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DELIVERY ORDER NO. 0068

WORK PLAN
SUPPLY SIDE LANDFILL CAP
NAVAL STATION GREAT LAKES
GREAT LAKES, ILLINOIS

PREPARED FOR

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
201 DECATUR AVENUE
GREAT LAKES, ILLINOIS 60088-5600

SUBMITTED
JUNE 2004

BY

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TOLTEST PROJECT NO. 73738.01

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TolTest, Inc. hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under this contract is complete, accurate, and complies with all requirements of the contract.

Prepared by: Jeffrey M. Tinney Date: 6/7/04
Jeff Tinney, Project Manager

Reviewed/Approved By: K. Mander Date: 6/7/04
Khushwant Mander, Senior Project Manager

TABLE OF CONTENTS

Section **Page No.**

List of Acronyms ..... **iii**

1.0 Introduction **1**

1.1 Background Information 1
1.2 Overview of Final Cover Construction 2
1.3 Final Cover Work Plan Organization 2
1.4 Project Organization 3
1.5 Schedule 3
1.6 Meetings and Reports 3
1.6.1 Preconstruction Meeting 3
1.6.2 Progress Meetings 4
1.6.3 Post-Construction Meetings 4
1.6.4 Daily Reports 4

2.0 Environmental Protection Requirements **5**

2.1 Spill Control Plan 5
2.1.1 Sources of Potential Spills 5
2.1.2 Spill Prevention Measures 5
2.1.3 Others 5
2.2 Spill and Discharge Response 5
2.3 Responsibilities and Communications 6
2.4 Spills and Discharges of Liquids 8
2.5 Dust Mitigation Plan 8
2.6 Decontamination Plan 9
2.6.1 Vehicles to be decontaminated 9
2.6.2 Decontamination methods 9
2.6.3 Decontamination Procedures 9
2.7 Stormwater Management 10
2.7.1 Care of Water 10

3.0 Pre-Mobilization Requirements **11**

3.1 Permitting 11
3.2 Preconstruction Survey 11
3.3 Health and Safety Plan 11
3.4 Site Security Plan 11
3.4.1 Personnel 11
3.4.2 Site Access 12
3.4.3 Site Security 12

TABLE OF CONTENTS (continued)

Section **Page No.**

4.0 Final Cover Construction Requirements 13

4.1 Landfill Gas Collection System 13
4.1.1 Perforated Pipe Laterals 13
4.1.2 Vent System 13
4.2 Final Cover 13
4.2.1 Borrow Soils 13
4.2.2 Subgrade Preparation 14
4.2.3 Low Permeability Soil 14
4.2.4 Topsoil 14
4.3 Additional Cover Features 15

5.0 Post Construction Requirements 16

5.1 Vegetative Cover 16
5.2 Erosion Control 16
5.3 Access Roads 16
5.4 Demobilization and Project Closeout 16
5.5 Project Documentation 16
5.5.1 Construction Surveys 16
5.5.2 Soil Testing 16

APPENDICES

Appendix A Project Plans
Appendix B Project Drawings
Appendix C Project Schedule
Appendix D Health and Safety Plan
Appendix E Stormwater Pollution Prevention Plan

LIST OF ACRONYMS

Versar	Versar, Inc.
FCC	Final Cover Construction
FCWP	Final Cover Work Plan
LFG	Landfill Gas
Navy	Department of the Navy
PPE	Personal protection equipment
TolTest	TolTest, Inc.

1.0 INTRODUCTION

This Final Cover Work Plan (FCWP) outlines the construction methods and procedures to be followed for the Final Cover Construction (FCC) at the Supply Side Landfill, Great Lakes, Illinois. The FCWP shall be used as a comprehensive reference document for the requirements of the various construction aspects of the FCC. It does not present all the details of the FCC requirements, but rather references the previously approved Plans and Drawings for the Supply Side Landfill FCC. Further details, as necessary, can be found in the referenced documents in each section of the FCWP. The plan has been prepared to be consistent with the documents in the FCWP References portion of this plan. Overall, this FCWP, including the Project Plans and Report and Drawings in **Appendix A and B**, respectively, form the comprehensive requirements for the FCC at the Supply Side Landfill.

All documents listed in the FCWP References and other documents that pertain to construction activities, including revisions to the documents, are to be maintained, used and followed as part of this FCC/FCWP. Unless noted specifically otherwise, the requirements of the Project Plans and Report (**Appendix A**) and Drawings (**Appendix B**) will govern the construction requirements.

1.1 Background Information

The Supply Landfill is a 18.0-acre, former Department of the Navy (Navy) base sanitary landfill. It is located within the Naval Station in Great Lakes, Illinois, approximately 40 miles north of Chicago, along the western shores of Lake Michigan. The site was used for a short period of time in the mid-1960s. In addition to typical sanitary landfill wastes, concrete and other demolition debris have been found during various construction activities in the area of the landfill.

Investigations were performed in 2001 to determine the presence of methane and volatile organic compounds in the landfill gas. In late 2002 and early 2003, an investigation was conducted to determine the thickness and properties of the existing soil cap and to collect samples of groundwater from the waste mass.

In August 2003, a Project Plan and Report Final Cover Study was prepared for the Navy by Versar, Inc. (Versar). This Report forms the basis for the construction requirements outlined herein.

The location of and the existing site plan for the Supply Side Landfill are shown on the drawings in **Appendix B**.

1.2 Overview of Final Cover Construction

The key elements of the FCC for the Supply Side Landfill include:

- Permitting;
- Installation of erosion control measures and site fencing;
- Installation of passive landfill gas collection system;
- Placing/compacting cover material;
- Placing topsoil and seeding;
- Long-term maintenance; and,
- Implementation of land use controls that allow for the future use of the open land space on the landfill surfaces while preventing potentially adverse/damaging activities and allowing unrestricted limited use of the adjacent areas.

1.3 Final Cover Work Plan Organization

The remainder of this FCWP is dedicated to organizing the requirements and presenting procedures to be followed during construction of the FCC at the Supply Side Landfill. The FCWP has been organized to present in a logical, chronological order, the requirements for the FCC beginning with Environmental Protection Requirements and Pre-Mobilization and ending with Post Construction.

The FCWP presents the required information in the following sections:

- **Section 2 - Environmental Protection Requirements** -This section defines the procedures to ensure adequate environmental protection from potential releases at the site during FCC construction, and includes the following plans:
  - Spill Control Plan
  - Dust Mitigation Plan
  - Decontamination Plan
  - Stormwater Management Plan
  - Erosion Control Plan
- **Section 3 - Pre-Mobilization Requirements** - The Pre-Mobilization Requirements define plans and procedures that need to be addressed prior to conducting the FCC on site, and include:
  - Permitting Plan
  - Pre-Construction Survey
  - Health and Safety Plan

- **Section 4 - Final Cover Construction Requirements** - The fieldwork associated with the construction activities is described in this section, which defines the requirements for the implementation of the FCC, and includes the following sections:
  - Landfill Gas Venting System
  - Final Cover
  - Additional Features
- **Section 5 - Post Construction Requirements** - Post construction requirements included in the FCC are as follows:
  - Site Restoration (finish grade, topsoil seeding, erosion control, and access road removal)
  - Post-Construction Survey
  - Demobilization and Project Closeout
  - Maintenance Plan

1.4 Project Organization

The TolTest, Inc. (TolTest) Project Manager, Mr. Jeff Tinney will be the day-to-day manager on site. The Project Manager will be on site regularly and will mange all aspects of the project, including regulatory, scheduling, construction, subcontract management, and Health and Safety. All other site personnel will report through the respective chain up to the Project Manager.

All Contractors employees on site have the authority to stop work if they feel there is a threat to worker safety or a potential negative impact to the environment.

1.5 Schedule

The anticipated schedule for construction of the FCC at the landfill is found in **Appendix C**. Further refinement of schedule will be an on-going process throughout construction, and updates to the schedule will be distributed to the project team on an as-needed basis.

1.6 Meetings and Reports

TolTest will provide the Navy with daily reports detailing the work activities performed. Minutes from any meeting regarding the FCC of the Supply Side Landfill will be developed by TolTest and provided to the Navy for review and approval.

1.6.1 Preconstruction Meeting

Prior to the field mobilization, and following Notice to Proceed, a preconstruction meeting will be held to discuss the major site construction activities, introduce the project team and coordinate administrative requirements. The meeting will be attended by Navy representatives, Versar, the

Navy's third party consultant, TolTest's Project Manager, and other project team members, as necessary. The meeting will be held at the site.

1.6.2 Progress Meetings

Progress meetings will be held as needed at the site during periods of major construction activities. Meetings will be attended by the Navy representatives, Versar representatives, TolTest's Project Manager, major Subcontractors, vendor representatives, and other project team members as necessary. The purpose of the meetings will be to update all parties on the progress of the work, review schedule and upcoming tasks, and to discuss issues relative to the work.

An agenda will be prepared for the meetings by TolTest, and TolTest will preside at meetings, record the minutes, and reproduce and distribute copies of minutes to the meeting participants. The minutes will also be distributed to parties affected by decisions made at the meeting.

1.6.3 Post-Construction Meetings

Following substantial completion of the construction activities, a pre-final inspection and final inspection meeting will be held to review the status of the construction, and perform a final inspection for acceptance of the installed facilities. The pre-final inspection will be held following installation of the majority of the equipment and facilities. A punch list will be developed and documented for resolution of incomplete items, items that need repair, or items that need replacement. Following completion of the punch list items, the final inspection meeting will be held and by that time, the construction activities will be verified as complete.

1.6.4 Daily Reports

Daily reports will be prepared that summarize the field activities being performed. A list of all on-site personnel, equipment list, materials, etc. will be included in each report. The report will also provide a description of any problems, the corrective actions taken, and the effectiveness of the corrective actions. The TolTest Project Manager will be responsible for the preparation of the report, and will sign and submit the report at the end of each day. The report will be provided directly to the Navy.

2.0 ENVIRONMENTAL PROTECTION REQUIREMENTS

2.1 Spill Control Plan

The Spill Control Plan summarizes spill and discharge control procedures and methods for construction activities associated with the FCC at the Supply Side Landfill, Great Lakes, Illinois.

2.1.1 Sources of Potential Spills

Most fueling and routine maintenance of construction equipment (excavators, dozers, loaders, off road trucks, compaction equipment, etc.) will be performed at the site. On-site equipment may be fueled directly from fuel delivery trucks that visit the site on an on-call basis during periods when fewer pieces of equipment are required for the work.

2.1.2 Spill Prevention Measures

All fueling of the mobile construction equipment will be at the fuel delivery trucks. Spill containment and control measures will be provided at the tanks. The measures will include, but not necessarily be limited to, storing shovels, sorbent pads, plastic bags, buckets, drip pans, and other similar material at the tank locations for use in containing any minor spills that may occur. Any equipment leaking or spitting fuel will be removed from the site or fixed prior to further work.

2.1.3 Others

Liquids and solid chemicals that may be used at the site or for other reasons, will be transported, stored, and handled following the manufacturer's recommendations and applicable regulations.

2.2 Spill and Discharge Response

Spills are generally defined as incidental spills or emergency spills under 29 CFR 1910.120 as follows:

- Incidental Spills – Leaks, spills or discharges that can be safely absorbed, neutralized or otherwise controlled by employees in the immediate release area
- Emergency spills – Leaks spills or discharges that require a response effort by employees from outside the immediate release area or by other designated responders (HAZMAT Team)

The definitions are based on hazards to workers responding to and/or cleaning up the spill.

Sources of potential spills anticipated at the site should result in incidental spills under the above definitions. The following discussions of spill and discharge response procedures are for incidental spills.

2.3 Responsibilities and Communications

All site workers are responsible for conducting their assigned duties in a manner that will prevent spills. The Project Manager, Health and Safety Officer, and Supervisor will be responsible to instruct and train each worker to the specific duties the worker should perform to prevent spills and discharges, and will be responsible to monitor worker performance and site conditions to reduce the chances of spills and discharges.

The person discovering a spill or discharge, will take such immediate actions that can be safely made to stop the spill or discharge. Persons near the spill or discharge will be warned. No actions will be made that will jeopardize the workers safety. That person will then notify the appropriate supervisor (Supervisor, Project Manager, Health and Safety Officer), who will arrange for further notifications and will assist in evaluating the spill or discharge and remedial actions. Individuals and agencies to be notified, and the timing of further notifications will depend on the type and location of the spill or discharge. All notifications should be made in a timely manner. Ultimately, the Project Manager, Health and Safety Officer, and Supervisor are to be informed.

In the event of an emergency spill, as previously defined, the Navy will be immediately contacted. If regulatory investigations are warranted, the Navy will conduct them.

The following information should be included in spill or discharge incident notifications:

- The name of the person making the notification
- Facility name, location of spill, and phone number
- A brief description of incident and time discovered
- Material(s) spilled, source, and approximate quantity
- Areas affected
- Possible hazards to human health or the environment
- Weather conditions

Table 2.1 Emergency Phone Numbers

Fire Department	(847) 688-3333
Police Department	(847) 688-3333
Emergency Medical Services	(847) 688-3333
Poison Control Center	(404) 588-4400
Blayne Kirsch, Navy Technical Representative – Cell Phone	(847) 774-8585
Blayne Kirsch, Navy Technical Representative – Home Phone	(262) 862-7226
Steve Nichols, Navy Project Manager – Cell Phone	(847) 366-7328
Steve Nichols, Navy Project Manager – Office Phone	(847) 688-2600 X 481
Jeff Tinney, TolTest Project Manager – Cell Phone	(847) 812-8200
Jeff Tinney, TolTest Project Manager – Home Phone	(847) 223-8183
CHEMTREC	(800) 424-9300
National Response Center	(800) 424-8802
National Poison Control Center	(800) 362-9922
Federal Emergency Management Agency	(202) 646-2400
Centers for Disease Control	(404) 488-4100
United States Coast Guard	(804) 441-3516
AT&F (Explosives Information)	(800) 424-9555
TolTest Environmental Services, Inc.	(847) 689-0697
US Environmental Protection Agency, Region V	(312) 886-4843
Illinois Environmental Protection Agency	(217) 557-8155

In the event that the spill or discharge is reportable under local, state, or federal laws, the Project Manager will prepare a detailed incident report which describes events that lead to the spill or discharge, corrective actions taken to contain and remove materials, decontamination procedures utilized, and any follow-up actions taken. A copy of the report will be provided to the Navy and will be maintained as part of the site records.

An assessment will be made of all spills and discharges to determine the source of material spilled or discharged, proper actions to be taken to stop or control the spill or discharge, methods to reducing hazards, and actions to remediate affected areas. The detail of the assessment and the type of actions to be taken will vary depending on the severity of the spill.

2.4 Spills and Discharges of Liquids

The actions and procedures of this plan will be started upon the discovery of any spill or discharge. Immediate actions will be taken to locate the source of any petroleum product spills and to stop the flow of the product. The following measures are among those that will be used to stop the spills and discharges:

- Isolate Source of spill
- Stop the flow of the liquids by closing valves, shutting off pumps, isolating plugs, and /or other appropriate methods

Possible ignition sources, including motors, electrical equipment, electrical circuits, open flames, and other possible sources of sparks or fire will be shut off, as appropriate. Remedial measures to mitigate the affects of spills and discharges will be started after stopping the source of the spill and discharge and taking the appropriate safety measures. The remedial measures used will be developed based on the liquids spilled or discharged. Measures will be implemented to contain the spill or discharge to as small of an area as practical. Earth berms or absorbent booms may be used to temporarily contain the spills of discharges.

All petroleum product spills that occur will be contained and collected, regardless of their source or size. That includes containing spills that may result from broken or damaged hydraulic hoses on construction equipment. Free liquids will be collected using buckets and/or sorbent materials. All soils contaminated by the petroleum product spills will be excavated and placed into buckets, bags or sacks or other appropriate containers for temporary on-site storage and eventual off-site disposal at an approved disposal facility.

2.5 Dust Mitigation Plan

This Dust Mitigation Plan summarizes dust control procedures for construction activities associated with the FCC at the Supply Side Landfill, Great Lakes, Illinois.

The following methods will be used to control dust during construction activities at the site:

- The work will be planned and conducted to reduce the size and number of areas being actively worked.
- Roads and work areas will be sprinkled with water, as required, to prevent excessive dust.
- Construction vehicles will be cleaned, as needed, before they are driven on to Great Lakes streets from work areas.
- Vehicles will not be permitted from work areas onto Great Lakes streets when the work areas are wet and muddy to prohibit tracking excessive soil materials onto the streets.

Water used for dust control will be from the Great Lakes fire water system. Water will be sprinkled or sprayed using hoses and/or equipment such as water trucks. The rate of water application will be controlled to provide complete coverage and to avoid creating overly wet, muddy conditions and runoff.

Dust monitoring as specified in the HASP will document the dust levels at the work area as well as at the perimeter fence.

2.6 Decontamination Plan

The Decontamination Plan summarizes vehicle and equipment decontamination procedures for constructions activities associated with the FCC at the Supply Side Landfill, Great Lakes, Illinois.

2.6.1 Vehicles to be decontaminated

Construction activities that are currently identified to require decontamination are excavation of passive landfill gas vent pipe trenches. The methods discussed in this plan are to be used for cleaning vehicles used in these activities.

Other planned construction activities do not appear to involve industrial hygiene concerns that require decontamination of equipment used to perform the work. If activities are later determined to require vehicle decontamination, specific vehicle decontamination procedures for those vehicles will be developed.

2.6.2 Decontamination methods

The construction equipment used for the passive vent pipe trench construction will be washed on a temporary decontamination pad set up on the surface of the Supply Side Landfill.

Areas with a slight slope that will allow drainage across the pads will be selected for the locations of the temporary decontamination pads. Some fill placement and/or excavation of the subgrade may be used to grade the selected site to drain. Maximum depths of fill or excavation will be about one foot. Sticks, rocks, sharp vegetation, and other items that could puncture the geomembrane material to be used to cover the area will be removed from the subgrade. The area to be prepared will be sized to be sufficient to contain the largest vehicle to be washed.

The area to be used for the decontamination pad will be enclosed by a soil berm, rock cribbing, sand bags or similar materials of sufficient height to retain wash water within the enclosed area and to create a sump at the low end of the area from which wash water can be pumped. The enclosed area will then be lined with a heavy geomembrane material. The geomembrane lining will extend over the berm or enclosure materials and will be anchored in place using sand bags or other appropriate methods.

2.6.3 Decontamination Procedures

The excavators (backhoes), off-road trucks, dozers, track loaders, or other construction vehicles used to excavate, haul and/or spread soil from the landfill gas trenches will be cleaned at the work areas before moving the vehicles to the temporary decontamination pads. All pieces of waste debris and large soil clumps will be removed from the equipment parts of the equipment that are contaminated using shovels and pry bars. To the extent practical, soils caught in the

equipment wheels and undercarriage will also be removed, if they have contacted contaminated material. Removing the soil will reduce the amount of water required to wash the vehicles and the quantity of sediments produced when the vehicles are washed.

Soils and trash removed from the vehicles used for the trash excavation work will be collected and spread over the landfills.

2.7 Stormwater Management

Stormwater management practices implemented at the Naval Station Great Lakes in conjunction with the FCC will be in accordance with the provisions of the Stormwater Pollution Prevention Plan (**Appendix E**) of this Supply Side Landfill Final Cover Work Plan. Prior to initiation of construction activities, the site will be assessed to identify surface water run-on and run-off routes. Stormwater management facilities and Best Management Practices required at the site is also included in the **Appendix E** Stormwater Pollution Prevention Plan.

2.7.1 Care of Water

All water from construction areas including groundwater and precipitation runoff will be controlled and handled using ditches, basins, sumps, site grading, silt fences, straw bales, pumps, tanks, and other similar devices to divert, collect and remove it from work areas. To the extent practical, runoff across areas not disturbed by construction will be diverted around construction area, and runoff from undisturbed areas and construction areas will not be allowed to intermingle.

Water from undisturbed areas (existing grassed and paved areas) and water from areas disturbed by construction (exposed earth, etc.) will be controlled to reduce intermingling of those waters. All runoff water (from disturbed areas) will be temporarily detained to allow sediments to settle. Discharge of site runoff water will be at locations and by methods approved by the Project Manager.

Drainage features will be constructed to have sufficient capacity to provide for continuous removal of water so that flooding of work areas does not occur. The features will be so arranged to avoid degradation of the ground surface around construction areas.

3.0 PRE-MOBILIZATION REQUIREMENTS

3.1 Permitting

This section describes the permits and other regulatory requirements that potentially apply to the implementation of the FCC for the Supply Side Landfill.

The selected site remedy for the Supply Side Landfill will be accomplished on Federally owned properties, thus is it not anticipated that permits and requirements under county and city ordinances, related to construction and site development activities, will be required.

3.2 Preconstruction Survey

TolTest will have an Illinois licensed land surveyor perform a site wide survey to document preconstruction grading, and layout the construction staking. The Contractor will be responsible to protect the original stakes or replace any markers removed. The preconstruction survey will serve to verify the existing conditions, and establish a 100-foot grid, beginning at the southwest corner of the site. TolTest's surveyor will return to the Site as needed throughout construction, to document grading, pipe placement, and elevations.

3.3 Health and Safety Plan

The comprehensive set of health and safety concerns and documentation forms are located in the Health and Safety Plan prepared by TolTest and contained in **Appendix D** to this Plan. This document describes the health and safety guidelines developed for performance of all activities of the FCC. The plan is designed to provide measures necessary to protect on-site personnel, visitors, and the public from physical harm and exposure to the work to be conducted. Where appropriate, specific Occupational Safety and Health Administration (OSHA), Environmental Protection Agency standards and the United States Army Corps of Engineers Safety manual 385-1 are cited and applied to the Health and Safety Plan.

3.4 Site Security Plan

This plan summarizes security procedures and methods for construction activities associated with the FCC at the Supply Side Landfill, Great Lakes, Illinois.

3.4.1 Personnel

A list of employees authorized to work at the site will be maintained at the site office. The list will include the names of each employee and their work classification. The list will also summarize employee training (health and safety, first aid, respirator fit tests, etc.) relative to the work to be performed. Only those employees on the list will be allowed on-site.

3.4.2 Site Access

All personnel will report to a staging area at the start of each work shift. The Project Manager and crew foremen will assemble the work crews, prepare a daily log with the names of the personnel on each crew, and will arrange for transportation of the crews to their work areas. No personal vehicles will be allowed on the site.

No employees will be allowed on the site unless they have the minimum level of personal protective equipment (PPE - hard hat, safety glasses, steel-toed boots, and safety vest). No personnel will be allowed to enter or work in an area requiring special training or upgraded levels of PPE unless they have that training and the additional PPE is available at the work area.

The Supervisor will arrange for transportation of employees from the work site to the staging area at the end of the work shifts. If the employee needs to leave the work site early, the employee will report to the Supervisor, who will then transport the employee to the staging area. The crew foremen will include when each employee leaves the site on the daily log.

All visitors will be briefed with respect to site safety and hazards before being allowed on the site. All visitors will be required to wear the minimum level of PPE (hard hat, safety glasses, steel-toed boots, and safety vest) when on-site. Visitor access to work areas requiring special training or upgraded levels of PPE will not be allowed unless the visitors have the required training, provided documentation of that training, and have read site-specific Health and Safety Plan. Unescorted visitors will not be allowed on-site. A log of visitors on the site will be maintained. The log will include the time of entry and exit from the site.

Unauthorized personnel and vehicles will not be allowed on the site. All employees will be instructed to report to a supervisor if they notice any unknown person or vehicle on the site. The Supervisor will determine if the unknown person of vehicle is authorized to be on the site. If not, the Supervisor will escort the person and vehicle from the site.

3.4.3 Site Security

Signs will be placed on the existing fencing around the Supply Side Landfill indicating the area is a construction area and that unauthorized access is prohibited. The signs will also direct visitors to the site office.

Access to the site will be controlled as previously discussed. Access into specific work areas will also be controlled following requirements detailed in the site-specific Health and Safety Plan.

All equipment and site offices will be secured and locked at the end of each working shift. Fuel oil tanks, water tanks, etc. will also be secured and locked when not in use and when construction personnel are not at the site.

4.0 FINAL COVER CONSTRUCTION REQUIREMENTS

Following site preparation, the final cover will be constructed at the site. The final cover construction will consist of the following tasks: clearing and grubbing, scarification and grading, landfill gas trenching and pipe installation, placement and compaction of clay cover, placement of topsoil and seed, and construction of additional cover features. The following sections describe these components in detail.

4.1 Landfill Gas Collection System

The landfill gas (LFG) produced within the landfills will be controlled by installing a passive LFG collection and venting system. The components of the LFG system will include a network of perforated shallow pipe laterals and a wind-powered turbine ventilator cap.

4.1.1 Perforated Pipe Laterals

Prior to placement of final cover, perforated shallow pipe laterals and transport piping will need to be installed. Perforated pipe will be constructed of corrugated and perforated HDPE pipe. Perforated pipe laterals will be installed in trenches through the existing soil cover and waste mass layers and backfilled with pea gravel (ASTM size #6) and 6 inches of clay, as shown in the Project Drawings. LFG pipe headers will be constructed of 6-inch diameter solid wall HDPE piping. The header piping will be installed in trenches of varying depth and backfilled with sand and excavated trench material. Details of the LFG pipe laterals and headers are shown on Drawing No. 14.

4.1.2 Vent System

A stack-type vent with a turbine ventilator will be installed. Under any wind, the ventilator will induce a small vacuum in the pipe laterals and header.

4.2 Final Cover

Cover placement will include the following:

- Clearing, grubbing, and scarification of existing soil
- Placement and compaction of low permeability fill
- Placement of topsoil and seeding

In order to prepare the landfills areas for cover placement, a number of other earthwork tasks will be necessary. Borrow of soils and subgrade preparation are all to be implemented prior to or during the construction of the caps.

4.2.1 Borrow Soils

The soil components of the cover construction will require suitable borrow soils. Soils capable of providing the necessary stability for each layer will be imported from an off-Site source. The

borrow source(s) soils will be utilized to provide the low permeability cover and topsoil necessary to complete the landfill cover.

Clay borrow sources will be tested by a geotechnical laboratory to determine if the soil is appropriate to use as landfill cover material.

Suitability of potential borrow sources will be evaluated during excavation activities and prior to construction of the landfill caps. Off-site borrow soils used will have properties that meet the selection criteria listed in the Project Plans.

4.2.2 Subgrade Preparation

Existing soils within the Supply Side Landfill footprint will be lightly graded to promote positive surface water drainage prior to engineered cover construction. In addition, the areas surrounding landfill will be graded, where necessary, to improve stormwater control. Following grading, the soil will be scarified prior to placement of the impermeable layer.

4.2.3 Low Permeability Soil

Low permeability soil will be placed in 9-inch maximum lifts up to the grades shown on Drawing C-4. The lifts will be compacted by mechanical means to not less than 90% relative compaction and from –1% to 3% of the optimum moisture content. Relative compaction and optimum moisture will be confirmed once per lift at the 100-foot grid centers using ASTM D2922 and ASTM D3017.

4.2.4 Topsoil

A 6-inch layer of topsoil will be loosely placed atop the low permeability soil layer. The topsoil layer will not be compacted.

The topsoil shall be clean and free of roots, debris, subsoil, and will contain less than 5% by volume of cobbles and rocks. Fertilizer will be applied to the topsoil prior to seedbed preparation at the rate of 270 lb/acre at a 1:1:1 ratio.

Seedbed preparation will consists of working the soil with a disc tiller to a depth of 3 inches, as necessary. Seed will be applied at the following rates, as specified:

- Kentucky Bluegrass 90 lb/acre
- Red Top 10 lb/acre
- Perennial Ryegrass 60 lb/acre
- Creeping Red Fescue 40 lb/acre

Seeding will be by hydroseeding or by a mechanical seed drill. Within 24 hours after seeding, straw mulch will be applied at a rate of 2 tons/acre.

4.3 Additional Cover Features

Following final cover construction, additional features, including a footpath and additional vegetation, will be constructed at the site.

The footpath will be 10 feet wide with 18-inch sloped shoulders. The path will be constructed of a 3-inch thick aggregate base course of CA-6 gravel screenings and a 3-inch thick aggregate FA-21 surface (no limestone). The location of the path will be as determined by the Navy.

A seven acre area of the Supply Side Landfill will have shrubs planted in berms constructed from on site topsoil the site. The shrub areas will be planted at locations along the footpath on the top of the landfill.

5.0 POST CONSTRUCTION REQUIREMENTS

Following completion of the FCC construction activities, the following tasks are anticipated.

5.1 Vegetative Cover

It is anticipated that, during the first year following construction, approximately 5% of the surface will require additional topsoil and seeding.

5.2 Erosion Control

Erosion control measures, such as silt fencing, will be removed once turf has established at the site.

5.3 Access Roads

Any temporary access roads will be dismantled or demolished, and Final access roads will be installed. Further definition of the access roads is found in Specification 02220 – "Access Roads."

5.4 Demobilization and Project Closeout

Following the completion of the site restoration activities, the contractor and subcontractors will demobilize from the site. Required activities as part of demobilization include removal of stored materials, removal of equipment and temporary facilities, and final cleaning.

5.5 Project Documentation

5.5.1 Construction Surveys

Prior to the start of the project, TolTest will survey the existing elevations of the landfill to establish baseline elevations. Following construction of the low permeability layer and again following construction of the topsoil, TolTest's surveyor will perform a topographic survey and prepare drawings to a 1-foot contour. Drawings will be submitted within 15 days of completion of each layer.

5.5.2 Soil Testing

If soil is required to be imported to the site to construct the cap, TolTest will submit the name and location of proposed sources for each type of imported material and will provide certified source quality control test results for each type of material. An independent geotechnical testing laboratory will be retained and approved by the Owner. Tests shall be conducted at the following frequencies for low permeability fill:

- Gradation and Atterberg Limits: 1 sample per 500 cubic yards.
- Hydraulic Conductivity: 1 sample per 1,000 cubic yards.

- Standard Proctor Determination: 1 sample per 1,000 cubic yards or when soil properties visibly change.

All fill materials will be tested for Standard Proctor as specified above. Copies of all certified test results will be provided to the owner.

APPENDIX A

PROJECT PLANS

Versar INC. 200 West 22nd Street • Suite 250 • Lombard, IL • 60148

EXISTING CONDITIONS INVESTIGATION AND PROPOSED MODIFICATIONS TO LANDFILL COVER SYSTEM SUPPLY SIDE LANDFILL NAVAL STATION GREAT LAKES, ILLINOIS

Prepared for:

Department of the Navy
Naval Station Great Lakes
Environmental Department
201 Decatur Avenue
Great Lakes, IL 60088-5600

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This document has been prepared in accordance with accepted scientific and engineering practices/procedures and the Versar, Inc. Quality Assurance Program.

Prepared by: John T. Angstmann, Senior Engineer — Date: 8/15/03

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TABLE OF CONTENTS

ACRONYMS USED IN THIS REPORT v

EXECUTIVE SUMMARY ES-1

1.0 INTRODUCTION 1
1.1 Purpose 1
1.2 Site Background Information 2
1.2.1 Site Description 2
1.2.2 Summary of Previous Reports and Findings 3
1.2.3 Regulatory History 5

2.0 FIELD INVESTIGATION ACTIVITIES 7
2.1 General 7
2.2 Aerial Survey 7
2.3 Soil Borings 8
2.4 Temporary Monitoring Wells 8
2.5 Geotechnical Sampling and Testing 9
2.6 Leachate Head Measurements and Sampling 10
2.7 Landfill Gas Sampling 11

3.0 INVESTIGATION RESULTS 12
3.1 Existing Conditions and Cover Thickness 12
3.2 Geotechnical Analysis 13
3.3 Leachate Head Analysis 13
3.4 Landfill Gas Evaluation 14
3.5 Surface Water Evaluation 15
3.6 Groundwater Monitoring System Evaluation 16
3.6.1 Groundwater Classification 16
3.6.2 Groundwater Monitoring Well History 17
3.6.3 Analytical Results Summary 17
3.6.4 Conclusions 19

4.0 END USE 21
4.1 General Considerations 21
4.2 End Use Concepts 21

5.0 PERMITS 23
5.1 General Review 23
5.2 Federal Permit Issues 23
5.3 State Permits 24
5.4 Local and County Permits 24

6.0 LANDFILL CLOSURE SYSTEM MODIFICATIONS 25
6.1 Excavation and Consolidation of Panhandle Area Waste 25
6.2 Landfill Regrading 25
6.3 Landfill Cover System 26
6.4 Gas Management System 29
6.5 Surface Water and Erosion Controls 30
6.6 Groundwater Controls 31

7.0 CONSTRUCTION PLANS AND SPECIFICATIONS 32
7.1 Construction Plans 32
7.2 Material Specifications 32
7.3 Material Quantities 33
7.4 Construction Quality Assurance 33

8.0 OPERATIONS AND MAINTENANCE 34
8.1 Landfill Cover System 34
8.2 Landfill Gas Management System 35
8.3 Groundwater Monitoring 35
8.4 Miscellaneous 36

9.0 CONSTRUCTION COST ESTIMATE AND SCHEDULE 37
9.1 Cost Estimate 37
9.2 Construction Schedule 37

REFERENCES 38

LIST OF TABLES

1 Summary of Field Investigation
2 Field Test Data
3 Geotechnical Test Results
4 Leachate/Groundwater Levels - Temporary Monitoring Wells
5 Leachate/Groundwater Sample Results - Temporary Monitoring Wells
6 VOC Summary - Leachate
7 Gas Vent Survey
8 Surface Water Sample Exceedances
9 Comparison of Original to Replacement Wells
10 Groundwater Levels (Replacement Monitoring Wells)
11 Groundwater Analyte Exceedances (Original Monitoring Wells)
12 Groundwater Analyte Exceedances (Replacement Monitoring Wells)
13 HELP Model Summary Results
14 Annual O&M Costs

LIST OF FIGURES

1 Gas Vent Location Map
2 Original Monitoring Well and Surface Water Sample Locations

APPENDICES

Appendix A Boring Logs
Appendix B Geotechnical Test Data
Appendix C Leachate/Groundwater Analytical Data
Appendix D Surface Water Monitoring Data
Appendix E Quarterly Groundwater Monitoring Well Data (1983-1996)
Appendix F Quarterly Groundwater Monitoring Well Data (1999-2002)
Appendix G Borrow Soil Geotechnical Study
Appendix H HELP Modeling Data
Appendix I Erosion Control and Vegetation Plan
Appendix J Material Specifications
Appendix K Material Quantity Calculations
Appendix L Construction Quality Assurance Manual
Appendix M Engineer's Cost Estimate
Appendix N Construction Schedule

LIST OF DRAWINGS

1 Existing Site Conditions Plan
2 Field Investigation Locations
3 Existing Top of Waste Contours
4 Existing Cover Soil Thickness Isopach Map
5 Proposed Regrading Plan (Top of Waste/Soil)
6 Proposed Top of 18" Low Permeability Soil Layer Plan
7 Proposed Top of 6" Vegetative Soil Layer Plan
8 Erosion Control and Vegetation Plan
9 Panhandle Area Construction
10 Cross-Sections
11 Isopach Map - Existing Topo to Regraded Waste/Soil Surface
12 Isopach Map - Existing Top of Waste Surface to Regraded Waste/Soil Surface
13 Gas Management System Plan
14 Gas Management System Details

ACRONYMS USED IN THIS REPORT

ASTM	American Society for Testing and Materials
bgs	below ground surface
CQA	Construction Quality Assurance
IEPA	Illinois Environmental Protection Agency
ESDD	East Skokie Drainage District
ET	Evapotranspiration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HDPE	High density polyethylene
FOIA	Freedom of Information Act
HELP	Hydrologic Evaluation of Landfill Performance
LL	Liquid Limit
MSL	Mean Sea Level
MWR	Morale, Welfare and Recreation
NSGL	Naval Station Great Lakes
O&M	Operations and Maintenance
PI	Plasticity Index
PID	Photoionization Detector
PL	Plastic Limit
PVC	Polyvinyl chloride
USCS	Unified Soil Classification System
SMC	Lake County Stormwater Management Commission
SSL	Supply Side Landfill
TACO	*Tiered Approach to Corrective Action Objectives* (35 IAC 742)
TMW	Temporary Monitoring Well
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

EXECUTIVE SUMMARY

Project Scope

This report presents the results of various site investigation activites conducted at the Supply Side Landfill (SSL or Site) conducted by Versar, Inc. at Naval Station Great Lakes (NSGL) to document existing conditions of SSL. This report also presents recommendations to modify the existing landfill cover system to achieve regulatory compliance and promote reuse of the Site by the Navy, a discussion of permit requirements, construction specifications and quality assurance requirements, and operations and maintenance requirements. This report is accompanied by detailed plans for construction of the modified landfill cover system.

An aerial survey was conducted to establish current topography of the main landfill as well as a fill area north of the main landfill referred to as the "Panhandle Area". A digital topographic map was generated to serve as the base map for all other SSL maps and design drawings.

Existing Site conditions were investigated by drilling and sampling 33 soil borings in and around the landfill. Soil borings advanced inside the landfill were conducted to establish the existing soil cover thickness and depth to waste. Soil borings ranged in depth from 8 feet bgs to a maximum depth of 20 feet bgs. Select soil samples were tested to determine Atterberg limits, moisture content, soil classification, and hydraulic conductivity.

Five temporary monitoring wells (TMW1 through TMW5) were installed during investigation activities to determine the depth to leachate and conduct leachate sampling and analysis to characterize the leachate within the landfill. Leachate samples were analyzed for indicator parameters used during the quarterly groundwater monitoring program, and TMW1 was analyzed for volatile organic compounds (VOCs).

Landfill gas screening was conducted at 23 locations to determine landfill gas concentrations and pressures below the landfill cover and another 10 locations outside the recognized area of the

landfill. The landfill gas screening was conducted in conjunction with soil borings drilled as part of the landfill cover thickness evaluation. Attempts were also made to obtain landfill gas readings from existing gas vents located across the landfill.

Summary

Field investigation activities verified that a suspected area located northeast of the main landfill contained buried refuse (this area was identified as the "Panhandle Area"). It is recommended that waste/refuse in the Panhandle Area be exhumed and consolidated with the main landfill.

In order to optimize end use possibilities, it is recommended that the existing landfill surface be regraded to create a flat plane surface with a gradual slope from west to east across the top of the landfill. A 3 percent slope is designed for the top surface of the landfill for drainage and erosion protection. Regrading operations shall not cut into existing waste in the main landfill, except as may be necessary around the perimeter of the landfill to key the final cover into the native clay soils of the project area. Excavated waste materials shall be placed on the lowest areas of the existing landfill and under the new final cover system.

Final cover design is based on proposed end use for the Supply Side Landfill Site, available cover materials, material grading and placement costs, and schedule. Consistent with standard practices and engineering standards, the final cover should consist of 18 inches of low permeability clay with 6 inches of topsoil to promote vegetation. The final cover will be increased to 24 inches of low permeability clay with 6 inches of topsoil around the perimeter of the landfill where the slopes key into the existing ground surface to help protect against erosion. A geotechnical investigation has determined the proposed borrow materials near the Site are suitable as low permeability soil for the modified cover system.

Based on the field investigation and general site observations, the existing methane gas vent system has limited effectiveness since many of the vents do not appear to extend through the existing cover system into the underlying waste. In addition, the existing vent system is obtrusive and inconsistent

with proposed end use. It is recommended the existing gas vents be removed (or cut back below grade) and a new passive methane gas venting system be designed to remove landfill gas passively from the main landfill area. The new passive gas venting system will consist of shallow trenches excavated within the waste material, with horizontal collector pipes in granular bedding leading to passive vents. A minimum number of vents will protrude through the ground surface and be located along a roadway on the west side of the landfill.

Section 7 presents Construction Plans and Specifications for the proposed landfill cover system modifications. Section 8 presents an Operations and Maintenance Plan for the modified cover system. Section 9 presents a construction cost estimate and schedule to implement the proposed landfill cover system modifications.

1.0 INTRODUCTION

1.1 Purpose

This report presents the results of various site investigation activites conducted by Versar, Inc. at the Supply Side Landfill (SSL or Site), Naval Station Great Lakes (NSGL) to document existing conditions of SSL. This report also presents recommendations to modify the existing landfill cover system to achieve regulatory compliance for reuse of the Site by the Navy, a discussion of permit requirements, construction specifications and quality assurance requirements, and operations and maintenance requirements. This report is accompanied by detailed plans for construction of the modified landfill cover system.

This report is prepared in accordance with the with the requirements outlined in the Revised Statement of Work, Supply Side Landfill Cover Study, NTC Great Lakes (SOW), dated 4 September 2002 and Versar's Proposal No. Q02-5059, dated September 13, 2002, as approved by NSGL on September 24, 2002. Versar was assisted on this project by Earth Tech, which prepared the design drawings, material and construction specifications, operations and maintenance plan, and other associated plans.

The scope of the Site investigation was expanded to include: (1) the area between Building 3503 and Skokie River (referred to as the "Panhandle Area", located northeast of the main landfill); (2) provide for additional subsurface efforts due to the existing cover system being substantially thicker than originally anticipated; and (3) geotechnical evaluation of the proposed cover materials. The expanded scope of the Site investigation and additional drilling efforts were conducted in accordance with Versar Proposal No. Q03-5153, dated December 4, 2002, as approved by NSGL on January 14, 2003. The geotechnical evaluation of the proposed cover materials was conducted in accordance with Versar Proposal No. Q03-5188, dated January 24, 2003, and approved by NSGL on February 5, 2003.

1.2 Site Background Information

1.2.1 Site Description

SSL is located on NSGL in the Northeast 1/4 of Section 18, Township 44 North, Range 12 East, Shields Township, Lake County on the United States Geological Survey (USGS) *Waukegan, Illinois* 7.5-minute topographic map (USGS, 1993). Drawing 1, Cover Sheet presents a vicinity map which depicts the Site location with respect to NGSL and the surrounding area.

SSL was designed as a trench and fill landfill. The north portion was filled first, and then the southeast portion (i.e., south east of the former rail spur) was designated as landfill expansion (U.S. Navy, undated). The southeast portion and part of the north portion were built on an existing lagoons and filter beds (presumably used for wastewater treatment).

SSL received waste approximately from 1969 to 1983. Waste reportedly consisted of primarily mixed office waste and some food waste (Rogers, et. al., 1986); although, residential waste and construction/demolition debris was also reportedly disposed (K-Plus, 1995a).

In 1985, the Naval Construction Battalion graded the final cover (Rogers, et. al., 1986). The landfill was described as two cells separated by an inactive railroad spur bending southeast through the Site. In 1999, the NSGL removed the railroad track ties. In 2001, NGSL filled the valley depression with imported soil, creating a smooth contiguous cover between the two cells. The soil fill was also placed on top of the main landfill to provide additional cover protection.

According to NSGL Environmental Department, a landfill waste boundary delineation has not been conducted. Versar used an existing report (STS, 1983) to determine the approximate landfill boundary, as shown on Drawing 1. The landfill is bounded by high-voltage transmission lines over railroad right-of-way to the west, road and warehouses to the north, Skokie River to the east, and a small drainage ditch to the south. A 14-inch underground water main is located east of the buried rail spur along the north part of the main landfill. The Site is enclosed by 6-foot high chain link

fence along the north, west and south perimeter. The Panhandle Area is bounded by a fence along the west, south and north and by Skokie River along the east side. Skokie River bounds the east side of both the main landfill and Panhandle Area.

The area surrounding the Site is mixed residential, commercial, and industrial. Vacant land and large warehouses exist to the north, a residential trailer park is located east across Skokie River, a former wastewater treatment plant is located to the south (currently operated as wastewater overflow detention area), with wetlands, railroad tracks and industrial properties located to the west.

Site elevations range from 677 to 698 feet above Mean Sea Level (MSL). The Site currently drains via sheet flow in all directions. Skokie River runs adjacent to SSL and flows south. Based on groundwater level data taken from landfill monitoring wells in September 1998, groundwater flow direction is to the southeast (Toltest, 1999).

Review of published geologic information indicates NSGL is underlain by glacial till ranging in thickness from approximately 170 to 210 feet, below which is bedrock (limestone). The till consists of predominantly clayey soil with thin, irregular, discontinuous lenses of sand and silty sand. Discontinuous lenses of sand are a potential source of groundwater. Two discontinuous groundwater zones were reported at various NSGL locations at depths of 10 and 15 to 30 feet below ground surface (bgs) (Halliburton NUS, 1992).

1.2.2 Summary of Previous Reports and Findings

Versar reviewed NSGL files and files and documents obtained from the Illinois Environmental Protection Agency (IEPA) through the Freedom of Information Act (FOIA). Versar submitted a FOIA Request to IEPA on October 14, 2002 for file and permit information for Supply Side Landfill (U.S. Naval Training #2 Landfill No. 0978110002). IEPA letter dated November 6, 2002 provided copies of the public record totaling 540 pages of paper and 22 microfilm jackets. Versar reviewed this information to gain a further understanding of history and regulatory activities associated with SSL.

Following is a summary of major documents reviewed and significant findings:

Final Report for Technical Services Being Provided to Develop a Closure Plan (STS, 1983) documents a subsurface investigation, and recommendations for landfill closure. The closure plan addressed landfill cover requirements, groundwater and gas migration controls, and included material specifications for closure.

According to the reviewed documents, the STS Closure Plan was apparently implemented, and closure activities were completed as of July 23, 1985.

On December 20, 1988 the IEPA issued a letter to the Navy stating Certification of Closure requirements had been met in accordance with Title 35 of the Illinois Administrative Code (35 IAC) Subpart G, Section 807.508. The IEPA letter stated the facility must continue to comply with post-closure plan requirements for 5 years following closure.

Technical Memorandum - Immediate Response Action (SEC/Donohue, 1992), was prepared to determine possible immediate health and safety issues, and make recommendations for corrective action. The report stated several observations regarding the condition of SSL including deterioration of the landfill cap and presence of leachate seeps. The report concluded high water levels have rendered gas vents ineffective, the existing capping system was inadequate, and high leachate head may result in seepage to surrounding groundwater.

Supplyside Landfill Investigation Work Plan (Halliburton NUS, 1992) proposed leachate sampling, gas sampling, landfill cover thickness evaluation, and geotechnical testing. There is no record that the work commenced.

Landfill Assessment Report (K-Plus Environmental, 1995a) was prepared to identify environmental concerns related to SSL. The report recommended installation of new monitoring wells, and suggested an area north of the landfill as a possible filled area and possible source of leachate to Skokie River.

Landfill Cover Specifications (K-Plus Environmental, 1995b) were prepared as part of the proposed cover repairs. These repairs were not implemented.

Delivery Order Completion Report (Toltest, 1999) was prepared to document installation of new monitoring wells (MW-A through MW-F), repair of gas vents, and other landfill maintenance activities.

Plan of Action - Repairs to Supply Side Landfill and Forrestal Landfill (Toltest, 2000) was prepared to scope out repair work, including regrading a soil stockpile at SSL to fill in the old railroad track depression, and re-seeding bare soil areas.

(According to NSGL Environmental Department, additional soil was added to fill the old railroad track depression and across the top plateau of the landfill in 2001).

Delivery Order Completion Report - Sampling and Analysis of Volatile Organic Compounds at Supply Side Landfill (Toltest, 2001) documented collection and analysis of soil gas samples from 40 points. The report concluded that methane gas readings were variable across the landfill and that VOCs were present in subsurface although low in concentration, and that shallow groundwater and methane was observed in the "Panhandle" area north of the main landfill.

1.2.3 Regulatory History

Versar's review of NSGL files and IEPA files obtained through FOIA revealed no correspondence referring to a permit; however, the files received from the NSGL contained the following documents and correspondence regarding SSL regulatory closure activities:

- A closure plan was developed by STS Consultants, Ltd., titled "Final Report for the Technical Services Being Provided to Develop a Closure Plan for the Naval Base" (STS, 1983).

