT Type No. 3: 10-6-4 grade containing at least 10 percent available nitrogen, 6 percent readily available phosphoric acid and 4 percent total available potash in conformity with the Standards of the Association of Official Agricultural Chemists.

2. Supply in unopened bags with the weight, contents and guaranteed analysis shown thereon or on a securely attached tag.

C. Lime: Ground limestone composed of not less than 88 percent calcium and magnesium carbonate; at least 60 percent shall pass a No. 100 mesh screen, 90 percent shall pass a No. 20 mesh screen.

D. Seed: Shall meet the minimum requirements approved by the Department of Seeds Investigations, New York State Agricultural Station, Geneva, New York.

1. The grass seed mixture shall include no "primary noxious weed seeds."
2. Furnish in fully-labeled, standard sealed containers.
3. Percentage and germination of each seed type in the mixture, purity, and weed seed content of the mixture shall be clearly stated on the label.
4. The weight of pure live seed (PLS) is computed by the labeled purity percent times the labeled germination percent times the weight.
   a. To illustrate the method of computing to PLS from the tag basis, the following example is given: Required: 20 pounds PLS of a particular variety--stock available is 99.41% pure and 92% germination--20 divided by the product of 0.9941 and 0.92 equals 21.8 pounds on the tag basis to furnish 20 pounds of PLS.
5. Subject to the testing provisions of the Association of Official Seed Analysis, with the month and year of test clearly stated on the label.
6. May be tested after it has been delivered to the project.
7. Seed which has become wet, moldy, or otherwise damaged will not be acceptable.
8. Use seed mixture as specified below:

Name	Wt. of Pure Live Seed/Acre
Red Fescue (Festiga Rubra)	50
Perennial Ryegrass (Lolium Perenne)	30
White Clover (Trifolium Repens)	5
Total	85

9. Other suitable seed mix is acceptable if approved by the Delaware County Soil and Water Conservation District and by the Engineer.
10. For temporary seeding requirements see Section 02271, Erosion Control.

E. Mulch:
   1. Wood Fiber - NYSDOT 713-11.
   2. Hay - NYSDOT 713-18.
   3. Straw - NYSDOT 713-19.

F. Erosion Control Matting: See Section 02271, Erosion Control for matting which may be used for mulching.

PART 3 - EXECUTION

3.01 PREPARATION:

A. All Areas to be Seeded:
   1. Shall be worked with a disk, harrow, dragged with a chain, mat or blade, machine-raked, or hand-worked as necessary to provide a reasonably firm but friable seedbed.
   2. Shall meet the specified grades and are free of growth and debris.
   3. Take care to prevent the formation of low places and pockets where water will stand.

B. Depth of Tillage:
   1. 2 inches or as directed by the Engineer.

2. On slopes steeper than 2:1, reduce depth of tillage as directed.

C. Where ryegrass has been planted for temporary erosion control and has not been eliminated prior to the completion of the work, disk at least 4 inches deep and seed to permanent grasses.

3.02 APPLICATION:

A. Topsoil: See Section 02221, Excavation, Backfill, and Compaction.

B. Fertilizer and Lime:

1. Apply by means of a mechanical spreader or other acceptable method which is capable of maintaining a uniform rate of application.
2. Conduct when the soil is in a moist condition and at least 24 hours before sowing the seed.
3. Fertilizer shall be applied at the rate based on the results of the Nutrient Analysis specified in Section 02221, "Excavation, Backfill, and Compaction," Subsection 2.03.

C. Seeding:

1. Perform erosion control items of work such as seeding and mulching upon completion of a unit or portion of the project.
2. When immediate protection of newly graded areas is necessary at a time which is outside of the normal seeding season, apply hay mulch with the seeding done at the same time or done later, or both, as ordered.
3. When immediate seeding is required on areas of the project which are not to be regraded or disturbed, use specified seed mixture.
4. Areas of the project which are to be left temporarily and which will be regraded or otherwise disturbed later during construction may be ordered to be seeded with winter ryegrass to obtain temporary control, spread at the rate of approximately 1 pound PLS per 1,000 square feet.
5. The Engineer reserves the right to prohibit the use of any equipment that is unsuitable or inadequate for the proper performance of the work; immediately remove all rejected equipment from the project.