- On September 9, 1983 the IEPA issued a letter to the Navy approving the STS closure plan.
- On December 9, 1987 the IEPA issued a letter to the Navy requiring landfill closure certification.
- On October 11, 1988 the Navy issued a letter to IEPA documenting closure activities completed as of July 23, 1985.
- On December 20, 1988 the IEPA issued a letter to the Navy stating Certification of Closure requirements had been met in accordance with 35 IAC Subpart G, Section 807.508, and that the facility must continue to comply with post-closure plan requirements for 5 years following closure.

On April 11, 2003 a meeting was held between representatives of NSGL Environmental Department, Versar, and IEPA to discuss the regulatory status of SSL. During the meeting it was determined that the landfill is not a permitted facility by the IEPA. The IEPA subsequently stated landfill cover modification, Panhandle excavation activities, and final closure shall be coordinated under the IEPA Federal Facilities program.

2.0 FIELD INVESTIGATION ACTIVITIES

2.1 General

The scope of the SSL field investigation included both land and aerial surveying, soil borings and grid-based sampling to obtain existing soil cover thickness and soil gas measurements, geotechnical analysis of existing cover, installation of temporary monitoring wells, and sampling and analysis to determine depth and chemical make-up of leachate. Field investigation activities are summarized in Table 1. The original scope was expanded to: (1) include the area between Building 3503 and Skokie River (referred to as the "Panhandle Area", located northeast of the main landfill) because it was suspected as containing waste and (2) add depth to soil borings because the existing cover of the main landfill was substantially thicker than originally anticipated.

Existing Site conditions were investigated by drilling and sampling 33 soil borings in and around the landfill, conducting geotechnical testing on the existing landfill cover materials, installing five temporary monitoring wells within the landfill, collecting leachate/groundwater samples from the temporary wells, and analyzing leachate/groundwater samples for contaminants of concern.

2.2 Aerial Survey

An aerial survey was conducted to establish current topography of the main landfill as well as the Panhandle Area. The aerial survey was obtained from an elevation of 1,800 feet on November 23, 2002. Versar subcontracted the services of Chicago Aerial Survey to conduct the aerial survey of SSL and vicinity.

Vertical black and white aerial photography was acquired to produce a topographic contour map with a vertical accuracy of a two feet. Horizontal and vertical field control was performed using convention land surveying techniques to tie in the aerial survey. Horizontal control was relative to North American Datum as updated ((NAD) 83 (1997) Illinois State Plane Coordinates - East Zone), and vertical control was relative to North American Vertical Datum (NAVD) 1988. A digital

topographic map was generated to serve as the base map for all other SSL maps and design drawings.

2.3 Soil Borings

Grid-based sampling was conducted to establish the existing soil cover thickness and depth to waste. Soil borings GP-1 through GP-23 were advanced using truck-mounted Geoprobe™ (direct push technology) equipment was used to minimize generation of investigative-derived waste and expedite the drilling process.

Prior to the start of field exploration activities, the landfill was divided into approximately one acre grids. Exploratory soil borings were drilled at a frequency of one per acre. Soil borings ranged in depth from 8 feet bgs to a maximum depth of 20 feet bgs. Soil boring locations are shown on Drawing 2 (see Section 7.1). In general, soil borings were continuously sampled until waste/refuse was encountered. Upon completion, borings were converted to temporary groundwater monitoring wells or abandoned by filling with bentonite grout.

Versar's field geologist logged all borings and obtained representative undisturbed and bulk samples of the subsurface materials encountered. The soils were classified in accordance with the Unified Soil Classification System (USCS), as described in the American Society for Testing and Materials (ASTM) D-2487 Test Procedure, Classification of Soils for Engineering Purposes. The Boring Logs are presented in Appendix A. Versar subcontracted the services of Mid-America Drilling to advance soil borings and install gas probes.

2.4 Temporary Monitoring Wells

Five temporary monitoring wells (TMW1 through TMW5) were installed during investigation activities for the landfill cover evaluation. Temporary monitoring wells (TMWs) were installed to determine the depth to leachate and conducted leachate sampling and analysis to characterize the leachate within the landfill. TMW locations are shown on Drawing 2 (see Section 7.1).

TMWs were constructed by inserting the well casing into the annular space of the hollow-stem auger prior to auger removal. Each well consisted of 2-inch I.D. PVC materials utilizing 10-foot section of 10-slot (0.01" opening) PVC machine-slotted screen and PVC riser centered within the annular space of the boring. The screen and riser material have threaded, flush-joint fittings (ASTM F480). The top of the well screen was positioned just above the interface between the waste/refuse and the underlying native clay soils, and was sealed at the bottom with a threaded flush-joint cap.

Filter packs were installed around the well screens consisting of clean, uniform, siliceous sand (#5 filter sand). The filter pack extended from the bottom of the well screen to approximately 1.5-feet above the screened interval. The remaining portion of the annular space was filled to grade with bentonite pellets. The top of the well casing was capped with a well plug to protect the integrity of the well. Construction of TMWs was supervised by Versar's field geologist.

TMWs were developed by bailing to remove materials introduced into the well during construction and insure properly functioning. TMWs 1 and 2 were developed by removing leachate from each well until they became dry. TMWs 3 and 4 were developed by removing approximately 40 gallons of groundwater from each well. TMW5 was developed by removing approximately 40 gallons of leachate from the well. Purge water was placed into 55-gallon drums. Top of casing elevation and vertical coordinates were tied to the topographic survey by Jacob and Hefner Associates using conventional land surveying equipment.

Temporary monitoring wells were abandoned by removing casing to two feet below ground surface, filling the remaining casing with bentonite, and filling the top of the open borehole with bentonite on February 6, 2003.

2.5 Geotechnical Sampling and Testing

Geotechnical samples were collected from the cover materials during the cover thickness investigation. A total of 28 soil samples were collected for possible geotechnical testing. Geotechnical sample depths ranged from 1 to 8 feet, depending on the thickness of cover. Soil

samples were collected in clear acetate liners using a Geoprobe®. Soil samples were inspected in the field for soil staining, discoloration and odors, and were logged by Versar's field geologist.

Representative samples were retained from the landfill cover materials, and where different soil layers were encountered. No samples were collected from the top foot of loose sandy/clayey material and/or topsoil for the geotechnical evaluation of the landfill cover soils. Selected samples were analyzed for geotechnical parameters. One sample was collected from the native clay below the landfill at a depth of 30 feet (bgs).

The laboratory testing program consisted of Atterberg limits, moisture content, soil classification, and hydraulic conductivity performed on selected samples. Geotechnical test results are discussed in Section 3.2, and included on soil boring logs in Appendix A.

2.6 Leachate Head Measurements and Sampling

Water levels were allowed to stabilize for a minimum of 24 hours, then leachate or groundwater level measurements were conducted using an electronic water level indicator. Each well was carefully opened to release any gas pressure and the top of the well was screened for organics using a PID. Water levels were measured on two occassions, November 25, 2002 and December 13, 2002.

On November 25, 2002 leachate samples were collected from each TMW. Leachate samples were analyzed for the following landfill indicator parameters used during the quarterly groundwater monitoring program: pH, phenols, total organic carbon, ammonia, chloride, sulfate, total dissolved solids, iron, manganese, and lead. In addition, TMW1 was analyzed for VOCs, since this boring exhibited the highest PID readings. Liquid samples were collected into laboratory-supplied, clean, pre-preserved sampling containers, and placed on ice. Sample results for the leachate evaluation are discussed in Section 3.3.

2.7 Landfill Gas Sampling

Landfill gas screening was conducted at 23 locations to determine landfill gas concentrations and pressures below the landfill cover. Landfill gas measurement were obtained at GP-1 through GP-8, and GP-11 through GP-23 within the main landfill, GP-9 and 10 in the Panhandle Area, and another 10 locations (GP-24 through GP-33) outside the recognized area of the landfill. The landfill gas screening was conducted in conjunction with soil borings drilled as part of the landfill cover thickness evaluation.

A gas probe was inserted and sealed into the completed borehole, and landfill gas measurements were conducted (pressure and concentration). Soil gas samples were collected using a post-run-tubing system (sample drawn through point and into sample tubing). Sample tubing was connected to GA-90 Infrared Gas Analyzer (and sample pump). Each sample was analyzed for methane, carbon dioxide, and oxygen, and static pressure.

In addition, Versar attempted to obtain landfill gas readings from existing gas vents located across the landfill. Gas measurements were obtained by inserting a length of tubing past the top elbow of the vent (to minimize ambient air intrusion), which was connected to the GA-90. Seventeen of the 24 vents were tested; the remaining vents were inaccessible due to their height. Sample results for the gas probe and gas vent testing is discussed in Section 3.4.

3.0 INVESTIGATION RESULTS

3.1 Existing Conditions and Cover Thickness

Soil borings encountered cover material ranging from 2 to 12 feet thick. Cover material primarily consisted of silty clay soils with varying amounts of gravel. The existing top of waste was mapped from the field investigation data, and is shown on Drawing 3 (see Section 7.1). Cover thickness/top of waste data and observations are shown in Table 2. Existing cover thickness was interpreted from the field investigation data and is shown as an isopach on Drawing 4 (see Section 7.1).

Most borings encountered several layers of daily cover separated by refuse or refuse mixed with the soil. At some locations, primarily in the east part of the landfill, crushed limestone was interbedded with silty clay. Site reconnaissance indicated the presence of occasional construction demolition debris at the ground surface in the southeast part of SSL. Refuse was also encountered at the surface in the Panhandle Area where there was little or no cover material. Specific soil conditions are depicted on the boring logs in Appendix A.

The southern part of the landfill is characterized primarily by construction debris (fill soils interlayered with broken concrete, brick, etc.). Construction rubble was encountered in southern part of landfill in borings GP19, GP20, GP32, and GP33. Industrial grit material was observed in borings GP31, GP33, and MW3. The industrial grit may have been associated with the filter bed as shown in Navy Public Works Sanitary Landfill construction drawing for SSL (U.S. Navy, undated).

The bottom of the landfill (native gray silty clay) was encountered 30 feet bgs at TMW2 (or approximately elevation 659 feet msl). This is consistent with investigation findings of others which reported waste as deep as 19 feet bgs (approximately elevation 654). The bottom of the landfill in the Panhandle Area was 12 feet bgs (approximately elevation 665).

Pockets of trapped (or perched) water and saturated conditions were encountered at various depths within the landfill,as discussed in Section 3.3.

3.2 Geotechnical Analysis

The laboratory testing program consisted of moisture content, Atterberg limits, soil classification, and flexible wall permeability testing (hydraulic conductivity). All tests except hydraulic conductivity were performed on bulk disturbed samples. The hydraulic conductivity test was performed on undisturbed shelby tube samples. Geotechnical testing results are summarized in Table 3. Complete geotechnical test reports are provided in Appendix B.

Geotechnical testing of the existing cover materials indicates those materials meet the original material specifications in the implemented Closure Plan (STS, 1983) and constitute an adequate cover over the entire main landfill area. Laboratory permeabilities (hydraulic conductivities) ranged from 8.0×10^{-9} cm/sec to 1.4×10^{-8} cm/sec. Plasticity indices (PIs) ranged from 8 to 20 with liquid limits of 31 to 43. Moisture content tests indicate the existing cover materials are generally on the dry side of the PI range (between 7.3 and 22.4 percent) near the surface and moisture content increases with depth.

3.3 Leachate Head Analysis

TMW1 and TMW2, located in the deepest part of the main landfill, encountered leachate approximately 12 feet below the landfill surface. TMW3 and TMW4 are located in southern part of the landfill in an area topographically lower than the main landfill; both were located near the edge of the estimated landfill boundary. TMW3 encountered leachate (or groundwater) approximately 12 feet bgs. TMW4 encountered an abundant water-bearing sand seam below the fill soils 12 feet bgs. TMW5 encountered leachate at a depth of about 2 feet bgs in the Panhandle.

Saturated soil conditions were observed in the soil borings at varying depths from 2 feet to 16 feet bgs in the main landfill area. Static water levels taken from the temporary monitoring wells (TMW1 through TMW4) are shown in Table 4. Water level data is determined to be too variable to construct a representative isopach map. Leachate elevations ranged from 676 to 685, and groundwater elevations were lower (667 to 671). The leachate appears to be mounded within the waste/refuse.

Based on water level data from the current permanent monitoring wells, the water table southeast of the landfill (natural water table) is approximately 8 feet bgs (elevation 665). This is consistent with observations at TMW4, where depth to water was at elevation 667.

Leachate level observed from TMW5 in the "Panhandle Area" was less than 2 feet bgs, indicating bath-tub effect of surrounding clay soils. Also, the Panhandle Area is topographically lower than the main landfill and is adjacent to Skokie River.

Leachate/groundwater analytical results have been tabulated and compared to both IEPA Class I and Class II Groundwater Quality standards, and General Use (Surface) Water Quality standards. Leachate and groundwater analytical data is shown on Table 5. The highest concentrations were found at TMW1, TMW2 and TMW3. Leachate results were within the range of common sanitary landfill leachate (Corbitt, 1998). TMW4, which was installed just outside of the estimated landfill limits, encountered groundwater. TMW5 installed in the Panhandle Area exceeded most criteria.

VOCs detected in the sample collected from TMW1 are summarized on Table 6 and include: toluene, ethylbenzene, xylenes, 1,2,4-trimethylbenzene, p-isopropyltoluene, 1,4-dichlorobenzene, and naphthalene. The detected VOCs were below groundwater remediation objectives, as defined in TACO. Laboratory test data is included as Appendix C.

3.4 Landfill Gas Evaluation

The information collected during the Site investigation was used to assess the migration pathways and the number and location of future gas vents. Methane gas was detected at all sampling locations, and concentrations ranged from 0.3 to 73.8 percent. Landfill gas results are presented on Table 2. Elevated gas readings (above 50% methane) were generally found along the west side of the landfill, although high readings were also found in the southeast part of the landfill. High gas concentrations and pressures are anticipated in areas of the landfill which were not probed during the field investigation. For example, lower explosive limit (LEL) readings were recorded during the installation of TMW1 and TMW2 and exhibited pressure build-up on multiple occasions. Both

TMW1 and TMW2 are located in the central part of the landfill. Methane gas concentrations of 64.1% were recorded in the Panhandle Area. The Toltest 2001 study concluded methane gas is present in the subsurface environment sporadically throughout the Supply Side Landfill, and that the existing gas vents appear to be succeeding in removing the methane from the subsurface in most areas of the landfill. The investigation results appear to confirm the general gas concentration ranges reported from the previous study (Toltest, 2001). Otherwise, there is no correlation between the previous (Toltest, 2001) gas study and the current investigation results.

As a result of elevated readings, additional probes were set around the perimeter of the main landfill and the Panhandle. Only GP-24 and GP-25 along the west side of SSL indicated significant levels of methane. Methane in this area may be related to natural organic decomposition due to wetland deposits. None of the other probes along the perimeter indicated significant levels of gas, and there does not appear to be off-site migration of methane gas from the landfill.

Generally little to no elevated methane gas concentrations were detected in the existing gas vents. Only four vents indicated the presence of methane, and one only indicated carbon dioxide. Results are presented in Table 7. It appears as though many of the existing gas vents do not extend through the existing cover system or have been "watered out". The "operational vents" were located along the east and west sides of the landfill (see Figure 1).

3.5 Surface Water Evaluation

Based on the topography of the Site, surface water runoff is directed to the wetlands area to the west, and Skokie River to the east via sheet flow. Some direct runoff may occur from well established vegetative side slopes adjacent to the River. Minimal runoff occurs from the grassey areas in the southeast part of the landfill where grades are gentle and vegetation is well established. Minimal runoff is expected from the "Panhandle Area" due to the flat ground surface.

As part of the quarterly groundwater monitoring program, surface water samples S101 (upstream) and S301 (downstream) were collected from 1985 to 1996. Locations are shown on Figure 2.

Surface water results have been tabulated and compared to IEPA General Use Water Quality Standards as presented in Appendix D. The tables include average and maximum values of each parameter, and samples exceeding the IEPA water quality standard are highlighted. For calculation purposes, one-half the laboratory detection limit was used for values less than the detection limit. Since the data was generated from multiple laboratories under different regulatory standards, some of the calculated detection limits exceed the surface water standard, as noted on the table.

As an indicator of determining which samples are impacted, the data was evaluated by comparing the average and maximum concentrations, number of sample exceedances, and downstream to upstream values.

Upstream and downstream concentrations of each parameter were similar. The number of exceedances by parameter for each location is shown on Table 8. As shown on the table, the upstream sampling location had a slightly greater number of exceedances than the downstream location. The upstream location is immediately upstream of the Panhandle Area. The upstream location is downstream of Forrestal Landfill. These exceedances may be due to natural or anthropogenic sources, and may or may not be the result of Supply Side Landfill activities.

3.6 Groundwater Monitoring System Evaluation

3.6.1 Groundwater Classification

A groundwater classification of Class I is assumed since the Site has not been classified as having Class II groundwater. However, tables show both Class I and Class II standards for comparison with current and historical groundwater data. In any event, a Land Use Control Memorandum of Understanding (LUC-MOU) for NSGL prohibits the use of shallow groundwater for potable purposes.

3.6.2 Groundwater Monitoring Well History

Historical quarterly groundwater monitoring data obtained through the NSGL project and FOIA file review spans the period from November 1983 to October 2002 and includes both original and replacement monitoring wells. The original wells were installed in 1983 and consisted of G101, G102, G103, and G104, as shown on Figure 2. These wells were sampled until 1996 (except that G101 was not sampled after 1992 due to damage). Off-site gas monitoring wells were sampled as part of the quarterly monitoring in 1995 and 1996; these wells were designated G105, G106, and G107. No data was available for 1997 and 1998 for any of the original groundwater monitoring wells.

Because the original wells were no longer functional, six replacement wells (MW-A, -B, -C, -D, -E and -F) were installed by Toltest in September 1998. The locations of the replacement monitoring wells are shown on Drawing 1. The relationship between the original and replacement wells is shown in Table 9.

The new monitoring wells were completed in silty clays and clays. MW-C was completed in sand seams and clay. Well depths ranged from 13 to 15 feet deep. Static water level data generated by Toltest is shown on Table 10. These wells have been sampled quarterly from 1999 to present. Static water levels were measured intermittantly during this period. For both the original and replacement wells, groundwater has been analyzed for the parameters specified by the IEPA.

3.6.3 Analytical Results Summary

Groundwater results for the 1983-1996 period have been tabulated as presented in Appendix E. Groundwater results for the 1999-2002 period have been tabulated and are included in Appendix F. The tables include average and maximum values of each parameter, and samples exceeding the IEPA Class I groundwater standard are highlighted. For calculation purposes, one-half the laboratory detection limit was used for values less than the detection limit. Since the data was generated from multiple laboratories under different regulatory standards, some of the calculated detection limits

exceed the groundwater standard, as noted on the table. Due to improvement in detection limits, data quality is expected to improve over time.

As an indicator of determining which wells are impacted, the data was evaluated by comparing number of sample exceedances, the average concentrations, and downgradent to upgradient values of indicator parameters. Overall concentration trends of each well were also evaluated, where applicable. Since the number and locations of the replacement wells differs from the original well placement, each data set has been treated separately:

Original Monitoring Wells

The number of exceedances by parameter for each well is shown on Table 11. Downgradient wells have a significantly greater number of exceedances than G101 (upgradient well). On average, downgradient well G102 indicated the highest concentrations of chloride, sulfate, TDS, TOC, iron, lead, and manganese, and downgradient well G103 indicated highest concentrations of ammonia. Upgradient well (G101) reported the highest concentration of phenolics. The exceedances in the upgradient well may be due to natural or anthropogenic sources. For example, the presence of phenolics in G101 is likely from a man-made source. The downgradient exceedances are likely the result of landfill operations.

Groundwater data for the off-site gas monitoring wells (also used for groundwater monitoring) is included in Appendix E. In general, the off-site monitoring wells indicated lower concentrations than the downgradeint wells. Wells MW6 and MW7 indicated higher concentrations and number of exceedances for some of the indicator parameters (chloride, sulfate and TDS) than MW5, possibly because MW6 and MW7 are closer to the landfill area.

Replacement Monitoring Wells

The number of exceedances by parameter for each well is shown on Table 12. Downgradient wells, particularly MW-B, have a significantly greater number of exceedances than MW-C (upgradient

well). The exceedances in the upgradient well may be due to natural or anthropogenic sources. The downgradient exceedances are likely the result of landfill operations.

On average, downgradient well MW-A exhibited the highest concentrations of ammonia and iron. The highest average concentration of chloride, TDS, TOC, and lead was reported in MW-B. The highest average concentration of phenolics and manganese were reported in MW-F. The highest average concentration of sulfate was reported in MW-C (upgradient well).

The off-site wells (MW-D and MW-E) indicated fewer exceedances and lower concentrations than those detected in the downgradient wells.

3.6.4 Conclusions

Concentrations in the downgradient wells appear to be decreasing, as evidenced by the generally lower concentration than those reported in the original monitoring wells. This seems to indicate a trend of decreasing impact from the landfill. The off-site wells do not appear to be impacted, as concentrations are in the range of those reported in the upgradient well.

In addition, MW-C appears to be adequate as a background monitoring well, due to the few number of exceedances. Certain parameters (eg. manganese) were detected in all monitoring wells, and may be naturally occurring and not indicative of landfill contamination.

No groundwater monitoring wells are located in the vicinity of the "Panhandle Area". It is not possible to assess the possible impact to groundwater.

Potable water supplied to the Naval Base comes from Lake Michigan and is treated at the Naval Base Water Treatment Plant. Therefore, groundwater consumption is not a public health concern.

4.0 END USE

4.1 General Considerations

NSGL plans to redevelop the landfill for beneficial use, due in part to open space limitations on the Naval Base. The Navy Moral Welfare and Recreation (MWR) unit plans to use the property for outdoor recreational use. Possible end uses discussed with NSGL include BMX biking, hill roller/snow boarding, walking/hiking trails, and camping sites.

Any property development will occur above the final cap, so that the integrity of the cap is maintained. NSGL will enter a land-use restriction with IEPA to assure construction does not impact the integrity of the final cap or any of the related components.

Landfill cover modification plans have considered the end-use in the following ways:

- cover slope (flat gentle slope), utilizing maximum extent of land surface
- gas management with minimum obtrusiveness (all vents protruding surface placed on west side of landfill)
- majority of sheet runoff flow to Skokie River (no detention basin)
- provision for access by roads on the south and north sides
- extent of regraded area to be above elevation 674 (flood plane elevation).

4.2 End Use Concepts

The regrading and landfill cover modification plan also includes vegetating the cover soils with a typical vegetation seed mixture consisting of bluegrass and fescue, creating a simple grassed area. At a minimum, the area will be a typical natural grassland area, but with a few additions, it can also be a recreational use area for the public.

In concept, the basic end use designs envisioned for placement on top of the cover system at the Supply Side Landfill area consist of any or all of the following features:

- A system of gravel or paved walkways winding through the resulting nature area. The walkways can serve as a system of paths and trails for biking, hiking, running, walking, horseback riding, and/or cross-country skiing.
- Soil berms or landscape mounds, with native prairie grass and wildflower plantings on the mounds, placed in various locations to enhance the beauty of the area.
- Picnic, campground, and/or playground areas associated with the path system.
- A star gazing hill as an offshoot of the path system
- Sport fields and athletic areas for soccer, softball, baseball, football, volleyball, and/or batting cage practice areas.
- A rugged mountain-bike and/or dirt-bike course or trail
- A skateboard park
- A golf chipping practice area with a green, fringe, and sand traps

5.0 PERMITS

5.1 General Review

Versar has reviewed regulatory requirements to determine applicable construction or development permits and approvals at the local, state and federal levels. The review covered the areas of air, water, solid waste, other environmental concerns.

As a government entity, NSGL is generally not required to obtain permits from state and local agencies. However, regulatory standards are still applicable. NSGL will coordinate applicable regulatory correspondance with appropriate local, state, and federal agencies. NGSL will provide the IEPA Federal Facility Section opportunity to review the engineering.

The permit review assumed certain design factors for the final cap:

- Passive gas venting system
- Final grade will slope majority of stormwater to Skokie River.
- Construction near and possible filling-in of wetlands.
- Construction near or in floodway
- No leachate collection
- No stormwater detention

5.2 Federal Permit Issues

Due to the close proximity of the landfill to Skokie River, construction in the floodplain and/or floodway becomes a special concern. The current Flood Insurance Rate Map (FIRM) Lake County, Illinois, Panel 186 of 295 indicates the area inundated by the 100-year flood includes the southeast portion of the landfill. Apparently the map is out of date and requires revision. The FIRM also shows the Regulatory Floodway extending toward the landfill approximately 50 feet from Skokie River. The FIRM is one of the factors used in determining watershed permit requirements. To avoid

floodway/floodplain issues, the regrading area has been limited to elevation 674, which is above the current floodplain.

Additionally a Section 404 (Dredge and Fill) permit may be required by the Corps of Engineers for activities impacting wetland or drainage areas. Certain federal projects may be exempt from permit requirements.

5.3 State Permits

No permit is required by Illinois Department of Natural Resources/office of Water Resources (IDNR/OWR), for land disturbance outside of the floodway.

5.4 Local and County Permits

The East Skokie Drainage District (ESSD) requires review of plans before construction. ESDD is concerned with construction within their easement and any material modifications to the River. NSGL will address watershed permit requirements with the ESDD.

No permit is required by Lake County Stormwater Management Commission (SMC), but NSGL will address the conditions of the SMC Ordinance.

6.0 LANDFILL CLOSURE SYSTEM MODIFICATIONS

6.1 Excavation and Consolidation of Panhandle Area Waste

Field investigation activities verified that a suspected area located northeast of the main landfill contained buried refuse (this area was identified as the "Panhandle Area"). Based on data collected during the field investigation, this irregular-shaped area contains approximately 5,700 cubic yards of waste/refuse, and is between Building 3503 and Skokie River. Soil borings indicated the waste/refuse is approximately 12 feet deep. The Panhandle Area is not contiguous with the main landfill.

It is recommended that waste/refuse in the Panhandle Area be exhumed and consolidated with the main landfill for the following reasons:

- Refuse is saturated and in close proximity to Skokie River, and poses a potential leachate source to the River;
- Refuse is exposed at the surface, and there is no soil cover;
- Buried waste, in its current form, presents a potential future environmental liability; and
- The refuse can be efficiently consolidated within the main landfill during regrading operations, prior to installation of the final cover.

Drawing No. 9 illustrates the excavation plan and final grading plan for the Panhandle Area. The cut volume is approximately 5,700 cubic yards and the subsequent fill volume is 5,460 cubic yards.

6.2 Landfill Regrading

Based on the aerial survey, the crown of the landfill configuration runs north-south approximately in the middle of the landfill. In order to optimize end use possibilities, it is recommended that the existing landfill surface be regraded to create a flat plane surface with a gradual slope from west to east across the top of the landfill. The new crown of the regraded landfill will be constructed along

the western edge of the landfill. The regrading plan requires approximately 34,586 cubic yards of cut (including 5,700 cubic yards from the Panhandle Area) and 31,206 cubic yards of fill volume. Regrading plan details are shown on Drawing 5 (see Section 7.1). Approximately 3,500 cubic yards of clean fill from the cut volume is planned for use as fill in the Panhandle Area.

A 3 percent slope will be used on the top surface of the landfill for drainage and erosion protection. A 3.0 (horizontal) : 1.0 (vertical) slope will be used around the perimeter of the landfill to tie into existing grade. Drawings 6 and 7 (see Section 7.1) present final grading plan details for the low permeability soil layer and the vegetative soil layer. Cross sections are shown on Drawing 10. Regrading operations will not cut into existing waste in the main landfill, except as may be necessary around the perimeter of the landfill to key the final cover into the natural clay soils. Excavated waste materials will be placed on the lowest areas of the existing landfill and under the new final cover system.

Waste material in the Panhandle Area will be exhumed and consolidated with the main landfill. Exhumed waste from the Panhandle Area will be placed in the lowest possible areas of the existing landfill to ensure adequate cover under the new final cover system.

Monitoring wells MW-F and MW-G will be protected during regrading operations and extended to 3 feet above top of final grade to permit continued use of these wells.

6.3 Landfill Cover System

The field investigation indicated that existing cover material overlying refuse includes a variety of silty sand and low permeability soils. The existing cover material complies with sanitary landfill requirements and original design standards (STS, 1983). However, the field investigation indicated that some areas of the landfill lacked adequate impermeable soil cover thickness.

Final cover design is based on proposed end use for the Supply Side Landfill Site, available cover materials, material grading and placement costs, and schedule. Other design considerations include

the footprint of the existing landfill, existing Site conditions, flood way restrictions, and applicable state and local regulations.

Consistent with standard practices and engineering standards, the final cover will consist of 18 inches of low permeability clay with 6 inches of topsoil to promote vegetation. The final cover may be increased to 24 inches of low permeability clay with 6 inches of topsoil around the perimeter of the landfill where the slopes key into the existing ground surface to help protect against erosion.

A borrow source has been identified near the Site which will provide sufficient quantities of silty clay soils. A geotechnical investigation has determined the proposed borrow materials are suitable as low permeability soil for the modified cover system (see Appendix G). A borrow source has also been identified for the topsoil required for the Site. NGSL is stockpiling up to 22,000 cubic yards of topsoil for the project Site.

General backfill material will be placed in the Panhandle excavation and covered with 6-inches of topsoil to match existing grade. Topsoil will be seeded with a mixture of bluegrass and fescue to establish vegetation and provide erosion control.

The subgrade portion of the gas management system will be installed, as detailed in Section 6.4, as part of cover construction

HELP Modeling Evaluation

The Hydrologic Evaluation of Landfill Performance (HELP) Modeling was conducted to compare precipitation through existing surface and proposed final cover systems. HELP Model Version 3.07 was developed by US Army Corps of Engineers for USEPA. HELP computer program is a quasi two dimensional hydrologic model of water movement across, into, through, and out of landfills. The model accounts for the effects of surface storage, runoff, infiltration, evapotranspiration (ET), vegetative growth, soil moisture storage, lateral subsurface drainage, unsaturated vertical drainage, and leakage through soil liners. Model inputs include weather, soil characteristics, cover thickness,

cover slope, and vegetation. Model outputs are amount of runoff, ET, drainage, leachate, and liner leakage.

Boring logs, topographic map and Site reconnaissance were used to determine soil characteristics and thickness of the existing cover. Due to the variability of existing soil cover thickness, the existing cover was divided into a 12-inch top layer of loose topsoil/sandy clay and a 24-inch bottom layer of silty clay. This is also consistent with the landfill specifications (STS, 1983). The barrier clay layer thickness was assumed less than actual field conditions to account for the nonuniformity of different materials encountered (eg. silty clay with gravel, crushed limestone, etc.) during the subsurface investigation. Landfill slope and length of the existing cover were determined from the topographic map and the cross-section drawings. A poor stand of grass and evaporative zone depth of 6 inches was assumed.

For modeling the proposed cover, borrow soil geotechnical data (Versar, 2003) and the proposed cover criteria were used for the landfill soil and thickness characteristics. Landfill slope and length of the proposed cover were determined from the final grading plan and the cross-section drawings. A good stand of grass and evaporative zone depth of 6 inches was assumed. Both model simulations used ET and weather data obtained for Chicago, Illinois.

The detailed assumptions of soil profile in HELP model are listed as follows:

- Existing cover consists of 12 inches topsoil/clayey sand with hydraulic conductivity (k) on the order of 1.2×10^{-4} cm/sec, underlain by 24 inches silty clay with hydraulic conductivity on the order of 3.3×10^{-5} cm/sec.
- Proposed cover consists of a 6-inch topsoil layer with hydraulic conductivity on the order of 1.2×10^{-4} cm/sec, underlain by a 18-inch well compacted clay layer with hydraulic conductivity on the order of 1.0×10^{-7} cm/sec.

The HELP model was run for the existing cover as well as the proposed cover simulating a 30-year period. Results are printed out and included as Appendix H. Model data inputs and outputs are summarized in Table 12.

Based on HELP Model results, the existing cover has an average annual percolation (leakage through cover) of 9.04 inches (28%), 4.7 inches (14%) runoff, and 18.9 inches (58%) ET. The proposed cover has an average annual percolation of 0.86 inches (3%), 8.5 inches (26%) runoff, and 23.3 inches (71%) ET. Therefore, the proposed design indicates the new landfill cover system reduces infiltration by an order of magnitude. In addition, runoff and ET are increased through improved vegetative cover.

6.4 Gas Management System

Based on the field investigation and general site observations, the existing methane gas vent system has limited effectiveness since many of the vents do not appear to extend through the existing cover system into the underlying waste. In addition, the existing vent system is obtrusive and inconsistent with proposed end use.

The Toltest (2001) and Versar gas investigations concluded that elevated gas concentrations exist throughout the landfilled area. Since the existing gas vents are generally ineffective at this time and will be in the way during regrading of the landfill, it is recommended they be removed (or cut back below grade) and a new passive methane gas venting system should be designed and installed to cover the main landfill area.

The new passive gas venting system consists of shallow trenches excavated within the waste material, with horizontal collector pipes in granular bedding leading to passive vents. The design (i.e., vent spacing, depth and location of trenches, diameter of collector pipes, gradation of pipe bedding, etc.) of the gas vent system will be based on the landfill and waste characteristics. A minimum number of vents will protrude through the ground surface and be located along a roadway on the west side of the landfill. The layout of Gas Management System is shown on Drawing 13 (see Section 7.1). Details of the gas management system are shown on Drawing 14 (see Section 7.1).

The gas extraction trenches consist of perforated HDPE horizontal pipes within a gravel backfilled trench. Gravel filled bores will also be placed along the trench spaced at approximately 100 feet

apart. Each trench is also equipped with a top sheet of flexible geomembrane to protect the gravel pack from surface water infiltration. Based on typical gas extraction trench radius of influence, the trenches are spaced at approximately 185 feet apart.

Each gas extraction trench is equipped with a gas extraction trench vent assembly that terminates above ground with a stainless steel wind driven rotary ventilator. The gas extraction vent assemblies are located on the west end of the gas extraction trenches. A vacuum will be induced on the gas extraction trench from the ventilators. Positive pressure from the landfill gas is also used to push gas through the gas extraction vent. A control valve is installed below the ventilator for isolation of the gas vent during gas vent maintenance periods.

The east end of the gas extraction trenches (the low point of the gas extraction trench piping system) is equipped with a trench cleanout riser. These cleanout risers can be used to pump out any liquids that accumulate at the trench low points. All of the gas extraction trenches are sloped from west to east, consistent with the cover slope.

6.5 Surface Water and Erosion Controls

The 100-year flood plain currently depicted on the FIRM (FEMA, 2000) does not reflect actual Site conditions. The location of the 100-year flood plain for Skokie River needs to be determined and/or adjusted in conjunction with the design of the final cover modifications. NSGL has agreed to pursue this issue with FEMA and Lake County. The area of regrading has been limited to areas above elevation 674, to avoid construction within a flood plain.

The Erosion Control Plan during construction of the SSL cover modifications is presented in Appendix I. Erosion controls will include silt fencing around the perimeter of the regrading limit, and placement of straw bales at locations subject to gully erosion, as shown on Drawing 8 (see Section 7.1).

The gentle top slope of the landfill will permit the continued use of the existing stormwater management approach of sheet drainage coupled with improved erosion control methods along the south ditch and Skokie River.

6.6 Groundwater Controls

The existing groundwater monitoring network should continue to be used for monitoring the landfill. The landfill is not regulated by an IEPA solid waste permit; however, quarterly monitoring data has been collected since 1983. Upon completion of final cover modification construction activity, NSGL will discontinue groundwater monitoring based on concurrence with the IEPA Federal Facility Section.

The existing monitoring wells will be unaffected by construction, except MW-F and MW-G which will be extended, as previously discussed in Section 6.2. Groundwater monitoring is discussed further in Section 8.3.

7.0 CONSTRUCTION PLANS AND SPECIFICATIONS

7.1 Construction Plans

Construction plans and details covering waste consolidation and regrading, construction of the modified landfill cover system, the gas management system accompany this report:

Drawing 0	Title Sheet
Drawing 1	Existing Site Conditions Map
Drawing 2	Field Investigation Locations
Drawing 3	Existing Top of Waste Contours
Drawing 4	Existing Cover Soil Thickness Isopach Map
Drawing 5	Proposed Regrading Plan (Top of Waste/Soil)
Drawing 6	Proposed Top of 18" Low Permeability Soil Layer Plan
Drawing 7	Proposed Top of 6" Vegetative Soil Layer Plan
Drawing 8	Erosion Control and Vegetation Plan
Drawing 9	Panhandle Area Construction
Drawing 10	Cross Sections
Drawing 11	Isopach Map - Existing Topo to Regraded Waste/Soil Surface
Drawing 12	Isopach Map - Existing Top of Waste Surface to Regraded Waste/Soil Surface
Drawing 13	Gas Management System Plan
Drawing 14	Gas Management System Details

7.2 Material Specifications

Material and placement specifications for general fill in the Panhandle Area, subgrade, low permeability soil layer, vegetative soil layer, geotextile material and road aggregate are presented in Appendix J.

7.3 Material Quantities

Construction material quantities have been developed for regrading, cutting and filling and construction of the gas management system. These quantities are included in Appendix K.

7.4 Construction Quality Assurance

Construction Quality Assurance is necessary part of to assure the work is conducted in accordance with engineering plans and specifications and to provide documentation of the work. Construction quality assurance activities will confirm that construction is done in accordance with the design through random testing of materials, verification that materials meet design specifications, and documenting that specified construction procedures are followed. The Construction Quality Assurance (CQA) Manual is provided in Appendix L.

8.0 OPERATIONS AND MAINTENANCE

The following information describes the long-term operations and maintenance (O&M) activities to be performed at the Supply Side Landfill. The maintenance and inspection activities will begin upon completion of regrading and cover application. At no time will additional refuse be accepted at the Site during the long-term O&M period.

At a minimum, long-term O&M activities will consist of the following:

- maintaining the integrity and effectiveness of the final cover, including any required repairs;
- maintaining and operating the landfill gas management system; and
- maintaining the groundwater monitoring systems.

The following section provides a description of each facet of the long-term O&M plan.

8.1 Landfill Cover System

Semi-annual inspections will be performed on all vegetated surfaces during the long-term O&M period. The final cover will be repaired in areas where rills, gullies and crevices six inches or deeper have been identified. Areas of final cover which are identified as being particularly susceptible to soil erosions will be repaired. Also, any holes or depressions which had been created by differential settling and may promote ponding of surface water will be repaired. Excessive differential settlement of the final cover is not anticipated. Rather, settlement of waste and final cover is expected to be generally uniform in nature. The repairing of final cover defects will involve regrading of the final cover to continue to promote positive surface water drainage and management.

All areas of the final cover which have been repaired due to erosion, scouring, desiccation, settlement or other causes will be re-vegetated. Mowing of the landfill area will be performed twice per year.

Long-term erosion and soil loss is anticipated to be minimal following the regrading, cover application activities, and vegetation establishment due to the presence of a very gradual top slope over the vast majority of the landfill and good stand of vegetation. For cost estimating purposes, it is assumed that repairs to the cover will be performed at a rate of approximately ½ acre per year. The cost estimate for the landfill cover system O&M is provided in Table 14.

8.2 Landfill Gas Management System

A landfill gas management system will be installed during cover application and will continue to be operated throughout the long-term O&M period, or until approval is obtained from the IEPA to cease operations. Semi-annual inspections will be performed on the above ground portions of the gas system. Inspection work will include checking to see that the gas venting system ventilators operate properly; that bird nests or other debris have not collected and clogged the ventilators; that the valves operate properly; that the pipe caps are intact; and that no pipe cracks are present.

It is anticipated that minor repairs may be necessary to assure the proper operation of the landfill gas management system. These repairs may entail cleaning out collected debris, maintaining or replacing ventilators and valves, or replacing cracked pipe sections. Dewatering of liquids from the landfill gas management system cleanout risers may also be performed as necessary during the semi-annual inspections. Dewatering, when necessary, is anticipated to be performed via use of a vacuum truck. The cost estimate for the landfill gas system O&M is provided in Table 14.

8.3 Groundwater Monitoring

SSL has a groundwater monitoring plan which is currently being utilized. The groundwater monitoring plan may be modified at a future date. Modifications to the plan will be reported to and negotiated with the IEPA Federal Facility Section. The current system of ground water wells will be inspected on a semi-annual basis and repairs to the system will be performed as needed pursuant to the semi-annual inspections. The cost estimate for the landfill groundwater monitoring O&M is provided in Table 14.

8.4 Miscellaneous

Minor repairs may be necessary throughout the long-term O&M period to ensure the integrity of other site features such as fencing and roads. Determination of the need of these repairs will be made during the routine inspections of the final cover. Repairs will be made as warranted. The cost estimate for miscellaneous repairs is provided in Table 14.

All site inspections will be documented and records will be kept at the NSGL Environmental Department office. The documentation will address problems found and corrective actions taken.

9.0 CONSTRUCTION COST ESTIMATE AND SCHEDULE

9.1 Cost Estimate

Two construction cost estimates have been prepared for the proposed SSL landfill cover system modifications as described in Sections 6.0 and 7.0. One estimate assumes the required cover soils will be available from NSGL sources and stockpiled at the Site, and one estimate is based on importing the necessary cover materials.

The estimated cost to construct the proposed landfill cover modifications outlined herein using soils available from NSGL sources is $896,758. The estimated cost to construct the proposed landfill cover modifications using imported soils from off-site sources is $1,415,508.

Both engineering cost estimates are included in Appendix M.

9.2 Construction Schedule

Versar estimates approximately 12 weeks will be required to construct the landfill cover system modifications described in this report. A proposed bar chart construction schedule is presented in Appendix N.

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TABLES

Table 1
FIELD INVESTIGATION SUMMARY
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Sample Type	No. of Borings/Samples	Analysis
Soil Borings (cover thickness)	23	Soil classification
Soil Borings (outside of landfill)	10	Soil classification
Geotechnical Samples	28	Moisture, Atterberg limits, hydraulic conductivity, and soil classification.
Gas Probes Samples (both inside and outside of landfill)	33	Methane, carbon dioxide, oxygen, and pressure
Gas Samples (from existing vents)	17	Methane, carbon dioxide, and oxygen
Leachate/Groundwater Samples (temporary monitoring wells)	5	Leachate indicator parameters, and VOCs

Notes:

Leachate indicator parameters include ammonia, chloride, sulfate, total dissolved solids, total organic carbon, phenolics, iron, lead, manganese, and pH.

VOCs=Volatile Organic Compounds

Table 2
FIELD TEST DATA
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Gas Probe	Sample Collection Date	Peak Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Static Pressure (in. H2O)	Gas Probe depth (ft)	Top of Waste (ft bgs)	Saturated Zone (ft bgs)	Comment
1	11/19/02	2.3	2.5	19.6	-0.1	7	12	7.5	Gas readings taken from cap.
2	11/18/02	32.6	21.6	20.2	-0.1	16	NA	3 & 16	No waste observed
3	11/18/02	61.1	42.6	0	47.2	8	2.5	5.5	
4	11/18/02	73.8	28.4	0	18.9	6	6	4 & 8	
5	11/18/02	67.3	32.2	0.7	-0.2	5	3.5	None	
6	11/19/02	0.3	0.4	19.8	0.1	8	3.5	None	
7	11/19/02	6.1	3.4	18.8	0.7	6	NA	None	No waste observed
8	11/19/02	69.3	29.4	0.6	0.6	6	NA	4	No waste observed
9	11/19/02	0.4	1	19.4	0.4	3.5	NA	4	No waste observed
10	11/19/02	64.1	29.3	1.8	0.5	2	Surface	0.5	Panhandle
11	11/19/02	67.1	37.5	0	-0.2	8.5	NA	10	No waste observed
12	11/19/02	5.6	7.4	14.1	-0.2	12.5	NA	3	No waste observed
13	11/19/02	3.8	2.8	18.5	-0.2	7	7	5	
14	11/19/02	63.4	41.2	0	0.3	5.5	5.5	3.5	
15	11/19/02	22.3	10.6	13.4	-0.4	7	NA	3.5	No waste observed
16	11/20/02	0.5	4	11.2	0.4	12	10	None	
17	11/20/02	66.5	40	0	0.2	5	2.5	2.5	
18	11/20/02	34.2	12.8	11.9	0.1	2.5	2.5	2	
19	11/20/02	25.1	8.7	16.1	0.2	5	5	3.5	
20	11/20/02	7.1	4.2	15.2	0.1	4.5	1	None	No refuse/only C&D waste
21	11/20/02	64.1	41.2	0.8	0.1	5.5	3	3	
22	11/20/02	48.1	7.1	13.9	-0.1	2	2	2	
23	11/20/02	7.1	1.6	13.6	-0.1	8	7	None	
24	11/20/02	37.2	18.6	9.1	0.1	6.5	NA	None	No waste observed
25	11/20/02	27.6	8.8	14.6	0.1	1.2	1	None	
26	11/21/02	3.4	1.9	18.6	0	3	NA	None	No waste observed
27	11/21/02	0	0.01	20.1	0.2	3	NA	None	No waste observed
28	11/22/02	0	0.4	20.1	0	3	NA	None	No waste observed
29	11/22/02	0	3.3	18.2	0	2.5	2	None	
30	11/22/02	0	2.5	19.3	0.1	5	NA	None	No waste observed
31	11/22/02	0	0	20.5	0	2.5	0.5	None	
32	11/21/02	0.4	4.6	16.4	0	6	Surface	None	Construction debris
33	11/21/02	0.7	0.7	20.5	0.5	13	Surface	None	Construction debris and grit

Notes:

bgs=below ground surface

Table 3
GEOTECHNICAL TEST RESULTS
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Sample/Depth	Sample collection date	Soil Description	Moisture Content	LL	PL	PI	Permeability (cm/sec)
MW1X/3-5'	11/14/02	Brown silty clay w/ tr. gravel	16.6	39	22	17	
GP3-4'	11/18/02		13.3				
GP4 0-18"	11/18/02	Brown silty clay w/ tr. gravel	15.7	34	18	16	1.70E-08
GP4-4'	11/18/02		8.3				
GP5-3'	11/18/02		17.2				
GP6 1.5-3.5'	11/19/02	Dk. brown & gray silty clay w/ tr. gravel	20.1	37	19	18	8.00E-09
GP7-3'	11/19/02		15.1				
GP7-6'	11/19/02	Dk. brown silty clay	22.4	40	20	20	
GP8-2'	11/19/02	Dk. brown silty clay w/ tr. gravel	21	40	21	19	
GP8-6'	11/19/02		7.3				
GP11-3'	11/19/02		15.2				
GP11-8'	11/19/02		15				
GP12-3'	11/19/02		15.6				
GP12-5'	11/19/02		17.1				
GP13-3'	11/19/02		17.7				
GP14 2-4'	11/19/02	Brown silty clay w/ tr. gravel	15.4	35	19	16	
GP14-5'	11/19/02	Dk. brown silty clay w/ organics	20.6	35	27	8	
GP15 1-2'	11/19/02		15.9				
GP15 2-4'	11/19/02	Brown silty clay	15.9	34	19	15	1.40E-08
MW2/10-12'	11/14/02	Brown silty clay	18.2	43	25	18	
MW2/30-32'	*11/14/02*	*Gray silty clay w/ tr. gravel*	*19.4*	*39*	*23*	*16*	
MW3/1-3'	11/15/02	Lt. brown & brown silty sandy clay w/ tr. gravel	14.9	37	20	17	
GP18-22"	11/20/02		15.8	31	15	16	
GP19-3'	11/20/02	Dk. brown silty sandy clay w/ tr. gravel	13.3				
GP21-2'	11/20/02		18.7				
GP22-1.5'	11/20/02		17				
GP23-6'	11/20/02		17.5				

Notes:

MW2/30-32' was collected from native clay below the landfill.