D. Mulch:

1. Undertake immediately after each area has been properly prepared.
2. Apply hay that has been thoroughly fluffed at approximately, but not to exceed, 3 tons per acre unless ordered otherwise.
3. Blowing chopped mulch will be permitted when authorized.
4. Authorization will be given when it can be determined that the mulch fibers will be of such length and applied in such a manner that there will be a minimum amount of matting that would retard the growth of plants.
5. Hay mulch should cover the ground enough to shade it, but the mulch should not be so thick that a person standing cannot see ground through the mulch.
6. Remove matted mulch or bunches.
7. When specified, use asphalt emulsion as a tie-down, at a rate not less than 100 gallons per acre.
8. Dispose of all baling wire or rope outside the limits of the project in approved areas.

3.03 SEEDING SEASONS:

A. Conduct permanent seeding between May 15 and June 30, between August 15 and September 1, or as directed or permitted by the Engineer.

B. Do not seed during windy weather or when the ground is frozen, excessively wet, or otherwise untillable.

3.04 SEEDING METHODS: Fertilizer, limestone, mulch material if required, and seed of the type specified may be placed at the locations shown or ordered by one of the following methods, provided an even distribution is obtained. The maximum seeding depth shall be 1/4-inch when using methods other than hydroseeding.

A. Dry Method:

1. Power Equipment: Use mechanical seeders, seed drills, landscape seeders, cultipacker seeders, fertilizer spreaders, or other approved mechanical seeding equipment or attachments when seed, limestone, and fertilizer are to be applied in dry form.
2. Manual Equipment: On areas which are inaccessible to power equipment, permission may be given to use hand-operated mechanical equipment when the materials are to be applied in dry form. The use of hand shovels to spread the materials will not be allowed.
3. Do not mix limestone and fertilizer together prior to their application, but work into the soil together to the specified depth.
4. After seeding, compact the entire area by a suitable roller weighing 60 to 90 lbs. per lineal foot.
5. Allow at least 24 hours between fertilizing and seeding.
6. Unless otherwise ordered, mulch areas covered with seed.

B. Hydraulic Method:

1. The application of grass, seed, fertilizer, limestone, and a suitable mulch, if approved, may be accomplished in one operation by the use of an approved spraying machine.
2. Mix materials with water in the machine and keep in an agitated state in order that the materials may be uniformly suspended in the water.
3. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of limestone, fertilizer, and grass seed are equal in quantity to the required rates.
4. Flush and clean hydraulic seeding and fertilizing machine each day before seeding is to be started, and thoroughly flush of all residue after the completion of application on every 10 acres.
5. If the results of the spray operations are unsatisfactory, abandon this method and apply the materials by the dry method.
6. When inoculum is required, mix with the seed and spray.
7. Compaction or rolling not required.
8. Unless mulch material required is applied during the seeding operation or within 1/2 hour following the seeding operation, take measures to protect the seed from sunlight and heat such as the use of a light brush dragged over the seeded areas to stir the seed into the soil, taking care not to carry the seed ahead.

3.05 CARE AFTER SEEDING:

A. Protect and care for seeded areas until final acceptance of the work, and repair any damage to seeded areas caused by pedestrian or vehicular traffic or other causes, at the Contractor's expense.

B. If necessary, place barricades of brush or other materials and suitable signs to protect the seeded areas.

C. Apply water to maintain proper moisture to promote growth. Use approved water wagons or tanks or other approved devices to apply water in the form of a spray or sprinkle without erosive force. Apply water prior to 10:00 a.m. and after 4:00 p.m. to minimize losses due to evaporation.

D. Cut back weeds growing in seeded areas to prevent them from dominating the desired grass plants.

E. Hay mulch to be provided as described on the Drawings.

F. To be acceptable, a stand of grass shall show a reasonably thick, uniform stand, free from sizable areas of thin or bare spots, with a uniform count of at least 1000 plants of grass per square foot.

G. Reseed any parts of seeded areas which fail to show a uniform stand until all areas are covered with grass, at the Contractor's expense.

H. Maintenance Period:

1. This period shall extend for 90 days or until the turf has been mowed 3 times or until all work on the entire area has been completed and accepted.
2. In this time do all necessary mowing to keep the grass between 3 and 6 inches in height.
3. Acceptable grass areas shall have a coverage of not less than 80% of permanent grasses at the termination of the maintenance period.

END OF SECTION

SECTION 02990

HANDLING AND DISPOSAL OF CONTAMINATED MATERIAL

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

A. Summary of Work: Section 01010
B. Special Project Procedures: Section 01125
C. General Requirements, Safety, Health, and Emergency Response: Section 01620
D. Decontamination Procedures: Section 02021
E. Off-Site Transportation: Section 02081

1.02 DESCRIPTION:

A. This specification covers the Contractor's requirements for management of the materials, equipment, and personnel associated with the excavation, handling, and disposal of landfilled waste and contaminated soil and water. All activities conducted under this section shall be performed in strict accordance with the Contractor's approved Health and Safety Plan, as well as with other appropriate specification sections.

B. Work includes:

1. Excavation, relocation, and consolidation of landfilled wastes as shown on the Drawings to within the limits of the North Disposal Area prior to landfill cover construction.
2. Drums containing investigation-derived wastes (IDW) located within the onsite RI/FS staging areas shall be crushed and disposed within the limits of the North Disposal Area.
3. Excavation, handling, overpacking and staging of drums, if encountered within landfilled wastes.
4. Handling and disposal of soil and wash-down water from decontamination activities.

1.03 REFERENCES:

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

CODE OF FEDERAL REGULATIONS (CFR) CITATIONS

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 261	Identification and Listing of Hazardous Wastes
40 CFR 262	Generator Standards
40 CFR 263	Transporter Standards

40 CFR 264	TSDF Standards
40 CFR 268	RCRA Land Disposal Restrictions
40 CFR 270	Hazardous Waste Permit Program
49 CFR 171	General Information
49 CFR 172	Hazardous Materials
49 CFR 173	General Shipping Requirements
49 CFR 177	Transporter Requirements
49 CFR 178-79	Container Specifications
29 CFR 1910.1200	Hazard Communication Standard
29 CFR 1926	Construction Standards

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA/540/2-85/003	Dust Control at Hazardous Waste Sites (dated November 1985)
OSWER Directive 9834.11	Revised Procedures for Implementing Off-site Response Actions

AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)

Z 9.2-79	Fundamentals Governing the Design and Operation of Local Exhaust Systems
Z 88.2-80	Practices for Respiratory Protection

UNDERWRITERS LABORATORIES, INC. (UL)

586-85	High-Efficiency, Particulate, Air Filter Units

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

6 NYCRR Part 364	Waste Transporter Permits
6 NYCRR Part 371	Identification and Listing of Hazardous Wastes
6 NYCRR Part 372	Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities

1.04 DEFINITIONS:

A. Contaminated Materials Staging/Stockpile Area - A secure area within the limits of the Exclusion Zone used for storage of contaminated materials prior to removal of same from the project site.

B. Staging/Stockpile Area - The area of the site in which the Contractor stockpiles materials.

C. Hazardous Waste Manifest - A legal document used to track the generation, transport, and disposal of RCRA-hazardous waste materials in accordance with regulations specified in 40 CFR 262-263. The Hazardous waste manifest to be used shall be the Uniform Hazardous Waste manifest (EPA Form 8700-22, Rev. 9-88) or a NYSDEC hazardous waste manifest from the State of origin or the State where material is to be shipped.

D. NYSDEC - New York State Department of Environmental Conservation

E. TSDF - A treatment, storage, or disposal facility permitted to accept hazardous wastes in accordance with provisions of 40 CFR 264.

1.05 SUBMITTALS:

A. As part of the Work Plan described in Section 01125, Special Project Procedures, the Contractor shall describe the following procedures:

1. Method proposed in the excavation, handling, and consolidating landfill wastes and/or other contaminated materials that may be encountered. Those procedures should be in agreement with standard or method in the following Federal Code of Regulations: 29 CFR 1926.65, 40 CFR 261, and 49 CFR 172.
2. Proposed location(s) of site access points for construction vehicles.
3. Storage and security provisions for excavated materials.
4. Location of waste staging, storage areas, and stockpile areas.
5. Provisions for equipment and vehicle decontamination and minimization of off-site contamination.
6. The Contractor shall submit a list of TSDFs proposed for the disposal of all materials associated with this Contract. The list shall contain the address, telephone number and contact name for each facility. The Contractor shall provide written approval from each TSDF of its acceptance of materials from this Contract and written notice from each TSDF that it is in conformance with its operating permit.
7. Provide copies of the written notification to all rental companies concerning the intended use of rental equipment and the possibility of contamination of the equipment.
8. Submit a complete waste profile sheet and sample(s) of material to be shipped to the selected TSDF in accordance with the facility's requirements. These items shall be submitted in advance such that sufficient time is allowed for analysis, approval, and scheduling and the overall project schedule is not affected.
9. Submit written evidence including the name, address, and USEPA identification number, that the hazardous waste transporter and the TSDF are approved for hazardous waste transport-disposal by the USEPA and State or local regulatory agency(s) in accordance with provisions of 49 CFR 171-179, 40 CFR 262-264, and OSWER Directive 9834.11. Submit copy of the generator's copy of the hazardous waste manifests, certifying the amount of material delivered to the