Geotechnical data also reported on Soil Boring Logs (Appendix A)

Table 4
LEACHATE/GROUNDWATER LEVELS
TEMPORARY MONITORING WELLS
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Well ID	Ground Elev	TOC Elev	DTW (below TOC) 11-25-02	Leachate/ Groundwater Elev 11-25-02	DTW (below TOC) 12-13-02	Leachate/ Groundwater Elev 12-13-02	Comments
MW1	690.36	692.38	13.3	679.08	11.3	681.08	Leachate
MW2	689.82	691.90	7.3	684.60	15.4	676.50	Leachate
MW3	681.49	684.73	14.0	670.73	14.0	670.73	Groundwater
MW4	677.74	678.74	11.5	667.24	11.6	667.14	Groundwater
MW5	676.65	679.36	4.2	675.16	3.9	675.46	Leachate

Notes:

DTW=Depth to Water

TOC=Top of Casing

Table 5
LEACHATE/GROUNDWATER SAMPLE RESULTS
TEMPORARY MONITORING WELLS
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Sample Location	Ammonia	Chloride	Sulfate	TDS	TOC	Phenols	Iron	Lead	Manganese	pH
TMW1	120	**1800**	15	**4000**	330	**0.28**	**15**	**0.58**	**0.4**	7.36
TMW2	46	**1500**	**>1100**	**>4000**	5600	**0.28**	**270**	**0.17**	**17**	**6.13**
TMW3	20	**830**	1.9	**2200**	350	**0.49**	**400**	**9.0**	**5**	6.65
TMW4	48	**520**	4.6	**1400**	23	<.005	**140**	**0.11**	**4.1**	6.76
TMW5	58	**660**	4.3	**1900**	330	**0.3**	**130**	**0.13**	**0.89**	**6.40**
Class I GQS (mg/L)	NA	200	400	1200	NA	0.1	5	0.0075	0.15	6.5-9.0
Class II GQS (mg/L)	NA	200	400	1200	NA	0.1	5	0.1	10	6.5-9.0
SWQS (mg/L)	15	500	500	1000	NA	0.1	1.0	*	1.0	6.5-9.0

Notes:

Bold and Highlighted = Exceeds Class I Groundwater Quality Standard

GQS=Groundwater Quality Standard

SWQS=Surface Water Quality Standard

Class I and Class II Groundwater Quality Standards (Title 35, Part 620 Subpart D)

General Use (Surface) Water Quality Standards (Title 35, Part 302, Subpart B)

* Calculated lead standard based on hardness concentration.

Table 6
VOC SUMMARY - LEACHATE
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

VOCs	IAC 620 Groundwater Remediation Objectives		Laboratory Reporting Limit	Sample Location/Date (mg/L)
	Class I (mg/L)	Class II (mg/L)	(mg/L)	TMW1 11/25/02
1,4-Dichlorobenzene	0.075	0.375	0.01	0.045
Ethylbenzene	0.7	1	0.01	0.023
p-Isopropyltoluene	NS	NS	0.01	0.011
Naphthalene	0.14	0.22	0.01	0.030
1,2,4-Trimethylbenzene	NS	NS	0.01	0.022
Toluene	1	2.5	0.01	0.031
m&p-Xylenes	10	10	0.02	0.044
o-Xylene	10	10	0.01	0.022

Notes:

NS=No standard established by IEPA

Tier 1 Groundwater Remediation Objectives for Class I and Class II groundwater (Illinois EPA, Tiered Approach to Corrective Action Objectives, 1977).

Table 7
GAS VENT SURVEY
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Gas Vent No.	Peak Methane %	Carbon Dioxide %	Oxygen %
1	--	--	--
2	--	--	--
3	--	--	--
4	0.7	1.2	20.2
5	I	I	I
6	I	I	I
7	I	I	I
8	1.5	1.8	19.3
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--
13	I	I	I
14	--	--	--
15	25	NA	NA
16	--	--	--
17	--	--	--
18	I	I	I
19	--	--	--
20	I	I	I
21	2.7	6.7	16
22	0	2.8	0
23	--	--	--
24	--	--	--

Notes:

Vents tested on 11/26/02, except Vent No. 15 tested on 11/20/02.

--=No measureable gas concentrations.

I=Inaccessible (vent too high to sample).

Table 8
SURFACE WATER SAMPLE EXCEEDANCES
1985-1996
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Location	Ammonia	Chloride	Sulfate	TDS	Phenolics	Iron	Manganese	Total
S 101 (upgradient)	1	5	2	13	6	9	1	37
S 301 (downgradient)	2	5	0	8	3	6	2	26

Note:
Concentrations compared to Title 35, Part 302, Subpart B General Use Water Quality Standards.

Table 9
COMPARISON OF ORIGINAL TO REPLACEMENT WELLS
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Original Well	Replacement Well	Use
G101	None (MW-G* is closest)	Upgradient
G102	MW-A	Downgradient
G103	MW-B	Downgradient
G104	MW-F	Downgradient
G105 (Gas Well MW5)	MW-D and E are across Skokie River and roughly coincide with G105, G106, and G107.	Off-Site
G106 (Gas Well MW6)		Off-Site
G107 (Gas Well MW7)		Off-Site
None	MW-C	Upgradient

Notes:
MW-G not installed as part of Supply Side Landfill project.

Table 10
GROUNDWATER LEVELS
(REPLACEMENT MONITORING WELLS)
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Well ID	Date Measured	Total Depth from TOC (ft)	TOC Elev. (ft)	Depth to Water (ft)	Static Water Level (ft)
MW-A	9/9/98	14.7	96.01	9.03	86.98
MW-B	9/9/98	17.0	95.20	10.83	84.37
MW-C	9/9/98	17.2	99.28	6.04	93.24
MW-D	9/9/98	17.9	94.47	7.57	86.90
MW-E	9/9/98	17.7	94.01	7.78	86.23
MW-F	9/9/98	17.1	100.83	12.60	88.23

Notes:

TOC=Top of Casing

Table 11
GROUNDWATER ANALYTE EXCEEDANCES
(ORIGINAL MONITORING WELLS)
1983-1996
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Well ID	Chloride	Sulfate	TDS	Phenolics	Iron	Lead	Manganese	Total
G101 (upgradient)	8	2	12	2	0	15	8	47
G102 (downgradient)	22	5	41	5	14	29	20	136
G103 (downgradient)	10	5	18	3	14	20	25	95
G104 (downgradient)	5	10	17	2	15	29	25	103

Note:

Concentrations compared to Class I Groundwater Quality Standards (Title 35, Part 620, Subpart D).

Table 12
GROUNDWATER ANALYTE EXCEEDANCES
(REPLACEMENT MONITORING WELLS)
1999-2002
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

Well ID	Chloride	Sulfate	TDS	Phenolics	Iron	Lead	Manganese	Total
MW A (downgradient)	0	0	0	1	10	0	13	24
MW B (downgradient)	10	0	11	1	12	1	5	40
MW C (upgradient)	0	0	2	0	0	0	2	4
MW D (cross-gradient)	0	0	1	2	0	0	11	14
MW E (cross-gradient)	0	0	0	3	0	0	11	14
MW F (downgradient)	0	2	1	3	0	0	10	16

Note:

Concentrations compared to Class I Groundwater Quality Standards (Title 35, Part 620, Subpart D).

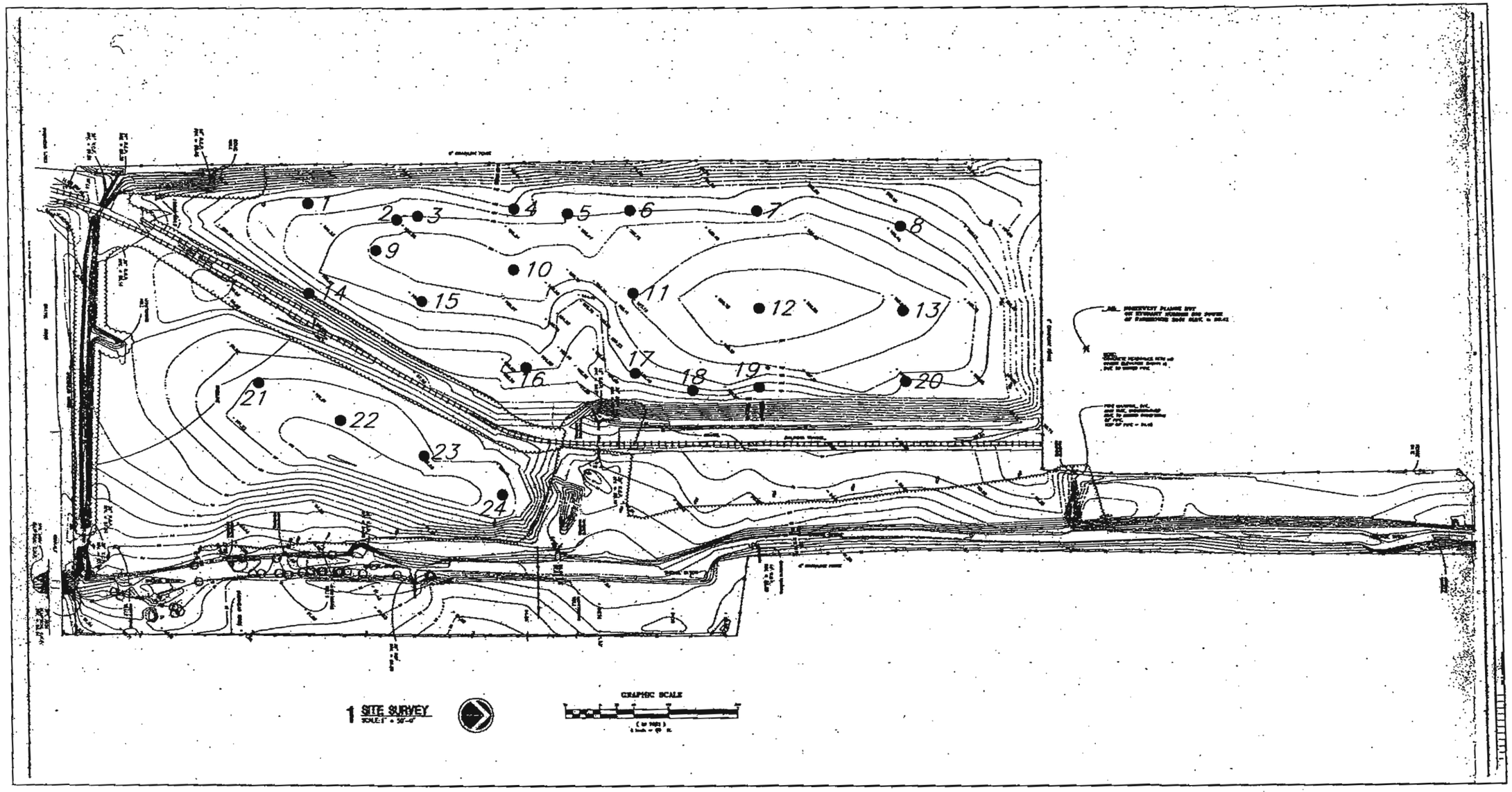
Table 13
HELP MODEL SUMMARY RESULTS
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, IL

Cover Description	Topsoil	Clay Cover (Barrier)	Analysis Results
1. Existing Cover	12 inches HELP Soil Type=10 k=1.2 x 10^{-4} cm/sec Poor stand of grass Slope=3%/Length=150 feet	24 inches HELP Soil Type=13 k=3.3 x 10^{-5} cm/sec	Efficiency = 72% (14% runoff, 58% ET) Percolation = 9.04 in (27.7%)
2. Proposed Cover	6 inches HELP Soil Type=10 k=1.2 x 10^{-4} cm/sec Good stand of grass Slope=4%/Length=520 feet	18 inches HELP Soil Type=16 (well compacted clay soil) k=1.0 x 10^{-7} cm/sec	Efficiency = 97% (26% runoff, 71% ET) Percolation = 0.86 in (2.6%)

Table 14
ANNUAL OPERATIONS AND MAINTENANCE COSTS
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, Illinois

1. Cover/Gas System Inspections	
4 hours x $75/hr x 2 times/yr	$600
2. Cover Maintenance	
0.5 acres x 2 feet x $5.50/cy	$8,873
3. Vegetation Maintenance	
0.5 acres x 2,000 acres	$1,000
4. Mowing	
15 acres x $25/acre x 2 times/yr	$750
5. Gas System Maintenance	
Labor - 4 hours x $75/hr x 2 times/yr	$600
Materials - $1000 x 2 times/yr	$2,000
6. Ground Water Monitoring	
Labor - 8 hours x $75/hr x 2 times/yr	$1,200
Analytical - $180/sample x 6 samples x 2 times/yr	$2,160
7. Miscellaneous Repairs	
Labor - 4 hours x $75/hr x 2 times/yr	$600
Materials - $1000 x 2 times/yr	$2,000
TOTAL ESTIMATED ANNUAL O&M COST	**$21,943**

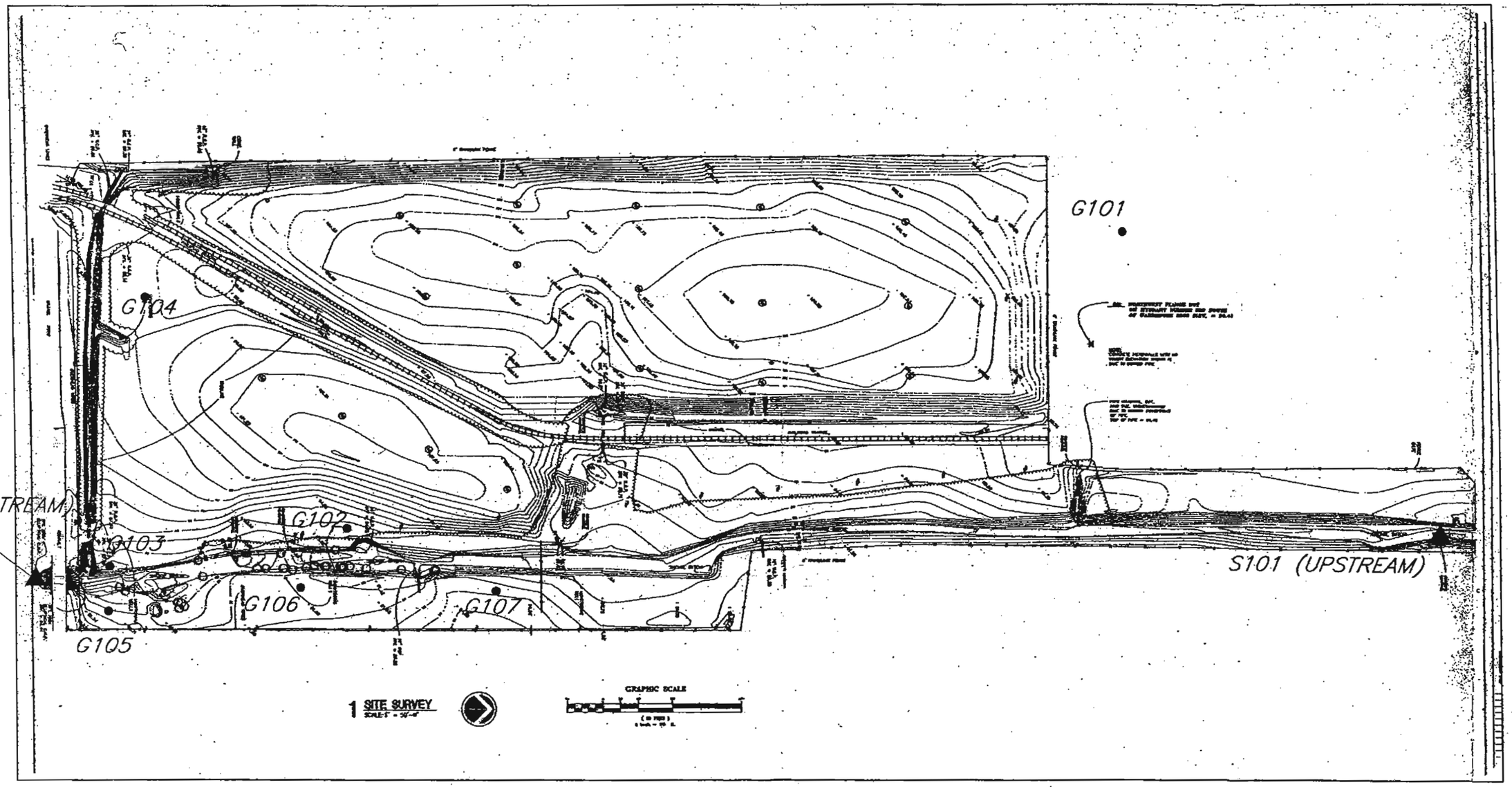
FIGURES



21 • GAS VENT IDENTIFICATION

LOCATIONS BASED ON POST-REPAIR VENT AND MONITORING WELLS LOCATIONS, SUPPLY SIDE LANDFILL (TOLTEST, JUNE 1999).
BASEMAP PROVIDED BY U.S. NAVY (SITE SURVEY, PRIMERA ENGINEERS, 1997).

TITLE: FIGURE 1 GAS VENT LOCATIONS SUPPLY SIDE LANDFILL, GREAT LAKES ILLINOIS			FOR:
CAD: HDP	CHECKED: HDP	APPROVED: JA	GREAT LAKES NAVAL TRAINING CENTER, GREAT LAKES, ILLINOIS
DATE: 7/9/03	SCALE: RELATIVE		
Versar INC. 200 W. 22nd STREET, SUITE 250 LOMBARD, IL 60148			PROJECT NO. 110684.0001.001



▲ SURFACE WATER SAMPLING LOCATION

• MONITORING WELL IDENTIFICATION
G103

LOCATIONS BASED ON GROUNDWATER MONITORING WELLS, PWC DWG NO. C-1-861, MAY 1984 (NAVY PUBLIC WORKS CENTER, GREAT LAKES, IL) AND K-PLUS ENVIRONMENTAL DWG, MARCH 1995. BASEMAP PROVIDED BY U.S. NAVY (SITE SURVEY, PRIMERA ENGINEERS, 1997)

TITLE: FIGURE 2 ORIGINAL MONITORING WELL AND SURFACE WATER SAMPLE LOCATIONS SUPPLY SIDE LANDFILL, GREAT LAKES ILLINOIS			FOR: GREAT LAKES NAVAL TRAINING CENTER, GREAT LAKES, ILLINOIS
CAD: HDP	CHECKED: HDP	APPROVED: JA	
DATE: 7/9/03	SCALE: RELATIVE		
Versar INC. 200 W. 22nd STREET, SUITE 250 LOMBARD, IL 60148			PROJECT NO. 110684.0001.001
			DRAWING NO. LAYOUT

APPENDIX A

BORING LOGS

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP1
Surface Elevation
Job No. 1106840003002
Sheet 1 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Clay and Sand with gravel (Fill)	
						Topsoil	
				5		Silty CLAY (CL) with gravel (Fill)	
				10		Silty CLAY (CL) with some sand and gravel (Fill)	Set the gas probe at 7 ft. just above the first layer of saturated silty clay fill. $CH_4 = 2.3$ $CO_2 = 2.5$ $O_2 = 19.6$ VP = 0.0

Continued Next Page

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No.: GP1
Surface Elevation:
Job No.: 1106840003002
Sheet 2 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Silty CLAY (CL) with isolated waste	
				15			
						Organic stained silty CLAY (CL) with waste	
						EOB at 19.5 feet	
				20			

GENERAL NOTES

Begin Drilling: 11/19/02 Complete Drilling: 11/19/02
Drilling Contractor: Mid America Drill Rig: Not Applicable
Driller: NA Logged By: T Freudenrich Reviewed By:
Drilling Method: Geoprobe

WATER LEVEL DATA

While Drilling:
At Completion of Drilling:
Time After Drilling:
Depth to Water:

The stratification lines represent the approximate boundary between soil ...

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP2
Surface Elevation
Job No. 1106840003002
Sheet 1 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Clay and Sand with gravel (Fill)	
						Silty CLAY (CL) with some gravel.	
						Silty CLAY (CL) with organics.	Saturated zone.
				5			
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP2
Surface Elevation
Job No. 1106840003002
Sheet 2 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
				15			
						EOB at 16 feet	Water Set the gas probe at 16 ft and in daily cover. CH_4 = 32.6 CO_2 = 21.6 O_2 = 20.2 VP = -0.1
				20			

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP3
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil	
						Silty CLAY (CL) with little gravel (Fill).	w=13.3%
				5		Organic stained silty CLAY (CL) with isolated waste inclusions.	Saturated
				10		EOB at 8 feet	Install GeoProbe continuous sample to 8 ft. BSG, and set gas probe at base of run with daily cover material. CH_4 = 67.3 CO_2 = 37.9 O_2 = 0.2 VP = 28.9

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP4
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil	
						Silty CLAY (CL) with gravel (Fill).	Shelby tube at 1 to 1.5 ft. hit gravel. w=15.7% LL=34, PL=16, PI=18
						Interbedded silty CLAY (CL) and crushed limestone. at 4.5ft. a transition into interbeded organic material becomes present (Fill).	
				5			w=8.3% Wet
						Waste matrix mixed in with organic stained silty clay.	Set gas probe @ 6 ft. BSG. CH_4 = 62.2 CO_2 = 34.6 O_2 = 14.6
						EOB at 8 feet	Watertable at 8 ft.
				10			

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP5
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil	
						Silty CLAY (CL) with gravel (Fill).	
						Crushed limestone and silty clay (Fill).	w=17.2%
						Refuse/waste	
				5		EOB at 5 feet	Set gas probe at 5 ft.: CH_4 = 67.3, CO_2 = 32.1, O_2 = 0.7, VP = -0.2
				10			

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP6
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil/Clay and Sand with gravel (Fill).	
						Silty CLAY (CL) with some gravel (Fill).	Shelby tube: 2 to 3.5 ft. w=20.1% LL=37, PL=18, PI=19
				5		Waste matrix with stained silty clay.	
				10		EOB at 8 feet	Set gas probe at 8 ft: CH_4 = 0.3 CO_2 = 0.4 O_2 = 19.8 VP = 0.1

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP7
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil	
						Silty CLAY (CL) with gravel (Fill).	w=15.1%
				5		Organic stained silty CLAY (CL) (Fill).	w=22.4% LL=40, PL=20, PI=20 Set gas probe to 6 ft. BSG: CH_4 = 6.1 CO_2 = 3.4 O_2= 18.8 VP = 0.7
				10		EOB at 8 feet	

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP8
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Interbedded topsoil and crushed limestone (Fill).	
						Silty CLAY (CL) with gravel (Fill).	w=21.0% LL=40, PL=19, PI=21
						Crushed limestone (Fill).	Wet
				5		Organic stained sandy-silty CLAY (CL) (Fill).	w=7.3% Set gas probe at 6 ft.: CH_4 = 69.3 CO_2 =29.4 O_2 = 0.6 VP = 0.6
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP9
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil	
						Silty CLAY (CL) (Fill).	
							Set gas probe at 3.5 ft, just above saturation zone $CO_4 = 0.4$ $CO_2 = 1.0$ $O_2 = 19.4$ VP = 0.4
				5		Till, yellow/brown CLAY (CL) with gray silt varves.	
						EOB at 8 feet	No refuse observed.
				10			

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries between ...

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No.: GP10
Surface Elevation:
Job No.: 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Refuse to surface, wet.	
				5			Set gas probe at 2 ft.: CH_4 = 64.1 CO_2 =29.3 O_2 = 1.8 VP = 0.5
		4				EOB at 6 feet	
				10			

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP11
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Clay and Sand with gravel (Fill)	
						Gravelly silty CLAY (CL) (Fill).	w=15.2%
				5		Organic stained silty clay interbedded with layers of gravelly silty clay (Fill).	
				10		Organic stained silty CLAY (CL) (Fill).	Set gas probe at 8.5 ft. CO_4 = 67.1 CO_2 = 37.5 O_2 = 0.0 VP = -0.2 Wet

Continued Next Page

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No.: GP11
Surface Elevation:
Job No.: 1106840003002
Sheet 2 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Gray CLAY (CL). EOB at 12 feet	No refuse observed.
				15			
				20			

GENERAL NOTES

Begin Drilling: 11/19/02 Complete Drilling: 11/19/02
Drilling Contractor: Mid America Drill Rig: Not Applicable
Driller: NA Logged By: T Freudenrich Reviewed By:
Drilling Method: Geoprobe

WATER LEVEL DATA

While Drilling:
At Completion of Drilling:
Time After Drilling:
Depth to Water:

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP12
Surface Elevation
Job No. 1106840003002
Sheet 1 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Clay and Sand with gravel grading into silty CLAY with gravel (CL) (Fill).	
							w=15.6%
							Wet
						Interbedded organic stained silty CLAY (CL) with gravel and sand (Fill).	
				5			
							w=17.1%
						Organic stained silty CLAY (CL) (Fill).	
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP12
Surface Elevation
Job No. 1106840003002
Sheet 2 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
							Set gas probe at 12 ft. CH_4 = 5.6 CO_2 = 7.4 O_2 = 14.1 VP = -0.2
						Gray silty CLAY (CL).	
				15			
						EOB at 18.5 feet	
				20			

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between ...

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP13
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
		1				Clay and Sand with gravel (Fill).	
		0.16				Silty CLAY (CL) with gravel (Fill).	Shelby tube at 3 to 5 ft. w=17.7%
		0.58		5		Silty CLAY (CL) with gravel, seams of silty CLAY (CL) with water (Fill).	Wet
						Refuse.	Set gas probe at 7 ft. just above waste. CH_4 = 3.8 CO_2 = 2.8 O_2 = 18.5 VP = -0.2
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP14
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
		1				Topsoil.	
						Brown silty CLAY (CL) with gravel (Fill).	w=15.4% LL=35, PL=16, PI=19 Wet
				5		Silty CLAY (CL) with crushed stone (Fill).	w=20.6% LL=35, PL=8, PI=27
						Refuse.	Set gas probe at 5.5 ft.: CH_4 = 63.4 CO_2 = 41.2 O_2 = 0.0 VP = 0.3
						Gravelly silty CLAY (CL).	
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the ...

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP15
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil	
						Silty CLAY (CL) with gravel (Fill).	w=15.9%
							Shelby tube at 2 to 4 ft. w=15.9% LL=34, PL=15, PI=19
						Silty CLAY (CL) with small amounts of sand and gravel (Fill).	Wet
				5		Organic stained silty CLAY (CL) with small amounts of crushed limestone (Fill).	Set gas probe at 7 ft.: CH_4 = 22.3 CO_2 = 10.6 O_2 = 13.4 VP = -0.4
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/19/02 Complete Drilling 11/19/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP16
Surface Elevation
Job No. 1106840003002
Sheet 1 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
		0.5				Clay and Sand with gravel (Fill).	
		0					
		0.66					
				5		Topsoil	
		0.83				Silty CLAY (CL) with some gravel and isolated organic stains (Fill).	
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP16
Surface Elevation:
Job No. 1106840003002
Sheet 2 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Waste matrix.	
							set gas probe at 12 ft. BSG: CH_4 = 0.5 CO_2 = 4.0 O_2 = 11.2 VP = 0.4
				15			
				20			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP16
Surface Elevation
Job No. 1106840003002
Sheet 3 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						EOB at 20 feet	
				25			
				30			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP17
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil	
						Silty CLAY (CL) with gravel (Fill).	
						Refuse.	Wet
				5		EOB at 5 feet	Set gas probe at 5 ft. BSG: CH_4 = 66.5 CO_2 = 40.0 O_2 = 0.0 VP = 0.2
				10			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP18
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Silty CLAY (CL) with gravel (Fill).	
						Organic stained silty CLAY (CL) (Fill).	w=15.8% Wet
						Refuse.	Set gas probe at 30 in. CH_4 = 34.2 CO_2 = 12.8 O_2 = 11.9 VP = 0.1
						EOB at 4 feet	
				5			
				10			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP19
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Silty CLAY (CL) with gravel (Fill).	Attempted Shelby tube at 2 to 3.5 ft., rejected by rock. w=13.3% LL=31, PL=16, PI=15
						Organic silty CLAY (CL) (Fill).	Wet
				5		Refuse.	Set gas probe at 5 ft. BSG. CH_4 = 25.1 CO_2 = 8.7 O_2 = 16.1 VP = 0.2
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP20
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil.	
						Mixed silty CLAY (CL) with construction rubble (asphalt) (Fill).	
				5		Gravelly CLAY (CL) with crushed limestone and construction debris (Fill).	Set gas probe at 4.5 ft. BSG. CH_4 = 7.1 CO_2 = 4.2 O_2 = 15.2 VP = 0.1
				10		EOB at 8 feet	

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP21
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil	
						Silty CLAY (CL) with some sand and gravel (Fill).	w=18.7%
						Refuse. Between 4.5 to 5.5 ft. lens of soft refuse.	Wet
				5			Set gas probe at 5.5 ft. BSG. CH_4 = 64.1 CO_2= 41.2 O_2 = 0.8 VP 0.1
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil ty...

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP22
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Silty CLAY (CL) with some sand and gravel (Fill).	
							w=17.0% Wet
						Refuse.	Set gas probe at 2 ft. BSG CH_4 = 48.1 CO_2 = 7.1 O_2 = 13.9 VP = -0.1
						EOB at 4 feet	
				5			
				10			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP23
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Clay and Sand with gravel (Fill).	
						Crushed limestone (Fill).	
						Gravelly silty CLAY (CL) (Fill).	
						Silty CLAY (CL) with some gravel (Fill).	
						Crushed limestone (Fill).	
				5		Silty CLAY (CL) with some coarse sand (Fill).	w=17.5%
						Refuse.	
						EOB at 8 feet	Install GeoProbe continuous soil sample to 8 ft. BSG, set gas probe at 8 ft. near landfill vent. $CH_4 = 7.1$ $CO_2 = 1.6$ $O_2 = 13.6$ VP -0.1
				10			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP24
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Vegetation and soil mix.	
						Topsoil.	
						Silty CLAY (CL) (Fill).	
						Crushed limestone (Fill).	
						Crushed limestone and silty CLAY (CL) mix (Fill).	
				5		Green/Gray silty CLAY (CL) with decomposing organics (swamp sediments).	Set gas probe at 6.5 ft. CH_4 = 37.2 CO_2 = 18.6 O_2 = 9.1 VP = 0.1
						Gray silty CLAY (CL).	
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP25
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil becoming mixed with refuse.	
						Gray silty CLAY (CL).	Set gas probe at 14 in. depth. CH_4 = 27.6 CO_2 = 8.8 O_2 = 14.6 VP = 0.1
						EOB at 4 feet	
				5			
				10			

GENERAL NOTES

Begin Drilling 11/20/02 Complete Drilling 11/20/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No.: GP26
Surface Elevation:
Job No.: 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil.	
						Silty CLAY (CL) with some gravel (Fill).	
						Organic stained silty CLAY (CL) (Fill).	Set gas Probe at 3 ft. BSG. CH_4 = 3.4 CO_2 = 1.9 O_2 = 18.6 VP = 0.0
				5		Gray silty CLAY (CL).	
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling: 11/21/02 Complete Drilling: 11/21/02
Drilling Contractor: Mid America Drill Rig: Not Applicable
Driller: NA Logged By: T Freudenrich Reviewed By:
Drilling Method: Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries between ...

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP27
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil.	
						Gray silty CLAY (CL).	Set gas probe at 2nd location: CH_4 = 0.0 CO_2 = 0.1 O_2 = 20.1 VP = 0.2
						EOB at 4 feet	
				5			
				10			

GENERAL NOTES

Begin Drilling 11/21/02 Complete Drilling 11/21/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP28
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil.	
						Gray silty CLAY (CL).	
							Set gas probe at 3 ft. CH_4 = 0.0 CO_2 = 0.4 O_2 = 20.1 VP = 0.0
						EOB at 4 feet	
				5			
				10			

GENERAL NOTES

Begin Drilling 11/22/02 Complete Drilling 11/22/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP29
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil.	
						Sandy loam.	
						Organic stained CLAY (CL) with little refuse.	
						Organic stained clay with some sand and gravel.	Set gas Probe at 2.5 ft.: $CH_4 = 0.0$ $CO_2 = 3.3$ $O_2 = 18.2$
				5		Gray silty CLAY (CL).	
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/22/02 Complete Drilling 11/22/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP30
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Topsoil.	
						CLAY (CL) with sand and gravel inclusions.	
						Topsoil.	
						CLAY (CL) with little sand and gravel.	
				5		Topsoil.	Set gas probe at 5 ft. depth. $CH_4 = 0.0$ $CO_2 = 2.5$ $O_2 = 19.3$
						Gray silty CLAY (CL).	
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/22/02 Complete Drilling 11/22/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP31
Surface Elevation
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Silty CLAY (CL) (Fill).	
						Industrial grit, red (Fill).	
						Gravelly CLAY (CL).	Set gas probe at 2.5 ft.: $CH_4 = 0.0$ $CO_2 = 0.0$ $O_2 = 20.5$ VP = 0.1
				5		Void, Drain tile?	
						Silty CLAY (CL).	
						EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/22/02 Complete Drilling 11/22/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP32
Surface Elevation:
Job No. 1106840003002
Sheet 1 of 1

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Silty CLAY (CL) with construction rubble (Fill).	
				5			
						Organic layer.	Set gas probe at 6 ft. depth. $CH_4 = 0.4$ $CO_2 = 4.6$ $O_2 = 16.4$ VP = 0.0
						Silty CLAY (CL) with gravel (Fill).	
						Blue/gray silty CLAY (CL). EOB at 8 feet	
				10			

GENERAL NOTES

Begin Drilling 11/21/02 Complete Drilling 11/21/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP33
Surface Elevation
Job No. 1106840003002
Sheet 1 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Mixed CLAY (CL) with constuction rubble (Fill).	
				5			
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/21/02 Complete Drilling 11/21/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. GP33
Surface Elevation
Job No. 1106840003002
Sheet 2 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Organic muck (Fill).	
						Silty CLAY (CL) with gravel (Fill).	
						8 inch seam of industrial grit, red (Fill).	Set gas probe at 13 ft.: $CH_4 = 0.7$ $CO_2 = 0.7$ $O_2 = 0.5$ VP = 0.5
						Organic stained CLAY (CL).	
				15		Silty CLAY (CL) with gravel.	
						EOB at 16 feet	
				20			

GENERAL NOTES

Begin Drilling 11/21/02 Complete Drilling 11/21/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T. Freudenrich Reviewed By
Drilling Method Geoprobe

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary but may not be exact

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW1
Surface Elevation
Job No. 1106840003002
Sheet 1 of 4

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Clay and Sand with gravel (Fill).	
						Silty CLAY (CL) with some sand and gravel (Fill).	
				5			
						Organics and refuse in silty CLAY (CL) daily cover.	
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundaries

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW1
Surface Elevation
Job No. 1106840003002
Sheet 2 of 4

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
				15			
							Dry
				20		Difficult drilling, foam rubber and metal	

Continued Next Page

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition [illegible]

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW1
Surface Elevation
Job No. 1106840003002
Sheet 3 of 4

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
				25			Elevated methane discharge (LEL>10%)
				30			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW1
Surface Elevation
Job No. 1106840003002
Sheet 4 of 4

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						EOB at 32 feet Set temporary monitoring well, 2" diameter, 5' screen, 32' to 27' BGS.	
				35			
				40			

GENERAL NOTES

Begin Drilling 11/18/02 Complete Drilling 11/18/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW1X
Surface Elevation
Job No. 1106840003002
Sheet 1 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Clay and Sand with gravel, loose to firm, dry (Fill)	
				5		Brown silty CLAY (CL) (Fill).	w=16.6% LL=39, PL=17, PI=22
				10		Silty CLAY (CL) with organic mottling, very plastic with varying veins of gray silt and some organic mottling (Fill).	Soft and very moist

Continued Next Page

GENERAL NOTES

Begin Drilling 11/14/02 Complete Drilling 11/14/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW1X
Surface Elevation
Job No. 1106840003002
Sheet 2 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
							10-14 ft. stiff and dry
				15			
							After auger was removed below 16 feet caved in
			<6			Refuse, refusal at 25 ft.	Matrix becomes very dry
				20			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/14/02 Complete Drilling 11/14/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW1X
Surface Elevation
Job No. 1106840003002
Sheet 3 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
							18-22 ft. dry, no recovery below 22 ft.
							LEL : 10%
				25		EOB at 25 feet , abandoned hole.	Refusal at 25 ft.
				30			

GENERAL NOTES

Begin Drilling 11/14/02 Complete Drilling 11/14/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No.: MW2
Surface Elevation:
Job No.: 1106840003002
Sheet 1 of 4

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Loose Clay and Sand with gravel (Fill).	
						Very loose Clay and Sand with gravel (Fill).	Wet
				5		Very soft topsoil layer	Moist
						Soft to firm brown silty CLAY (CL) with some organic lenses (Fill).	w=18.2% LL=43, PL=18, PI=25
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling: 11/14/02 Complete Drilling: 11/15/02
Drilling Contractor: Mid America Drill Rig: Not Applicable
Driller: NA Logged By: T Freudenrich Reviewed By:
Drilling Method: Hollow Stem Auger

WATER LEVEL DATA

While Drilling:
At Completion of Drilling:
Time After Drilling:
Depth to Water:

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW2
Surface Elevation
Job No. 1106840003002
Sheet 2 of 4

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
			2-6	15		Waste matrix, clay with refuse, including plastic, wood, metal, poly	Water transition LEL: 0-4% Wet
				20			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/14/02 Complete Drilling 11/15/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW2
Surface Elevation
Job No. 1106840003002
Sheet 3 of 4

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
							Wet
				25			
				30			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/14/02 Complete Drilling 11/15/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW2
Surface Elevation
Job No. 1106840003002
Sheet 4 of 4

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Silty CLAY (CL), hard, gray. refusal at 32 ft.	w=19.4% LL=39, PL=16, PI=23
						EOB at 32 feet Set temporary monitoring well, 2" diameter, 10' screen, 31' to 21' BGS	Refusal at 32 ft.
				35			
				40			

GENERAL NOTES

Begin Drilling 11/14/02 Complete Drilling 11/15/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW3
Surface Elevation
Job No. 1106840003002
Sheet 1 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						CLAY (CL) with gravel (Fill).	w=14.9% LL=37, PL=17, PI=20
						Refuse including paper, metal, plastic, not decomposing. void between 10.5-12 ft.	
				5			
							Dry
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/15/02 Complete Drilling 11/15/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T. Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW3
Surface Elevation
Job No. 1106840003002
Sheet 2 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Layer of dark red/brown medium grit (industrial material).	Oversaturated
				15		EOB at 15.5 feet Below is very stiff moist silty CLAY (CL).	Moist
				20		Set temporary monitoring well, 2" diameter, 10' screen, 15.5' to 5.5' BGS	

GENERAL NOTES

Begin Drilling 11/15/02 Complete Drilling 11/15/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No.: MW4
Surface Elevation:
Job No.: 1106840003002
Sheet 1 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Mixed layers of soft CLAY (CL), gravelly CLAY (CL), GRAVEL (GW), ash/cinders (Fill).	
				5		CLAY (CL) becomes less gravelly and more plastic and stiff/firm	
						CLAY (CL) with slight amounts of gravel and organic lenses. water present at 12 ft. and clay becomes soft	Moist
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling: 11/15/02 Complete Drilling: 11/15/02
Drilling Contractor: Mid America Drill Rig: Not Applicable
Driller: NA Logged By: T Freudenrich Reviewed By:
Drilling Method: Hollow Stem Auger

WATER LEVEL DATA

While Drilling:
At Completion of Drilling:
Time After Drilling:
Depth to Water:

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW4
Surface Elevation
Job No. 110684000300
Sheet 2 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
							Wet
							Water presents at 12 ft, and clay becomes soft.
				15		Medium dense gray sandy SILT (ML) becoming silty fine SAND (SM) to fine SAND (SP) with increase depth.	
						Silty CLAY (CL), very soft, gray.	Moist
				20			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/15/02 Complete Drilling 11/15/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No.: MW4
Surface Elevation:
Job No.: 1106840003002
Sheet 3 of 3

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						EOB at 20 feet Set temporary monitoring well, 2" diameter, 10' screen, 22' to 12' BGS	
				25			
				30			

GENERAL NOTES

Begin Drilling: 11/15/02 Complete Drilling: 11/15/02
Drilling Contractor: Mid America Drill Rig: Not Applicable
Driller: NA Logged By: T Freudenrich Reviewed By:
Drilling Method: Hollow Stem Auger

WATER LEVEL DATA

While Drilling:
At Completion of Drilling:
Time After Drilling:
Depth to Water:

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW5
Surface Elevation
Job No. 1106840003002
Sheet 1 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Interbed layers of clay, landscape waste and general refuse.	
							Water present and continues down to 15 ft.
			2-6	5			
							LEL : 0 to 4%
				10			

Continued Next Page

GENERAL NOTES

Begin Drilling 11/15/02 Complete Drilling 11/15/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOG

Versar INC.

Client: US Navy
Project: supply side landfill
Location:

Boring No. MW5
Surface Elevation
Job No. 1106840003002
Sheet 2 of 2

SAMPLE No.	Type	Rec (ft.)	PID (ppm)	Depth (ft.)	Profile	VISUAL DESCRIPTION	REMARKS
						Silty CLAY (CL), stiff.	
				15		EOB at 15 feet Set temporary monitoring well, 2" diameter, 10' screen, 15' to 5' BGS	
				20			

GENERAL NOTES

Begin Drilling 11/15/02 Complete Drilling 11/15/02
Drilling Contractor Mid America Drill Rig Not Applicable
Driller NA Logged By T Freudenrich Reviewed By
Drilling Method Hollow Stem Auger

WATER LEVEL DATA

While Drilling
At Completion of Drilling
Time After Drilling
Depth to Water

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

APPENDIX B

GEOTECHNICAL TEST DATA

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60527 Ph: (630) 321-0944 Fax: (630) 321-0945

Moisture Content & Classification

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	Date Tested	12/2/2002	Tested By	NP	QC By	SB

Sample ID	Sample Type	Moisture Cont (%)	Liquid Limit	Plasticity Index	Class. (see note)
MW1X/#2	Jar	16.6	39	22	CL
GP3-4'	Jar	13.3			CL
GP4 0-18"	Shelby	15.7	34	18	CL
GP4-4'	Jar	8.3			SP
GP5-3'	Jar	17.2			CL
GP6 1.5-3.5'	Shelby	20.1	37	19	CL
GP7-3'	Jar	15.1			CL
GP7-6'	Jar	22.4	40	20	CL
GP8-2'	Jar	21.0	40	21	CL
GP8-6'	Jar	7.3			CL
GP11-3'	Jar	15.2			CL
GP11-8'	Jar	15.0			CL
GP12-3'	Jar	15.6			CL
GP12-5'	Jar	17.1			CL
GP13 3-5'	Shelby	Hold			CL
GP13-3'	Jar	17.7			CL
GP14 2-4'	Jar	15.4	35	19	CL
GP14-5'	Jar	20.6	35	27	CL
GP15 1-2'	Jar	15.9			CL
GP15 2-4'	Shelby	15.9	34	19	CL
MW2/5	Jar	18.2	43	25	CL
MW2/9	Jar	19.4	39	23	CL
MW3/#1	Jar	14.9	37	20	CL
GP18-22"	Jar	15.8			CL
GP19-3'	Jar	13.3	31	15	CL
GP21-2'	Jar	18.7			CL
GP22-1.5'	Jar	17.0			CL
GP23-6'	Jar	17.5			CL

Remarks

Classification is based on visual observation and/or Atterberg Limits tests. No grain size analyses were performed.

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File #	2555	Date Tested	12/9/2002	Tested by:	NP	QC by:	SB
Sample ID:	GP-15 (2-4)	Date Recd.	11/27/02	Location	2'-4' in depth		
Sample Description	Brown silty clay						

Specimen Data

Initial

Diameter:	7.26	cm	Area, A:	41.4	sq cm
Height, L:	6.80	cm	Volume, V:	281.5	cu cm
Mass of Sample:	606.7	g	Moisture Content:	15.9	%
			Wet Density	134.5	pcf
			Dry Density	116.1	pcf

Final

Diameter:	7.25	cm	Area, A:	41.3	sq cm
Height, L:	6.87	cm	Volume, V:	283.6	cu cm
Mass of Sample:	611.90	g	Moisture Content:	17.8	%
			Wet Density	134.6	pcf
			Dry Density	114.2	pcf
			Deg of Saturation	97.7	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	78.0	psi
Gradient:	31.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/9/2002	9:15 AM	0	0	2.94	5.99		20.0	—
12/9/2002	10:15 AM	3600	3600	3.01	5.90	0.8	20.0	1.77E-08
12/9/2002	11:15 AM	3600	7200	3.07	5.83	0.9	20.0	1.38E-08
12/9/2002	12:25 PM	4200	11400	3.13	5.75	0.8	20.0	1.36E-08
12/9/2002	1:25 PM	3600	15000	3.18	5.69	0.8	20.0	1.20E-08

Average Permeability = 1.4E-08 cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File #	2555	Date Tested	12/9/2002	Tested by:	NP	QC by:	SB
Sample ID:	GP-6 (1.5-3.5)	Date Recd.	11/27/02	Location	1.5' to 3.5' in depth		
Sample Description	Dark brown & gray silty clay with traces of gravel						

Specimen Data

Initial

Diameter:	7.28	cm	Area, A:	41.6	sq cm
Height, L:	6.68	cm	Volume, V:	278.1	cu cm
Mass of Sample:	834.3	g	Moisture Content:	20.1	%
			Wet Density	187.2	pcf
			Dry Density	155.9	pcf

Final

Diameter:	7.24	cm	Area, A:	41.2	sq cm
Height, L:	6.70	cm	Volume, V:	275.8	cu cm
Mass of Sample:	835.40	g	Moisture Content:	17.3	%
			Wet Density	189.0	pcf
			Dry Density	161.1	pcf
			Deg of Saturation	729.9	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	77.0 psi
Gradient:	21.1

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/9/2002	9:15 AM	0	0	2.95	6.02		20.0	—
12/9/2002	10:15 AM	3600	3600	2.98	5.99	1.0	20.0	8.25E-09
12/9/2002	11:15 AM	3600	7200	3.01	5.96	1.0	20.0	8.28E-09
12/9/2002	12:25 PM	4200	11400	3.04	5.93	1.0	20.0	7.11E-09
12/9/2002	1:25 PM	3600	15000	3.07	5.90	1.0	20.0	8.32E-09

Average Permeability = 8.0E-09 cm/sec

Remarks:

A big piece of gravel was found in the sample when the test was completed during moisture content determination.