TSDF within 6 days after delivery. Submit copies of the TSDF copy of hazardous waste manifests within 40 days of the date waste was transported from the site.

1.06 MATERIALS TO BE ENCOUNTERED:

A. The Sidney Landfill Site accepted municipal and industrial wastes during operation from 1967 to 1972. Contaminants that have been identified in the landfilled wastes included volatile organic compounds, PCBs, semivolatile organic compounds, and inorganics.

PART 2 - PRODUCTS

2.01 EQUIPMENT:

A. Personal Protective Equipment (PPE): The Contractor shall select all PPE in accordance with the approved Health and Safety Plan.

B. Tools: Remove all residual dirt and dust from reusable tools prior to storage or reuse.

C. Vehicle decontamination shall be performed in accordance with Section 02021.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS:

A. No on-site activities shall be permitted to start until the Contractor has received approval on the final Health and Safety Plan (HASP). Take all necessary precautions to adequately protect personnel and public and private property in the areas of work. Personnel shall wear and utilize protective clothing and equipment as specified in the approved HASP. Eating, smoking, or drinking shall not be permitted in the Exclusion and Contamination Reduction Zones as defined in 29 CFR 1910.120. Site work zones shall be clearly marked. If a contaminated material spill occurs outside of the Exclusion Zone, stop work immediately, notify the Engineer immediately, and correct the condition prior to resumption of work.

3.02 ESTABLISHMENT OF WORK ZONES:

A. Prior to commencing sampling activities, the Contractor shall conduct initial site inspections in accordance with provisions of the approved HASP. The Contractor shall locate and clearly delineate and mark in the field the Exclusion Zone, the Contamination Reduction Zone, and the Support Zone, as directed by the site Health and Safety Officer pursuant to health and safety considerations as identified in the approved HASP. The limit of the Exclusion Zone shall not be decreased to less than the outer limits of known contamination shown on the Contract Drawings without written approval from the Engineer.

3.03 PERMITS, STATE LICENSE, AND NOTIFICATIONS:

A. Obtain necessary permits and state license in conjunction with hazardous waste removal, hauling, and disposition, and furnish timely notification of such actions required by Federal, state, regional, and local authorities. Notify the Engineer in writing 3 days prior to the commencement of work.

3.04 VEHICULAR RESTRICTIONS:

A. All vehicles and equipment entering the Exclusion Zone shall be considered contaminated and shall not leave the Exclusion Zone without being properly decontaminated at the Decontamination Pad. Route traffic within the Exclusion Zone away from remediated areas to prevent recontaminating these areas.

3.05 LANDFILL WASTE, DRUMS, AND CONTAMINATED MATERIALS REMOVAL:

A. The Contractor shall implement the procedures for handling the drums and bulk containers in accordance with 29 CFR 1926.65 and as proposed in the Work Plan.

B. Excavated wastes from identified areas (white goods, or bottle and cans disposal areas) shall be placed within the limits of the North Disposal Area prior to landfill cover construction as shown on the Drawings. Additionally, during subgrade construction within the limits of each disposal area, some cutting and filling of wastes may occur.

D. Drum Handling:

1. The Contractor shall implement the procedures for handling the drums in bulk containers in accordance with 29 CFR 1926.65 and as proposed in the Work Plan.
2. The Contractor shall inspect each drum and bulk container to assure its integrity prior to being moved.
3. Labeling of drums and bulk containers shall be performed in accordance with 40 CFR 261, and 49 CFR 172 and as proposed in the Work Plan.

E. Existing Monitoring Wells - There are existing monitoring wells at the site as indicated on the Drawings. Any existing well(s) or other structure that is to remain and becomes damaged by the Contractor shall be replaced by the Contractor at no additional cost to the Owner.