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File #	2555	**Date Tested**	12/9/2002	**Tested by:**	NP	**QC by:**	SB
Sample ID:	GP4 (0-18)	Date Recd.	11/27/02	**Location**			
Sample Description	Brown silty clay with traces of gravel						

Specimen Data

Initial

Diameter:	7.31	cm	Area, A:	42.0	sq cm
Height, L:	6.92	cm	Volume, V:	290.4	cu cm
Mass of Sample:	624.1	g	**Moisture Content:**	15.7	%
			Wet Density	134.1	pcf
			Dry Density	115.9	pcf

Final

Diameter:	7.34	cm	Area, A:	42.3	sq cm
Height, L:	6.90	cm	Volume, V:	292.0	cu cm
Mass of Sample:	627.80	g	**Moisture Content:**	17.0	%
			Wet Density	134.2	pcf
			Dry Density	114.7	pcf
			Deg of Saturation	94.2	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	77.0	psi
Gradient:	20.3	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/9/2002	9:15 AM	0	0	2.89	5.93		20.0	—
12/9/2002	10:15 AM	3600	3600	2.95	5.86	0.9	20.0	1.98E-08
12/9/2002	11:15 AM	3600	7200	3.00	5.80	0.8	20.0	1.71E-08
12/9/2002	12:25 PM	4200	11400	3.05	5.74	0.8	20.0	1.47E-08
12/9/2002	1:25 PM	3600	15000	3.10	5.68	0.8	20.0	1.73E-08

Average Permeability = **1.7E-08** cm/sec

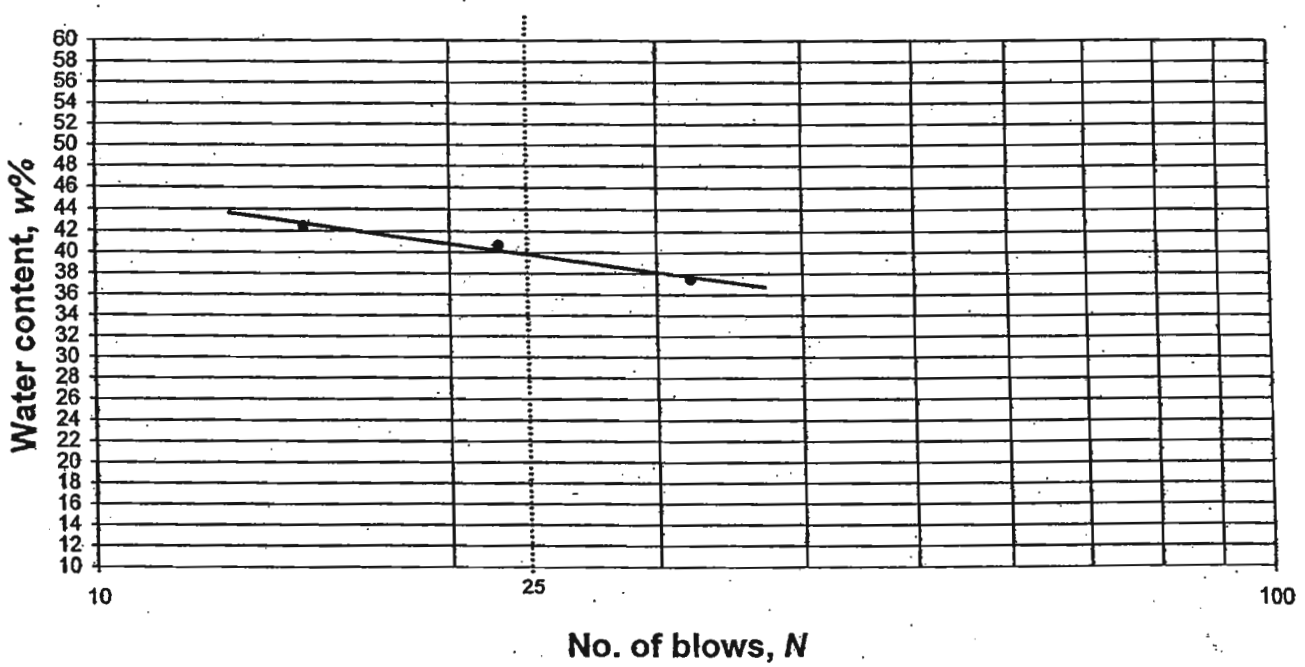
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	MW1x/#2	**Date Tested**	12/5/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	
Sample Description	Brown silty clay with traces of gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	39	**Plastic Limit, PL**	17	**Plasticity Index, PI**	22

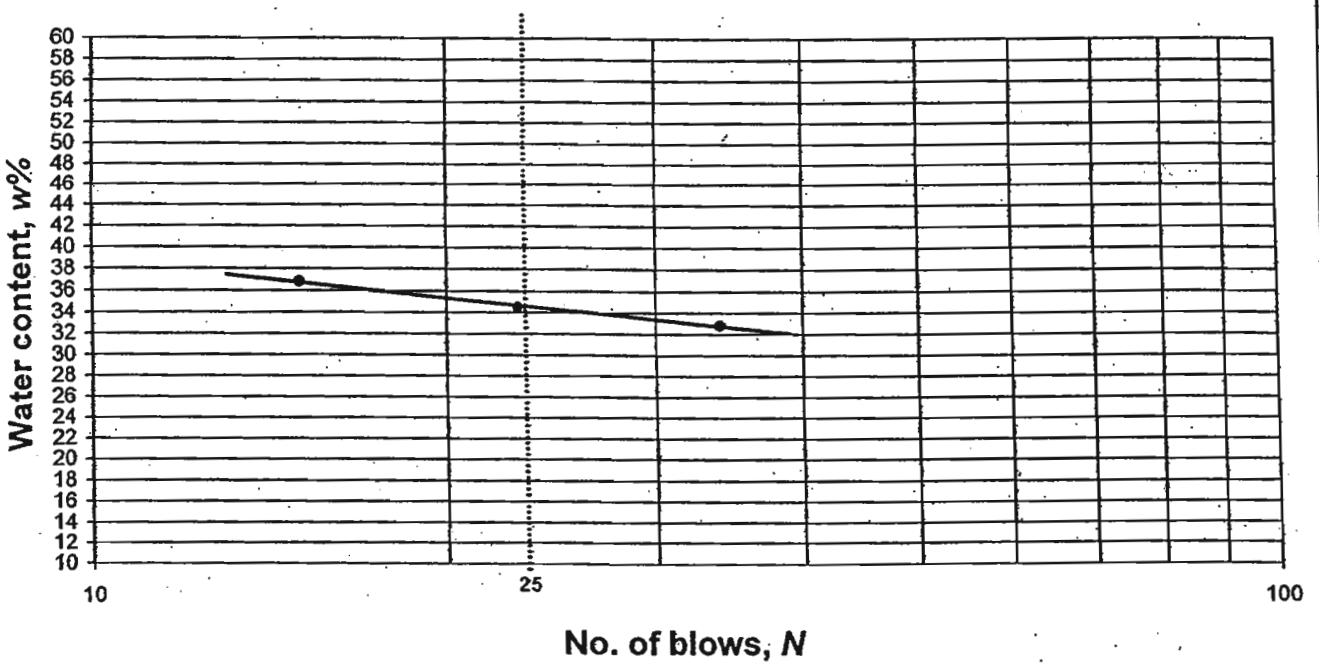
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	GP4 (0-18)	**Date Tested**	12/4/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	
Sample Description	Brown silty clay with traces of gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	34	**Plastic Limit, PL**	16	**Plasticity Index, PI**	18

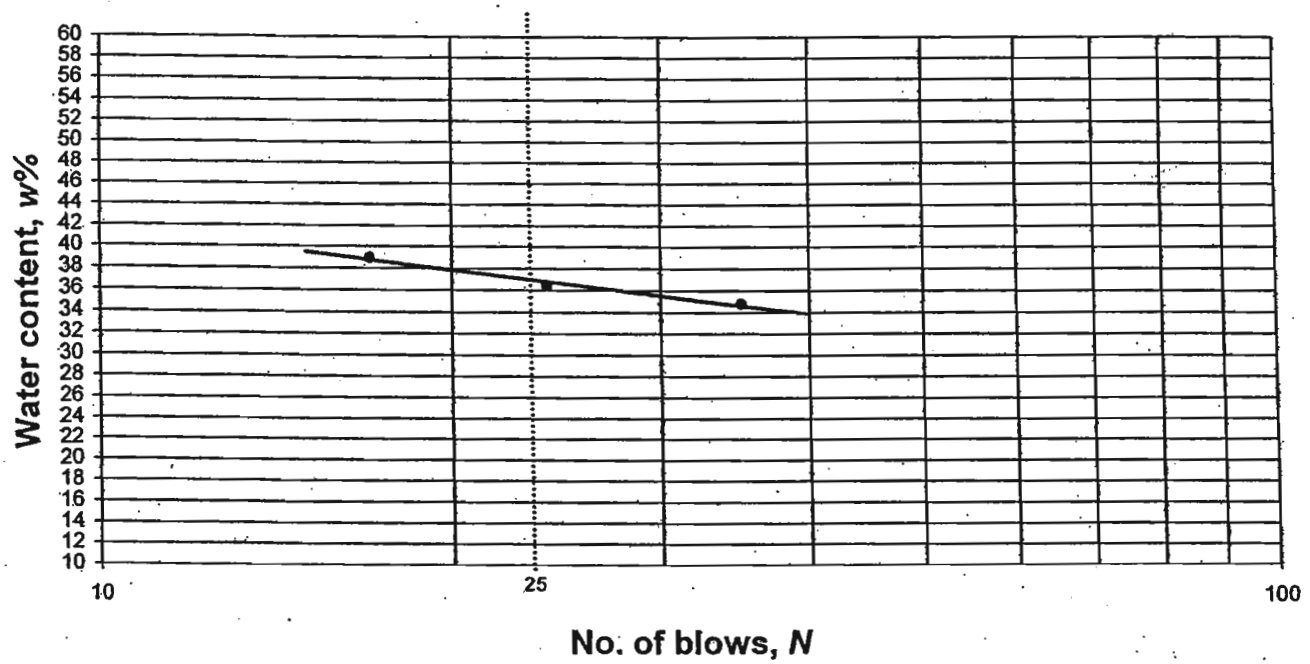
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	GP-6 (1.5-3.5)	**Date Tested**	12/5/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	1.5' to 3.5' in depth
Sample Description	Dark brown & gray silty clay with traces of gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	37	**Plastic Limit, PL**	18	**Plasticity Index, PI**	19

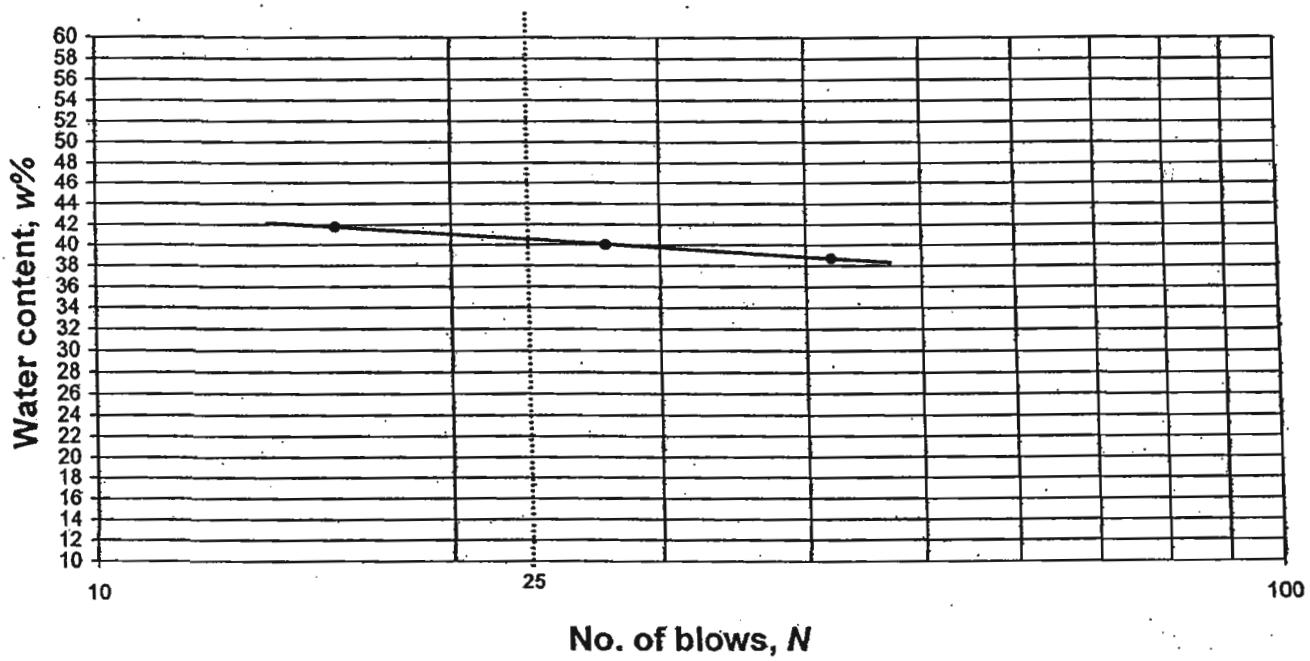
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	GP-7 (6)	**Date Tested**	12/5/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	6' in depth
Sample Description	Dark brown silty clay

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	40	**Plastic Limit, PL**	20	**Plasticity Index, PI**	20

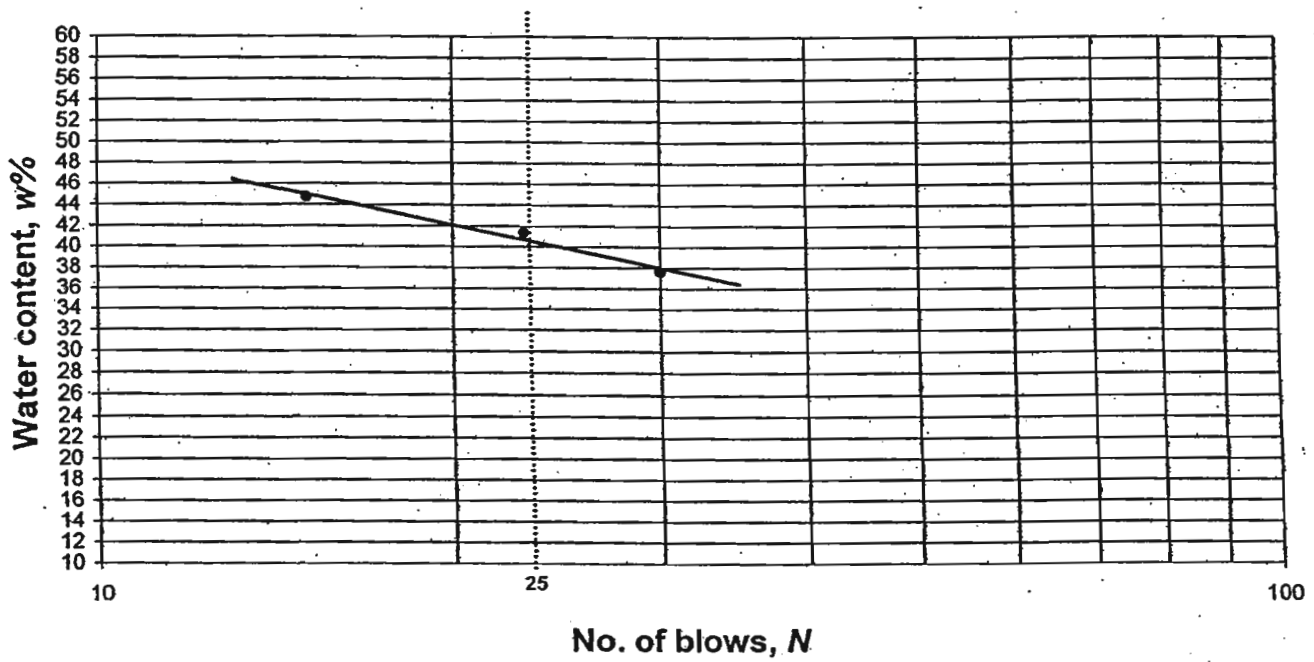
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	GP-8 (2)	**Date Tested**	12/5/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	2' in depth
Sample Description	Dark brown silty clay with traces of gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	40	**Plastic Limit, PL**	19	**Plasticity Index, PI**	21

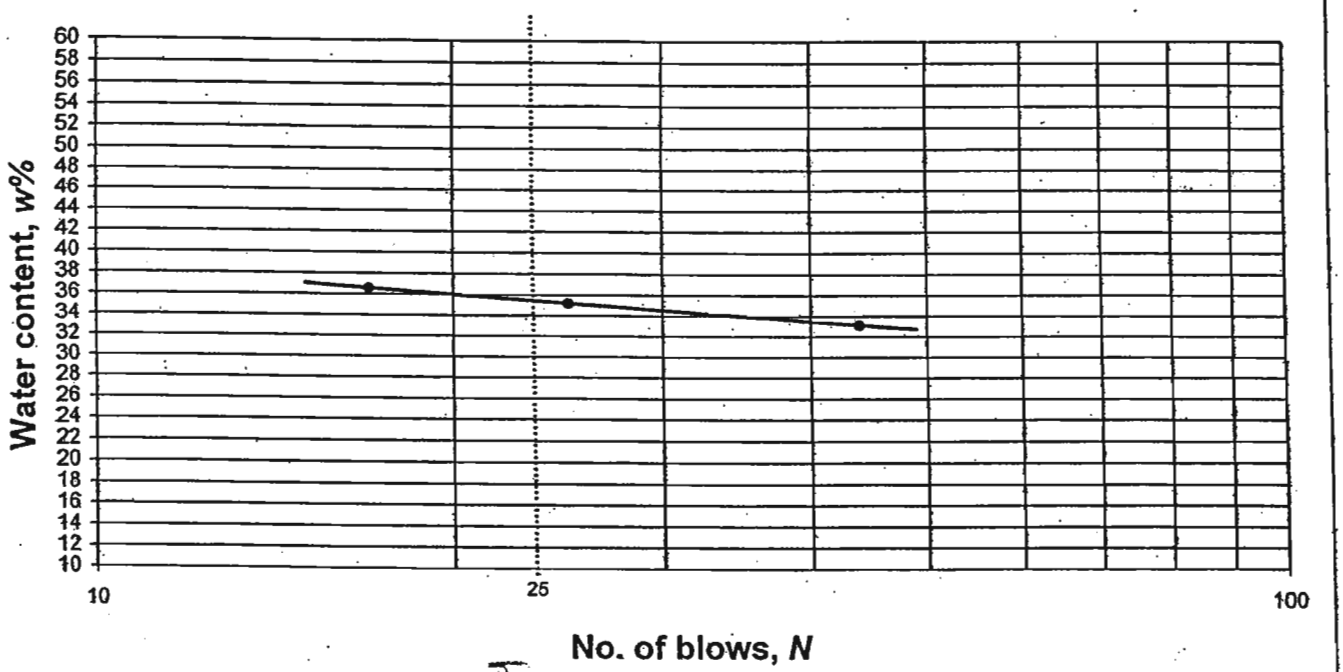
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	GP-14 (2-4)	**Date Tested**	12/4/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	2'-4' in depth
Sample Description	Brown silty clay with traces of gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	35	**Plastic Limit, PL**	16	**Plasticity Index, PI**	19

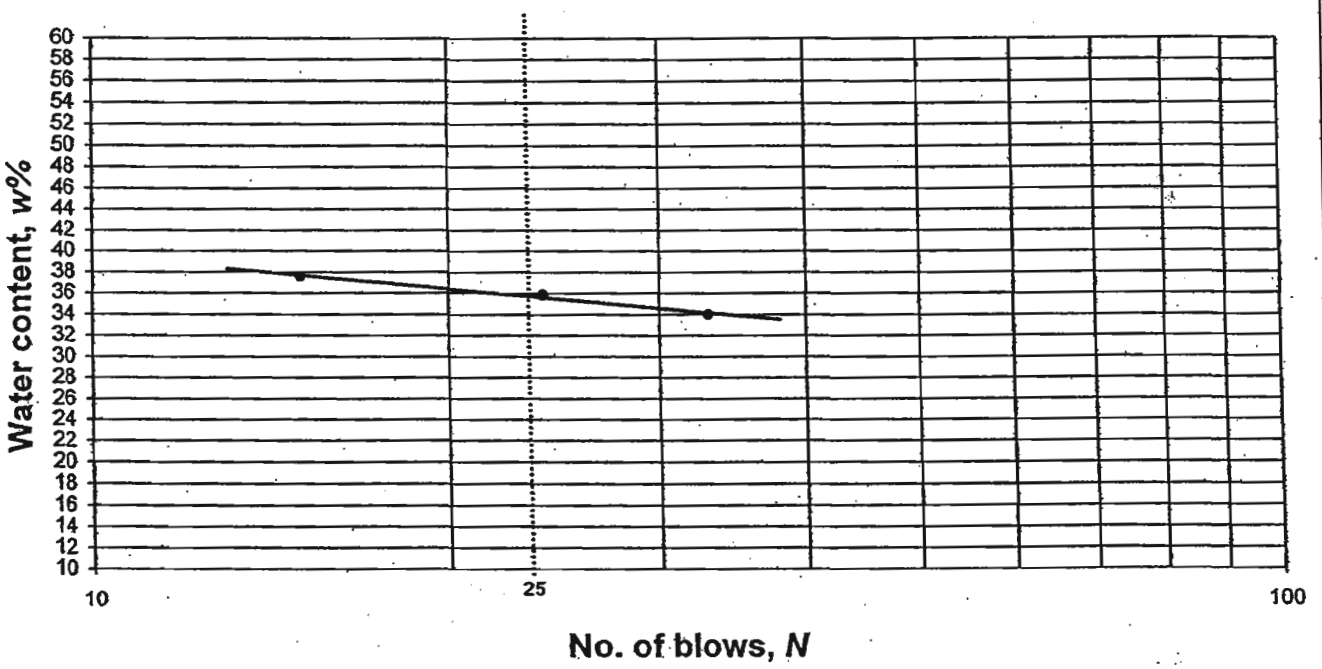
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	GP-14 (5)	**Date Tested**	12/4/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	5' in Depth
Sample Description	Dark brown silty clay with organic content

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	35	**Plastic Limit, PL**	8	**Plasticity Index, PI**	27

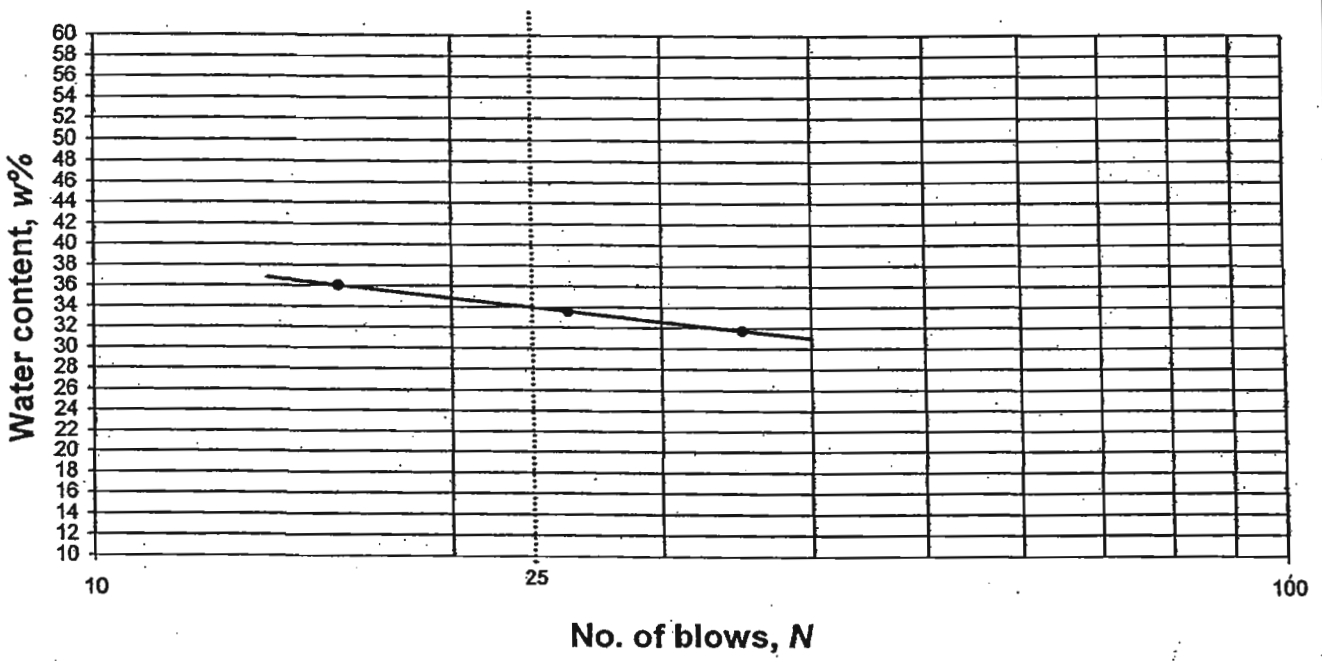
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	Atterberg Limits (ASTM D4318)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	Sample #	GP-15 (2-4)	Date Tested	12/4/2002	Tested By	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	2'-4' in depth
Sample Description	Brown silty clay

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	34	Plastic Limit, PL	15	Plasticity Index, PI	19

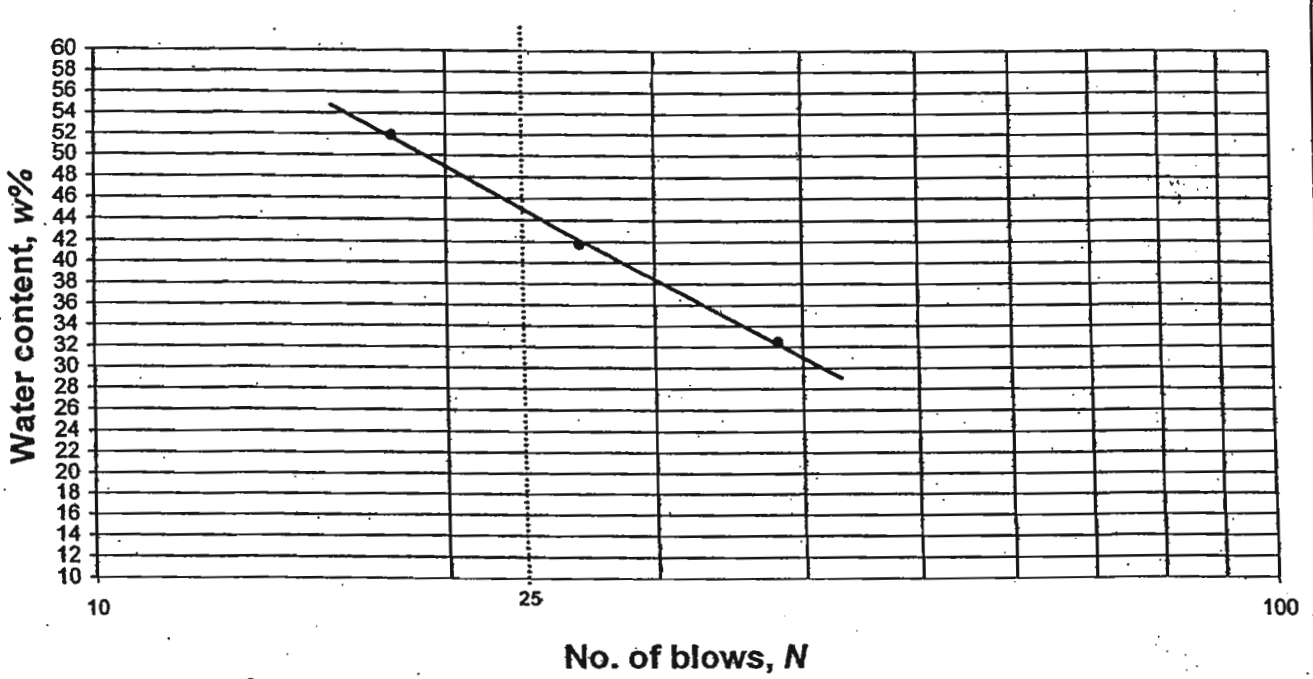
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	MW2/5	**Date Tested**	12/5/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	5' in depth
Sample Description	Brown silty clay

LIQUID LIMIT DETERMINATION



Results

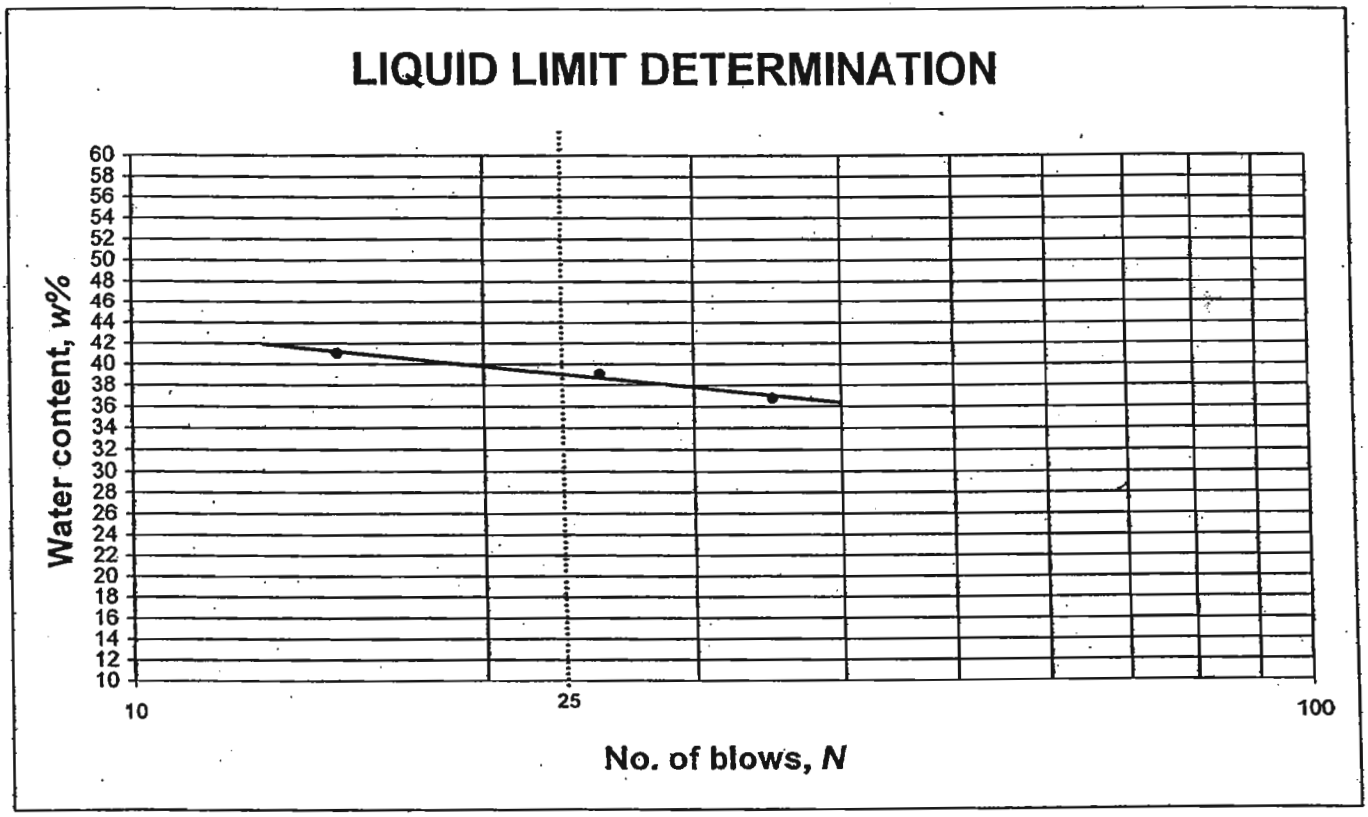
Liquid Limit, LL	43	**Plastic Limit, PL**	18	**Plasticity Index, PI**	25

Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	Atterberg Limits (ASTM D4318)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	Sample #	MW2/9	Date Tested	12/5/2002	Tested By	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	9' in depth
Sample Description	Gray silty clay with traces of gravel



Results					
Liquid Limit, LL	39	Plastic Limit, PL	16	Plasticity Index, PI	23

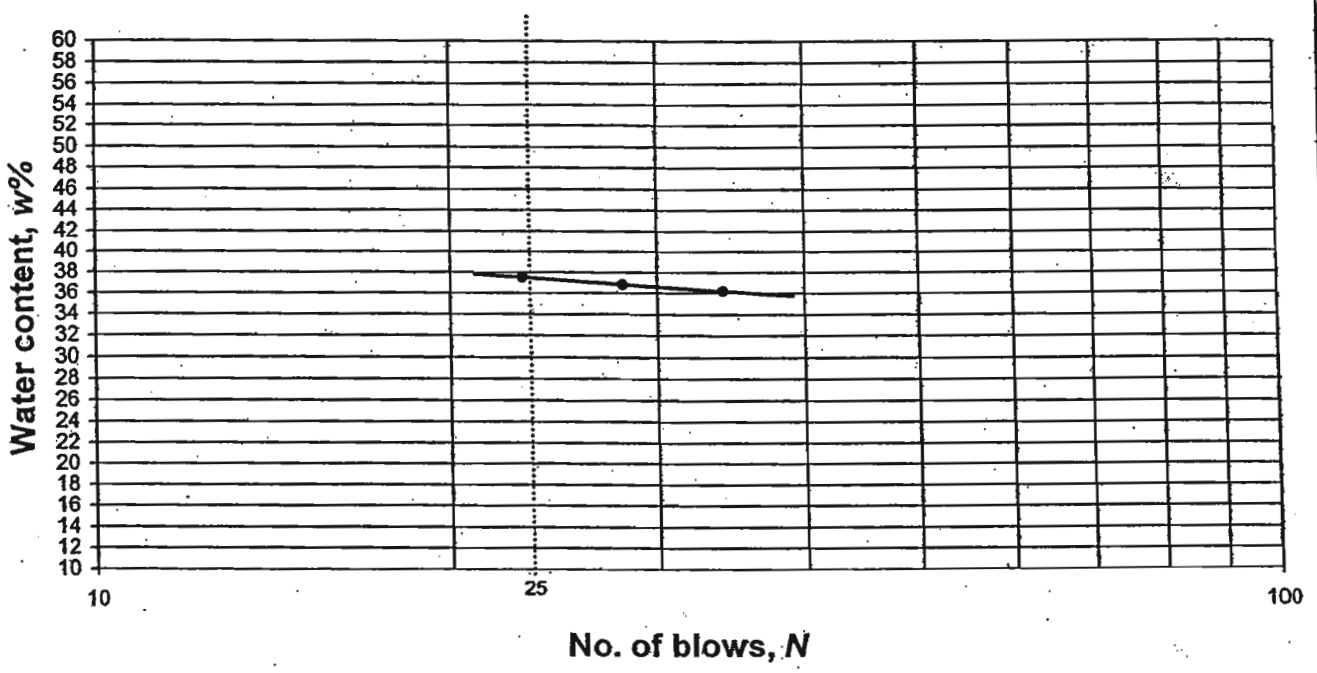
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	Atterberg Limits (ASTM D4318)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	Sample #	MW3/#1	Date Tested	12/4/2002	Tested By	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	
Sample Description	Light brown & brown silty sandy clay with traces gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	37	Plastic Limit, PL	17	Plasticity Index, PI	20

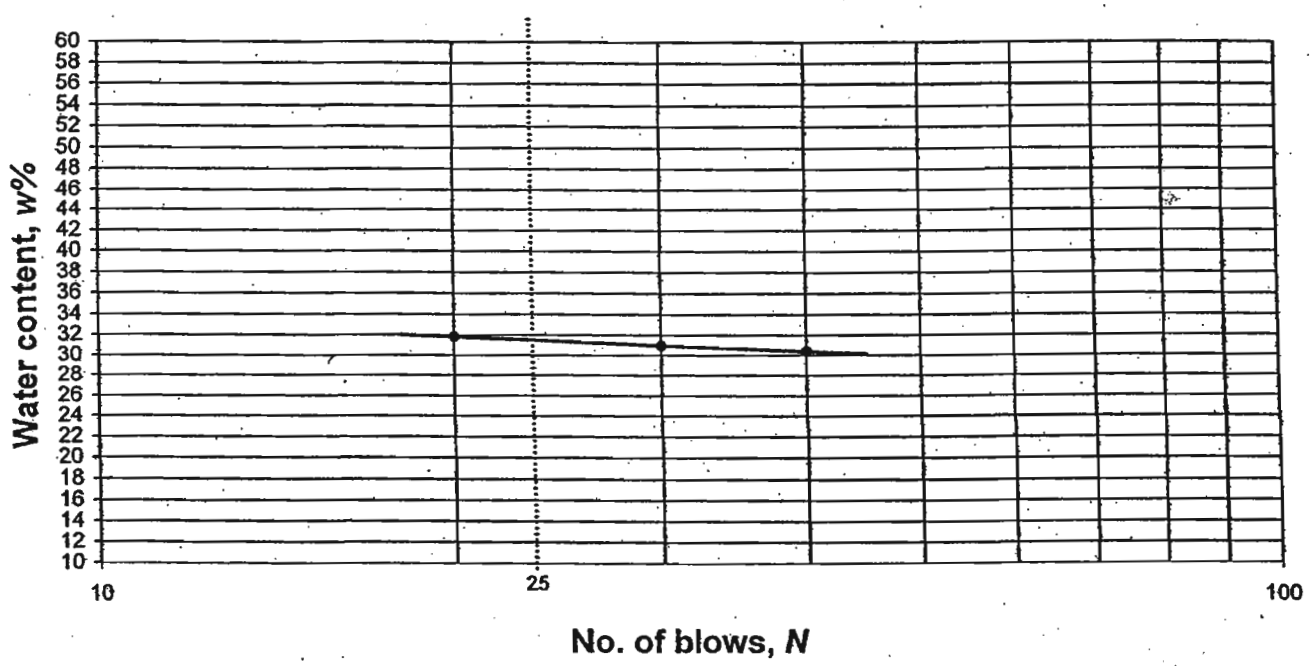
Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	GP-19 (3)	**Date Tested**	12/4/2002	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/27/2002
Sample Location	3' in depth
Sample Description	Dark Brown silty sandy clay with traces of gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	31	**Plastic Limit, PL**	16	**Plasticity Index, PI**	15

Remarks

APPENDIX C

ANALYTICAL DATA

SEVERN TRENT SERVICES

STL Chicago

SEVERN TRENT LABORATORIES ANALYTICAL REPORT

JOB NUMBER: 213781

Prepared For:

Versar, Inc.
Green Brook Executive Center
Ste. 250
200 West 22nd Street
Lombard, IL 60148
Project: Great Lakes NS-Supply Side Landfill

Attention: Donna Oswald

Date: 12/12/2002

Nancy S. McDonald
Signature

12/12/02
Date

Name: Nancy S. McDonald

Title: Project Manager

E-Mail: nmcdonald@stl-inc.com

STL Chicago
2417 Bond Street
University Park, IL 60466

PHONE: (708) 534-5200
FAX..: (708) 534-5211

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Severn Trent Laboratories Chicago
GC/MS Case Narrative

Versar
Great Lakes NS Supply Side Landfill
Job# 213781
VOA DATA:

1. The water sample was properly analyzed within the 14-day required hold time from date collected.

2. All Method Blank target compounds were below reporting limits.

3. The LCS (Laboratory Control Sample) sample had all spike recoveries within the in-house generated QC limits.

4. Matrix Spike/Matrix Spike Duplicate analyses were not performed on this sample set.

5. The volatile sample had surrogate recoveries within the in-house generated QC limits.

6. The water sample was prepared using Method 5030B and analyzed following SW846 Method 8260B and 8000B. All calibration criteria were met per method or SOP (for minimum R values for certain compounds). The low point in the initial calibration verifies the base reporting limits. The target compounds were quantitated using the initial calibration.

7. All of the internal standard areas and retention times were within SOP acceptance limits as compared to the corresponding calibration verification standard.

8. The water sample was analyzed using a 25-mL purge volume. An initial dilution was required on sample 4 due to a foaming matrix. The results and reporting limits were adjusted to account for the dilutions performed.

JoAnn Petruszak
GC/MS VOA Dept.

12-12-02
Date

STL Chicago is part of Severn Trent Laboratories, Inc.

SAMPLE INFORMATION
Date: 12/12/2002

Job Number.: 213781
Customer...: Versar, Inc.
Attn.....: Donna Oswald

Project Number.....: 20002823
Customer Project ID....: SUPPLY SIDE LANDFILL
Project Description....: Great Lakes NS-Supply Side Landfill

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
213781-1	MW4	Water	11/25/2002	08:30	11/26/2002	09:45
213781-2	MW3	Water	11/25/2002	09:45	11/26/2002	09:45
213781-3	MW2	Water	11/25/2002	10:15	11/26/2002	09:45
213781-4	MW1	Water	11/25/2002	10:45	11/26/2002	09:45
213781-5	MW5	Water	11/25/2002	11:30	11/26/2002	09:45

STL Chicago is part of Severn Trent Laboratories, Inc.

LABORATORY TEST RESULTS

Job Number: 213781

Date: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Customer Sample ID: MW4
Date Sampled.....: 11/25/2002
Time Sampled.....: 08:30
Sample Matrix.....: Water

Laboratory Sample ID: 213781-1
Date Received.....: 11/26/2002
Time Received.....: 09:45

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	REPORTING LIMIT	UNITS	DATE	TECH
350.2	Nitrogen, Ammonia (Dist./Nessler.)					
	Ammonia(NH3+NH4),as N	48	10	mg/L	12/03/02	jmk
9056	Ion Chromatography Analysis					
	Chloride	320	25	mg/L	12/03/02	cvw
	Sulfate	4.6	0.20	mg/L	12/03/02	cvw
420.2	Phenolics, Total Recoverable					
	Phenolics, Total Recoverable	<0.0050	0.0050	mg/L	11/27/02	kd
150.1	pH (Water)					
	pH	6.76	0.20	pH Units	11/26/02	nrp
160.1	Solids, Total Dissolved (TDS)					
	Solids, Total Dissolved (TDS)	1400	10	mg/L	12/02/02	jmk
415.1	Organic Carbon					
	TOC Average Duplicates	23	2.0	mg/L	12/06/02	kd
6010B	Metals Analysis (ICAP Trace)					
	Iron	140	0.050	mg/L	12/05/02	tds
	Lead	0.11	0.0050	mg/L	12/05/02	tds
	Manganese	4.1	0.010	mg/L	12/05/02	tds

* In Description = Dry Wgt.

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LABORATORY TEST RESULTS

Job Number: 213781

Date: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Customer Sample ID: MW3
Date Sampled.....: 11/25/2002
Time Sampled.....: 09:45
Sample Matrix.....: Water

Laboratory Sample ID: 213781-2
Date Received.....: 11/26/2002
Time Received.....: 09:45

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	REPORTING LIMIT	UNITS	DATE	TECH
350.2	Nitrogen, Ammonia (Dist./Nessler.)					
	Ammonia(NH3+NH4),as N	20	5.0	mg/L	12/03/02	jmk
9056	Ion Chromatography Analysis					
	Chloride	330	25	mg/L	12/03/02	cvw
	Sulfate	1.9	0.20	mg/L	12/03/02	cvw
420.2	Phenolics, Total Recoverable					
	Phenolics, Total Recoverable	0.49	0.0050	mg/L	11/27/02	kd
150.1	pH (Water)					
	pH	6.65	0.20	pH Units	11/26/02	nrp
160.1	Solids, Total Dissolved (TDS)					
	Solids, Total Dissolved (TDS)	2200	10	mg/L	12/02/02	jmk
415.1	Organic Carbon					
	TOC Average Duplicates	350	25	mg/L	12/06/02	kd
6010B	Metals Analysis (ICAP Trace)					
	Iron	410	0.050	mg/L	12/05/02	tds
	Lead	9.0	0.0050	mg/L	12/05/02	tds
	Manganese	7.5	0.010	mg/L	12/05/02	tds

* In Description = Dry Wgt.

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LABORATORY TEST RESULTS

Job Number: 213781

Date: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Customer Sample ID: MW2
Date Sampled.....: 11/25/2002
Time Sampled.....: 10:15
Sample Matrix.....: Water

Laboratory Sample ID: 213781-3
Date Received.....: 11/26/2002
Time Received.....: 09:45

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	REPORTING LIMIT	UNITS	DATE	TECH
350.2	Nitrogen, Ammonia (Dist./Nessler.)					
	Ammonia(NH3+NH4),as N	46	10	mg/L	12/03/02	jmk
9056	Ion Chromatography Analysis					
	Chloride	1500	50	mg/L	12/03/02	cvw
	Sulfate	1100	50	mg/L	12/03/02	cvw
420.2	Phenolics, Total Recoverable					
	Phenolics, Total Recoverable	0.28	0.0050	mg/L	11/27/02	kd
150.1	pH (Water)					
	pH	6.13	0.20	pH Units	11/26/02	nrp
160.1	Solids, Total Dissolved (TDS)					
	Solids, Total Dissolved (TDS)	14000	10	mg/L	12/02/02	jmk
415.1	Organic Carbon					
	TOC Average Duplicates	5600	500	mg/L	12/06/02	kd
6010B	Metals Analysis (ICAP Trace)					
	Iron	270	0.25	mg/L	12/05/02	tds
	Lead	0.17	0.025	mg/L	12/05/02	tds
	Manganese	17	0.050	mg/L	12/05/02	tds

* In Description = Dry Wgt.

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LABORATORY TEST RESULTS

Job Number: 213781

Date: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Customer Sample ID: MW1
Date Sampled.....: 11/25/2002
Time Sampled.....: 10:45
Sample Matrix.....: Water

Laboratory Sample ID: 213781-4
Date Received.....: 11/26/2002
Time Received.....: 09:45

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	REPORTING LIMIT	UNITS	DATE	TECH
350.2	Nitrogen, Ammonia (Dist./Nessler.)					
	Ammonia(NH3+NH4),as N	120	10	mg/L	12/03/02	jmk
9056	Ion Chromatography Analysis					
	Chloride	1800	100	mg/L	12/03/02	cvw
	Sulfate	15	5.0	mg/L	12/03/02	cvw
420.2	Phenolics, Total Recoverable					
	Phenolics, Total Recoverable	0.25	0.0050	mg/L	11/27/02	kd
150.1	pH (Water)					
	pH	7.36	0.20	pH Units	11/26/02	nrp
160.1	Solids, Total Dissolved (TDS)					
	Solids, Total Dissolved (TDS)	4000	10	mg/L	12/02/02	jmk
415.1	Organic Carbon					
	TOC Average Duplicates	330	25	mg/L	12/06/02	kd
6010B	Metals Analysis (ICAP Trace)					
	Iron	13	0.050	mg/L	12/05/02	tds
	Lead	0.53	0.0050	mg/L	12/05/02	tds
	Manganese	0.24	0.010	mg/L	12/05/02	tds
8260B	Volatile Organics					
	Dichlorodifluoromethane	ND	10	ug/L	12/06/02	jdn
	Chloromethane	ND	10	ug/L	12/06/02	jdn
	Vinyl chloride	ND	10	ug/L	12/06/02	jdn
	Bromomethane	ND	10	ug/L	12/06/02	jdn
	Chloroethane	ND	10	ug/L	12/06/02	jdn
	Trichlorofluoromethane	ND	10	ug/L	12/06/02	jdn
	1,1-Dichloroethene	ND	10	ug/L	12/06/02	jdn
	Carbon disulfide	ND	50	ug/L	12/06/02	jdn
	Acetone	ND	50	ug/L	12/06/02	jdn
	Methylene chloride	ND	10	ug/L	12/06/02	jdn
	trans-1,2-Dichloroethene	ND	10	ug/L	12/06/02	jdn
	Methyl-tert-butyl-ether (MTBE)	ND	10	ug/L	12/06/02	jdn
	1,1-Dichloroethane	ND	10	ug/L	12/06/02	jdn
	2,2-Dichloropropane	ND	10	ug/L	12/06/02	jdn
	cis-1,2-Dichloroethene	ND	10	ug/L	12/06/02	jdn
	2-Butanone (MEK)	ND	50	ug/L	12/06/02	jdn
	Bromochloromethane	ND	10	ug/L	12/06/02	jdn
	Chloroform	ND	10	ug/L	12/06/02	jdn
	1,1,1-Trichloroethane	ND	10	ug/L	12/06/02	jdn
	1,1-Dichloropropene	ND	10	ug/L	12/06/02	jdn
	Carbon tetrachloride	ND	10	ug/L	12/06/02	jdn
	Benzene	ND	10	ug/L	12/06/02	jdn
	1,2-Dichloroethane	ND	10	ug/L	12/06/02	jdn
	Trichloroethene	ND	10	ug/L	12/06/02	jdn

* In Description = Dry Wgt.

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LABORATORY TEST RESULTS

Job Number: 213781 Date: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Customer Sample ID: MW1
Date Sampled.....: 11/25/2002
Time Sampled.....: 10:45
Sample Matrix.....: Water

Laboratory Sample ID: 213781-4
Date Received.....: 11/26/2002
Time Received.....: 09:45

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	REPORTING LIMIT	UNITS	DATE	TECH
	1,2-Dichloropropane	ND	10	ug/L	12/06/02	jdn
	Dibromomethane	ND	10	ug/L	12/06/02	jdn
	Bromodichloromethane	ND	10	ug/L	12/06/02	jdn
	cis-1,3-Dichloropropene	ND	10	ug/L	12/06/02	jdn
	4-Methyl-2-pentanone (MIBK)	ND	50	ug/L	12/06/02	jdn
	Toluene	31	10	ug/L	12/06/02	jdn
	trans-1,3-Dichloropropene	ND	10	ug/L	12/06/02	jdn
	1,1,2-Trichloroethane	ND	10	ug/L	12/06/02	jdn
	Tetrachloroethene	ND	10	ug/L	12/06/02	jdn
	1,3-Dichloropropane	ND	10	ug/L	12/06/02	jdn
	2-Hexanone	ND	50	ug/L	12/06/02	jdn
	Dibromochloromethane	ND	10	ug/L	12/06/02	jdn
	1,2-Dibromoethane (EDB)	ND	10	ug/L	12/06/02	jdn
	Chlorobenzene	ND	10	ug/L	12/06/02	jdn
	1,1,1,2-Tetrachloroethane	ND	10	ug/L	12/06/02	jdn
	Ethylbenzene	23	10	ug/L	12/06/02	jdn
	m&p-Xylenes	44	20	ug/L	12/06/02	jdn
	o-Xylene	22	10	ug/L	12/06/02	jdn
	Styrene	ND	10	ug/L	12/06/02	jdn
	Bromoform	ND	10	ug/L	12/06/02	jdn
	Isopropylbenzene	ND	10	ug/L	12/06/02	jdn
	Bromobenzene	ND	10	ug/L	12/06/02	jdn
	1,1,2,2-Tetrachloroethane	ND	10	ug/L	12/06/02	jdn
	1,2,3-Trichloropropane	ND	10	ug/L	12/06/02	jdn
	n-Propylbenzene	ND	10	ug/L	12/06/02	jdn
	2-Chlorotoluene	ND	10	ug/L	12/06/02	jdn
	1,3,5-Trimethylbenzene	ND	10	ug/L	12/06/02	jdn
	4-Chlorotoluene	ND	10	ug/L	12/06/02	jdn
	tert-Butylbenzene	ND	10	ug/L	12/06/02	jdn
	1,2,4-Trimethylbenzene	22	10	ug/L	12/06/02	jdn
	sec-Butylbenzene	ND	10	ug/L	12/06/02	jdn
	1,3-Dichlorobenzene	ND	10	ug/L	12/06/02	jdn
	p-Isopropyltoluene	11	10	ug/L	12/06/02	jdn
	1,4-Dichlorobenzene	45	10	ug/L	12/06/02	jdn
	n-Butylbenzene	ND	10	ug/L	12/06/02	jdn
	1,2-Dichlorobenzene	ND	10	ug/L	12/06/02	jdn
	1,2-Dibromo-3-chloropropane	ND	10	ug/L	12/06/02	jdn
	1,2,4-Trichlorobenzene	ND	10	ug/L	12/06/02	jdn
	Hexachlorobutadiene	ND	10	ug/L	12/06/02	jdn
	Naphthalene	30	10	ug/L	12/06/02	jdn
	1,2,3-Trichlorobenzene	ND	10	ug/L	12/06/02	jdn

* In Description = Dry Wgt.

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LABORATORY TEST RESULTS

Job Number: 213781

Date: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Customer Sample ID: MW5
Date Sampled.....: 11/25/2002
Time Sampled.....: 11:30
Sample Matrix.....: Water

Laboratory Sample ID: 213781-5
Date Received.....: 11/26/2002
Time Received.....: 09:45

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	REPORTING LIMIT	UNITS	DATE	TECH
350.2	Nitrogen, Ammonia (Dist./Nessler.)					
	Ammonia(NH3+NH4),as N	58	10	mg/L	12/03/02	jmk
9056	Ion Chromatography Analysis					
	Chloride	660	25	mg/L	12/03/02	cvw
	Sulfate	4.3	0.20	mg/L	12/03/02	cvw
420.2	Phenolics, Total Recoverable					
	Phenolics, Total Recoverable	0.32	0.0050	mg/L	11/27/02	kd
150.1	pH (Water)					
	pH	6.46	0.20	pH Units	11/26/02	nrp
160.1	Solids, Total Dissolved (TDS)					
	Solids, Total Dissolved (TDS)	1900	10	mg/L	12/02/02	jmk
415.1	Organic Carbon					
	TOC Average Duplicates	330	25	mg/L	12/06/02	kd
6010B	Metals Analysis (ICAP Trace)					
	Iron	130	0.050	mg/L	12/05/02	tds
	Lead	0.13	0.0050	mg/L	12/05/02	tds
	Manganese	0.89	0.010	mg/L	12/05/02	tds

* In Description = Dry Wgt.

LABORATORY CHRONICLE

Job Number: 213781 Date: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Lab ID: 213781-1 Client ID: MW4 Date Recvd: 11/26/2002 Sample Date: 11/25/2002

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
3010A	Acid Digestion (ICAP)	1	70593		12/03/2002	0450	
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1040	1.00
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1131	5.00
6010B	Metals Analysis (ICAP Trace)	1	71059	70593	12/05/2002	1819	
350.2	Nitrogen, Ammonia (Dist./Nessler.)	1	70633	70633	12/03/2002	0947	50
415.1	Organic Carbon	1	71283	71283	12/06/2002	1408	2
420.2	Phenolics, Total Recoverable	1	70337	70337	11/27/2002	1528	1
160.1	Solids, Total Dissolved (TDS)	1	70630	70630	12/02/2002	1535	
150.1	pH (Water)	1	70217	70217	11/26/2002	1514	

Lab ID: 213781-2 Client ID: MW3 Date Recvd: 11/26/2002 Sample Date: 11/25/2002

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
3010A	Acid Digestion (ICAP)	1	70593		12/03/2002	0450	
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1050	1.00
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1141	5.00
6010B	Metals Analysis (ICAP Trace)	1	71059	70593	12/05/2002	1825	
350.2	Nitrogen, Ammonia (Dist./Nessler.)	1	70633	70633	12/03/2002	0948	25
415.1	Organic Carbon	1	71283	71283	12/06/2002	1427	25
420.2	Phenolics, Total Recoverable	1	70337	70337	11/27/2002	1528	1
160.1	Solids, Total Dissolved (TDS)	1	70630	70630	12/02/2002	1537	
150.1	pH (Water)	1	70217	70217	11/26/2002	1515	

Lab ID: 213781-3 Client ID: MW2 Date Recvd: 11/26/2002 Sample Date: 11/25/2002

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
3010A	Acid Digestion (ICAP)	1	70593		12/03/2002	0450	
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1222	10.00
6010B	Metals Analysis (ICAP Trace)	1	71059	70593	12/05/2002	1832	5
350.2	Nitrogen, Ammonia (Dist./Nessler.)	1	70633	70633	12/03/2002	0949	50
415.1	Organic Carbon	1	71283	71283	12/06/2002	1600	500
420.2	Phenolics, Total Recoverable	1	70337	70337	11/27/2002	1529	1
160.1	Solids, Total Dissolved (TDS)	1	70630	70630	12/02/2002	1540	
150.1	pH (Water)	1	70217	70217	11/26/2002	1517	

Lab ID: 213781-4 Client ID: MW1 Date Recvd: 11/26/2002 Sample Date: 11/25/2002

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
5030B	5030 25 mL Purge Prep	1	71152		12/06/2002	2024	
3010A	Acid Digestion (ICAP)	1	70593		12/03/2002	0450	
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1110	1.00
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1232	20.00
6010B	Metals Analysis (ICAP Trace)	1	71059	70593	12/05/2002	1838	
350.2	Nitrogen, Ammonia (Dist./Nessler.)	1	70633	70633	12/03/2002	0949	50
415.1	Organic Carbon	1	71283	71283	12/06/2002	1617	25
420.2	Phenolics, Total Recoverable	1	70337	70337	11/27/2002	1529	1
160.1	Solids, Total Dissolved (TDS)	1	70630	70630	12/02/2002	1542	
8260B	Volatile Organics	1	71533	71152	12/06/2002	2024	10.0000
150.1	pH (Water)	1	70205	70205	11/26/2002	1450	

Lab ID: 213781-5 Client ID: MW5 Date Recvd: 11/26/2002 Sample Date: 11/25/2002

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
3010A	Acid Digestion (ICAP)	1	70593		12/03/2002	0450	
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1121	1.00
9056	Ion Chromatography Analysis	1	70784	70784	12/03/2002	1447	5.00
6010B	Metals Analysis (ICAP Trace)	1	71059	70593	12/05/2002	1844	
350.2	Nitrogen, Ammonia (Dist./Nessler.)	1	70633	70633	12/03/2002	0950	50
415.1	Organic Carbon	1	71283	71283	12/06/2002	1636	25

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LABORATORY CHRONICLE

Job Number: 213781 Date: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Lab ID: 213781-5 Client ID: MW5 Date Recvd: 11/26/2002 Sample Date: 11/25/2002

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
420.2	Phenolics, Total Recoverable	1	70337	70337	11/27/2002	1530	1
160.1	Solids, Total Dissolved (TDS)	1	70630	70630	12/02/2002	1545	
150.1	pH (Water)	1	70217	70217	11/26/2002	1518	

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SURROGATE RECOVERIES REPORT

Job Number.: 213781

Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Gawald

Method.....: Volatile Organics
Method Code...: 8260B

Test Matrix...: Water
Batch(s).....: 71533

Prep Batch..: 71152

Lab ID	DT	Sample ID	Date	12DCED	BRFLBE	DBRFLM	TOLD8
LCS			12/06/2002	121	108	117	108
MB			12/06/2002	105	102	103	104
213781- 4		MW1	12/06/2002	115	100	109	105

Test	Test Description	Limits
12DCED	1,2-Dichloroethane-d4 (surr)	61 - 131
BRFLBE	4-Bromofluorobenzene (surr)	73 - 122
DBRFLM	Dibromofluoromethane (surr)	66 - 132
TOLD8	Toluene-d8 (surr)	78 - 128

QUALITY CONTROL RESULTS

Job Number.: 213781

Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

QC Type	Description	Reag. Code	Lab ID	Dilution Factor	Date	Time

Test Method.....: 8260B
Method Description.: Volatile Organics

Equipment Code....: GCL9
Batch.....: 71533

Analyst...: jdn

LCS	Laboratory Control Sample	V02L06DSA	71152 -019		12/06/2002 1331

Parameter/Test Description	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	*	Limits	F
Dichlorodifluoromethane	ug/L	9.968		10.000	1.000 U	100	%	56-136	
Chloromethane	ug/L	10.379		10.000	1.000 U	104	%	56-129	
Vinyl chloride	ug/L	10.182		10.000	1.000 U	102	%	67-137	
Bromomethane	ug/L	14.053		10.000	1.000 U	141	%	51-152	
Chloroethane	ug/L	11.239		10.000	1.000 U	112	%	68-135	
Trichlorofluoromethane	ug/L	10.996		10.000	1.000 U	110	%	62-141	
1,1-Dichloroethene	ug/L	9.586		10.000	1.000 U	96	%	54-127	
Carbon disulfide	ug/L	9.331		10.000	5.000 U	93	%	29-136	
Acetone	ug/L	7.143		10.000	5.000 U	71	%	43-150	
Methylene chloride	ug/L	10.023		10.000	1.000 U	100	%	52-133	
trans-1,2-Dichloroethene	ug/L	10.032		10.000	1.000 U	100	%	64-119	
Methyl-tert-butyl-ether (MTBE)	ug/L	11.789		10.000	1.000 U	118	%	52-156	
1,1-Dichloroethane	ug/L	11.809		10.000	1.000 U	118	%	69-127	
2,2-Dichloropropane	ug/L	13.032		10.000	1.000 U	130	%	56-141	
cis-1,2-Dichloroethene	ug/L	11.031		10.000	1.000 U	110	%	78-126	
2-Butanone (MEK)	ug/L	10.830		10.000	5.000 U	108	%	54-145	
Bromochloromethane	ug/L	11.470		10.000	1.000 U	115	%	57-133	
Chloroform	ug/L	12.067		10.000	1.000 U	121	%	74-128	
1,1,1-Trichloroethane	ug/L	12.039		10.000	1.000 U	120	%	66-129	
1,1-Dichloropropene	ug/L	10.748		10.000	1.000 U	107	%	70-128	
Carbon tetrachloride	ug/L	10.948		10.000	1.000 U	109	%	66-136	
Benzene	ug/L	10.043		10.000	1.000 U	100	%	74-116	
1,2-Dichloroethane	ug/L	11.940		10.000	1.000 U	119	%	63-133	
Trichloroethene	ug/L	9.369		10.000	1.000 U	94	%	70-120	
1,2-Dichloropropane	ug/L	10.519		10.000	1.000 U	105	%	71-132	
Dibromomethane	ug/L	10.466		10.000	1.000 U	105	%	66-131	
Bromodichloromethane	ug/L	11.476		10.000	1.000 U	115	%	76-129	
cis-1,3-Dichloropropene	ug/L	11.081		10.400	1.000 U	107	%	75-123	
4-Methyl-2-pentanone (MIBK)	ug/L	9.911		10.000	5.000 U	99	%	66-147	
Toluene	ug/L	10.054		10.000	1.000 U	101	%	71-122	
trans-1,3-Dichloropropene	ug/L	10.740		9.600	1.000 U	112	%	76-126	
1,1,2-Trichloroethane	ug/L	11.045		10.000	1.000 U	110	%	69-138	
Tetrachloroethene	ug/L	9.460		10.000	1.000 U	95	%	69-128	
1,3-Dichloropropane	ug/L	10.826		10.000	1.000 U	108	%	71-133	
2-Hexanone	ug/L	9.850		10.000	5.000 U	99	%	70-144	
Dibromochloromethane	ug/L	10.692		10.000	1.000 U	107	%	74-137	
1,2-Dibromoethane (EDB)	ug/L	10.448		10.000	1.000 U	104	%	71-135	
Chlorobenzene	ug/L	10.054		10.000	1.000 U	101	%	76-124	
1,1,1,2-Tetrachloroethane	ug/L	10.662		10.000	1.000 U	107	%	70-134	
Ethylbenzene	ug/L	10.627		10.000	1.000 U	106	%	74-121	
m&p-Xylenes	ug/L	21.562		20.000	2.000 U	108	%	71-125	
o-Xylene	ug/L	10.638		10.000	1.000 U	106	%	72-124	
Styrene	ug/L	10.638		10.000	1.000 U	106	%	80-125	
Bromoform	ug/L	10.261		10.000	1.000 U	103	%	73-139	
Isopropylbenzene	ug/L	11.464		10.000	1.000 U	115	%	67-123	
Bromobenzene	ug/L	10.591		10.000	1.000 U	106	%	77-121	
1,1,2,2-Tetrachloroethane	ug/L	11.332		10.000	1.000 U	113	%	72-127	
1,2,3-Trichloropropane	ug/L	11.933		10.000	1.000 U	119	%	71-126	
n-Propylbenzene	ug/L	11.246		10.000	1.000 U	112	%	67-123	
2-Chlorotoluene	ug/L	11.907		10.000	1.000 U	119	%	69-120	

* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

QUALITY CONTROL RESULTS

Job Number.: 213781

Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

QC Type	Description	Reag. Code	Lab ID	Dilution Factor	Date	Time
LCS	Laboratory Control Sample	V02L06DSA	71152 -019		12/06/2002	1331

Parameter/Test Description	Units	QC Result	QC Result	True Value	Orig. Value		QC Calc.	*	Limits	F
1,3,5-Trimethylbenzene	ug/L	11.635		10.000	1.000	U	116	%	69-123	
4-Chlorotoluene	ug/L	11.178		10.000	1.000	U	112	%	68-120	
tert-Butylbenzene	ug/L	11.388		10.000	1.000	U	114	%	69-123	
sec-Butylbenzene	ug/L	11.439		10.000	1.000	U	114	%	69-124	
1,3-Dichlorobenzene	ug/L	10.192		10.000	1.000	U	102	%	73-121	
p-Isopropyltoluene	ug/L	11.439		10.000	1.000	U	114	%	67-126	
1,4-Dichlorobenzene	ug/L	10.242		10.000	1.000	U	102	%	74-121	
n-Butylbenzene	ug/L	11.221		10.000	1.000	U	112	%	71-118	
1,2-Dichlorobenzene	ug/L	10.050		10.000	1.000	U	100	%	74-119	
1,2-Dibromo-3-chloropropane	ug/L	11.834		10.000	1.000	U	118	%	66-123	
1,2,4-Trichlorobenzene	ug/L	8.401		10.000	1.000	U	84	%	77-123	
Hexachlorobutadiene	ug/L	9.520		10.000	1.000	U	95	%	56-147	
Naphthalene	ug/L	6.752		10.000	1.000	U	68	%	69-125	*
1,2,3-Trichlorobenzene	ug/L	7.983		10.000	1.000	U	80	%	75-123	

* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

QUALITY CONTROL RESULTS

Job Number.: 213781

Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

QC Type	Description	Reag. Code	Lab ID	Dilution Factor	Date	Time

Test Method.....: 8260B
Method Description.: Volatile Organics

Equipment Code....: GCL9
Batch.....: 71533

Analyst...: jdn

MB	Method Blank		71152-018		12/06/2002	1146

Parameter/Test Description	Units	QC Result		QC Result	True Value	Orig. Value	QC Calc.	*	Limits	F
Dichlorodifluoromethane	ug/L	1.000	U							
Chloromethane	ug/L	1.000	U							
Vinyl chloride	ug/L	1.000	U							
Bromomethane	ug/L	1.000	U							
Chloroethane	ug/L	1.000	U							
Trichlorofluoromethane	ug/L	1.000	U							
1,1-Dichloroethene	ug/L	1.000	U							
Carbon disulfide	ug/L	5.000	U							
Acetone	ug/L	5.000	U							
Methylene chloride	ug/L	1.000	U							
trans-1,2-Dichloroethene	ug/L	1.000	U							
Methyl-tert-butyl-ether (MTBE)	ug/L	1.000	U							
1,1-Dichloroethane	ug/L	1.000	U							
2,2-Dichloropropane	ug/L	1.000	U							
cis-1,2-Dichloroethene	ug/L	1.000	U							
2-Butanone (MEK)	ug/L	5.000	U							
Bromochloromethane	ug/L	1.000	U							
Chloroform	ug/L	1.000	U							
1,1,1-Trichloroethane	ug/L	1.000	U							
1,1-Dichloropropene	ug/L	1.000	U							
Carbon tetrachloride	ug/L	1.000	U							
Benzene	ug/L	1.000	U							
1,2-Dichloroethane	ug/L	1.000	U							
Trichloroethene	ug/L	1.000	U							
1,2-Dichloropropane	ug/L	1.000	U							
Dibromomethane	ug/L	1.000	U							
Bromodichloromethane	ug/L	1.000	U							
cis-1,3-Dichloropropene	ug/L	1.000	U							
4-Methyl-2-pentanone (MIBK)	ug/L	5.000	U							
Toluene	ug/L	1.000	U							
trans-1,3-Dichloropropene	ug/L	1.000	U							
1,1,2-Trichloroethane	ug/L	1.000	U							
Tetrachloroethene	ug/L	1.000	U							
1,3-Dichloropropane	ug/L	1.000	U							
2-Hexanone	ug/L	5.000	U							
Dibromochloromethane	ug/L	1.000	U							
1,2-Dibromoethane (EDB)	ug/L	1.000	U							
Chlorobenzene	ug/L	1.000	U							
1,1,1,2-Tetrachloroethane	ug/L	1.000	U							
Ethylbenzene	ug/L	1.000	U							
m&p-Xylenes	ug/L	2.000	U							
o-Xylene	ug/L	1.000	U							
Styrene	ug/L	1.000	U							
Bromoform	ug/L	1.000	U							
Isopropylbenzene	ug/L	1.000	U							
Bromobenzene	ug/L	1.000	U							
1,1,2,2-Tetrachloroethane	ug/L	1.000	U							
1,2,3-Trichloropropane	ug/L	1.000	U							
n-Propylbenzene	ug/L	1.000	U							
2-Chlorotoluene	ug/L	1.000	U							

* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

QUALITY CONTROL RESULTS

Job Number.: 213781

Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

QC Type	Description	Reag. Code	Lab ID	Dilution Factor	Date	Time
MB	Method Blank		71152 -018		12/06/2002	1146

Parameter/Test Description	Units	QC Result		QC Result	True Value	Orig. Value	QC Calc.	*	Limits	F
1,3,5-Trimethylbenzene	ug/L	1.000	U							
4-Chlorotoluene	ug/L	1.000	U							
tert-Butylbenzene	ug/L	1.000	U							
1,2,4-Trimethylbenzene	ug/L	1.000	U							
sec-Butylbenzene	ug/L	1.000	U							
1,3-Dichlorobenzene	ug/L	1.000	U							
p-Isopropyltoluene	ug/L	1.000	U							
1,4-Dichlorobenzene	ug/L	1.000	U							
n-Butylbenzene	ug/L	1.000	U							
1,2-Dichlorobenzene	ug/L	1.000	U							
1,2-Dibromo-3-chloropropane	ug/L	1.000	U							
1,2,4-Trichlorobenzene	ug/L	1.000	U							
Hexachlorobutadiene	ug/L	1.000	U							
Naphthalene	ug/L	1.000	U							
1,2,3-Trichlorobenzene	ug/L	1.000	U							

* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

QUALITY CONTROL RESULTS

Job Number.: 213781

Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

QC Type	Description	Reag. Code	Lab ID	Dilution Factor	Date	Time

Test Method.....: 6010B
Method Description.: Metals Analysis (ICAP Trace)
Equipment Code....: ICP4
Batch.....: 71059
Analyst...: tds

LCS	Laboratory Control Sample	M02KSPK001	70593 -002		12/05/2002 1813

Parameter/Test Description	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	*	Limits	F
Iron	mg/L	0.93261		1.00000	0.03960 U	93	%	80-120	
Lead	mg/L	0.09975		0.10000	0.00290 U	100	%	80-120	
Manganese	mg/L	0.48904		0.50000	0.00071 U	98	%	80-120	

LCS	Laboratory Control Sample	M02KSPK001	70626 -002		12/05/2002 2109

Parameter/Test Description	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	*	Limits	F
Iron	mg/L	0.96179		1.00000	0.03960 U	96	%	80-120	
Lead	mg/L	0.10156		0.10000	0.00290 U	102	%	80-120	
Manganese	mg/L	0.50069		0.50000	0.00071 U	100	%	80-120	

* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

QUALITY CONTROL RESULTS

Job Number.: 213781

Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

QC Type	Description	Reag. Code	Lab ID	Dilution Factor	Date	Time

Test Method.....: 6010B
Method Description.: Metals Analysis (ICAP Trace)
Equipment Code....: ICP4
Batch.....: 71059
Analyst...: tds

MB	Method Blank	70593	70593 -001		12/05/2002	1807

Parameter/Test Description	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	*	Limits	F
Iron	mg/L	0.03960 U							
Lead	mg/L	0.00290 U							
Manganese	mg/L	0.00071 U							

MB	Method Blank	70626	70626 -001		12/05/2002	2103

Parameter/Test Description	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	*	Limits	F
Iron	mg/L	0.03960 U							
Lead	mg/L	0.00290 U							
Manganese	mg/L	0.00071 U							

* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

QUALITY CONTROL RESULTS

Job Number.: 213781 Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Test Method.....: 350.2 Batch.....: 70633 Analyst...: jmk
Method Description.: Nitrogen, Ammonia (Dist./Nessler.) Equipment Code....: Test Code.: NH3
Parameter.....: Ammonia(NH3+NH4),as N

QC	Lab ID	Reagent	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	F	*	Limits	Date	Time
MB	70633 -004		mg/L	0.11000 U								12/03/2002	0933
LCS	70633 -005	I02KSTTK2	mg/L	2.44400		2.50000		98		%	80-120	12/03/2002	0934

Test Method.....: 9056 Batch.....: 70784 Analyst...: cvw
Method Description.: Ion Chromatography Analysis Equipment Code....: IC4 Test Code.: CHL
Parameter.....: Chloride

QC	Lab ID	Reagent	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	F	*	Limits	Date	Time
MB	70784 -004		mg/L	0.12400 U								12/03/2002	1008
LCS	70784 -005	I02LINIC1B	mg/L	50.54590		50.00000	3.10000 U	101		%	80-120	12/03/2002	1019
LCS	70784 -006	I02LINIC1A	mg/L	3.12920		3.00000		104		%	80-120	12/03/2002	1029
MS	213781-1	I02LINIC1B	mg/L	813.88600		2500.00000	316.13650	100		%	75-125	12/03/2002	1457
MSD	213781-1	I02LINIC1B	mg/L	814.97000	813.88600	2500.00000	316.13650	100		%	75-125	12/03/2002	1508
								0.0		R	20		

before 5x dil'n

Test Method.....: 9056 Batch.....: 70784 Analyst...: cvw
Method Description.: Ion Chromatography Analysis Equipment Code....: IC4 Test Code.: SO4
Parameter.....: Sulfate

QC	Lab ID	Reagent	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	F	*	Limits	Date	Time
MB	70784 -004		mg/L	0.04900 U								12/03/2002	1008
LCS	70784 -005	I02LINIC1B	mg/L	48.56740		50.00000	1.22500 U	97		%	80-120	12/03/2002	1019
LCS	70784 -006	I02LINIC1A	mg/L	5.33530		5.00000		107		%	80-120	12/03/2002	1029
MS	213781-1	I02LINIC1A	mg/L	56.34800		250.00000	4.57050	104		%	75-125	12/03/2002	1457
MSD	213781-1	I02LINIC1A	mg/L	56.67900	56.34800	250.00000	4.57050	104		%	75-125	12/03/2002	1508
								0.0		R	20		

before 5x dil'n

Test Method.....: 420.2 Batch.....: 70337 Analyst...: kd
Method Description.: Phenolics, Total Recoverable Equipment Code....: LACHAT1 Test Code.: PHENTR
Parameter.....: Phenolics, Total Recoverable

QC	Lab ID	Reagent	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	F	*	Limits	Date	Time
MB	70337 -004		mg/L	0.00330 U								11/27/2002	1526
LCS	70337 -005	I02KSTPE2	mg/L	0.09340		0.10000		93		%	80-120	11/27/2002	1526

Test Method.....: 160.1 Batch.....: 70630 Analyst...: jmk
Method Description.: Solids, Total Dissolved (TDS) Equipment Code....: Test Code.: TDS
Parameter.....: Solids, Total Dissolved (TDS)

QC	Lab ID	Reagent	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	F	*	Limits	Date	Time
MB	70630 -001		mg/L	4.80000 U								12/02/2002	1530
LCS	70630 -002	I02KSTTS1A	mg/L	236.00000		250.00000		94		%	80-120	12/02/2002	1532

 * %=% REC, R=RPD, A=ABS Diff., D=% Diff.

QUALITY CONTROL RESULTS

Job Number.: 213781 Report Date.: 12/12/2002

CUSTOMER: Versar, Inc. PROJECT: SUPPLY SIDE LANDFILL ATTN: Donna Oswald

Test Method.....: 415.1 Batch.....: 71283 Analyst....: kd
Method Description.: Organic Carbon Equipment Code....: TOC3 Test Code.: TOCAV2
Parameter.....: TOC Average Duplicates

QC	Lab ID	Reagent	Units	QC Result	QC Result	True Value	Orig. Value	QC Calc.	F	*	Limits	Date	Time
MB	71283 -004		mg/L	0.57000 B								12/06/2002	0958
LCS	71283 -005	I02KSTTC2B	mg/L	5.09800		5.00000		102		%	80-120	12/06/2002	1014

 * %=% REC, R=RPD, A=ABS Diff., D=% Diff.

REPORT COMMENTS

1) All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.
2) Soil, sediment and sludge sample results are reported on a "dry weight" basis except when analyzed for landfill disposal or incineration parameters. All other solid matrix samples are reported on an "as received" basis unless noted differently.
3) Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.
4) The test results for the noted analytical method(s) meet the requirements of NELAC. Lab Cert. ID# 100201
5) Arizona Environmental Laboratory License number AZ0603.
6) According to 40CFR Part 136.3, pH, Chlorine Residual and Dissolved Oxygen analyses are to be performed immediately after aqueous sample collection. When these parameters are not indicated as field (e.g. pH Field) they were not analyzed immediately, but as soon as possible on laboratory receipt.

Glossary of flags, qualifiers and abbreviations (any number of which may appear in the report)

Inorganic Qualifiers (Q-Column)

U Analyte was not detected at or above the stated limit.
< Not detected at or above the reporting limit.
J Result is less than the RL, but greater than or equal to the method detection limit.
B Result is less than the CRDL/RL, but greater than or equal to the IDL/MDL.
S Result was determined by the Method of Standard Additions.
F AFCEE: Result is less than the RL, but greater than or equal to the method detection limit.

Inorganic Flags (Flag Column)

^ ICV,CCV,ICB,CCB,ISA,ISB,CRI,CRA,MRL: Instrument related QC exceed the upper or lower control limits.
* LCS, LCD, MD: Batch QC exceeds the upper or lower control limits.
+ MSA correlation coefficient is less than 0.995.
4 MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.
E SD: Serial dilution exceeds the control limits.
H MB, EB1, EB2, EB3: Batch QC is greater than reporting limit or had a negative instrument reading lower than the absolute value of the reporting limit.
N MS, MSD: Spike recovery exceeds the upper or lower control limits.
W AS(GFAA) Post-digestion spike was outside 85-115% control limits.

Organic Qualifiers (Q - Column)

U Analyte was not detected at or above the stated limit.
ND Compound not detected.
J Result is an estimated value below the reporting limit or a tentatively identified compound (TIC).
Q Result was qualitatively confirmed, but not quantified.
C Pesticide identification was confirmed by GC/MS.
Y The chromatographic response resembles a typical fuel pattern.
Z The chromatographic response does not resemble a typical fuel pattern.
E Result exceeded calibration range, secondary dilution required.
F AFCEE:Result is an estimated value below the reporting limit or a tentatively identified compound (TIC)

Organic Flags (Flags Column)

B MB: Batch QC is greater than reporting limit.
* LCS, LCD, ELC, ELD, CV, MS, MSD, Surrogate: Batch QC exceeds the upper or lower control limits.
^ EB1, EB2, EB3, MLE: Batch QC is greater than reporting Limit
A Concentration exceeds the instrument calibration range
a Concentration is below the method Reporting Limit (RL)
B Compound was found in the blank and sample.
D Surrogate or matrix spike recoveries were not obtained because the extract was diluted for analysis; also compounds analyzed at a dilution will be flagged with a D.
H Alternate peak selection upon analytical review
I Indicates the presence of an interfence, recovery is not calculated.
M Manually integrated compound.

P The lower of the two values is reported when the % difference between the results of two GC columns is greater than 25%.

Abbreviations

AS	Post Digestion Spike (GFAA Samples - See Note 1 below)
Batch	Designation given to identify a specific extraction, digestion, preparation set, or analysis set
CAP	Capillary Column CCB Continuing Calibration Blank
CCV	Continuing Calibration Verification
CF	Confirmation analysis of original
C1	Confirmation analysis of A1 or D1
C2	Confirmation analysis of A2 or D2
C3	Confirmation analysis of A3 or D3
CRA	Low Level Standard Check - GFAA; Mercury
CRI	Low Level Standard Check - ICP
CV	Calilbration Verification Standard
Dil Fac	Dilution Factor - Secondary dilution analysis
D1	Dilution 1
D2	Dilution 2
D3	Dilution 3
DLFac	Detection Limit Factor
DSH	Distilled Standard - High Level
DSL	Distilled Standard - Low Level
DSM	Distilled Standard - Medium Level
EB1	Extraction Blank 1
EB2	Extraction Blank 2
EB3	DI Blank
ELC	Method Extracted LCS
ELD	Method Extracted LCD
ICAL	Initial calibration
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
ISA	Interference Check Sample A - ICAP
ISB	Interference Check Sample B - ICAP
Job No.	The first six digits of the sample ID which refers to a specific client, project and sample group
	Lab ID An 8 number unique laboratory identification
LCD	Laboratory Control Standard Duplicate
LCS	Laboratory Control Standard with reagent grade water or a matrix free from the analyte of interest
MB	Method Blank or (PB) Preparation Blank
MD	Method Duplicate
MDL	Method Detection Limit
MLE	Medium Level Extraction Blank
MRL	Method Reporting Limit Standard
MSA	Method of Standard Additions
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ND	Not Detected
PREPF	Preparation factor used by the Laboratory's Information Management System (LIMS)
PDS	Post Digestion Spike (ICAP)
RA	Re-analysis of original
A1	Re-analysis of D1
A2	Re-analysis of D2
A3	Re-analysis of D3
RD	Re-extraction of dilution
RE	Re-extraction of original
RC	Re-extraction Confirmation
RL	Reporting Limit
RPD	Relative Percent Difference of duplicate (unrounded) analyses
RRF	Relative Response Factor

RT	Retention Time
RTW	Retention Time Window Sample ID A 9 digit number unique for each sample, the first six digits are referred as the job number
SCB	Seeded Control Blank
SD	Serial Dilution (Calculated when sample concentration exceeds 50 times the MDL)
UCB	Unseeded Control Blank
SSV	Second Source Verification Standard
SLCS	Solid Laboratory Control Standard(LCS)
PHC	pH Calibration Check LCSP pH Laboratory Control Sample
LCDP	pH Laboratory Control Sample Duplicate
MDPH	pH Sample Duplicate
MDFP	Flashpoint Sample Duplicate
LCFP	Flashpoint LCS
G1	Gelex Check Standard Range 0-1
G2	Gelex Check Standard Range 1-10
G3	Gelex Check Standard Range 10-100
G4	Gelex Check Standard Range 100-1000

Note 1: The Post Spike Designation on Batch QC for GFAA is designated with an "S" added to the current abbreviation used. EX. LCS S=LCS Post Spike (GFAA); MSS=MS Post Spike (GFAA)

Note 2: The MD calculates an absolute difference (A) when the sample concentration is less than 5 times the reporting limit. The control limit is represented as +/- the RL.

SEVERN TRENT SERVICES

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Report To:
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Fax: 630-268-0555
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Bill To:
Contact:
Company: same
Address:
Phone:
Fax:
PO#: Quote:

Shaded Areas For Internal Use Only ____ of ____

Lab Lot# 213781

Package Sealed (Yes) No | Samples Sealed Yes (No)
Received on Ice (Yes) No | Samples Intact (Yes) No
Temperature 3°C Cooler
Within Hold Time (Yes) No | Preservative Indicated (Yes) No NA
pH Check OK (Yes) No NA | Res Cl Check OK (Yes) No NA
Sample Labels and COC Agree (Yes) No | COC Complete (Yes) No

Sampler Name: T Freudenrich
Signature:
Project Name: Supply Side Landfill
Project Number:
Project Location: GREAT LAKES NTC
Lab PM:
Date Required
Hard Copy: ___/___/___
Fax: ___/___/___

Lab Sample ID	MS-MSD	Client Sample ID	Sampling Date	Sampling Time	Matrix	Comp/Grab	Phenols	Iron, Manganese, Lead	Ammonia	Total Dissolved Solids	TOC	VOA					Additional Analyses / Remarks
1		MW4	11/25	8:30AM	H_2O	✓	1		1	1	2	Ø					GRAY TURBID
2		MW3	11/25	9:45AM	H_2O	✓	1	1	1	1	2	Ø					BROWN SEDIMENTS TURBID
3		MW2	11/25	10:15AM	H_2O	✓	1	1	1	1	2	Ø					OPAQUE/SOUR ODOR
4		MW1	11/25	10:45AM	H_2O	✓	1	1	1	1	2	3					REACTION TO H_2SO_4 PRESERVATIVE
5		MW5	11/25	11:30AM	H_2O	✓	1	1	1	1	2	Ø					REACTION TO H_2SO_4 PRESERVATIVE

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
T Freudenrich		11/25/02	4:00		STL	11/26/02	0945
RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME

Matrix Key
WW = Wastewater
W = Water
S = Soil
SL = Sludge
MS = Miscellaneous
OL = Oil
A = Air
SE = Sediment
SO = Solid
DS = Drum Solid
DL = Drum Liquid
L = Leachate
Wi = Wipe
O = _____

Container Key
1. Plastic
2. VOA Vial
3. Sterile Plastic
4. Amber Glass
5. Widemouth Glass
6. Other _____

Preservative Key
1. HCl, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. Cool to 4°
7. None

COMMENTS
NOTE: VOLATILATION OF SAMPLES DURING FIELD BOTTLING @ MW1 & MW5 see Remarks

Date Received 11 / 26 / 02
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APPENDIX D

SURFACE WATER DATA

Surface Water Monitoring Data (1985-1996)
SUPPLY SIDE LANDFILL

S101 (UPSTREAM)

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH
27-Feb-85	[illegible]	337	61.4	660	22	0.00125	0.81	<0.1	<0.1	6.5
27-Aug-85	0.1	175	132.2	744	17	0.0063	0.59	<0.1	0.1	7
19-Nov-85	0.4	29	34	245	10	[illegible]	[illegible]	<0.1	<0.1	7
24-Feb-86	0.78	[illegible]	127	[illegible]	76	0.0025	[illegible]	0.043	[illegible]	7.8
7-Jul-86	0.88	152	90	600	6	0.021	0.08	0.02	0.01	7
26-Aug-86	3.2	55	25	310	15	<0.001	1	<0.05	<0.1	7.8
24-Nov-86	<1	213	170	1000	<5	<0.010	<.2	<.2	<.2	7.4
26-Feb-87	<0.1	255	225	[illegible]	157	[illegible]	<0.3	<0.3	<0.2	8.1
19-May-87	0.08	258	5.5	870	7	<0.010	<0.3	<0.2	<0.2	7.4
20-Aug-87	1.2	111	1	302	7.5	0.0025	<0.2	<0.2	<0.2	7.1
30-Nov-87	0.08	241	9.5	655	6	<0.01	<0.2	<0.2	<0.2	7.5
28-Feb-88	<5	[illegible]	5.5	[illegible]	5	[illegible]	<0.2	NA	<0.2	7.5
28-May-88	<0.1	442	6	500	19	<0.1	[illegible]	<0.2	<0.2	7.5
1-Sep-88	0.73	116	14.12	770	6.5	<0.1	<0.2	<0.5	<0.2	8
30-Nov-88	<0.5	[illegible]	16	[illegible]	34.8	<0.5	<0.2	<0.2	<0.2	7.3
28-Feb-89	1	[illegible]	11.7	[illegible]	10	0.0066	0.21	0.23	0.15	7.8
31-May-89	2.1	42.5	[illegible]	804	37.42	[illegible]	0.42	0.1	<0.05	8
31-Aug-89	1.5	150	140	740	8.5	<1	0.44	0.03	0.08	7.5
30-Nov-89	1.5	500	168	[illegible]	31.1	<1	0.15	0.33	0.08	7.5
28-Feb-90	2.5	[illegible]	144	[illegible]	6	<1	0.03	0.07	0.02	7.5
29-May-90	0.5	128	15	570	8.33	<1	0.04	0.1	<0.01	7.5
28-Aug-90	6.7	3.6	<1	230	37.5	<1	0.3	0.07	0.03	7
30-Nov-90	4	71	6.7	710	12	<1	0.66	0.039	0.01	7.5
26-Feb-91	<1	365	117	[illegible]	6.3	<1	0.2	0.04	0.03	8.2
31-May-91	3.18	213	72.2	480	12.4	<1	0.16	0.03	0.01	8.2
30-Aug-91	0.23	199	300	980	21.5	[illegible]	[illegible]	0.02	0.14	8.19
26-Nov-91	14.5	225	[illegible]	[illegible]	102	<1	0.03	0.05	0.08	6.92
28-Feb-92	1.36	60	135	[illegible]	12.5	<1	0.08	<0.01	0.02	9
28-May-92	1.3	375	150	[illegible]	7.4	<1	0.04	0.03	<0.1	7.24
31-Aug-92	0.7	210	60	644	8.74	<1	0.26	<0.01	<0.01	8.2
30-Dec-92	0.3	160	73	590	6.2	<1	0.14	0.07	<0.01	7.63
25-Feb-93	4.6	[illegible]	190	[illegible]	7.4	<1	0.18	0.04	0.11	7.2
21-May-93	0.24	295	400	[illegible]	7.5	<1	0.75	<0.05	0.18	7.3
31-Aug-93	0.21	95.3	32	410	8.21	<0.2	[illegible]	<0.050	0.07	7.4
7-Mar-94	NA	220	58	500	6.8	<0.1	[illegible]	0.0092	0.14	7.6
16-May-94	0.19	310	120	970	18	<0.03	[illegible]	0.011	0.34	8.3
15-Jul-94	<0.1	180	120	1000	14	<0.03	[illegible]	<0.005	0.23	7.8
23-Sep-94	0.24	260	120	780	16	<0.03	0.62	0.0066	0.11	7.8
24-Feb-95	0.3	370	120	870	6.1	<0.03	0.89	0.011	0.2	7.9
5-May-95	0.17	150	60	420	NA	<0.03	[illegible]	0.016	0.09	8.2
10-Jul-95	1.5	280	93	850	18	<0.1	0.63	<0.0075	0.13	7.8
5-Oct-95	0.17	190	110	640	18	<0.03	0.71	0.71	0.19	7.8
1-May-96	<.10	44	84	1000	8	[illegible]	0.8	<0.05	0.065	8.1
24-Jun-96	0.29	7	52	36	8.3	<0.03	0.73	<0.005	0.15	7.6
17-Sep-96	0.34	150	93	760	6.2	<0.03	0.41	<0.005	0.045	8.3
19-Nov-96	0.15	200	68	670	6.5	<0.03	0.71	<0.005	0.13	8
Ave	1.7	305.1	110.7	3212.7	19.3	0.3	0.8	0.07	0.1	
Max	19	2181	540	107000	157	2.73	5.2	0.71	2.2	
General Use Water Quality Standards	15	500	500	1000	NA	0.1	1	*	1	6.5-9.0

Concentrations in mg/L

Bold and Shaded = Exceeds Water Quality Standard

General Use Water Quality Standards (Title 35, Part 302, Subpart B)

Lead standard based on hardness calculation

Surface Water Monitoring Data (1985-1996)
SUPPLY SIDE LANDFILL

S301 (DOWNSTREAM)

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH
27-Feb-85	**18.9**	337	64.2	692	29	0.00156	0.8	<0.1	<0.1	6.7
27-Aug-85	0.1	169	113.2	804	20	<0.00313	0.51	<0.1	0.14	7
19-Nov-85	0.33	39	48	280	15	0.00364	**0.31**	<0.1	0.14	7
24-Feb-86	0.75	**973**	108	**1956**	13	<0.001	**5.2**	0.041	**[illegible]**	7.7
7-Jul-86	0.8	150	101	465	16	<0.019	0.06	0.01	0.01	7
26-Aug-86	**[illegible]**	82	35	400	15	<0.001	<0.1	<0.05	<0.1	7.8
24-Nov-86	<1	354	146	820	<5	<0.01	<.2	<.2	<0.2	8.3
26-Feb-87	<0.1	200	155	910	12	0.025	<0.3	<0.3	<0.2	8
19-May-87	0.02	282	5.5	840	7	<0.01	<0.3	<0.2	<0.2	7.5
20-Aug-87	1.08	99	5.5	302	9.1	0.01	<0.2	<0.2	<0.2	7.3
30-Nov-87	<0.02	268	4.3	675	9	<0.01	<0.2	<0.2	<0.2	7.8
28-Feb-88	<5	**1665**	7.5	969	6	**[illegible]**	<0.2	<0.2	NA	7.8
28-May-88	<0.1	419	<0.1	550	18	<0.1	**[illegible]**	<0.2	<0.2	7.8
1-Sep-88	0.48	61	9.41	320	3.2	<0.1	<0.2	<0.5	<0.2	7.4
30-Nov-88	<0.5	**1980**	10	940	44.4	<0.5	<0.2	<0.2	<0.2	7.3
28-Feb-89	1	460	10.6	**[illegible]**	9.8	0.0049	0.16	0.25	0.17	8.1
31-May-89	1.57	312	476	976	38.93	<1	<0.05	<0.05	<0.05	8.8
31-Aug-89	1.3	170	52	760	8.4	0.1	0.13	<0.01	0.01	7.1
30-Nov-89	1.5	408	156	**[illegible]**	19.95	<1	0.05	0.34	0.05	7.5
28-Feb-90	1.2	**[illegible]**	123	**[illegible]**	5.7	<1	0.04	0.19	0.03	7.7
29-May-90	0.5	140	15	650	8.54	<1	0.11	0.12	<0.01	7.8
28-Aug-90	7.7	110	<1	230	20	<1	0.1	0.1	<0.01	6.8
30-Nov-90	4	64	15	840	15	<1	0.77	0.058	0.016	7.5
26-Feb-91	<1	300	130	**[illegible]**	5.3	<1	0.3	0.05	0.07	7.9
31-May-91	<1	156	33.3	380	13.4	<1	0.15	0.03	0.01	7.9
30-Aug-91	0.68	213	180	930	30.2	**[illegible]**	**[illegible]**	0.04	**[illegible]**	7.61
26-Nov-91	0.3	5.7	340	560	40	<1	0.06	0.02	0.09	7.47
28-Feb-92	1.81	313	79	**[illegible]**	11.1	<1	0.08	<0.01	0.01	8
28-May-92	0.64	**[illegible]**	160	**[illegible]**	7.53	<1	0.09	0.07	<0.1	6.6
31-Aug-92	0.7	200	250	637	7.75	<1	0.19	0.01	0.01	7.6
20-Dec-92	0.6	110	53	410	4.9	<1	0.24	0.04	<0.01	7.24
25-Feb-93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
21-May-93	0.95	310	130	**[illegible]**	8.1	<1	0.48	<0.05	0.15	7.5
31-Aug-93	<0.1	77.4	31.8	390	9.63	<0.2	**[illegible]**	0.06	0.07	7
7-Mar-94	0.22	250	59	930	6.7	<0.1	**[illegible]**	<0.005	<0.1	7.6
16-May-94	0.17	180	77	680	14	<0.03	0.7	0.0085	<.10	8.2
15-Jul-94	0.18	120	85	690	16	<0.03	0.78	<0.005	0.11	7.8
23-Sep-94	0.2	110	85	420	11	<0.03	0.42	<0.005	<0.05	7.7
24-Feb-95	0.21	300	94	70	NA	<0.03	0.84	0.013	0.15	8
5-May-95	0.19	140	60	470	23	<0.03	0.91	<0.005	0.073	8.2
10-Jul-95	0.88	170	70	700	10	<0.1	0.36	<0.0075	0.14	7.9
5-Oct-95	0.12	170	96	630	23	<0.03	0.29	<0.005	0.061	8
1-May-96	<0.10	29	83	870	3.4	<0.03	0.83	<0.05	0.066	8.2
24-Jun-96	0.32	5	51	400	5.8	**[illegible]**	0.83	<0.005	0.16	7.9
17-Sep-96	0.6	140	93	720	5.9	<0.03	0.8	<0.005	0.081	8.1
19-Nov-96	0.16	220	70	710	200	<0.03	0.85	<.005	0.19	7.9
Ave	1.9	283.9	88.2	2853.0	18.2	0.7	0.8	0.06	0.2	
Max	34.6	1980	476	94000	200	10	5.8	0.34	1.9	
General Use Water Quality Standards	15	500	500	1000	NA	0.1	1	*	1	6.5-9.0

Concentrations in mg/L

Bold and Shaded = Exceeds Water Quality Standard

General Use Water Quality Standards (Title 35, Part 302, Subpart B)

Lead standard based on hardness calculation

APPENDIX E

GROUNDWATER MONITORING DATA (1983-1996)