F. RI/FS drums should be opened for confimation that they contain IDW. IDW containing drums shall be brought to the North Disposal Area for crushing and disposal prior to landfill subgrade development.

G. On-site Hauling - Construction equipment working in or entering the Exclusion Zone may not leave the Exclusion Zone until it has been decontaminated at the Decontamination Pad.

H. Contaminated Material Staging/Stockpile Area - Prior to any drum handling activities, the Contractor shall construct or expand staging/stockpile areas within the Exclusion Zone for storage of contaminated materials. This area shall be solely for storage of contaminated materials; uncontaminated materials shall be stored outside of the limits of the Exclusion Zone and Contamination Reduction Zone. All contaminated excavated materials shall be stored in this area.

I. Off-site Transport - All drums containing Contractor generated waste (PPE, decon water, and sediment) shall be transported and disposed at a licensed TSDF by the Contractor. The Contractor will not be responsible for off-site transport and disposal of drums encountered during excavation of landfilled wastes. Loading of off-site transport vehicles shall occur only in the area specified for this activity. The transport vehicles shall be equipped and permitted to carry hazardous material, and be placarded upon leaving the site. Offsite waste transport shall be in accordance with all relevant provisions of 40 CFR 263, 49 CFR 171-179, and 6 NYCRR Part 364 and Part 372. Following loading, the transport vehicle shall be decontaminated at the Decontamination Pad and immediately leave the job site. Loading equipment is considered contaminated and shall not leave the Exclusion Zone without first being decontaminated. Vehicles shall leave the site by the designated route.

3.06 CLEAN-UP AND DISPOSAL:

A. Housekeeping - Essential parts of dust control are housekeeping and cleanup procedures. Accumulations of dust in the Exclusion Zone shall be minimized. Meticulous attention shall be paid to restricting the spread of dust and debris; prevent waste from being distributed over the general area. Cleanup shall include loading of all debris in containers. Dispose of materials used for wiping, rinsing, and cleaning as hazardous waste.

B. Disposal of Contaminated Materials - Handling and disposal of contaminated material shall be in strict accordance with 40 CFR 160 and 268.

C. Construction-Generated Debris - Contaminated scrap, debris, bags, containers, disposable equipment, and contaminated clothing shall be treated as hazardous and disposed of in accordance with requirements outlined in 40 CFR 268.45. If disposed of off-site, place in containers approved for transportation of hazardous wastes. All contaminated materials that are to be removed as part of this Contract shall be disposed of at an EPA-approved TSDF and must follow all applicable Federal, state, and local regulations for transport and disposal. The Contractor shall be responsible for all aspects of the disposal of contaminated material. The Owner will be considered to be the Generator of all waste contaminated material. The Contractor shall prepare all required hazardous waste manifests and disposal documents for the transport and disposal of contaminated items produced as part of this Contract. These manifests and documents shall be submitted to the Engineer for Generator's signature. The Engineer must be notified by the Contractor two days prior to the shipping of any waste contaminated material from the project site.

D. Soil and water removed from decontamination pads shall be disposed of within the limits of a disposal area prior to landfill cover construction, see Section 02021, Decontamination Procedures.

E. Non-Contaminated Debris - All other non-contaminated debris shall be placed in approved Contractor furnished containers to prevent the spread and accumulation of dust and dirt. Non-contaminated debris shall be removed from the area as often as necessary, but not less than at least once at the end of each week. The non-contaminated debris shall not be disposed of in hazardous waste containers.

3.07 SITE RESTORATION:

A. Demolition of Decontamination Pad - Prior to demolition, the Engineer will verify that decontamination has been achieved. Following all decontamination activities, completely remove the decontamination facility. Resulting debris from demolition will be treated as contaminated waste and disposed of accordingly. Care shall be taken not to contaminate the site during decontamination, demolition, or disposal activities.

B. Removal of Control Structures - With approval of Engineer, remove drum staging materials and safety fence.

3.08 DEMOBILIZATION:

A. Shall include the following activities:

1. Decontamination and removal from site of all Contractor equipment and materials.
2. Collection and disposal of all Contractor generated contaminated materials for which decontamination is inappropriate.
3. Decontamination of site-dedicated equipment and facilities operated by the Contractor and removal from site of same.

4. Disconnection and removal of temporary utilities from the site.

END OF SECTION