Quarterly Groundwater Monitoring Data (1983-1996)
SUPPLY SIDE LANDFILL

G101

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water	Comments
22-Nov-83	0.11	64	285	NA	43	<0.01	0.2	<0.1	[illegible]	NA	NA	
1-Mar-84	<0.1	[illegible]	323	NA	50	0.013	0.2	[illegible]	[illegible]	NA	NA	
27-Feb-85	22.8	[illegible]	50.36	[illegible]	14	0.0075	<0.1	<0.1	<0.1	[illegible]	5	
27-Aug-85	0.15	149	236.7	1060	228	<0.00313	<0.1	<0.1	[illegible]	6.9	6	
19-Nov-85	0.4	70	267	830	23	0.00352	0.16	<0.1	<0.1	7	3	
24-Feb-86	0.26	78	206	943	27	0.002	1.2	[illegible]	[illegible]	7.7	2.75	
7-Jul-86	0.64	127	150	785	11	<0.019	0.1	[illegible]	0.01	7	4	
26-Aug-86	30	29	137	[illegible]	9	<0.001	3	<0.05	<0.1	[illegible]	NA	
24-Nov-86	2	[illegible]	[illegible]	[illegible]	<5	<0.01	<.2	<.2	<.2	7.2	NA	
26-Feb-87	<0.1	33	16	265	14	<0.01	<0.3	<.03	<0.3	[illegible]	NA	
19-May-87	0.03	101	5.5	820	11	0.05	<0.3	<0.2	<0.2	7.2	NA	
20-Aug-87	264	[illegible]	7.4	[illegible]	128	<0.0025	<0.2	<0.2	<0.2	7	NA	
30-Nov-87	0.02	[illegible]	6.4	[illegible]	42	<0.01	<0.2	<0.2	<0.2	7.4	NA	
28-Feb-88	<5	90.8	5.5	612	10	[illegible]	<0.2	NA	<0.2	7.3	NA	
28-May-88	<0.1	[illegible]	5.5	[illegible]	15	[illegible]	3.4	<0.2	<0.2	7.3	NA	
1-Sep-88	0.42	105	44.71	[illegible]	32.3	<0.1	<0.2	<0.5	<0.2	7	NA	
30-Nov-88	<0.5	[illegible]	26	1028	8.3	<0.5	<0.2	<0.2	<0.2	7.1	NA	
28-Feb-89	<1	82	18.3	785	23.1	8.5	1	0.00035	[illegible]	7.7	NA	
31-May-89	2	[illegible]	345	580	36.52	<1	<0.05	[illegible]	<0.05	8.1	NA	
31-Aug-89	1.8	170	200	1140	21	<1	0.31	[illegible]	0.01	6.9	NA	
30-Nov-89	2	95.7	[illegible]	[illegible]	47.44	<1	0.03	[illegible]	0.01	7.5	NA	
28-Feb-90	1.8	92.2	320	[illegible]	15.4	<1	0.08	[illegible]	[illegible]	8.2	NA	
29-May-90	0.9	28.5	150	700	15.2	<1	0.15	<0.01	0.01	7	NA	
28-Aug-90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
30-Nov-90	0.6	57	387	[illegible]	32	<1	0.02	[illegible]	0.032	7.7	NA	
26-Feb-91	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
31-May-91	1.8	142	222	590	14.2	<1	0.16	[illegible]	0.03	7.8	NA	
30-Aug-91	7.23	142	350	[illegible]	29.5	<1	3.1	[illegible]	0.11	8.64	NA	
26-Nov-91	0.6	35.5	130	500	109	<1	0.02	[illegible]	<0.01	7.68	NA	
28-Feb-92	0.9	35	230	960	26.9	<1	0.04	[illegible]	<0.01	7.5	NA	
28-May-92	<0.5	24	135	[illegible]	11.73	<1	0.09	[illegible]	[illegible]	7.21	NA	
31-Aug-92	0.7	72.1	290	882	25.8	<1	1.95	[illegible]	[illegible]	7.8	NA	
30-Dec-92	0.2	53	220	740	18	<1	0.13	[illegible]	0.02	7.23	NA	
25-Feb-93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
21-May-93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
31-Aug-93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
7-Mar-94	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Frozen Well.
16-May-94	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
15-Jul-94	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
23-Sep-94	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
24-Feb-95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
5-May-95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
10-Jul-95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
5-Oct-95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
1-May-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
24-Jun-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
17-Sep-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
19-Nov-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
Ave	11.1	169.0	190.7	2951.1	35.3	0.7	0.5	0.08	0.2			
Max	264	803	580	54000	228	8.5	3.4	0.26	1.6			
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0		
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0		

Concentrations in mg/L

Bold and Shaded = Exceeds Class I Groundwater Quality Standard (GQS)

Class I and Class II Groundwater Quality Standards (Title 35, Part 620, Subpart D)

NA=Not Available

NS=No Standard established by IEPA

Quarterly Groundwater Monitoring Data (1983-1996)
SUPPLY SIDE LANDFILL

G102

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water
18-Jul-83	13	127	155	NA	11	0.04	<0.1	0.01	0.1	NA	NA
22-Nov-83	16.8	147	151	NA	48	0.01	0.5	<0.1	0.04	NA	NA
1-Mar-84	16.5	153	208	NA	111	0.032	0.3	0.05	0.06	NA	NA
27-Feb-85	28.8	285	351.2	1512	40	0.01857	<0.1	<0.12	0.5	6.5	5
27-Aug-85	13.4	136	423	1684	30	<0.00313	0.15	<0.1	0.1	7.1	7
19-Nov-85	15.5	142	350	1540	35	0.0055	0.1	<0.1	0.18	7	5
24-Feb-86	63.1	127	315	1550	17	0.004	14	<.01	1	7.3	6.75
7-Jul-86	11.25	132	350	1570	10	0.029	0.05	0.01	0.02	7	10
26-Aug-86	13	135	40	2000	17	<0.001	1	<0.05	<0.1	7.2	NA
24-Nov-86	10	495	440	1520	<5	<0.01	<.2	<.2	<.2	7.1	NA
26-Feb-87	0.1	130	400	1450	25	0.2	<0.3	<0.3	<0.2	7.7	NA
19-May-87	0.14	167	9.5	1350	16	0.1	<0.3	<0.2	<0.2	7.2	NA
20-Aug-87	14.4	173	5.5	1380	40	0.0175	<0.2	<0.2	<0.2	7.1	NA
30-Nov-87	<0.02	294	5.5	1740	21	<0.01	<0.2	<0.2	<0.2	7.1	NA
28-Feb-88	30	255	13.5	1740	17	3.2	<0.2	NA	<0.2	6.9	NA
28-May-88	<0.1	196	13.7	1835	36	10.6	5	<0.2	<0.2	6.9	NA
1-Sep-88	0.73	NA	70.59	1834	16.6	<0.1	<0.2	<0.5	<0.2	6.6	NA
30-Nov-88	2.5	1418	26	1376	14	<0.5	<0.2	<0.2	<0.2	7.3	NA
28-Feb-89	1	46	20	1570	26.5	0.0054	15.33	0.26	0.06	7.3	NA
31-May-89	14.4	184	1760	1570	46.65	<1	<0.05	0.2	<0.05	7.6	NA
31-Aug-89	9.2	160	360	2210	21.8	<1	0.45	0.09	0.08	7	NA
30-Nov-89	8	195	475	1950	93.36	<1	0.76	0.08	0.11	7.3	NA
28-Feb-90	6.5	56.7	224	2000	19.6	<1	1.2	0.21	0.03	8.2	NA
29-May-90	15	184	16	1300	44.8	<1	2.3	<0.01	0.15	7	NA
28-Aug-90	16	210	140	1270	50.3	<1	0.95	0.01	0.01	7.1	NA
30-Nov-90	2	235	387	1700	39	<1	2.31	<0.01	0.2	7.2	NA
26-Feb-91	21.9	285	341	1540	25.6	<1	1.3	0.07	0.12	7.6	NA
31-May-91	1.5	220	389	1580	25.6	<1	0.38	0.04	0.14	7.1	NA
30-Aug-91	2	49.6	286	900	21.9	0.35	2.78	0.03	0.57	8.5	NA
26-Nov-91	0.9	184	210	510	37.9	<1.0	0.11	0.1	0.03	7.73	NA
28-Feb-92	13.63	242	115	1150	65.8	<1	0.1	0.1	0.02	7.2	NA
28-May-92	9.03	364	440	145000	21.9	<1	0.06	0.05	0.04	6.89	NA
31-Aug-92	9.5	276	270	1600	22.1	<1	0.11	0.05	0.07	7.2	NA
20-Dec-92	15	290	194	1590	27	<1	1.19	0.05	0.15	7.42	NA
25-Feb-93	4.3	104	180	1780	21.9	0.2	0.07	0.04	<0.01	7.26	NA
21-May-93	2.6	290	57	1590	44.6	<1	0.5	<0.05	0.02	6.7	NA
31-Aug-93	10.6	310	0.49	1500	24.7	<0.2	1.6	0.1	0.30	7.2	NA
7-Mar-94	12	380	170	1400	620	<0.1	320	0.2	17	7.2	NA
16-May-94	21	350	270	1800	3000	<0.03	120	0.35	5.1	7.1	NA
15-Jul-94	4.2	160	120	1800	50	<0.03	460	0.37	16	7.1	NA
23-Sep-94	16	1300	300	1300	38	<0.03	96	0.035	37	7.3	NA
24-Feb-95	13	360	180	690	30	0.06	130	0.1	6.3	7.3	NA
5-May-95	19	290	170	1700	52	<0.03	190	0.14	13	7	NA
10-Jul-95	19	400	170	2000	110	<0.1	130	0.12	5.4	7.1	NA
5-Oct-95	21	350	260	1800	78	<0.03	120	0.052	6.5	7.3	NA
1-May-96	18	130	79	1900	12	0.09	42	0.024	12	7	NA
24-Jun-96	19	<1.1	0.96	2300	20	0.042	35	0.055	11	6.9	NA
17-Sep-96	36	NA	NA	NA	NA	<.03	NA	NA	NA	NA	NA
19-Nov-96	11	55	NA	NA	NA	0.09	2.5	0.005	0.01	7.8	NA
Ave	11.6	250.4	235.0	5052.9	114.8	0.4	43.4	0.10	2.0		
Max	36	1418	1760	145000	3000	5.25	460	0.47	25		
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0	
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0	

Concentrations in mg/L

Bold and Shaded = Exceeds Class I Groundwater Quality Standard (GQS)

Class I and Class II Groundwater Quality Standards (Title 35, Part 620, Subpart D)

NA=Not Available

NS=No Standard established by IEPA

Quarterly Groundwater Monitoring Data (1983-1996)
SUPPLY SIDE LANDFILL

G103

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water	Comments
22-Nov-83	12.6	53	366	NA	85	0.014	[illegible]	<0.10	[illegible]	NA	NA	
1-Mar-84	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
27-Feb-85	503.6	[illegible]	[illegible]	71.43	23	0.07143	<0.1	<0.1	<0.1	[illegible]	3	
27-Aug-85	0.08	[illegible]	[illegible]	[illegible]	206	0.025	0.1	[illegible]	[illegible]	7	5	
19-Nov-85	0.52	122	[illegible]	[illegible]	25	[illegible]	<0.1	<0.1	[illegible]	6.9	4.5	
24-Feb-86	14.7	[illegible]	[illegible]	[illegible]	75	0.001	2.2	<.01	[illegible]	7.3	6.67	
7-Jul-86	0.88	130	314	1070	13	0.029	0.04	[illegible]	[illegible]	7	NA	
26-Aug-86	1935	[illegible]	170	[illegible]	128	<0.001	[illegible]	<0.05	<0.1	7.1	NA	
24-Nov-86	250	[illegible]	220	[illegible]	94	<0.01	0.9	<.2	<.2	7.6	NA	
26-Feb-87	0.3	198	180	[illegible]	84	<0.01	<0.3	<0.3	<0.2	7.8	NA	
19-May-87	1.06	[illegible]	11	[illegible]	92	<0.1	<0.3	<0.2	<0.2	6.9	NA	
20-Aug-87	1.92	99	25.5	[illegible]	14.6	0.0125	<0.2	<0.2	<0.2	7.4	NA	
30-Nov-87	<0.02	[illegible]	8.9	[illegible]	101	<0.01	<0.2	<0.2	<0.2	7.4	NA	
28-Feb-88	60	154.6	13.4	[illegible]	70	[illegible]	<0.2	NA	<0.2	7	NA	
28-May-88	<0.1	[illegible]	13.2	[illegible]	67	<0.1	4	<0.2	<0.2	7	NA	
1-Sep-88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Dry Well
30-Nov-88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
28-Feb-89	1	55	33.3	[illegible]	15.8	0.0057	0.81	[illegible]	[illegible]	7.4	NA	
31-May-89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Dry Well
31-Aug-89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
30-Nov-89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
28-Feb-90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Dry Well
29-May-90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Dry Well
28-Aug-90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
30-Nov-90	2.8	100	344	[illegible]	390	<1	0.1	[illegible]	[illegible]	7.6	NA	
26-Feb-91	5.8	36	47	540	11.4	<1	0.2	[illegible]	[illegible]	7.4	NA	
31-May-91	<1	49.6	322	720	19.5	<1	0.05	[illegible]	[illegible]	6.8	NA	
30-Aug-91	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
26-Nov-91	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
28-Feb-92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
28-May-92	80.6	[illegible]	[illegible]	[illegible]	64.7	<1	1.6	[illegible]	[illegible]	6.6	NA	
31-Aug-92	4.8	98.4	150	[illegible]	27.7	<1	0.71	[illegible]	[illegible]	7.6	NA	
30-Dec-92	1	85	225	680	11	<1	3.8	[illegible]	[illegible]	7.28	NA	
25-Feb-93	4.9	48.4	210	[illegible]	19.9	[illegible]	2.68	[illegible]	[illegible]	7.25	NA	
21-May-93	0.7	61	245	1190	44.5	<1	[illegible]	[illegible]	[illegible]	7.3	NA	
31-Aug-93	17.7	150	70	860	17.4	<0.2	[illegible]	[illegible]	[illegible]	7.2	NA	
7-Mar-94	22	88	280	810	22	<0.1	[illegible]	[illegible]	[illegible]	7	NA	
16-May-94	28	52	68	710	43	<0.03	[illegible]	[illegible]	[illegible]	7.1	NA	
15-Jul-94	11	26	250	940	27	<0.03	[illegible]	0.0036	[illegible]	6.7	NA	
23-Sep-94	19	29	220	630	50	<0.03	[illegible]	[illegible]	[illegible]	6.8	NA	
24-Feb-95	20	120	320	980	52	<0.03	[illegible]	[illegible]	[illegible]	7.2	NA	
5-May-95	30	70	110	1000	32	<0.03	[illegible]	[illegible]	[illegible]	7.1	NA	
10-Jul-95	29	43	42	510	36	<0.1	[illegible]	[illegible]	[illegible]	7	NA	
5-Oct-95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Silted Well
1-May-96	22	110	100	520	21	0.031	[illegible]	[illegible]	[illegible]	6.8	NA	
24-Jun-96	16	2	180	[illegible]	29	0.039	[illegible]	[illegible]	[illegible]	7	NA	
17-Sep-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Obstructed well
19-Nov-96	7.5	[illegible]	160	[illegible]	160	<0.03	[illegible]	<.005	[illegible]	7.7	NA	
Ave	91.3	150.1	219.2	3557.9	63.9	0.2	20.7	0.08	1.3			
Max	1935	495	808	69000	390	2.3	130	0.5	16.5			
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0		
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0		

Concentrations in mg/L

Bold and Shaded = Exceeds Class I Groundwater Quality Standard (GQS)

Class I and Class II Groundwater Quality Standards (Title 35, Part 620, Subpart D)

NA=Not Available

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Quarterly Groundwater Monitoring Data (1983-1996)
SUPPLY SIDE LANDFILL

G104

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water
22-Nov-83	0.28	40	480	NA	33	<0.01	2.3	<0.10	0.07	NA	NA
1-Mar-84	0.23	43	472	NA	51	<0.01	0.1	0.03	0.08	NA	NA
27-Feb-85	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
27-Aug-85	0.08	130	5136	1924	24	0.088	<0.1	0.1	0.15	7	4
19-Nov-85	0.5	109	670	3640	43	0.123	<0.1	<0.1	0.11	7	2
24-Feb-86	0.53	88	655	1624	17	0.001	2.6	<.01	0.1	7.6	4.5
7-Jul-86	0.94	110	414	1650	15	<0.019	0.01	0.03	0.09	7	6
26-Aug-86	3.2	108	430	1985	8	<0.001	<0.1	<0.05	<0.1	7.2	NA
24-Nov-86	1.5	260	620	1620	<5	<0.01	<.2	<.2	0.1	7.6	NA
26-Feb-87	<0.1	89	630	1630	12	0.05	<0.3	<0.3	<0.2	7.7	NA
19-May-87	0.06	115	29.5	1630	9	<0.01	<0.3	<0.2	<0.2	7.4	NA
20-Aug-87	56.4	163	12.5	2280	45.3	0.01	<0.2	<0.2	<0.2	7.6	NA
30-Nov-87	0.07	234	11	3000	10	<0.01	<0.2	<0.2	<0.2	7.3	NA
28-Feb-88	<5	37.01	15	1545	9	<0.5	<0.2	NA	<0.2	7.1	NA
28-May-88	<0.1	140	15	1600	20	<0.1	3.2	<0.2	<0.2	7.1	NA
1-Sep-88	0.42	NA	34.12	1170	11.6	<0.1	<0.2	<0.5	<0.2	7	NA
30-Nov-88	0.5	575	17	1144	14.7	<0.5	<0.2	<0.2	<0.2	7.1	NA
28-Feb-89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
31-May-89	2.4	240	312	960	36.22	<1	<0.05	0.3	<0.05	7.7	NA
31-Aug-89	3.6	43	110	1140	9.2	<1	0.12	0.01	<0.02	7.5	NA
30-Nov-89	3	39	215	1300	28.3	<1	0.43	0.02	0.05	7.4	NA
28-Feb-90	6.3	188	224	1270	6.7	<1	0.05	0.43	0.03	7.8	NA
29-May-90	1.4	35.4	200	1100	12.3	<1	0.07	0.06	0.01	6.9	NA
28-Aug-90	2.5	130	<1	340	19.2	<1	0.01	0.05	<0.01	7.1	NA
30-Nov-90	3	43	29	1000	66	<1	0.09	0.07	0.023	7.4	NA
26-Feb-91	2.47	43	353	1000	7	<1	0.3	0.04	0.04	7.6	NA
31-May-91	2.2	28.4	222	570	12.1	<1	0.13	0.01	0.05	7.5	NA
30-Aug-91	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
26-Nov-91	0.3	191	180	710	73.7	<1	0.1	0.12	0.01	7.98	NA
28-Feb-92	0.93	40	150	1150	12.6	<1	0.01	0.07	0.02	7.5	NA
28-May-92	<0.5	43	100	18000	6.18	<1	0.05	0.06	<0.1	7.09	NA
31-Aug-92	1	42.6	130	1020	7.66	<1	0.08	0.06	0.05	7.3	NA
30-Dec-92	0.2	53	170	790	8.4	<1	0.25	0.02	0.05	7.38	NA
25-Feb-93	0.72	40.9	200	1030	7.9	<1	0.03	0.03	0.02	7.2	NA
21-May-93	0.7	35	230	1190	7.2	<1	0.03	<0.05	0.05	6.8	NA
31-Aug-93	0.98	41.7	73.6	840	9.44	<0.2	0.02	<0.050	0.1	7.3	NA
7-Mar-94	NA	50	220	3400	11	<0.1	0.16	0.015	0.03	7.2	NA
16-May-94	2.2	36	99	1100	28	<0.03	0.07	0.02	0.15	7.8	NA
15-Jul-94	0.27	35	89	1100	68	<0.03	0.02	0.01	0.01	7.1	NA
23-Sep-94	1	30	200	850	17	<0.03	0.03	0.01	0.05	7	NA
24-Feb-95	1	38	130	900	13	<0.03	0.03	0.02	0.05	7.2	NA
5-May-95	2.1	40	150	1100	NA	0.00049	0.03	0.01	0.05	7	NA
10-Jul-95	1.3	38	110	1100	150	<0.1	0.06	0.03	0.02	7	NA
5-Oct-95	1.1	42	960	960	85	<0.03	0.1	0.03	0.05	7.1	NA
1-May-96	2.3	170	52	880	6	<.03	0.03	0.01	0.06	6.9	NA
24-Jun-96	2.2	<1.1	78	1400	8	0.069	0.02	0.01	0.02	6.9	NA
17-Sep-96	1.7	47	110	1100	30	0.034	0.02	0.03	0.05	7	NA
19-Nov-96	0.53	38	36	1000	160	<0.03	0.1	<0.005	0.02	7.1	NA
Ave	2.6	101.2	218.9	3263.4	28.0	0.2	26.6	0.07	1.3		
Max	56.4	575	670	88000	160	0.5	380	0.27	8.2		
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0	
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0	

Concentrations in mg/L

Bold and Shaded = Exceeds Class I Groundwater Quality Standard (GQS)

Class I and Class II Groundwater Quality Standards (Title 35, Part 620, Subpart D)

NA=Not Available

NS=No Standard established by IEPA

Off Site Gas Monitoring Wells (1995-1996)
SUPPLY SIDE LANDFILL

MW 5

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH
24-Feb-95	0.12	150	56	880	6.4	ND	[illegible]	[illegible]	[illegible]	7.3
5-May-95	0.24	80	30	420	ND	[illegible]	3.5	[illegible]	[illegible]	7.2
10-Jul-95	0.2	80	32	530	12	ND	2.9	0.0059	[illegible]	7.1
5-Oct-95	ND	75	53	600	8	ND	4.5	0.0061	[illegible]	7.4
1-May-96	0.17	39	87	640	1.2	<.03	2.2	<.05	[illegible]	7.3
24-Jun-96	<.10	<1.1	56	86	<1	<.03	0.98	<.005	[illegible]	7.2
17-Sep-96	0.37	98	110	880	11	<.03	[illegible]	[illegible]	[illegible]	7
19-Nov-96	<.1	160	78	820	4.6	<.03	1.1	<.005	[illegible]	7.2
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0

MW 6

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH
24-Feb-95	0.33	49	110	150	41	0.06	[illegible]	[illegible]	[illegible]	7.6
5-May-95	0.42	80	110	610	ND	ND	[illegible]	0.006	[illegible]	7.3
10-Jul-95	0.48	190	290	[illegible]	12	ND	[illegible]	ND	[illegible]	7.1
5-Oct-95	0.54	180	[illegible]	480	5.9	ND	[illegible]	ND	[illegible]	7.1
1-May-96	0.42	65	86	540	2	<.03	3.3	<.05	[illegible]	7.1
24-Jun-96	0.23	5	130	1000	2.3	<.03	0.76	<.005	[illegible]	7.1
17-Sep-96	0.69	170	[illegible]	[illegible]	4.2	<.03	[illegible]	[illegible]	[illegible]	7.1
19-Nov-96	0.12	150	340	1200	3.3	<.03	[illegible]	<.005	[illegible]	7.3
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0

MW 7

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH
24-Feb-95	0.11	15	39	230	ND	ND	0.88	[illegible]	[illegible]	7.8
5-May-95	0.22	150	70	550	ND	ND	2.4	ND	[illegible]	7.4
10-Jul-95	0.12	[illegible]	96	[illegible]	4	ND	2.2	ND	[illegible]	7.3
5-Oct-95	0.11	[illegible]	100	970	7.7	ND	2	ND	[illegible]	7.2
1-May-96	0.15	69	64	620	3.4	<.03	[illegible]	[illegible]	[illegible]	7.2
24-Jun-96	0.16	7	47	700	2.9	0.039	[illegible]	<.005	[illegible]	7.1
17-Sep-96	0.56	[illegible]	110	[illegible]	4.6	<.03	4.5	<.005	[illegible]	7.3
19-Nov-96	<.1	[illegible]	55	950	1.8	<.03	2.1	<.005	[illegible]	7.5
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0

Concentrations in mg/L

Bold and Shaded = Exceeds Class I Groundwater Quality Standard (GQS)

Class I and Class II Groundwater Quality Standards (Title 35, Part 620, Subpart D)

NA=Not Available

NS=No Standard established by IEPA

APPENDIX F

GROUNDWATER MONITORING DATA (1999-2002)

Quarterly Groundwater Monitoring Data (1999-2002)
SUPPLY SIDE LANDFILL

MW-A (G102)

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water
Jul-99	12.8	55.2	50.8	683	22.8	<0.10	[illegible]	<0.001	[illegible]	6.9	-
Oct-99	7.5	46.1	102	679	25.7	<0.10	4.25	<0.001	[illegible]	6.85	-
Jan-00	8.86	47.9	112	414	13.5	[illegible]	1.01	0.003	[illegible]	6.91	-
Apr-00	110	10	190	700	19	0.036	0.12	0.003	[illegible]	7.02	-
Jul-00	0.4	4.94	50.5	717	34	<0.005	[illegible]	<0.005	[illegible]	7	-
Oct-00	6	44.3	2.84	706	11	<0.005	[illegible]	<0.004	0.147	7.06	-
Jan-01	13.9	61.2	12.6	778	12	<0.005	[illegible]	<0.005	[illegible]	7.01	8.1
Apr-01	0.0336	53.2	135	823	15	<0.005	2.66	<0.004	[illegible]	7	9
Jul-01	20.4	50.4	66.2	795	20	<0.1	[illegible]	<0.003	[illegible]	6.6	-
Oct-01	14	12.1	106	509	16	<0.1	[illegible]	<0.171	[illegible]	6.76	-
Jan-02	20.3	47.2	71	773	9	<0.005	[illegible]	<0.171	[illegible]	6.58	-
Apr-02	31	35	92	780	14	<0.005	[illegible]	<0.001	[illegible]	6.8	-
Jul-02	9.9	-	57	770	13	0.005	[illegible]	<0.002	[illegible]	6.82	9.96
Oct-02	17	63	110	740	13	0.005	[illegible]	<0.002	[illegible]	7.01	-
Ave	19.4	40.8	82.7	704.8	17.0	0.04	10.9	0.014	0.54		
Max	110	63	190	823	34	0.27	25	<0.171	1.02		
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0	
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0	

MW-B (G103)

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water
Jul-99	5.5	[illegible]	122	<10.0	24.4	<0.10	[illegible]	<0.001	[illegible]	7.02	-
Oct-99	6.38	[illegible]	161	[illegible]	38.8	<0.10	2.16	0.002	[illegible]	6.93	-
Jan-00	4.95	[illegible]	147	[illegible]	25.8	<0.10	[illegible]	<0.001	[illegible]	6.93	-
Apr-00	76	[illegible]	190	[illegible]	35	0.054	[illegible]	<0.003	[illegible]	6.96	-
Jul-00	0.96	7.61	378	1099	36	<0.005	[illegible]	<0.005	[illegible]	7.5	-
Oct-00	10.8	152	8.82	[illegible]	19	[illegible]	[illegible]	<0.004	<0.0001	7.14	-
Jan-01	5.6	[illegible]	9.98	[illegible]	28	0.0127	[illegible]	<0.005	0.117	6.97	8.1
Apr-01	<0.0277	[illegible]	132	332	23	0.00794	[illegible]	<0.004	0.104	7	8.6
Jul-01	8.7	[illegible]	127	[illegible]	21	<0.1	[illegible]	<0.003	0.145	6.64	-
Oct-01	5.6	[illegible]	104	[illegible]	32	<0.1	[illegible]	<0.171	0.128	7.07	-
Jan-02	97	[illegible]	113	[illegible]	20	0.01	[illegible]	<0.171	0.133	6.62	-
Apr-02	2	200	160	[illegible]	23	<0.005	[illegible]	[illegible]	0.0028	6.7	-
Jul-02	8.7	-	150	[illegible]	21	0.005	3.9	<0.002	0.11	6.87	-
Oct-02	3.9	[illegible]	150	[illegible]	22	0.093	[illegible]	<0.002	0.13	6.91	-
Ave	16.9	292.6	139.5	1306.9	26.4	2.8	7.2	0.020	0.14		
Max	97	425	378	1800	38.8	38.1	10.6	0.097	0.32		
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0	
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0	

MW-C

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water
Jul-99	0.14	138	342	1150	5.5	<0.10	0.676	<0.001	[illegible]	7.28	-
Oct-99	0.34	137	279	[illegible]	11.7	<0.10	<0.100	<0.001	[illegible]	7.2	-
Jan-00	<0.10	175	291	1040	5.5	<0.10	<0.100	<0.003	0.05	7.26	-
Apr-00	48	150	380	1100	5.6	0.078	0.21	<0.003	<0.10	7.19	-
Jul-00	0.8	13.1	160	[illegible]	<9	<0.005	<0.0044	<0.005	<0.0001	7.5	-
Oct-00	<0.0277	140	15.2	1070	<6	<0.005	<0.0044	<0.004	<0.0001	7.32	-
Jan-01	<0.0277	151	15.2	1070	<9	<0.005	0.07	<0.005	<0.0001	7.24	4
Apr-01	<0.0277	160	203	1100	<6	<0.005	<0.0044	<0.004	<0.15	6.5	3.05
Jul-01	<0.4	137	318	1100	<6	<0.1	<0.075	<0.003	<0.042	6.91	-
Oct-01	<0.4	123	340	1160	<6	<0.1	<0.116	<0.171	<0.042	7.48	-
Jan-02	<0.4	124	331	1130	<6	<0.005	<0.116	<0.171	<0.042	6.96	-
Apr-02	0.94	140	300	1000	2.3	<0.005	<0.1	[illegible]	0.035	6.9	-
Jul-02	0.08	-	300	1100	3	0.005	0.25	<0.002	0.07	7.06	7.17
Oct-02	0.24	110	210	1100	2.6	0.005	0.05	<0.002	0.017	6.98	-
Ave	3.7	130.6	248.9	1148.4	4.3	0.03	0.11	0.013	0.05		
Max	48	175	380	1650	11.7	0.078	0.676	<0.171	0.19		
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0	
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0	

Concentrations in mg/L.
Bold and Shaded = Exceeds Class I Groundwater Quality Standard (GQS)
Class I and Class II Groundwater Quality Standards (Title 35, Part 620, Subpart D)
NA=Not Available
NS=No Standard established by IEPA

Quarterly Groundwater Monitoring Data (1999-2002)
SUPPLY SIDE LANDFILL

MW-D

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water
Jul-99	0.16	42.1	59.9	589	23.6	<0.10	<0.100	<0.001	[illegible]	7.4	-
Oct-99	0.24	49.6	217	811	25.4	[illegible]	0.113	<0.001	0.119	7.17	-
Jan-00	<0.10	38.1	286	1130	9.5	[illegible]	0.399	<0.002	[illegible]	7.2	-
Apr-00	44	90	310	940	3.7	<0.005	1.1	<0.003	[illegible]	7.15	-
Jul-00	0.3	13.1	125	1110	6	<0.005	0.58	<0.005	[illegible]	7.5	-
Oct-00	<0.0277	74.5	11.3	1019	<6	<0.005	0.592	<0.004	[illegible]	7.26	-
Jan-01	<0.0277	50.5	8.09	[illegible]	<9	<0.005	1.21	<0.005	[illegible]	7.3	6.6
Apr-01	<0.0277	31.9	58.1	429	<6	0.0381	1.78	<0.004	[illegible]	7	6.9
Jul-01	0.8	61	92.8	602	<6	<0.1	0.61	<0.003	[illegible]	7.03	-
Oct-01	<0.4	14.8	19.8	399	<6	<0.1	0.259	<0.171	0.054	7.22	-
Jan-02	<0.4	39.2	52.6	515	<6	<0.005	1.36	<0.171	[illegible]	7.04	-
Apr-02	0.92	30	110	490	1.7	0.002	0.26	<0.001	[illegible]	7	-
Jul-02	0.05	-	-	-	-	-	0.05	<0.002	0.13	-	11.03
Oct-02	0.26	48	140	770	2	0.005	0.048	<0.002	[illegible]	7.01	-
Ave	3.4	44.8	114.7	908.0	7.0	0.044	0.6	0.013	0.4		
Max	44	90	310	3000	25.4	0.2	1.78	<0.171	1.04		
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0	
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0	

MW-E

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water
Jul-99	0.14	20.4	45.9	530	5.5	<0.10	0.478	<0.001	[illegible]	7.38	-
Oct-99	0.24	40.8	61.3	<10.0	24	[illegible]	0.909	<0.001	[illegible]	7.27	-
Jan-00	<0.10	136	65.2	652	5.8	[illegible]	0.788	<0.001	<0.001	7.34	-
Apr-00	53	35	130	450	4	0.042	0.71	<0.003	[illegible]	7.26	-
Jul-00	0.4	2.63	19.5	240	13	<0.005	3.67	<0.005	[illegible]	7.5	-
Oct-00	<0.0277	23	4.73	518	<6	<0.005	0.619	<0.004	<0.0001	7.41	-
Jan-01	<0.0277	37.2	5.78	529	<3	<0.005	0.878	<0.005	[illegible]	7.31	6.5
Apr-01	<0.0277	31	81.7	488	<6	0.0984	1.09	<0.004	[illegible]	7	7.15
Jul-01	0.6	26.6	54.5	489	<3	<0.1	0.841	<0.003	[illegible]	7	-
Oct-01	0.6	14.4	45.6	352	7	[illegible]	<0.116	<0.171	<0.042	7.27	-
Jan-02	<0.4	23.8	50.3	469	<6	<0.005	1.54	<0.171	[illegible]	6.98	-
Apr-02	1.5	30	290	470	-	<0.171	0.56	<0.001	[illegible]	7	-
Jul-02	0.17	-	72	750	2.4	0.005	0.84	<0.002	[illegible]	7.11	7.79
Oct-02	1.2	31	120	550	2	0.0035	0.88	<0.002	[illegible]	7.04	-
Ave	4.2	34.8	74.8	463.7	5.8	0.6	1.0	0.013	0.3		
Max	53	136	290	750	24	7.27	3.67	<0.171	1.66		
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0	
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0	

MW-F (G104)

Sampling Date	Ammonia	Chloride	Sulfate	TDS	TOC	Phenolics	Iron	Lead	Manganese	pH	Depth to Water
Jul-99	1.93	18.7	129	750	22.6	<0.10	1.58	<0.001	[illegible]	7.13	-
Oct-99	3.13	21.3	[illegible]	1170	38.4	<0.10	2.68	<0.001	[illegible]	7.02	-
Jan-00	2.13	32.8	[illegible]	1540	21.2	[illegible]	0.271	<0.001	[illegible]	7.42	-
Apr-00	77	10	290	1100	11	0.078	0.11	<0.003	<0.10	7.13	-
Jul-00	2.8	9.98	12.4	854	17	<0.005	0.663	<0.005	[illegible]	7.5	-
Oct-00	<0.0277	24.8	15.2	1063	<6	[illegible]	0.685	<0.004	[illegible]	7.21	-
Jan-01	<0.0277	17.7	9.98	85	<3	<0.005	0.027	<0.005	<0.0001	7.28	8.8
Apr-01	<0.0277	15.1	162	675	<6	[illegible]	0.101	<0.004	0.077	7	7.2
Jul-01	2	60.2	142	735	10	<0.1	0.153	<0.003	[illegible]	6.78	-
Oct-01	0.4	20.8	130	465	8	<0.1	<0.116	<0.171	<0.042	7.44	-
Jan-02	1.8	34.7	249	880	<6	<0.005	2.15	<0.171	[illegible]	6.88	-
Apr-02	1.9	36	310	860	5.9	0.011	0.2	<0.001	[illegible]	6.9	-
Jul-02	1.8	-	250	840	7	0.005	1	<0.002	[illegible]	7.01	11.55
Oct-02	1.8	19	210	820	7.9	0.005	4.2	<0.002	[illegible]	6.98	-
Ave	6.9	24.7	219.1	845.5	11.4	6.2	1.0	0.013	0.6		
Max	77	60.2	688	1540	38.4	86.4	4.2	<0.171	1.5		
Class I GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.0075	0.15	6.5-9.0	
Class II GQS (mg/L)	NS	200	400	1200	NS	0.1	5	0.1	10	6.5-9.0	

Concentrations in mg/L.
Bold and Shaded = Exceeds Class I Groundwater Quality Standard (GQS)
Class I and Class II Groundwater Quality Standards (Title 35, Part 620, Subpart D)
NA=Not Available
NS=No Standard established by IEPA

APPENDIX G

GEOTECHNICAL EVALUATION OF BORROW SOURCE

MEMORANDUM

DATE: February 28, 2003

TO: Blayne Kirsch, P.E., P.G.

FROM: Gary Goodheart, P.E.

SUBJECT: Geotechnical Evaluation of Proposed Cover Materials
Supply Side Landfill
Versar Project No. 110684.0006.001

This memorandum summarizes Versar's geotechnical evaluation of proposed borrow material available from the Veteran's Administration (VA) site for use as cover material for Supply Side Landfill at Naval Training Center Great Lakes (NTC). This evaluation has been conducted n accordance with Versar Proposal No. Q03-5188, dated January 24, 2003, and authorized by NTC Contract Modification No. P00004, dated February 5, 2003.

BACKGROUND INFORMATION

Versar has been engaged by NTC to perform a Final Cover Study for the Supply Side Landfill at NTC. As a result of the project meeting on December 23, 2002, we understand there may be up to 55,000 cubic yards of silty clay material and top soil available at NTC for use as final cover or for general grading for Supply Side and Forrestal Landfills.

NTC provided Versar technical specifications for the construction of Multiple Recruit Barracks and Infrastructure at the former VA golf course (Site). Versar reviewed the Foundation Engineering Report (prepared by others) which characterizes subsurface conditions at the Site. The geotechnical borings taken across the Site identify the presence of a glacial till (below the topsoil/fill layer) that ranges approximately 9 to 23 feet below existing ground surface. The glacial till material is described as brown to gray very fine sandy clayey silt or silty clay with traces of coarse sand and small gravel.

FIELD OBSERVATIONS AND SAMPLING

Versar conducted a Site visit on February 6, 2003 to observe field conditions and to identify sampling locations prior to conducting field sampling at potential borrow locations at the recruit barracks construction site. Part of the top soil had been stripped off and stockpiled on site. The

majority of current excavation activity consists of underground utility construction. Limited excavation has also occurred at the Site, including construction of a retention pond and some of the building pads. Versar observed that gray clay (presumably excavated from the retention pond) was used as fill under the proposed building slabs. No large stockpiles of clay soils were observed at the Site.

A second proposed borrow source consists of a half-mile long water line trench located north of Buckley Road. The water line trench "zig-zags" around several existing facilities and crosses under several paved parking areas; subsurface conditions likely vary along the utiltiy alignment. No excavation activities were occurring at the time of Versar's site visit.

On February 7, Versar conducted field sampling at the primary borrow site at four locations as indicated on attached Figure 1. Field observations are documented on photos included as Appendix A. Samples were collected from existing stock piles (Locations 1 and 2), and test pits excavated to approximately 10 feet deep (Locations 3 and 4). The test pits revealed silty clay to clay soils, consistent with the previous soil boring logs. In general, a layer of brown clay is underlain by gray clay to the maximum depth investigated. Samples of brown clay were collected from Location 1 and Location 4, gray clay from Location 2, and a mixed brown and gray clay from Location 3. The soil samples were submitted to Great Lakes Soil & Environmental Consultants, Inc. for geotechnical testing.

GEOTECHNICAL TEST RESULTS

The laboratory testing program consisted of Atterberg limits, grain size analysis, standard Proctor, and hydraulic conductivity. The tests were performed on bulk disturbed samples. Soils were re-molded to 95 percent standard Proctor density for the hydraulic conductivity tests. Geotechnical testing results are summarized in Table 1. Complete geotechnical test reports are presented in Appendix B.

Soils data indicates that all three materials are similar, and contain in excess of 70 percent fines (silts and clays). The brown and gray material had a higher fraction of silt. Laborartory permeabilities (hydraulic conductivities) ranged from 1.3×10^{-8} cm/sec to 1.8×10^{-7} cm/sec.

CONCLUSIONS AND RECOMMENDATIONS

Based on Versar's visual inspection, geotechnical analysis, and review of available subsurface information, it is anticipated that all silty clay materials from the potential borrow source area (Recruit Barracks construction site) will meet the technical requirements for landfill cover material.

We understand these materials will be excavated and stock piled at a location west of the warehouses on the north side of Supply Side Landfill.

Versar recommends that periodic inspections be conducted as the excavations proceed at both the primary and secondary borrow source areas. Additional geotechnical testing should be conducted if subsequent excavations encounter materials other than as described herein to evaluate whether those materials are suitable for landfill cover. Versar recommends that proposed cover material also be tested for chemical analysis prior to its use.

TABLE 1
Geotechnical Test Results
Recruit Barracks Construction Site

			% Fines							
Sample	Description	% Sands & Gravels	% Silt	% Clay	LL	PL	PI	Max. Dry Density (pcf)	Optimum Moisture (%)	Permeability (cm/sec)
Loc-1	Brown clay	14.6	32.7	52.7	35	16	19	102.3	19.9	9.00E-08
Loc-2	Gray sandy clay	30.7	26.7	42.6	26	13	13	117.3	16	1.80E-07
Loc-3	Brown & gray clay w/ sand	24.4	36.9	38.7	25	14	11	114.5	16.7	1.30E-08
Loc-4	Brown clay w/ sand	29.5	22.9	47.6	38	18	20	101	21.7	

APPENDIX A

Appendix A. Pictures Taken at the Recruit Barracks Construction Site

Fig. 1 Ongoing construction at the Site

Fig. 2 Ongoing construction at the Site

Fig. 3 Soil stockpiled at Location 1

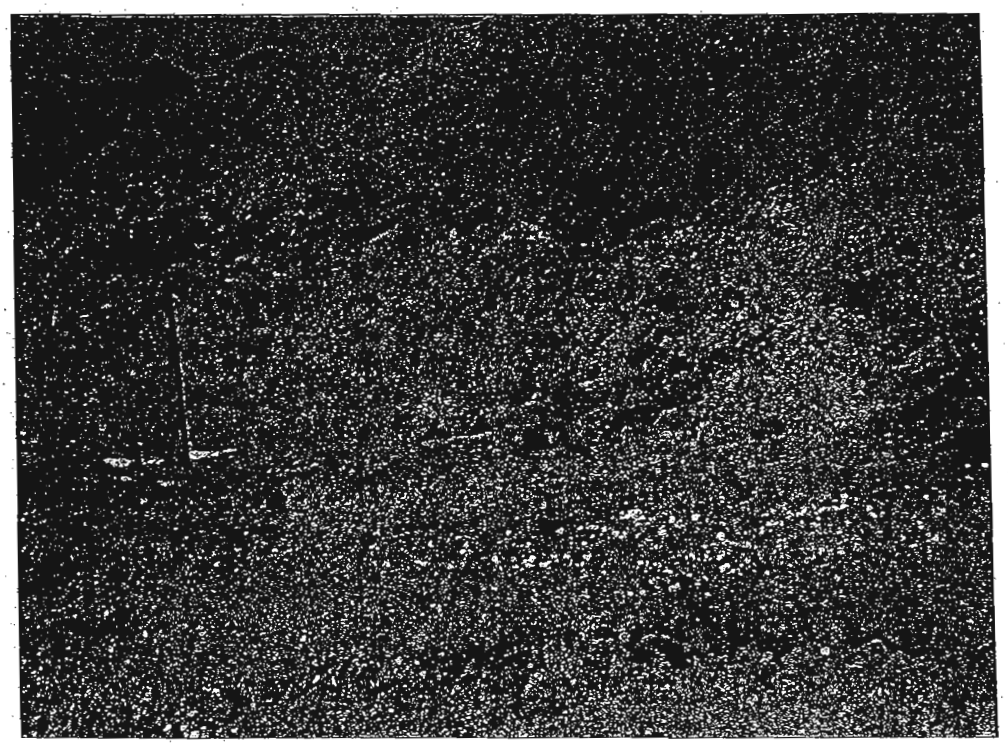


Fig. 4 Soil stockpiled at Location 2

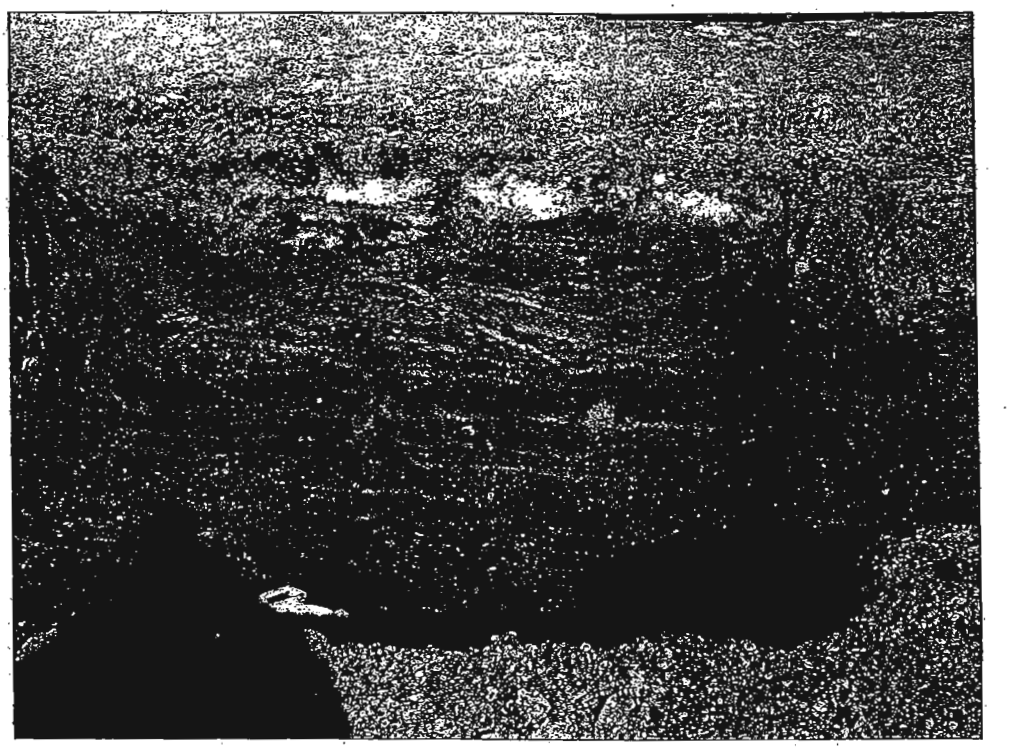


Fig. 5 Mixed soils at location 3 (test pit)

Fig. 6 Soil at Location 4 (test pit)

APPENDIX B

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File #	2555	**Date Tested**	2/25/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	Loc-1	Date Recd. 2/7/03	**Location**	#1			
Sample Description	Brown silty clay						

Specimen Data

Initial

Diameter:	9.90	cm	Area, A:	77.0	sq cm
Height, L:	5.14	cm	Volume, V:	395.7	cu cm
Mass of Sample:	784.8	g	**Moisture Content:**	11.0	%
			Wet Density	123.8	pcf
			Dry Density	111.5	pcf

Final

Diameter:	9.97	cm	Area, A:	78.1	sq cm
Height, L:	5.03	cm	Volume, V:	392.7	cu cm
Mass of Sample:	798.50	g	**Moisture Content:**	17.7	%
			Wet Density	126.9	pcf
			Dry Density	107.8	pcf
			Deg of Saturation	82.2	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	77.2	psi
Gradient:	30.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
2/25/2003	10:30 AM	0	0	3.38	5.48		20.0	---
2/25/2003	11:14 AM	2640	2640	4.00	4.80	0.9	20.0	1.04E-07
2/25/2003	11:50 AM	2160	4800	4.43	4.36	1.0	20.0	8.64E-08
2/25/2003	12:20 PM	1800	6600	4.78	3.99	0.9	20.0	9.04E-08
2/25/2003	12:40 PM	1200	7800	4.99	3.78	1.0	20.0	7.91E-08

Average Permeability = **9.0E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File #	2555	**Date Tested**	2/25/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	Loc-2	Date Recd.	2/7/03	**Location**	#2		
Sample Description	Gray silty clay with traces of gravel						

Specimen Data

Initial

Diameter:	10.16	cm	Area, A:	81.1	sq cm
Height, L:	5.15	cm	Volume, V:	417.5	cu cm
Mass of Sample:	869.4	g	**Moisture Content:**	11.0	%
			Wet Density	129.9	pcf
			Dry Density	117.1	pcf

Final

Diameter:	10.24	cm	Area, A:	82.4	sq cm
Height, L:	5.10	cm	Volume, V:	420.0	cu cm
Mass of Sample:	880.00	g	**Moisture Content:**	17.2	%
			Wet Density	130.7	pcf
			Dry Density	111.5	pcf
			Deg of Saturation	88.0	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	77.2	psi
Gradient:	30.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
2/25/2003	10:31 AM	0	0	3.64	4.82		20.0	---
2/25/2003	11:14 AM	2580	2580	4.80	3.64	1.0	20.0	1.88E-07
2/25/2003	11:50 AM	2160	4740	5.68	2.79	1.0	20.0	1.78E-07
2/25/2003	12:20 PM	1800	6540	6.34	2.12	1.0	20.0	1.82E-07
2/25/2003	12:40 PM	1200	7740	6.71	1.76	1.0	20.0	1.55E-07

Average Permeability = **1.8E-07** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File #	2555	**Date Tested**	2/25/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	Loc-3	Date Recd.	2/7/03	**Location**	#3		
Sample Description	Brown & Gray silty clay						

Specimen Data

Initial

Diameter:	10.16	cm	Area, A:	81.1	sq cm
Height, L:	5.24	cm	Volume, V:	424.8	cu cm
Mass of Sample:	854.5	g	**Moisture Content:**	**11.0**	**%**
			Wet Density	**125.5**	**pcf**
			Dry Density	**113.1**	**pcf**

Final

Diameter:	10.18	cm	Area, A:	81.4	sq cm
Height, L:	5.26	cm	Volume, V:	428.1	cu cm
Mass of Sample:	875.50	g	**Moisture Content:**	**21.5**	**%**
			Wet Density	**127.6**	**pcf**
			Dry Density	**105.0**	**pcf**
			Deg of Saturation	**93.4**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	77.2	psi
Gradient:	29.5	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
2/25/2003	10:39 AM	0	0	2.92	5.75		20.0	---
2/25/2003	11:14 AM	2100	2100	3.00	5.65	0.8	20.0	1.77E-08
2/25/2003	11:50 AM	2160	4260	3.07	5.58	1.0	20.0	1.21E-08
2/25/2003	12:20 PM	1800	6060	3.12	5.53	1.0	20.0	1.04E-08
2/25/2003	12:40 PM	1200	7260	3.16	5.49	1.0	20.0	1.26E-08

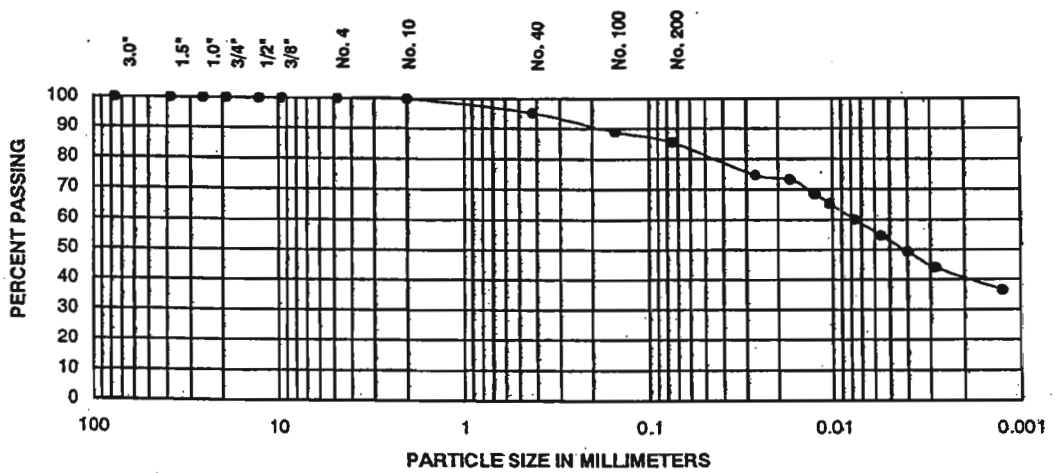
Average Permeability = **1.3E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	Sample #	Loc-1	Date Tested	2/14/2003	Tested by	NP
						Qc by	SB

Date Sample Received:	2/7/2003
Sample Location	#1
Sample Description	Brown silty clay



			Fines	
% + 3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	14.6	32.7	52.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	100.0
3/8"	100.0
No. 4	100.0
No. 10	99.9
No. 40	95.2
No. 100	88.9
No. 200	85.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
35	16	19

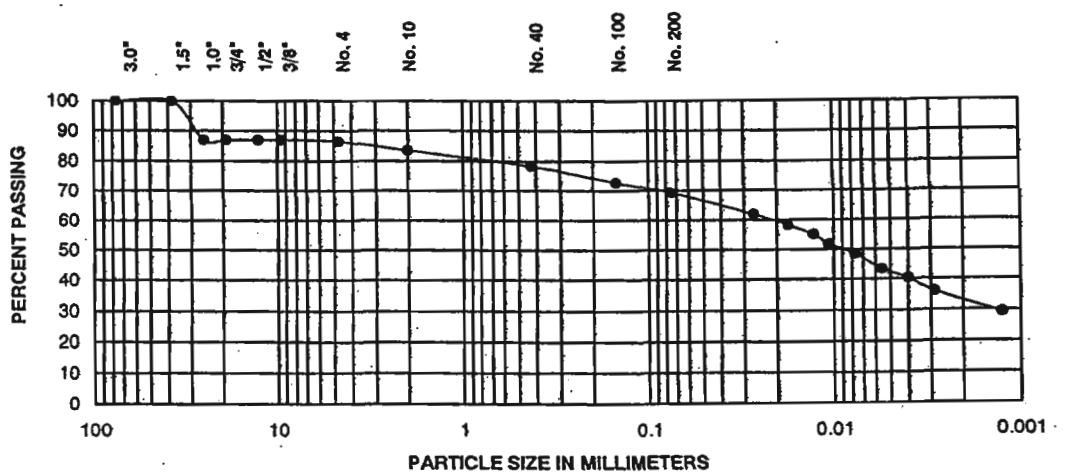
Soil Classification:	CL
Soil Description:	Lean clay
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	Sample #	Loc-2	Date Tested	2/14/2003	Tested by	NP
						Qc by	SB

Date Sample Received:	2/7/2003
Sample Location	#2
Sample Description	Gray silty clay with traces of gravel



			Fines	
% + 3"	% Gravel	% Sand	% Silt	% Clay
0.0	13.6	17.1	26.7	42.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	87.0
3/4"	87.0
1/2"	87.0
3/8"	87.0
No. 4	86.4
No. 10	83.5
No. 40	78.3
No. 100	72.6
No. 200	69.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
26	13	13

Soil Classification:	CL
Soil Description:	Sandy lean clay
System:	USCS

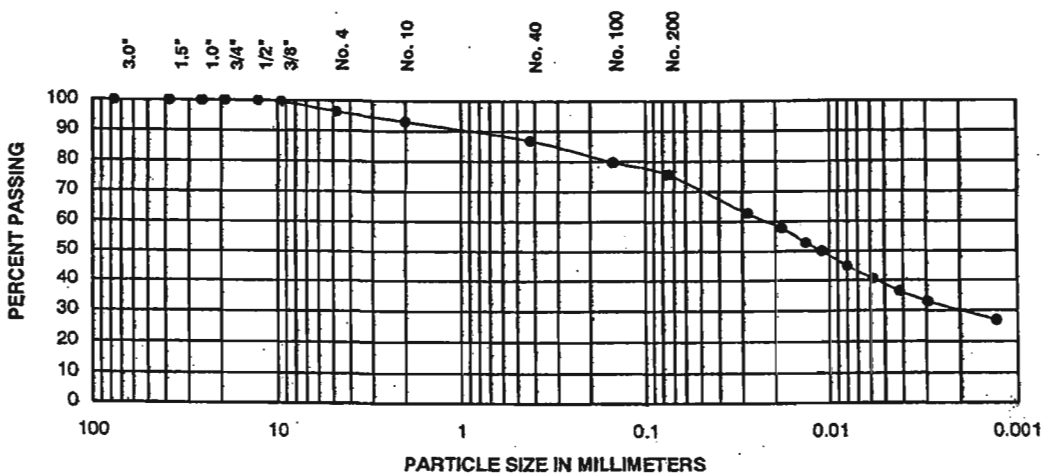
Remarks:

Quantity of Sample was not of required size.

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 · Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	Loc-3	**Date Tested**	2/14/2003	**Tested by**	NP
						Qc by	SB

Date Sample Received:	2/7/2003
Sample Location	#3
Sample Description	Brown & Gray silty clay with traces of Gravel



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	3.6	20.8	36.9	38.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	100.0
3/8"	99.6
No. 4	96.4
No. 10	93.2
No. 40	86.8
No. 100	79.6
No. 200	75.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
25	14	11

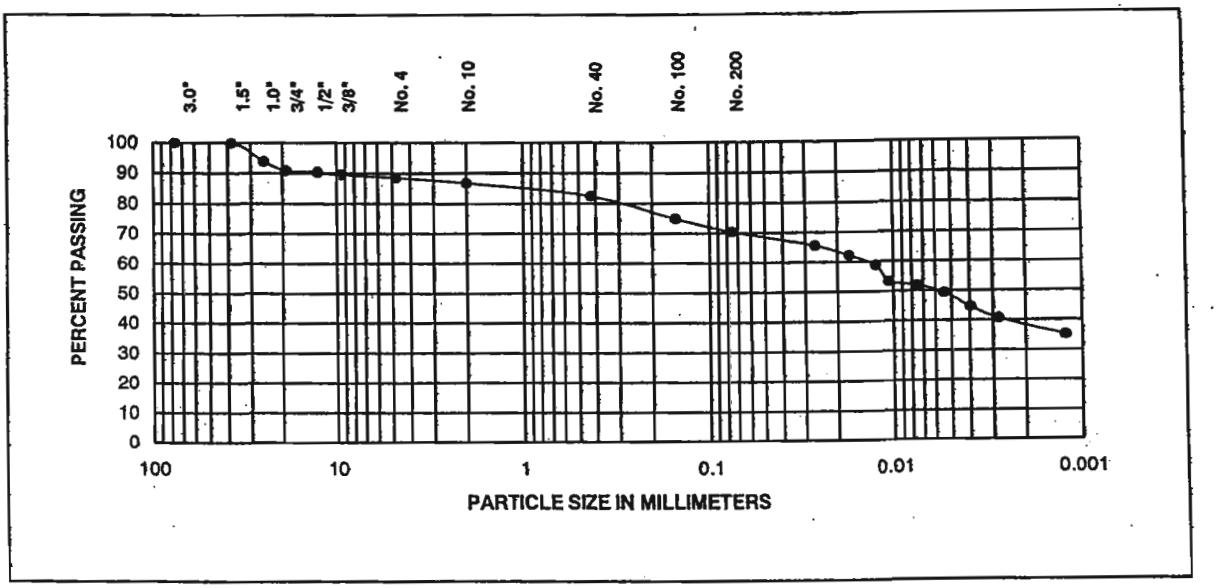
Soil Classification:	CL
Soil Description:	Lean clay with sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	Sample #	Loc-4	Date Tested	2/14/2003	Tested by	NP
						Qc by	SB

Date Sample Received:	2/7/2003
Sample Location	#4
Sample Description	Brown silty clay with traces of Gravel



			Fines	
% + 3"	% Gravel	% Sand	% Silt	% Clay
0.0	11.5	18.0	22.9	47.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	93.8
3/4"	90.9
1/2"	90.3
3/8"	89.5
No. 4	88.5
No. 10	86.8
No. 40	82.5
No. 100	74.8
No. 200	70.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
38	18	20

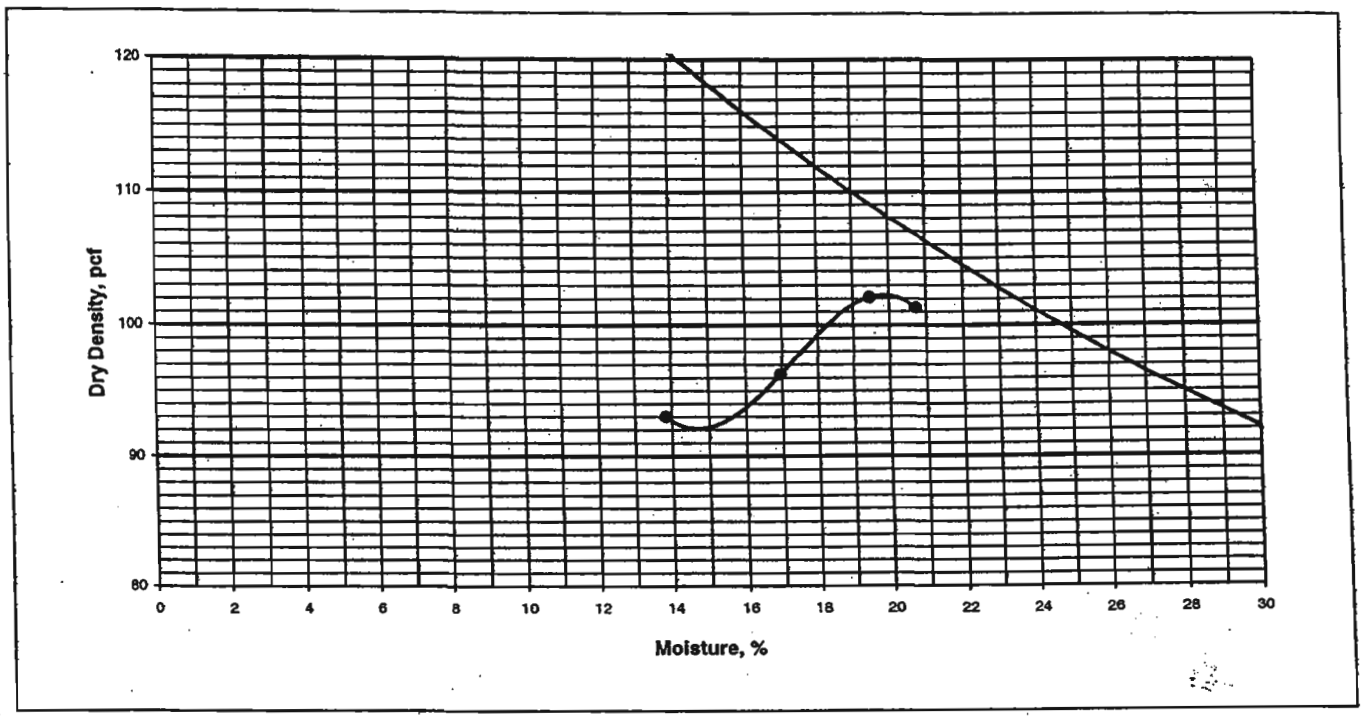
Soil Classification:	CL
Soil Description:	Lean clay with sand
System:	USCS

Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**MOISTURE - DENSITY RELATIONSHIP CURVE** **ASTM D698-91**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	Loc-1	**Date Tested**	2/11/2003	**Tested By**	MT
						Qc By	SB

Date Sample Recd.	2/7/03								
Sample Location	#1								
Sample Description	Brown silty clay								
Type of Proctor	Standard	**Method:**	A	**Mold Size, in.**	4	**Hammer Weight, lb.**	5.5	**Drop, in.**	12
No. of Layers	3	**No. of Blows per Layer**			25				



Zero Air Void Curve Specific Gravity: 2.65

Results

Maximum Dry Density, pcf	102.3	**Optimum Moisture Content, %**	19.9	**Natural Moisture Content, %**	15.7
Corrected Max. Dry Density, pcf		**Corrected Optimum Moisture Content, %**			

Remarks

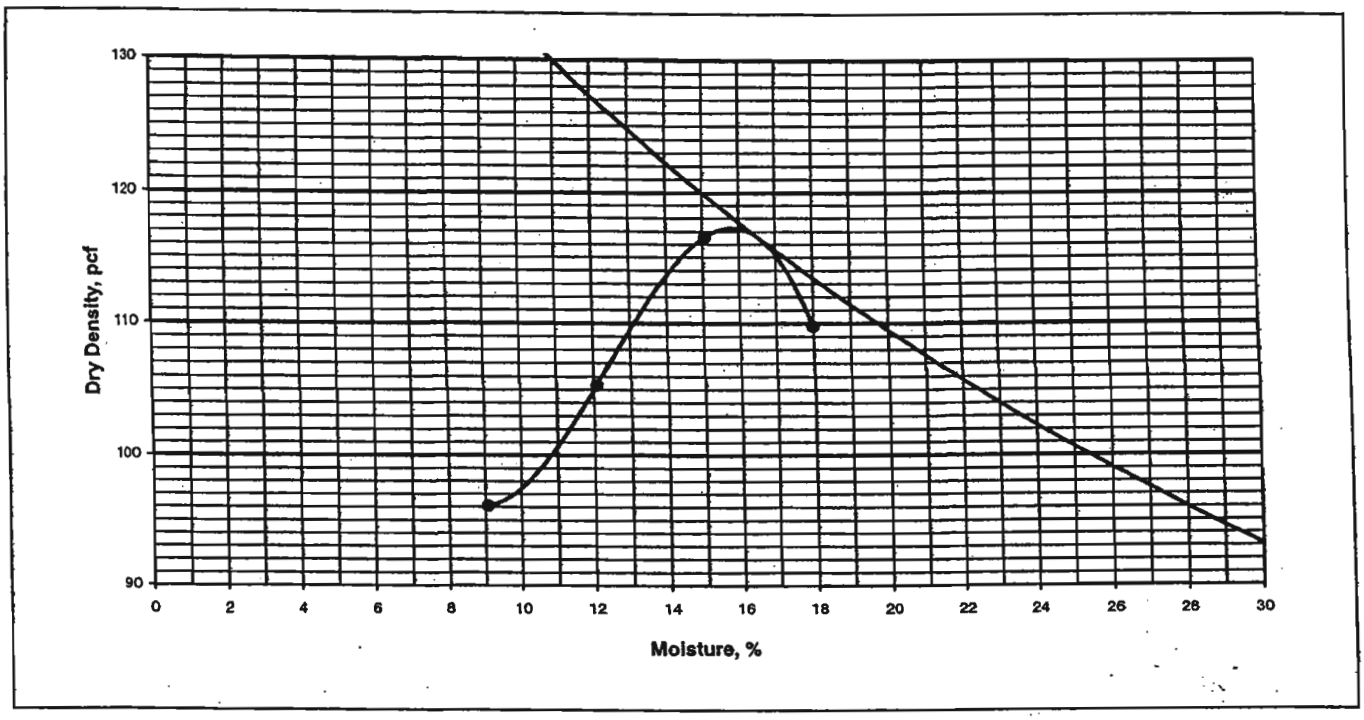
Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

MOISTURE - DENSITY RELATIONSHIP CURVE

ASTM D698-91

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	Loc-2	**Date Tested**	2/12/2003	**Tested By**	MT
						Qc By	SB

Date Sample Recd.	2/7/03								
Sample Location	#2								
Sample Description	Gray silty clay with traces of gravel								
Type of Proctor	Standard	**Method:**	A	**Mold Size, in.**	4	**Hammer Weight, lb.**	5.5	**Drop, in.**	12
No. of Layers	3	**No. of Blows per Layer**			25				



Zero Air Void Curve Specific Gravity: 2.70

Results

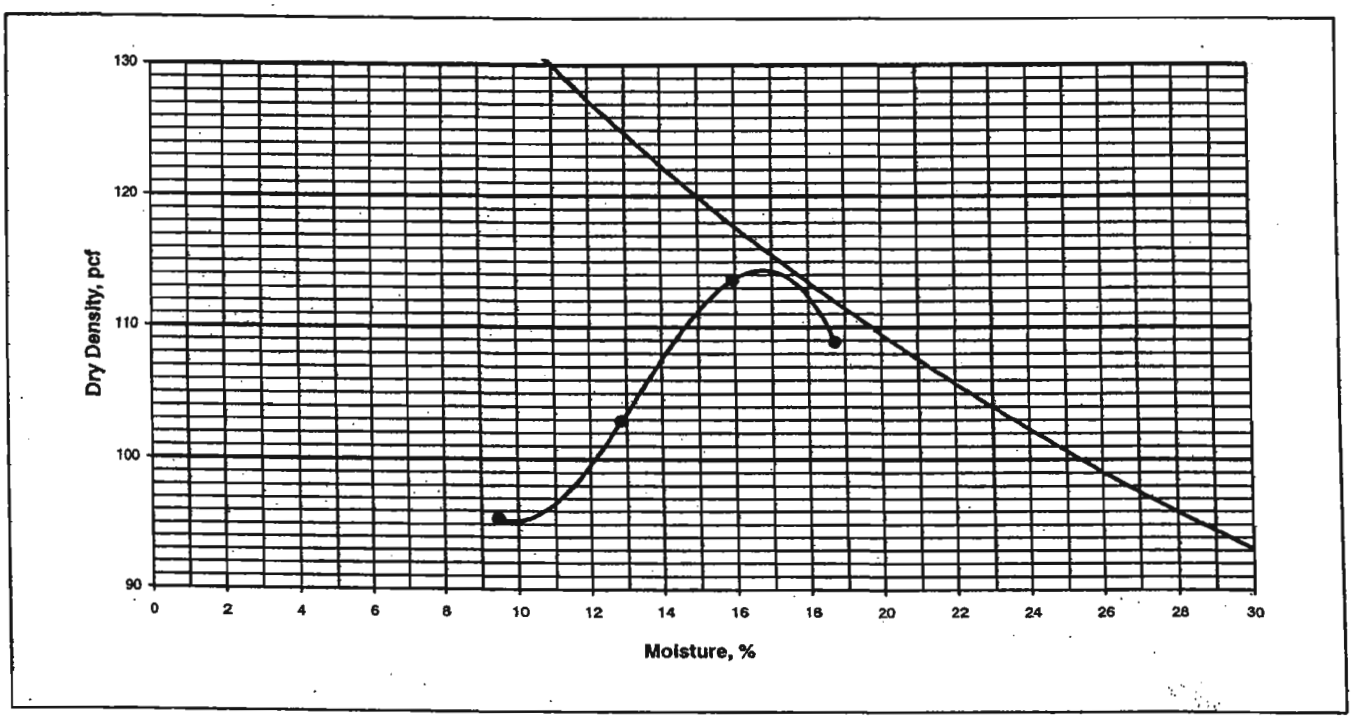
Maximum Dry Density, pcf	117.3	**Optimum Moisture Content, %**	16.0	**Natural Moisture Content, %**	4.7
Corrected Max. Dry Density, pcf		**Corrected Optimum Moisture Content, %**			

Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	MOISTURE - DENSITY RELATIONSHIP CURVE ASTM D698-91

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	Loc-3	**Date Tested**	2/11/2003	**Tested By**	MT
						Qc By	SB

Date Sample Recd.	2/7/03								
Sample Location	#3								
Sample Description	Brown & Gray silty clay with traces of Gravel								
Type of Proctor	Standard	**Method:**	A	**Mold Size, in.**	4	**Hammer Weight, lb.**	5.5	**Drop, in.**	12
No. of Layers	3	**No. of Blows per Layer**			25				



Zero Air Void Curve Specific Gravity: 2.70

Results

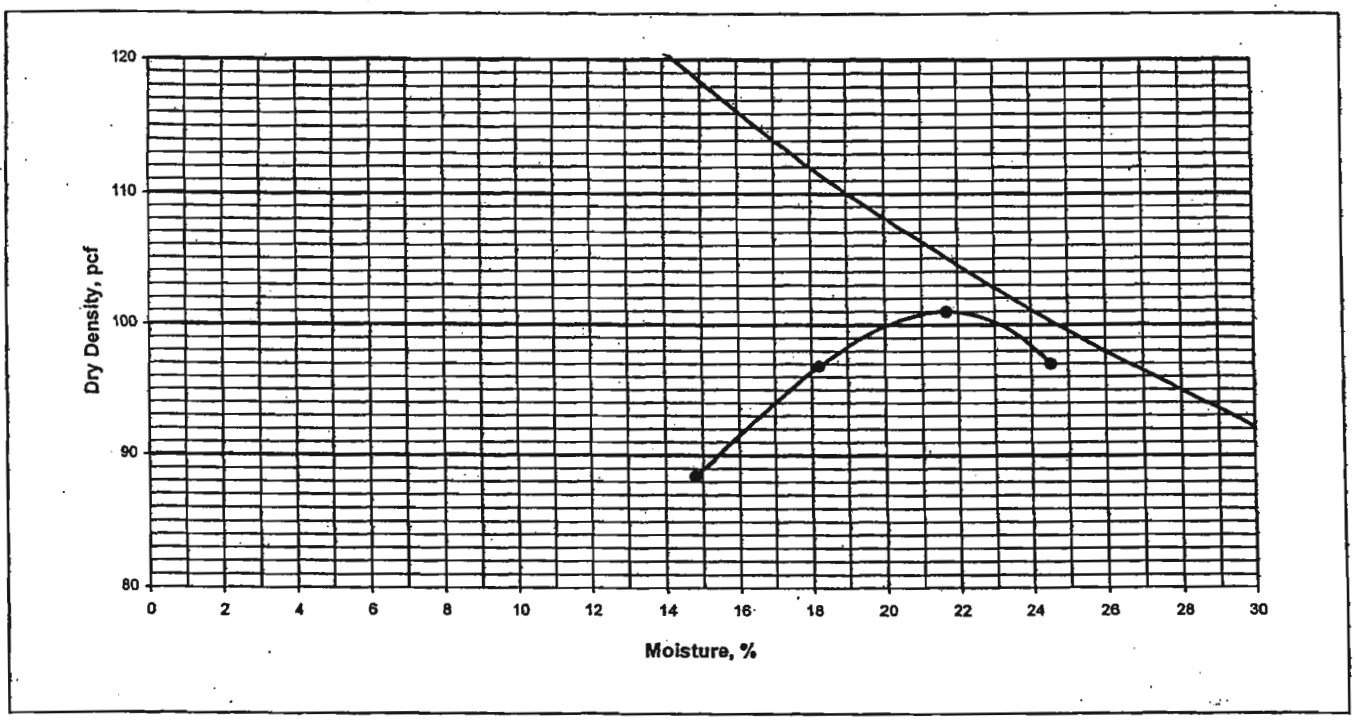
Maximum Dry Density, pcf	114.5	**Optimum Moisture Content, %**	16.7	**Natural Moisture Content, %**	15.8
Corrected Max. Dry Density, pcf		**Corrected Optimum Moisture Content, %**			

Remarks

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	MOISTURE - DENSITY RELATIONSHIP CURVE **ASTM D698-91**

Project	Supply Side Landfill						
Client	Versar, Inc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	2555	**Sample #**	Loc-4	**Date Tested**	2/14/2003	**Tested By**	MT
						Qc By	SB

Date Sample Recd.	2/7/03								
Sample Location	#4								
Sample Description	Brown silty clay with traces of Gravel								
Type of Proctor	Standard	**Method:**	A	**Mold Size, in.**	4	**Hammer Weight, lb.**	5.5	**Drop, in.**	12
No. of Layers	3	**No. of Blows per Layer**			25				



Zero Air Void Curve Specific Gravity: 2.65

Results

Maximum Dry Density, pcf	101.0	**Optimum Moisture Content, %**	21.7	**Natural Moisture Content, %**	18.5
Corrected Max. Dry Density, pcf		**Corrected Optimum Moisture Content, %**			

Remarks

APPENDIX H

HELP MODELING DATA

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                   USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:     C:\WMA\PROGRA~1\HELP3\P0730.D4
TEMPERATURE DATA FILE:       C:\WMA\PROGRA~1\HELP3\T0730.D7
SOLAR RADIATION DATA FILE:   C:\WMA\PROGRA~1\HELP3\S0730.D13
EVAPOTRANSPIRATION DATA:     C:\WMA\PROGRA~1\HELP3\E0730.D11
SOIL AND DESIGN DATA FILE:   C:\WMA\PROGRA~1\HELP3\ESD0729.D10
OUTPUT DATA FILE:            C:\WMA\PROGRA~1\HELP3\EO0730.OUT


TIME:  10:56     DATE:   7/30/2003


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     TITLE:  Existing Cap 0630

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 10

THICKNESS	=	12.00	INCHES
POROSITY	=	0.3980	VOL/VOL
FIELD CAPACITY	=	0.2440	VOL/VOL
WILTING POINT	=	0.1360	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2815	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.119999997000E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 1.80 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 13

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4300	VOL/VOL
FIELD CAPACITY	=	0.3210	VOL/VOL
WILTING POINT	=	0.2210	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4300	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.330000003000E-04	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #10 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 150. FEET.

SCS RUNOFF CURVE NUMBER	=	90.40	
FRACTION OF AREA ALLOWING RUNOFF	=	70.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	11.000	ACRES
EVAPORATIVE ZONE DEPTH	=	6.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.914	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	2.388	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.816	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	13.698	INCHES
TOTAL INITIAL WATER	=	13.698	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM CHICAGO ILLINOIS

STATION LATITUDE	=	41.78	DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00	
START OF GROWING SEASON (JULIAN DATE)	=	117	
END OF GROWING SEASON (JULIAN DATE)	=	290	
EVAPORATIVE ZONE DEPTH	=	6.0	INCHES

AVERAGE ANNUAL WIND SPEED = 10.30 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 71.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 65.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 70.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 72.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHICAGO ILLINOIS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.60	1.31	2.59	3.66	3.15	4.08
3.63	3.53	3.35	2.28	2.06	2.10

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHICAGO ILLINOIS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHICAGO ILLINOIS
AND STATION LATITUDE = 41.78 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.47	1.46	2.39	3.26	3.34	4.22
	3.43	3.42	3.11	2.19	2.10	2.22
STD. DEVIATIONS	0.68	0.71	1.18	1.52	1.65	2.14
	1.83	1.76	1.76	1.22	1.06	0.97
RUNOFF						
TOTALS	0.278	0.967	1.615	0.337	0.131	0.284
	0.277	0.304	0.219	0.066	0.060	0.172
STD. DEVIATIONS	0.418	0.721	1.209	0.419	0.277	0.382
	0.363	0.293	0.265	0.099	0.092	0.251
EVAPOTRANSPIRATION						
TOTALS	0.539	0.449	0.768	2.370	2.497	2.764
	2.371	2.219	1.801	1.376	1.080	0.625
STD. DEVIATIONS	0.121	0.087	0.426	0.857	0.961	0.994
	0.962	1.031	0.818	0.677	0.294	0.198

PERCOLATION/LEAKAGE THROUGH LAYER 2

TOTALS	0.0243	0.1738	1.2234	1.0722	0.7083	1.0809
	0.9011	0.9136	1.0481	0.6808	0.8732	0.3418
STD. DEVIATIONS	0.0720	0.2329	0.5173	0.8367	0.7952	0.8207
	0.7418	0.7323	0.9264	0.7041	0.7712	0.4510

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

AVERAGES	0.0007	0.0049	0.0547	0.0416	0.0197	0.0384
	0.0288	0.0309	0.0301	0.0184	0.0224	0.0082
STD. DEVIATIONS	0.0019	0.0066	0.0285	0.0338	0.0236	0.0454
	0.0392	0.0314	0.0343	0.0214	0.0182	0.0119

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	32.60	(5.565)	1301585.0	100.00
RUNOFF	4.710	(1.7412)	188074.55	14.450
EVAPOTRANSPIRATION	18.859	(3.1609)	753021.19	57.854
PERCOLATION/LEAKAGE THROUGH	9.04141	(2.21536)	361023.656	27.73723

LAYER 2

AVERAGE HEAD ON TOP OF LAYER 2	0.025	(0.008)		
CHANGE IN WATER STORAGE	-0.013	(1.3083)	-534.60	-0.041

****

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	4.09	163313.703
RUNOFF	1.475	58883.5469
PERCOLATION/LEAKAGE THROUGH LAYER 2	1.334315	53279.18750
AVERAGE HEAD ON TOP OF LAYER 2	4.529	
SNOW WATER	4.86	194148.0780

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3980
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1360

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	2.6596	0.2216
2	10.3200	0.4300
SNOW WATER	0.316	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                   USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:      C:\WMA\PROGRA~1\HELP3\P0630.D4
TEMPERATURE DATA FILE:        C:\WMA\PROGRA~1\HELP3\T0630.D7
SOLAR RADIATION DATA FILE:    C:\WMA\PROGRA~1\HELP3\S0630.D13
EVAPOTRANSPIRATION DATA:      C:\WMA\PROGRA~1\HELP3\E0630.D11
SOIL AND DESIGN DATA FILE:    C:\WMA\PROGRA~1\HELP3\SD0630.D10
OUTPUT DATA FILE:             C:\WMA\PROGRA~1\HELP3\O0630.OUT


TIME:   9: 7     DATE:   6/30/2003


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     TITLE:  New Cap 063003

******************************************************************************
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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 10

THICKNESS	=	6.00	INCHES
POROSITY	=	0.3980	VOL/VOL
FIELD CAPACITY	=	0.2440	VOL/VOL
WILTING POINT	=	0.1360	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3931	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.119999997000E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 1.80 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #10 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 4.% AND A SLOPE LENGTH OF 520. FEET.

SCS RUNOFF CURVE NUMBER	=	80.10	
FRACTION OF AREA ALLOWING RUNOFF	=	95.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	11.000	ACRES
EVAPORATIVE ZONE DEPTH	=	6.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	2.359	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	2.388	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.816	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	10.045	INCHES
TOTAL INITIAL WATER	=	10.045	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM CHICAGO ILLINOIS

STATION LATITUDE	=	41.78	DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00	
START OF GROWING SEASON (JULIAN DATE)	=	117	
END OF GROWING SEASON (JULIAN DATE)	=	290	
EVAPORATIVE ZONE DEPTH	=	6.0	INCHES

AVERAGE ANNUAL WIND SPEED = 10.30 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 71.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 65.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 70.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 72.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHICAGO ILLINOIS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.60	1.31	2.59	3.66	3.15	4.08
3.63	3.53	3.35	2.28	2.06	2.10

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHICAGO ILLINOIS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHICAGO ILLINOIS
AND STATION LATITUDE = 41.78 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.47	1.46	2.39	3.26	3.34	4.22
	3.43	3.42	3.11	2.19	2.10	2.22
STD. DEVIATIONS	0.68	0.71	1.18	1.52	1.65	2.14
	1.83	1.76	1.76	1.22	1.06	0.97
RUNOFF						
TOTALS	0.436	1.359	2.209	0.869	0.278	0.492
	0.431	0.474	0.521	0.360	0.498	0.558
STD. DEVIATIONS	0.543	0.969	1.649	0.961	0.803	0.917
	0.820	0.565	0.759	0.542	0.690	0.566
EVAPOTRANSPIRATION						
TOTALS	0.539	0.449	0.839	3.048	3.126	3.435
	3.199	2.912	2.278	1.698	1.110	0.645
STD. DEVIATIONS	0.120	0.087	0.500	0.773	1.137	1.259
	1.346	1.419	1.084	0.645	0.330	0.197

PERCOLATION/LEAKAGE THROUGH LAYER 2

TOTALS	0.0961	0.0600	0.1001	0.0900	0.0535	0.0561
	0.0433	0.0355	0.0509	0.0817	0.0897	0.1043
STD. DEVIATIONS	0.0336	0.0331	0.0238	0.0304	0.0253	0.0257
	0.0240	0.0269	0.0348	0.0396	0.0451	0.0399

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

AVERAGES	0.5209	0.2158	1.2151	2.1888	0.9637	1.0699
	0.7916	0.7642	1.2326	1.9423	2.6907	2.3214
STD. DEVIATIONS	0.4371	0.2819	0.7565	1.2626	0.8445	0.6277
	0.5796	0.6446	1.0636	1.4541	1.7095	1.2328

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	32.60	(5.565)	1301585.0	100.00
RUNOFF	8.486	(3.2452)	338830.47	26.032
EVAPOTRANSPIRATION	23.279	(3.8095)	929519.25	71.414
PERCOLATION/LEAKAGE THROUGH	0.86113	(0.15376)	34384.961	2.64178

LAYER 2

AVERAGE HEAD ON TOP OF LAYER 2	1.326 (	0.310)		
CHANGE IN WATER STORAGE	-0.029	(1.3881)	-1149.75	-0.088

****

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	4.09	163313.703
RUNOFF	2.790	111395.8670
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.004535	181.09744
AVERAGE HEAD ON TOP OF LAYER 2	6.000	
SNOW WATER	4.86	194148.0780

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3980
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1360

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.1785	0.1964
2	7.6860	0.4270
SNOW WATER	0.316	

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APPENDIX I

EROSION CONTROL PLAN

SUPPLY SIDE LANDFILL
EROSION CONTROL AND VEGETATION PLAN

1.0 EROSION CONTROL AND VEGETATION PLAN

This narrative presents the erosion control and vegetation plan for the regrading and cover application activities at the Supply Side Landfill. The plan addresses short-term and long-term erosion controls, and surface water management plans for the landfill.

1.1 Long-Term Erosion Control and Surface Water Management Measures

The upper layer of the cover system will be a 6-inch thick layer of soil capable of supporting vegetative growth. The vegetation shall be a typical seed mixture, appropriate for the area, consisting of bluegrass and fescue as indicated in the project specifications.

Disturbed portions of the site where construction activities permanently cease will be stabilized no later than 14 days after the last construction activity. The seed will be applied to the disturbed areas via a hydroseed application with fertilizer and mulch. A coconut fiber or straw erosion control blanket will be applied to steeper sideslope areas.

In addition to the vegetated surface, the regrading contoured landform is planned in such a way as to minimize erosion and provide surface water management. The extent of steep sideslope areas have been minimized and the vast majority of the landfill area (i.e., top slope area) will be at a very gradual slope. Surface water runoff resulting from precipitation over the vast majority of the site area will be sheet flow. Even though the slope is relatively short, the addition of a bench has been incorporated into the west and south steeper sideslope area to break-up the surface water flow down this slope.

Existing drainage ways located at the south and east perimeter of the landfill will collect and convey runoff from the site. Runoff to the west will be directed to an existing natural drainage collection

area, while runoff to the north from a very small contributing side slope area will be directed to existing vacant land and driveway area.

Erosion control measures such as straw bales, silt fence, or other features will be utilized as necessary.

1.2 Short-Term Erosion Control Measures

Prior to development activity, silt fencing will be installed along all downslope sections of the limits of construction disturbance to prevent sediment from leaving the site. In addition, erosion control measures such as straw bales, silt fence, diversions, or other features will be utilized where necessary to prevent sediment from leaving the site (Drawing 8).

APPENDIX J

MATERIAL SPECIFICATIONS

MATERIAL AND PLACEMENT SPECIFICATIONS FOR FINAL COVER SYSTEM
SUPPLY SIDE LANDFILL
NAVAL STATION GREAT LAKES
GREAT LAKES, IL

GENERAL FILL FOR PANHANDLE AREA: Soil obtained from on-site sources, and off- site sources if necessary. The soil obtained should be free of organic material and other debris such as waste, cinders, glass etc. Maximum particle dimension should be 3 inches.

SUBGRADE & SITE REGRADING: The subgrade shall be capable of supporting the construction of the cover system without excessive deformation and shall be stable under the loading applied by the filling operations. Grade to lines and grades shown on the Drawings. Finish grade should have a gentle slope and ensure free drainage as shown on Drawings.

COMPACTED LOW PERMEABILITY FINAL COVER SOIL: Place a minimum of 18 inches of cover material. The low permeability final cover soil shall meet the following specifications:

A. The soil shall be free of organic material and other debris. No frozen material.
B. Maximum particle size shall be 4 inches.
C. Prior to placement of first lift of soil, ensure vegetation and debris has been removed from the surface and the work area has been scarified and ready for low permeability soil placement.
D. Compaction and remolding of soils shall be performed using a sheep foot compactor with compactor feet at least as long as the compacted lift thickness to facilitate bonding between lifts. Additionally, prior to the placement of a successive lift, the surface of the constructed liner shall be prepared by scarifying to facilitate bonding between lifts. The constructed cover shall have a maximum permeability of $1x10^{-7}$ cm/sec.
E. Areas not meeting the specified requirements, such as density or moisture content tests that do not fall within the acceptable zone, and areas which have become too wet due to precipitation shall be scarified and reworked and replaced.
F. Place cover soils such that percent compaction and moisture content are within the acceptable zone.
G. When construction joints in the low permeable final cover are necessary, "stepping" or "keying" the segments of the layer together will be required. All vertical soil joints shall be kept to a minimum.
H. Grade to lines and grades shown on the Drawings.

VEGETATIVE FINAL COVER SOIL: Place a minimum of 6 inches of soil capable of supporting vegetative growth. Do not compact the topsoil during placement. Grade to lines and grades shown on the Drawings ensuring free drainage.

SEEDING: Seeding should not be done prior to application of vegetative soil. Do not seed on saturated or frozen soil. Seeding shall be accomplished via a hydroseed application. Seed mix shall consist of 20 lbs/acre of bluegrass and 20 lbs/acre of fescue. Hydroseed application of seed shall be accompanied by fertilizer and mulch.

GEOTEXTILE: Provide a non-woven product comprised of polyester or polypropylene.

Geotextile shall have a nominal mass per unit area of 8 oz/sy. Meet ASTM D-5261.

ROAD AGGREGATE: Place a minimum 12" thick layer of a clean round or crushed coarse aggregate to build the road surface. Placement shall be accomplished in one lift. Check the sub grade for soundness, grade, and cross-section. Construct crushed aggregate road to the lines and grades shown in the Drawings.

GAS SYSTEM COMPONENTS:

HDPE PIPE: HDPE SDR 17 Pipe and HDPE SDR 11 Fittings shall be used for the gas system trench piping. Meet ASTM D-3350. The HDPE perforated pipe sections shall be installed with the perforated face down. The pipe shall be perforated with approximately 3/8" diameter holes spaced 45 degrees apart for ½ of the pipe circumference.

PVC PIPE: PVC Schedule 80 Pipe and Fittings shall be used for all gas system trench risers. Meet ASTM D-1784. PVC Bell End Pipe shall be used.

FLEXIBLE MEMBRANE LINER: Provide a flexible membrane liner comprised of LLDPE, HDPE, or equivalent. Membrane liner shall have a nominal thickness of 40 mils. Meet ASTM D-5199. Overlap at seams a minimum of 18"; welding of seams is not required.

CMP CASING: Provide corrugated metal pipe (CMP) casing for all gas system pipe casings under roadway crossings. The CMP shall be constructed of 12 gauge steel with a diameter of 12".

OTHER SYSTEM COMPONENTS: Refer to construction drawings for further detail and specifications pertaining to other system components.

SURVEY CONTROL: Record surveys of top of each layer of final cover system, including top of regraded existing surface. Provide an as-built verification survey for the following layers within five working days after construction of the layer has been completed:

a. Regraded existing surface,
b. Top of compacted low permeability soil layer, and
c. Top of vegetative soil layer.

APPENDIX K

MATERIAL QUANTITY CALCULATIONS

Table K-1
Construction Materials Calculations
Supply Side Landfill
Naval Station Great Lakes
Great Lakes, IL

Description	Estimated Quantity	Unit
Regrading Area	14.6	acres
Regrade Existing Surface (Fill Volume)	31,000	cy
Regrade Existing Surface (Cut Volume)*	34,500	cy
Panhandle Area (Fill Volume)	5,500	cy
Compacted Low Permeability Soil	35,400	cy
Vegetative Soil	11,800	cy
Gas Collection Trenches	2,500	LF
Gravel Filled Bore Holes	450	LF
Corrugated Metal Pipe Casing	260	LF
Road Surfaces	926	cy

Notes:

* Includes 5,700 cy cut volume from panhandle area.

APPENDIX L

CONSTRUCTION QUALITY ASSURANCE MANUAL

CONSTRUCTION QUALITY ASSURANCE MANUAL
SUPPLY SIDE LANDFILL
NAVAL STATION GREAT LAKES
GREAT LAKES, IL

1.0 INTRODUCTION

Development and construction of final cover improvement will be monitored in accordance with the requirements of the construction quality assurance (CQA) program described in the following sections. Performance of CQA activities will confirm that the construction is done in accordance with the design through random testing of materials, verification that materials meet design specifications, and documenting that specified construction procedures are followed.

2.0 PERSONNEL

Prior to initiation of construction activities, a CQA Officer will be designated. The CQA Officer will be a professional engineer registered in the State of Illinois, who is a person other than the operator or an employee of the operator, and who will supervise and be responsible for all inspection, testing, and other activities required to be implemented as a part of the CQA plan. The CQA Officer will also be responsible for, and will provide direct supervision to, a staff of engineers and/or engineering technician (inspectors) who will perform the testing, sampling, and inspection and testing of the construction/installation of all structures, as described more specifically in Sections 3, 4, 5, and 6 of this document. The CQA Officer must be present at the outset of major undertakings and at critical times during the construction. The time that the CQA Officer must be at the landfill will be dependent upon the type of construction being conducted. The CQA Officer must exercise his/her own professional judgment to be present at the landfill as required to assume full responsibility for the inspection and testing performed by those persons under his/her direct supervision. The CQA Officer's staff will be on-site full-time for all of the construction activities specified herein.

If the CQA Officer is unable to be present to perform duties as outlined, then the CQA Officer will provide, in writing, reasons for his/her absence and a designation of the person who will exercise professional judgment in carrying out duties as the designated CQA Officer-in-absentia. A signed statement will be provided and recorded that the CQA Officer assumes full responsibility for all inspections performed and reports prepared by the designated CQA Officer-in-absentia during any absence of CQA officer.

The operator may, at his/her discretion, appoint a separate CQA Officers for the construction of different facility components, for example, a different CQA Officer for installation of the geomembrane or a different CQA Officer for the construction of the gas management system.

3.0 INSPECTION ACTIVITIES

At a minimum, it is required that the CQA Officer, or his/her designated representative, be present to observe and document the following construction activities:

- Excavation and grading activities.
- Placement of final cover materials.

- Installation of gas control facilities.

4.0 PRECONSTRUCTION TESTING PROGRAM

Prior to the construction of a final cover system barrier, preconstruction testing shall be performed to evaluate the materials and confirm the adequacy of earthen materials from each on-site or off-site source area. Testing to confirm the adequacy of the low permeability cover materials shall be performed on each material from each source area. All tests shall be documented, and the materials shall be accepted or rejected by the CQA Officer, or his/her designated representative, based on the criteria specified in Table L-1 - Material Testing Requirements and Frequency.

4.1 Low Permeability Soil Cover Materials

Potential borrow sources for use in the cohesive soil cover will be tested and evaluated for suitability prior to construction. Materials shall be classified according to the Unified Soil Classification System.

After identifying cover sources, a family of moisture-density curves and permeabilities will be developed for use as a field reference. These data will be compiled from the laboratory test data and will correlate soil densities to permeabilities. By compiling these data, the need for continuous borrow source testing is reduced. The family of curves can be used as a reference to compare the field results to known changes in materials. If borrow materials change relative to the referenced family of curves and lab data, a sample of the new material will be sent to the laboratory for evaluation. New test results will be added to the family of data, thereby updating the reference curves. The appropriate testing criteria for cover acceptance are shown on Table L-1.

4.2 Landfill Gas Management System

The landfill gas management system design provides specifications for piping material. These materials may be substituted with other piping material which possesses properties meeting or exceeding the materials specified in the design. The CQA Officer, or his/her designated representative, shall ensure the piping material delivered to the facility have been conformance tested and certified by the manufacturer as meeting the manufacturer's specifications, and will obtain testing certifications from the manufacturer. The CQA Officer, or his/her designated representative, shall verify that the piping material and installation conforms to the design plans.

4.3 Geotextiles

As specified in Table L-1 - Material Testing Requirements, the CQA Officer, or his/her designated representative, shall verify that the geotextile property values meet the manufacturer's specifications, and that the geotextile and installation conforms to the design plans.

5.0 CONSTRUCTION SAMPLING PROGRAM AND TESTING REQUIREMENTS

5.1 General

Sampling and testing requirements for the various materials and activities have been summarized in Table L-1. Frequencies listed in Table L-1 are based on the volume of material used in construction and are to be considered minimums. Frequencies may be increased depending on the actual construction techniques implemented. The CQA Officer, or his/her designated representative, will exercise professional judgment to ensure that testing and sampling fairly represent construction.

5.2 Grade Verification Plan

Following regrading of the existing surface, a registered professional land surveyor will survey the complete surface to certify that actual elevations and grades are in accordance with the engineering plans. Elevations will be surveyed based on the grid points indicated on the Drawings. The documented grades will be included on construction documentation drawings.

5.3 Compacted Low Permeability Soil Sampling Requirements

Testing methods for the compacted low permeability soil liner are referenced in Table L-1. Frequency of testing is based on the volume of material incorporated. The CQA Officer, or his/her designated representative, will choose random test locations throughout the construction area.

5.3.1 Material Thickness Testing

Elevations will be surveyed at the construction control data points indicated on the Drawings for a given surface both before and after cover construction to verify thickness and to verify proper drainage slopes. To obtain the specified design thickness for a given cover layer, additional cover material will be placed and compacted in areas where the as-built thickness is less than the design thickness for the given cover layer.

5.3.2 Moisture/Density Testing

Moisture and density testing by nuclear methods will be conducted at a minimum frequency as stated in Table L-1. The range of moisture content will be determined in accordance with the "acceptable zone" method, which is discussed in Appendix L-1. A moisture test will be considered failed if the result indicates that the moisture content does not lie within the "acceptable zone". Failing material will be dried or wetted until satisfactory moisture content is achieved. A density test will be considered failed if the result indicates a dry density outside the "acceptable zone". The material will be compacted until a passing test is achieved. Increased testing frequency will be required when different soil types are used in cover construction. To ensure accuracy and reproducibility of testing, all density gauges will be certified by annual calibration.

5.3.3 Hydraulic Conductivity Testing

A sample will be obtained and tested for hydraulic conductivity at a minimum frequency as shown in Table L-1. Two samples may be collected at a given test location for the purpose of retesting in

the event of unacceptable hydraulic conductivity results from the initial sample. A test will be considered failed if the results indicate a hydraulic conductivity greater than 1.0×10^{-7} cm/sec. If the test for an area fails, the soil will be removed and/or recompacted and retested until a passing result is obtained.

5.4 Vegetative Cover Soil Layer

The upper surface of the compacted low permeability cover will be dimpled with a soil compactor or some other appropriate means to achieve binding with the overlaying vegetative soil layer. The thickness of the vegetative soil layer shall be documented by comparing the finished elevation of the compacted low permeability soil layer with the final surface elevation. The minimum thickness of the vegetative soil layer will be placed as soon as practicable after placement of the compacted low permeability soil layer.

Finalized area will be prepared and seeded as soon as practicable to prevent erosion and deterioration. The soil sample testing shall be done at a minimum frequency as specified in Table L-1. The CQA Officer, or his/her designated representative, shall review the test results, determine amendments needed, and document application of required soil amendments.

5.5 Gas Management System

Testing methods for the gas management system granular materials are presented in Table L-1. Prior to installation of granular materials and other gas system components, material evaluation tests shall be performed by the supplier or the CQA Officer, or his/her designated representative, to confirm the adequacy of the material from on-site or off-site source areas. The test frequencies will be as specified in Table L-1. The material will be accepted or rejected by the CQA Officer, or his/her designated representative, based on design requirements presented in the design and on the design drawings.

All materials used to construct the gas system will be inspected by the CQA Officer, or his/her designated representative. The inspection will include such characteristics as required to show compliance with the approved plans and specifications. Pipe used in gas system construction will be inspected for proper diameter and material. Granular bedding and backfill for gas system components will be sampled and tested for gradation and hydraulic conductivity at a rate of once per material source, as indicted above and in Table L-1. Gas system components' material that does not conform to manufacturer or design specifications will be repaired or removed and replaced to meet design and manufacturer's specifications.

The CQA Officer, or his/her designated representative, shall observe and document installation of the gas system, including excavation of trenches, pipe system installation, and granular material placement, for conformance with the design, design drawings, and manufacturer's recommendations. The CQA Officer, or his/her designated representative, shall observe and ensure placement of general backfill is performed in such a manner that damage to gas system components does not occur.

5.6 Geotextile

Incoming rolls of the geotextiles shall be inventoried and inspected by the CQA Officer, or his/her designated representative, as they are unloaded. Holes, tears, or other visible defects shall be clearly marked on the geotextiles for identification of necessary repairs. The CQA Officer, or his/her designated representative, shall observe and document geotextile placement such that installation is performed in conformance with the design, design drawings, and manufacturer's recommendations.

TABLE L-1

MATERIAL TESTING AND FREQUENCY

PRECONSTRUCTION / PREQUALIFICATION TESTING			
Material	**Test**	**Requirement**	**Frequency**
Compacted Low Permeability Soil	Particle Size (ASTM D1140)	USCS Classification	1 per 20,000 cy
	Atterberg Limits (ASTM D4318)		
	Classification (ASTM D2487)		
	Hydraulic Conductivity	1×10^{-7} cm/sec	
	Standard Proctor (ASTM D-698)	Verify Soil Characteristics	
	Develop Acceptable Zone	Verify Soil Characteristics	Per Soil Type
Gas System Piping	Material Certification by manufacturer	Design Specifications	1 per Source
	ASTM D- 3350 - For HDPE		
	ASTM D-1784 - For PVC		
Geotextile	Material Certification by manufacturer	Design Specifications	1 per Source
	ASTM D-5261 (mass per unit area)	8 oz/sq yd	1 per Source
Geomembrane	Material Certification by manufacturer	Design Specifications	1 per Source
	ASTM D-5199 (thickness)	40 mils	1 per Source

CONSTRUCTION TESTING			
Material	**Test**	**Requirement**	**Frequency**
Compacted low permeability soil	Field Moisture Content (ASTM D2216 or D3017)	Percent compaction and moisture content within the "Acceptable Zone"	5 per acre per lift
	Field Density (ASTM D2922, D1556, D2937, D2167)	Percent compaction and moisture content within the "Acceptable Zone"	
	Density (Sand cone, Balloon Test, or Drive Cylinder)	Check Nuclear Gauge	1 per week of construction
	Standard Proctor (ASTM D-698)	Verify Soil Characteristics	1 per 10,000 cy
	Hydraulic Conductivity (ASTM D5084)	1×10^{-7} cm/sec	
	Thickness *	Design Thickness	Grid Points on Drawings
Vegetative Soil	pH (ASTM D-4972)	Verify Soil Characteristics	1 per source
	Organic Content (ASTM D-2974)		
	Thickness *	Design Thickness	Grid Points on Drawings
Gas System Granular Material	Particle Size (ASTM D1140, D422)	Design Specifications	1 per source
	Hydraulic Conductivity (ASTM D2434)	Verify Soil Characteristics	

* Thickness can be checked by surveying or other method acceptable to the certifying engineer.

6.0 DOCUMENTATION

6.1 General

The CQA Officer will be responsible for the overall administration and control of the project construction observation documents.

Construction observation, documentation, drawings, and acceptance reports for all components associated with construction of the landfill will be included as part of construction documentation reports for the landfill.

6.2 Daily Summary Reports

Each day of construction will be documented by a daily summary report. The report will be prepared by the CQA Officer or his designated representative and contain the following information:

1. Date
2. Summary of weather conditions.
3. Summary of locations where construction is occurring.
4. Equipment and personnel on the project.
5. Summary of any meetings held and attendees.
6. Description of all materials used and references or results of testing and documentation.
7. Calibration and recalibration of test equipment.
8. Daily inspection summaries from each inspector, including:
    - Summary of locations where construction is occurring.
    - Type of Inspection.
    - Inspection procedure used.
    - Test data.
    - Results of the activity.
    - Personnel involved in the inspection and sampling activities.
    - Signature of inspector.
    - Photographic records as appropriate.

6.3 Photographic Documentation

Construction documentation may be recorded with photographs, as appropriate. Photographs may be utilized to document construction observation activities, project progress, and work acceptability. Any photographs will be maintained by the CQA Officer. All CQA personnel will be required to identify the following information for each photograph recorded:

1. Location of work, date and time.
2. The name and signature of the photographer.
3. Description of activity.

6.4 Acceptance Reports

Upon completion of the work or of a major phase of the work, the CQA Officer shall submit an acceptance report. The report shall summarize the activities of the project and document all aspects of the quality assurance program that were performed in accordance with the requirements of the CQA plan. The CQA Officer shall state in the report that the installation has proceeded in accordance with the CQA Program. At a minimum, the report shall contain the following:

1. A certification by the CQA Officer that the construction has been prepared and constructed in accordance with the engineering design;
2. Record drawings;
3. All daily summary reports;
4. Documentation forms; and
5. Photographic logs.

APPENDIX L-1

PROCEDURE FOR DETERMINATION OF ACCEPTABLE ZONE FOR SOIL AND MOISTURE CONTENT

1.0 INTRODUCTION

One important factor affecting the performance of compacted soil cover liner is adequate control of water content and dry unit weight during construction. Because a cover is meant to be a hydraulic barrier, hydraulic conductivity requirements are the primary factor affecting the criteria of compaction specification.

For soil construction work, a typical requirement will be that the soil be placed at 90% Standard Proctor dry density (ASTM D698) with a moisture content of optimum to 5 points wet of optimum. But for Supply Side Landfill final cover construction, the governing specification for placement will be testing of the cover liner soils to determine its acceptable zone for a maximum hydraulic conductivity of 1.0×10^{-7} cm/sec. Research work performed by Benson and Daniel (1990) indicates that the acceptable zone can be expected to parallel a "line of optimums". This procedure should be performed when a new source of soil is selected for liner construction or when the Standard Proctor density changes by 10 pounds per cubic foot or more.

2.0 PROCEDURE

The following steps will be performed during prequalification of a soil source for liner construction. Prequalification also includes the performance of soil index testing. Such as Grain Size distribution analysis and Atterberg limits, and the determination of Standard Proctor densities. Once the testing is completed, the following steps will be followed to establish the acceptable zone.

Compact three soils samples at a controlled moisture content of ± 1 point of optimum moisture at approximately 95, 90 and 85 % maximum dry density. These samples should be tested for hydraulic conductivity using ASTM D5084. If all samples pass, it can be assumed as conformation that 90 % is an appropriate lower density.

If all three initial hydraulic conductivity test results are $> 1.0 \times 10^{-7}$ cm/sec, then three more samples should be prepared to confirm the moisture content range. Using approximately 85 to 87% dry density, prepare one sample at –2 points (dry of optimum), one +3 points and one at +8 points of optimum. These samples should then be tested for hydraulic conductivity using ASTM D 5084. If all sample pass, it can be assumed as confirmation that optimum to +5 points is an appropriate moisture content range.

If the first two steps do not confirm the hydraulic conductivity window, then CQA Officer will determine if the soil will be used for construction. If it will be used, then further testing will be performed to define a smaller acceptable zone. A smaller zone will significantly increase the construction effort and material testing.

In some cases, soil borrow sources may be so variable that composting of the soil will be required

for testing. In these cases, 3 or 4 Standard Proctor tests should be performed to determine the range of maximum dry density. If the range of dry densities is less than 10 pcf a composite can be tested as outlined above. If the range of maximum dry densities is greater the highest and lowest soil values should be tested to determine an acceptable range. Selection of density values will be based upon identification of soil percentages. Prequalification testing will assure the conformance by hydraulic conductivity.

3.0 USE OF ACCEPTABLE ZONE

During construction, the acceptable zone will be verified by the specified frequency of construction soil sampling. Each sample obtained (1 per 10,000 cubic yards of soil placed) will be tested for Standard Proctor density, grain size, Atterberg limits and hydraulic conductivity testing. The results can than be compared to the prequalification testing to verify soil consistency and passing hydraulic conductivity. These tests can also be plotted on the Standard Proctor as documentation of the acceptable zone of as demonstration that the zone can be enlarged.

4.0 REFERENCES

Daniel, D.E and C.H. Benson (1990), " Water Content-Density Criteria for Compacted Soil Liners, " *Journal of Geotechnical Engineering*, American Society of Civil Engineers, New York, Vol 116, No. 12, pp 1181-1830.

APPENDIX B

PROJECT DRAWINGS

APPENDIX C

PROJECT SCHEDULE

APPENDIX D

HEALTH AND SAFETY PLAN

EJOC CONTRACT NO. N68950-00-D-0200
DELIVERY ORDER NO. 0068

HEALTH AND SAFETY PLAN
SUPPLY SIDE LANDFILL
NAVAL STATION GREAT LAKES
GREAT LAKES, ILLINOIS

PREPARED FOR

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
201 DECATUR AVENUE
GREAT LAKES, ILLINOIS 60088-5600

SUBMITTED
JUNE 2004

BY

TOLTEST, INC.
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TOLTEST PROJECT NO. 73738.01

HEALTH AND SAFETY PLAN
SUPPLY SIDE LANDFILL
NAVAL STATION GREAT LAKES
GREAT LAKES, ILLINOIS

EJOC NO. N68950-00-D-0200
DELIVERY ORDER NO. 0068

Submitted by:

TolTest, Inc.
1000 S. Northpoint Boulevard
Waukegan, Illinois 60085

TolTest, Inc. hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under this contract is complete, accurate, and complies with all requirements of the contract.

Prepared by: Jeffrey M. Tinney, Project Manager Date: 6/7/04

Reviewed/Approved by: Khushwant Mander, Senior Project Manager Date: 6/7/04

TABLE OF CONTENTS

Section **Page No.**

List of Acronyms ..... **ii**

1.0 Introduction **1**

2.0 Applicability **2**

3.0 Site Safety and Health **3**

3.1 Key Personnel 3
3.2 Personal Protective Equipment 3
3.3 Site Control Measures 4
3.4 Site Standard Operating Safety Procedures 4
3.5 Site-Specific Respiratory Protection 5
3.6 Material Safety Data Sheets 6

4.0 Incident Prevention **7**

4.1 Daily Safety Inspections 7
4.2 Incident Reporting 7
4.3 Excavation Safety 7
4.4 Activity Hazard Analyses 8

5.0 Emergency Response **9**

5.1 Work Zones and Evacuation Procedures 9
5.2 Decontamination 9
5.3 Emergency Medical Treatment and First Aid 9
5.3.1 Cold Stress 10
5.3.2 Heat Stress 11
5.4 Spill and Discharge Control 13
5.4.1 Storage 13
5.4.2 Pumping Flammable and Combustible Liquids 14
5.4.3 Equipment Inspection 14

APPENDICES

Appendix A Material Safety Data Sheets
Appendix B Incident Reports
Appendix C Excavating and Trenching Procedures
Appendix D Activity Hazard Analyses

LIST OF ACRONYMS

AHA	Activity Hazard Analysis
OSHA	Occupational Safety and Health Administration
HASP	Health and Safety Plan
Navy	Department of the Navy
PPE	personal protection equipment
SSHO	Site Safety and Health Officer
TolTest	TolTest, Inc.

1.0 INTRODUCTION

TolTest, Inc. (TolTest) is responsible for the safety, health, and emergency response provisions for each task order under this contract. These provisions are provided through the development and implementation of TolTest's Corporate Health and Safety Plan and this Site Health and Safety Plan (HASP). All personnel, visitors, contractors, and subcontractors will be informed of this plan and any potential health and safety hazards of the operation.

2.0 APPLICABILITY

This plan will be followed during all site activities starting with site mobilization through site demobilization. This plan incorporates the requirements of the following regulations and/or appropriate guidance:

- Federal Acquisition Regulation clause 52.236-13, Accident Prevention
- Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926
- OSHA General Industry Standards, 29 CFR 1910 (including, but not limited to, 29 CFR 1910.120, Hazardous Waste Site Activities)
- OPNAVINST 5090.1B and the Naval Station Great Lakes Hazardous Waste Management Plan
- United States Army Corps of Engineers Health and Safety Manual EM385-1-1
- Other applicable federal, state, and local safety and health requirements

The implementation of the Supply Side Cap Construction Work Plan includes the necessary tasks that will be performed to construct the new landfill cap at the Supply Side Landfill.

3.0 SITE SAFETY AND HEALTH

This section addresses the responsibilities for safety and health oversight, personal protection equipment (PPE), and site-specific control measures and operating procedures.

3.1 Key Personnel

The Site Safety and Health Officer (SSHO) for this project has the overall responsibility for ensuring that the provisions of this HASP are implemented in the field. The SSHO will be present during the period that heavy equipment is operating and will observe and document the activities. The SSHO is responsible for conducting daily tailgate safety meetings and site inspections to ensure the effectiveness of this plan. As field conditions change, decisions will be made regarding additional protective measures. Personnel assigned to this project are experienced, meet the supervisory training requirements specified by OSHA in 29 CFR 1910.120, and have First Aid training.

3.2 Personal Protective Equipment

PPE is to be used by employees for each of the site tasks and operations being performed. The type of PPE will depend upon the level of potential exposure to hazards. TolTest personnel will be equipped, at a minimum, with the PPE listed below:

- Working uniform
- Coverall suit (use depends on site conditions)
- Steel-toe boots/shoes
- Hard hat
- Safety glasses
- Hearing protection if noise level exceeds 85 dB
- Work gloves

Level C PPE may include:

- Level D PPE, minus safety glasses (eye protection supplemented along with breathing protection (See next entry)
- Full Face, Negative Pressure Respirator equipped with filters specific to the contaminant of concern.

3.3 Site Control Measures

Control procedures will be implemented to prevent unauthorized access to the work area. Orange, plastic safety fencing and/or barricades may be installed around the work area, if needed. The SSHO will ensure that all personnel entering the site have the necessary training and medical approval documentation. Personnel entering the site will be given a thorough briefing on the site hazards and safe work procedures prior to proceeding. A safety meeting will be conducted on a daily basis and will be documented. The topics of discussion will include potential physical and chemical hazards involved in the excavation activities. This HASP will be used as a reference to discuss in detail the pertinent topics that are applicable for each days work activities.

All visitors will be expected to comply with applicable regulatory OSHA requirements as well as the requirements of this HASP. Visitors will also be expected to provide their own PPE. In the event visitors do not adhere to the provisions of the HASP, they will be requested to leave the work area. All non-conformance incidents will be recorded in the site log. The SSHO will document a written record of all personnel entering and exiting the site.

3.4 Site Standard Operating Safety Procedures

The following safety rules will be adhered to during all site activities:

- At least one copy of this HASP will be available at the project site in a location readily available to all personnel, including visitors.
- Personnel will practice contamination avoidance.
- No food or beverages will be present or consumed in the work area.
- No tobacco products will be used on the project site.
- No alcohol or drugs will be present or consumed on site or in any vehicle or worksite equipment.
- No personnel will be permitted to work while under the influence of alcohol or drugs while on site or operating a vehicle or worksite equipment.
- Emergency equipment consisting of fire extinguishers, a first aid kit, and a mobile telephone will be located in a company vehicle in a readily accessible location.
- Visual contact will be maintained between crew members at all times, and crew members will be required observe each other for signs of exposure to chemical, biological, or physical agents. *Indications of adverse effects include, but are not limited to*:
  - Changes in complexion and skin coloration
  - Changes in coordination
  - Changes in demeanor
  - Excessive salivation and pupillary response

- Changes in speech pattern

- All personnel will inform their partners or team members of visible or non-visible effects of overexposure to chemical, biological, or physical agents. *General symptoms of overexposure and specific overexposure symptoms for petroleum hydrocarbons and metals may include*:

From Inhalation:

- Headache
- Drowsiness
- Dizziness/lack of coordination
- Nausea
- Weakness
- Blurred vision
- Cramps
- Irritation of the eyes, skin, or respiratory tract

From Ingestion:

- Abdominal pain
- Stomach pain
- Thirst

From Contact:

- Dry skin
- Redness

From Absorption:

- Redness
- Stomach Pain

3.5 Site-Specific Respiratory Protection

During this project, respiratory protection is not anticipated to be required. In the case that a respirator will be required, TolTest will submit a copy of medical documentation for the personnel expected to wear respirators to the Department of the Navy (Navy). A copy of TolTest personnel's current respirator fit test will also be submitted to the Navy. The respirator fit test will be conducted in accordance with 29 CFR 1910.134. TolTest personnel will wear full-face negative air purifying respirators.

TolTest personnel will be required to perform fit checks of their respirators prior to engaging in any activity in which the use of a respirator is required. The following procedures for respirator fit checks will be adhered to in accordance with 29 CFR 1910.134:

- **Perform positive pressure fit checks.** Positive fit checks are performed by sealing the exhalation valve and exhaling gently. The check is considered to be successful if a slight positive pressure can be built up inside the face piece without any evidence of outward leakage of air at the seal
- **Perform negative pressure fit checks.** Negative pressure fit checks are performed by placing the palm of the hands over the respirator cartridge off the air inlet. Once the inlet is sealed, personnel will gently inhale so that the face piece slightly collapses, then hold their breath for 10 seconds. The fit check will be considered successful if the seal remains in the slightly collapsed condition with no inward leakage of air detected.
- **Perform manufacturer's recommended user seal checks.**

TolTest personnel will be responsible for the maintenance and upkeep of their respirators. Cleaning and maintenance procedures will be adhered to in accordance with 29 CFR 1910.134 as follows:

Step 1. Remove respirator cartridges after each day's use.

Step 2. Rinse the respirator and respirator components in warm water.

Step 3. Wash the respirator and respirator components with warm water and a cleaning solution with a disinfecting agent that is approved by the manufacturer.

Step 4. Rinse the respirator and respirator components in warm water.

Step 5. Hand dry the respirator and respirator components.

Step 6. Replace all respirator components including the cartridges.

Step 7. Place the respirator in a plastic bag and store in a safe area.

3.6 Material Safety Data Sheets

A material safety data sheet for petroleum can be found in **Appendix A.**

4.0 INCIDENT PREVENTION

Daily safety inspections, incident reporting, excavation safety, and liquid/soil handling safety are discussed in the following paragraphs. In addition, this section includes a list of Activity Hazard Analyses (AHAs), documents that describe the work activity, probable hazards related to the work, and proactive or precautionary measures that will be taken for safeguarding against and minimizing or eliminating each particular hazard.

4.1 Daily Safety Inspections

All machinery and equipment will be inspected daily by the Site Supervisor/SSHO to ensure a safe operating condition. Inspections will be in accordance with the manufacturer's recommendations and will be documented. Records of inspections will be maintained at the site, will be made available upon request, and will become part of the project file.

In addition to daily inspections, the SSHO will conduct a daily safety meeting. The SSHO will discuss safety topics relevant to the hazards involved in that day's work. All employees and visitors will review and sign the safety log, which documents the topics of discussion. The safety log will be submitted to the Navy with the Contractor Quality Control Reports.

4.2 Incident Reporting

All incident reporting and record-keeping requirements will be followed. TolTest forms will be completed for all incidents, including personal injury, safety incident, equipment damage and vehicle incident reports. (Copies of these forms are provided in **Appendix B**) All reports will be submitted to the Navy representative within 24 hours of any incident.

4.3 Excavation Safety

All excavating work will be conducted, at a minimum, in strict conformance with 29 CFR 1926.650 through 29 CFR 1926.652, including requirements for continuously sloping excavations, if required. Excavation and trenching procedures are outlined in **Appendix C**.

It is not anticipated that shoring or bracing of the excavations will be required; however, shoring and sheeting of the excavation will be used, if necessary, to prevent personal injury, damage to structures, injurious caving, and erosion. If used, the shoring, sheeting, and bracing will be carefully removed, as the excavation is backfilled.

Excavation work will not commence until TolTest has contacted the Base Utilities/PWC a minimum of 72 hours prior to excavation activities. TolTest will visually survey the area to ensure that clearances to overhead utility lines will be sufficient for the movement of vehicles and operation of excavation equipment. The requirements stated in OSHA 29 CFR 1926 General Construction Industry Standard will be followed by TolTest and its subcontractors.

During periods when the work site is unoccupied (i.e., overnight, weekends, and similar off periods), barricades and orange construction fencing will be placed around the excavations in such a manner as to alert personnel to the danger and prevent them from entering the work area if additional protection is needed.

4.4 Activity Hazard Analyses

The protective measures to be implemented during completion of the tasks/operations associated with this work are identified in the AHAs provided in **Appendix D**. Tasks/operations for which AHAs have been developed are:

- Site Preparation/Layout
- Soil Excavation
- Backfill and Site Restoration
- Equipment Decontamination

5.0 EMERGENCY RESPONSE

This section addresses work zones and evacuation procedures, decontamination, emergency medical treatment and first aid, emergency response procedures, and spill and discharge control. TolTest will implement emergency response and contingency procedures in accordance with OSHA standards 29 CFR 1910.120(L).

5.1 Work Zones and Evacuation Procedures

Daily safety meetings will identify the work zones for excavation activities. The three general work zones that will be established at the site are the Exclusion Zone, Contamination Reduction Zone, and Support Zone.

The **Exclusion Zone** is defined as the area where contamination is either known or likely to be present, or, because of activity, will provide a potential to cause harm to personnel. Entry into the Exclusion Zone will initially require the use of PPE. Downgrading PPE requirements will be made by the SSHO. Barricades will surround this zone.

The **Contamination Reduction Zone** is defined as the area where personnel conduct personal and equipment decontamination should contact with contaminated soil or concrete be suspected. It is essentially a buffer zone between potentially contaminated and clean areas.

The **Support Zone** is defined as a clean area where the chance to encounter hazardous materials or conditions is minimal. PPE is, therefore, not required in this zone.

Safe Distances are outside the Exclusion Zone, and **Places of Refuge** are outside the Contamination Reduction Zone.

In the event of an emergency that necessitates evacuation of the site, all personnel will be expected to leave the work zone and mobilize at a safe distance to an area designated by the SSHO using the prescribed evacuation routes. Personnel will remain at that area until the SSHO provides further instructions.

5.2 Decontamination

All site personnel should minimize contact with contaminants in order to minimize the need for extensive decontamination. The SSHO is responsible for monitoring decontamination procedures and determining their effectiveness. Eye wash stations will be available in the work area.

5.3 Emergency Medical Treatment and First Aid

There are no anticipated hazards on site that require specific medical attention or protocols. If an injury/illness or exposure occurs, employees must seek medical attention immediately.

5.3.1 Cold Stress

Cold and/or wet environmental conditions can place workers at risk of cold-related illness. Most cold-related worker fatalities have resulted from failure to escape low air temperatures, or from immersion in low temperature water.

Frostbite is the freezing of body tissue, ranging from superficial freezing of surface skin layers to deep freezing of underlying tissue. Frostbite will only occur when the ambient temperatures are below 32°F. The risk of frostbite increases as the temperature drops and the wind speed increases.

Frostbite First Aid. To administer first aid for frostbite, take the exposed worker indoors. Provide the worker with warm drinks, but no coffee, tea, or alcohol. Rewarm the affected areas as quickly as possible by placing them in warm water (102°F to 105°F) or covering them with warm clothing. Keep the frozen tissue submerged or covered for 20 to 30 minutes or until the frozen tissue regains its original color, even though the tissue may be very painful as it thaws. If present, do not allow blisters to be broken. Cover the injured area with sterile, soft, dry material, keep the patient warm, and get medical attention.

- ***Do not rub the frostbitten areas, as additional damage could occur.***
- ***Do not use heat lamps or hot water bottles to warm the frostbitten areas.***
- ***Do not place the exposed part near a hot stove.***

Hypothermia can occur whenever temperatures are below 45°F. The principal cause of hypothermia in these conditions usually involves the loss of insulating properties of clothing due to moisture; heat loss due to increased air movement, and evaporation of moisture on the skin.

Extremely low temperatures are not necessary to induce hypothermia. Hypothermia can occur in temperatures as high as 65°F, depending on the *wind chill factor*. Wind increases the body's heat loss by dispersing layers of warm air trapped between layers of clothing and skin. This heat loss increases as the wind speed increases.

General hypothermia is more life threatening than frostbite because it affects the entire body system. Lower body temperatures will very likely result in:

- reduced mental alertness
- reduction in rational decision making
- loss of consciousness with the threat of fatal consequences

The single most important aspect of life-threatening hypothermia is a drop in the deep core body temperature. Once the core body temperature drops to 95°F, thermal control is lost, and the body is no longer in thermal balance. If the core body temperature drops below 95°F, a coma may occur. Death can occur *within two hours* of the first signs and symptoms.

The general symptoms of hypothermia are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body
- Unconsciousness, glassy stare, slow pulse and respiratory rate
- Freezing of the extremities
- Death

Site workers should be protected from exposure to cold so that the deep core body temperature does not fall below 98.6°F. To prevent this from occurring, the following controls will be implemented:

- Site workers should wear warm clothing such as gloves and heavy socks when the air temperature is below 45°F. Protective clothing such as Tyvek or other disposable overalls may be used to shield employees from the wind.
- When the air temperature is below 32°F, *clothing* for warmth should include:
  - Insulated suits such as whole-body thermal underwear
  - Wool socks or polypropylene socks to keep moisture off the feet
  - Insulated gloves
  - Insulated boots
  - Insulated head cover such as hard hat, winter liner, or knit cap
  - Insulated jacket, with wind- and water-resistant outer layer
- When the air temperature is below 32°F, the following ***work practices*** must be implemented:
  - Site workers shall dress in layers, with thinner, lighter clothing worn next to the body.
  - If a site worker's underclothing becomes wet from sweat (and the worker is uncomfortable), the worker may finish the task at hand prior to changing into dry clothing. If the underclothing becomes wet in any other way, the worker must change into dry clothing immediately.
  - The intake of caffeinated beverages should be limited due to their circulatory and diuretic effects.
  - Site workers will be provided with a warm (65°F or above) break area.
  - The buddy system will be practiced at all times on site. Any site worker observed with severe shivering will be directed to go immediately to the heated break area.

5.3.2 Heat Stress

Physical hazards may involve heat-related symptoms such as heat stress, heat cramps, heat exhaustion, or heat stroke.

Heat stress is the aggregate of environmental and physical work factors that make up the total heat load imposed on the body. The environmental factors of heat stress include air temperature, humidity, radiant heat exchange, and wind/water vapor pressure (related to humidity). Physical work contributes to the total heat stress by producing metabolic heat in the body proportional to the intensity of the work. Heavy physical labor can greatly increase the likelihood of heat fatigue, heat exhaustion, and *heat stroke*, the latter being a life threatening condition. Heat stress monitoring and observation of personnel will commence when the ambient temperature is 80°F or above (70°F if chemical protective clothing is worn).

All employees will be informed of the possibility and symptoms of heat stress. If an employee experiences extreme fatigue, cramps, dizziness, headache, nausea, profuse sweating, or pale, clammy skin, the employee and the SSHO/Site Supervisor will take control measures. If the symptoms do not subside after a reasonable rest period, the SSHO/Site Supervisor will seek medical assistance.

To prevent heat stress, the following control measures will be implemented:

- Site workers will be encouraged to drink plenty of water throughout the day.
- On-site drinking water will be kept cool to encourage personnel to drink frequently.
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Employees will be instructed to observe and monitor themselves and coworkers for signs of heat stress and to take additional breaks as necessary.
- All breaks will take place in cool, shaded rest areas.

Heat Cramps are caused by heavy sweating and inadequate electrolyte replacement. Symptoms include muscle spasms and pain in the hands, feet, or abdomen.

Heat Exhaustion is caused by increased stress on various body organs. Signs and symptoms include:

- Pale, cool, moist skin
- Heavy sweating
- Dizziness, nausea
- Fainting

Heat stroke is the most serious form of heat stress and should always be treated as a medical emergency. The body's temperature regulation system fails, and the body temperature rapidly rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Symptoms of heat stroke include:

- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Strong, rapid pulse
- Coma

5.4 Spill and Discharge Control

This section provides contingency measures for potential spills and discharges from the handling and transportation of any hazardous substances imported to the site by TolTest or their subcontractors. The SSHO will conduct spill prevention briefings daily during safety meetings for all personnel who are involved with handling, receipt, storage, and/or cleanup of spilled material.

If a spill or discharge occurs, the following actions, at a minimum, will be taken:

- Take immediate measures to control and contain the spill within the site boundaries. This will include, at a minimum, the following:
  - Keep unnecessary people away, isolate hazardous areas, and deny entry.
  - Do not allow anyone to touch spilled material.
  - Stay upwind and keep out of low areas where fluids/ vapors may accumulate.
  - Keep combustibles away from the spilled material
  - Use water spray or foam to reduce vapor or dust generation, as needed.
  - Take samples for analysis to determine that clean up is adequate.
  - Take other corrective measures as needed.
- Notify the Navy representative immediately after the situation is under control.
- If the spill or discharge exceeds the reportable quantity for the substance involved, notify the federal and state regulatory authorities as appropriate.
- Submit a written report to the Department of the Navy within seven days of a verbal report.

5.4.1 Storage

All tanks, containers, and pumping equipment used for the storage or handling of flammable and combustible liquids will be labeled or placarded in accordance with the US DOT. Oils or fuels temporarily stored will be kept in tightly sealed containers (with the exception of proper venting), in fire-resistant areas and at safe distances from ignition sources. All transfer vessels will be emptied at the end of the workday.

5.4.2 Pumping Flammable and Combustible Liquids

Flammable liquid pumping systems will be electrically bonded and grounded. Flammable liquid will be drawn from, or transferred into vessels, containers, or tanks through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container, or portable tanks, by gravity or pump, through an approved self-closing valve. Transferring flammable liquid by means of air pressure on the container or portable tank is prohibited.

5.4.3 Equipment Inspection

Equipment inspection is part of the daily routine during field activities. The Site Supervisor is to ensure that no oil/fuel spill has accumulated in any area by conducting daily visual inspection of the equipment. Equipment and safety issues will be documented in the daily report.

APPENDIX A

MATERIAL SAFETY DATA SHEETS

CITGO No. 1 Diesel Fuel, All Grades

Material Safety Data Sheet

CITGO Petroleum Corporation
P.O. Box 3758
Tulsa, OK 74102-3758

MSDS No. AG1DF

Revision Date 03/20/2003

IMPORTANT: Read this MSDS before handling or disposing of this product and pass this information on to employees, customers and users of this product.

Hazard Rankings

		HMIS	NFPA
Health Hazard	*	1	0
Fire Hazard		2	2
Reactivity		0	0

* = Chronic Health Hazard

Emergency Overview

Physical State Liquid.

Color Clear to light amber. **Odor** Characteristic, kerosene-like.

WARNING!
Combustible liquid; vapor may cause flash fire.
Harmful or fatal if swallowed - can enter lungs and cause damage.
Mist or vapor can irritate the respiratory tract.
Liquid contact can cause eye or skin irritation.
May be harmful if inhaled or absorbed through the skin.
Overexposure can cause central nervous system (CNS) depression and/or other target organ effects.
Diesel engine exhaust can cause upper respiratory tract irritation and reversible pulmonary effects.
Spills may create a slipping hazard.

Protective Equipment

Minimum Recommended
See Section 8 for Details

SECTION 1: IDENTIFICATION

Trade Name	CITGO No. 1 Diesel Fuel, All Grades	**Technical Contact**	(918) 495-5940 or (918) 495-5933
Product Number	Various	**Medical Emergency**	(918) 495-4700
CAS Number	8008-20-6	**CHEMTREC Emergency (United States Only)**	(800) 424-9300
Product Family	Fuels.		
Synonyms			

SECTION 2: COMPOSITION

This product may be composed, in whole or in part, of any of the following refinery streams:

Kerosene [CAS No.: 8008-20-6]
Hydrodesulfurized Kerosine (Petroleum) [CAS No.: 64742-81-0]
Hydrodesulfurized Middle Distillate (petroleum) [CAS No.: 64742-80-9]
Straight-run Middle Distillate (Petroleum) [CAS No.: 64741-44-2]
Hydrodesulfurized Light Catalytic Cracked Distillate (Petroleum) [CAS No.: 68333-25-5]
Light Catalytic Cracked Distillate (Petroleum) [CAS No.: 64741-59-9]

This product contains the following chemical components:

Component Name(s)	CAS Registry No.	Concentration (%)

 Continued on Next Page

1) Nonane, all isomers	Mixture.	20 - 30
2) Ethylmethylbenzenes (Ethyltoluenes)	25550-14-5	1 - 3
3) Naphthalene	91-20-3	0 - 3
4) Trimethylbenzenes, all isomers	25551-13-7	0 - 2
5) Biphenyl (Diphenyl)	92-52-4	0 - 2
6) Ethylbenzene	100-41-4	0 - 1
7) Xylene, all isomers	1330-20-7	0 - 1
8) 1, 2, 4 Trimethylbenzene	95-63-6	0 - 1
9) Cumene	98-82-8	0 - 1

SECTION 3: HAZARDS IDENTIFICATION

Also see Emergency Overview and Hazard Ratings on the top of Page 1 of this MSDS.

Major Route(s) of Entry Skin contact. Eye contact. Inhalation.

Signs and Symptoms of Acute Exposure

Inhalation Breathing mist or vapors concentrations well above occupational exposure levels can irritate the mucous membranes of the nose, throat, bronchi, and lungs, and may cause transient central nervous system (CNS) depression. CNS symptoms include headache, dizziness, nausea, intoxication, blurred vision, slurred speech, flushed face, confusion, weakness, fatigue, loss of consciousness, convulsions, coma, and death, depending on the concentration and/or duration of exposure.

Eye Contact This product can cause eye irritation with short-term contact with liquid, mists or vapor. Symptoms include stinging, watering, redness, and swelling. In severe cases, permanent eye damage can result.

Skin Contact Animal test results on similar materials suggest that this product can cause moderate to severe skin irritation. Short-term contact symptoms include redness, itching, and burning of the skin. Also, certain components of this material may be absorbed through the skin and produce CNS depression effects (see "Inhalation" above). If the skin is damaged, absorption increases. Prolonged and/or repeated contact may cause severe dermatitis and/or more serious skin disorders. Chronic symptoms may include drying, swelling, scaling, blistering, cracking, and/or severe tissue damage.

Ingestion If swallowed, this material may irritate the mucous membranes of the mouth, throat, and esophagus. It can be readily absorbed by the stomach and intestinal tract. Symptoms include a burning sensation of the mouth and esophagus, nausea, vomiting, dizziness, staggering gait, drowsiness, loss of consciousness, and delirium, as well as additional central nervous system (CNS) effects (see "Inhalation" above).

Due to its light viscosity, there is a danger of aspiration into the lungs during vomiting. Aspiration of a small amount of liquid can cause severe pulmonary edema and lipoid or chemical pneumonia which can result in death. Progressive CNS depression, respiratory insufficiency, and ventricular fibrillation may also result in death.

Chronic Health Effects Summary Secondary effects of ingestion and subsequent aspiration into the lungs may cause pneumatocele (lung cavity) formation and chronic lung dysfunction.

This product contains petroleum middle distillates similar to those shown to produce skin tumors on laboratory rodents following repeated application. All tumors appeared during the latter portion of the typical 2-year lifespan of the animals. Certain studies have shown that washing the animal's exposed skin with soap and water between treatments greatly reduces the potential tumorigenic effects. These effects are unlikely to occur if good personal hygiene is practiced.

This material and/or its components have been associated with developmental and/or reproductive toxicity, genotoxicity, immunotoxicity, and carcinogenicity. Refer to Section 11 of this MSDS for additional health-related information.

Conditions Aggravated by Exposure Medical conditions aggravated by exposure to this material may include skin disorders, chronic respiratory diseases, neurological conditions, liver or kidney dysfunction.

Target Organs This material may cause damage to the following organs: kidneys, liver, upper respiratory tract, skin, eyes, central nervous system (CNS).

Carcinogenic Potential This material contains ethylbenzene and naphthalene at concentrations at or above 0.1%. Ethylbenzene is considered possibly carcinogenic to humans by IARC. (See Section 11.) NTP has determined that exposure to diesel exhaust particulates, a complex mixture of combustion products of diesel fuel, is reasonably anticipated to be a human carcinogen.

OSHA Hazard Classification is indicated by an "X" in the box adjacent to the hazard title. If no "X" is present, the product does not exhibit the hazard as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

OSHA Health Hazard Classification				OSHA Physical Hazard Classification					
Irritant	X	Toxic		Combustible	X	Explosive		Pyrophoric	
Sensitizer		Highly Toxic		Flammable		Oxidizer		Water-reactive	
Corrosive		Carcinogenic		Compressed Gas		Organic Peroxide		Unstable	

SECTION 4: FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting rescue or providing first aid. For more specific information, refer to Exposure Controls and Personal Protection in Section 8 of this MSDS.

Inhalation

Move victim to fresh air. If victim is not breathing, immediately begin rescue breathing. If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately. Keep the affected individual warm and at rest.

Eye Contact

Check for and remove contact lenses. Flush eyes with cool, clean, low-pressure water for at least 15 minutes while occasionally lifting and lowering eyelids. Do not use eye ointment unless directed to by a physician. Seek medical attention if excessive tearing, irritation, or pain persists.

Skin Contact

Remove contaminated shoes and clothing. Flush affected area with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. Do not use ointments. If skin surface is not damaged, clean affected area thoroughly with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists.

Ingestion

Do not induce vomiting. If spontaneous vomiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. Never give anything by mouth to a person who is not fully conscious. Do not leave victim unattended. Seek medical attention immediately.

Notes to Physician

Inhalation overexposure can produce toxic effects. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Vigorous anti-inflammatory/steroid treatment may be required at first evidence of upper airway or pulmonary edema. Administer 100 percent humidified supplemental oxygen with assisted ventilation, as required.

If ingested, this material presents a significant aspiration/lipoid or chemical pneumonitis hazard. As a result, induction of emesis is not recommended. Consider administration of an aqueous slurry of activated charcoal followed by a cathartic such as magnesium citrate or sorbitol. Also, treatment may involve careful gastric lavage if performed soon after ingestion or in patients who are comatose or at risk of convulsing. Protect the airway by placement in Trendelenburg and left lateral decubitus position or by cuffed endotracheal intubation. If vital signs become abnormal or symptoms develop, obtain a chest x-ray and liver function tests. Antibiotics are indicated if pulmonary bacterial infection occurs. Monitor for cardiac function and arterial blood gases in severe exposure cases.

SECTION 5: FIRE FIGHTING MEASURES

NFPA Flammability Classification NFPA Class-II combustible liquid.

Flash Point Method CLOSED CUP: 38°C (100°F). (Pensky-Martens. (Minimum))

Lower Flammable Limit AP 0.7 % **Upper Flammable Limit** AP 5 %

Autoignition Temperature >254°C (489.2°F)

Hazardous Combustion Products Carbon dioxide, carbon monoxide, smoke, fumes, unburned hydrocarbons and trace oxides of sulfur and/or nitrogen.

 Continued on Next Page

Special Properties

Combustible Liquid! This material releases vapors when heated above ambient temperatures. Vapors can cause a flash fire. Vapors can travel to a source of ignition and flashback. A vapor and air mixture can create an explosion hazard in confined spaces such as sewers. Use only with adequate ventilation. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media

SMALL FIRE: Use dry chemicals, carbon dioxide, foam, water fog, or inert gas (nitrogen).
LARGE FIRE: Use foam, water fog, or water spray. Water fog and spray are effective in cooling containers and adjacent structures. However, water can cause frothing and/or may not extinguish the fire. Water can be used to cool the external walls of vessels to prevent excessive pressure, autoignition or explosion. DO NOT use a solid stream of water directly on the fire as the water may spread the fire to a larger area.

Protection of Fire Fighters

Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles. Cover pooling liquid with foam. Containers can build pressure if exposed to radiant heat; cool adjacent containers with flooding quantities of water until well after the fire is out. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines. Be aware that burning liquid will float on water. Notify appropriate authorities if liquid enter sewers or waterways.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Take proper precautions to ensure your own health and safety before attempting spill control or clean-up. For more specific information, refer to the Emergency Overview on Page 1, Exposure Controls and Personal Protection in Section 8 and Disposal Considerations in Section 13 of this MSDS.

Combustible Liquid! Release can result in a fire hazard. Evacuate all non-essential personnel from release area. Establish a regulated zone with site control and security. Eliminate all ignition sources. Stop the leak if it can done without risk. A vapor-suppressing foam may be used to reduce vapors. Properly bond or ground all equipment used when handling this material. Avoid skin contact. Do not walk through spilled material. Verify that responders are properly trained and wearing appropriate personnel protective equipment. Dike far ahead of a liquid spills. Do not allow released material to entry waterways, sewers, basements, or confined areas. This material will float on water. Absorb or cover with dry earth, sand or other non-combustible material. Use clean, non-sparking tools to collect absorbed material. Place spent sorbent materials, free liquids and other clean-up debris into proper waste containers for appropriate disposal. Certain releases must be reported to the National Response Center (800/424-8802) and state or regulatory authorities. Comply with all laws and regulations.

SECTION 7: HANDLING AND STORAGE

Handling

Combustible Liquid!
A static electrical charge can accumulate when this material is flowing through pipes, nozzles or filters and when it is agitated. A static spark discharge can ignite accumulated vapors particularly during dry weather conditions. Always bond receiving containers to the fill pipe before and during loading. Always keep nozzle in contact with the container throughout the loading process. Do not fill any portable container in or on a vehicle. Special precautions, such as reduced loading rates and increased monitoring, must be observed during "switch loading" operations (i.e., loading this material in tanks or shipping compartments that previously containing gasoline or similar low flash point products).

Fire hazard increases as product temperature approaches its flash point. Use non-sparking tools. Keep container closed and drum bungs in place. Remove spillage immediately from walking areas. Do not handle or store near heat, sparks or other potential ignition sources. Do not handle or store with oxidizing agents. Avoid breathing mist or vapor. Never siphon by mouth. Do not taste or swallow. Avoid contact with eyes, skin and clothing. Use gloves constructed of impervious materials and protective clothing if direct contact is anticipated. Provide ventilation to maintain exposure potential below applicable exposure levels. Avoid water contamination. Wash thoroughly after handling. Prevent contact with food or tobacco products.

Cutting or welding of empty containers can ignite residues with explosive force. Do not pressurize or expose empty containers to flames, sparks or heat. Observe all label warnings and precautions. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product. Return empty drums to a qualified reconditioner. When performing repairs and maintenance on contaminated equipment, keep unnecessary persons from hazard area. Eliminate heat, flame and other potential ignition

sources. Drain and purge equipment, as necessary, to remove material residues. Remove contaminated clothing. Wash exposed skin thoroughly with soap and water after handling.

Storage

Store in a cool, dry, well-ventilated place. Keep containers tightly closed. Do not store this product near heat, flame or other potential ignition sources. Do not store with oxidizers. Do not store this product in unlabeled containers. Do not puncture or incinerate containers. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers or waste residues of this product. Ground all equipment containing this material. All electrical equipment in areas where this material is stored or handled must meet all applicable requirements of the NFPA's National Electrical Code (NEC). Store and transport in accordance with all applicable laws.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or mists below the applicable workplace exposure limits indicated below. All electrical equipment should comply with the National Electric Code. An emergency eye wash station and safety shower should be located near the work-station.

Personal Protective Equipment

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations. The following pictograms represent the minimum requirements for personal protective equipment. For certain operations, additional PPE may be required.

Eye Protection

Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing, or spraying of this material. Suitable eye wash water should be readily available.

Hand Protection

Avoid skin contact. Use gloves (e.g., disposable PVC, neoprene, nitrile, vinyl, or PVC/NBR). Wash hands with plenty of mild soap and water before eating, drinking, smoking, use of toilet facilities or leaving work. DO NOT use gasoline, kerosene, solvents or harsh abrasives as skin cleaners.

Body Protection

Avoid skin contact. Wear long-sleeved fire-retardant garments (e.g., Nomex®) while working with flammable and combustible liquids. Additional chemical-resistant protective gear may be required if splashing or spraying conditions exist. This may include an apron, boots and additional facial protection. If product comes in contact with clothing, immediately remove soaked clothing and shower. Promptly remove and discarded contaminated leather goods.

Respiratory Protection

Airborne concentration will determine the level of respiratiory protection required. Respiratory protection is normally not required unless the product is heated or misted. For known or anticipated vapor or mist concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator equipped with a dust/mist prefilter if adequate protection is provided. For unknown vapor concentrations or concentrations exceeding respirator protection factors, use a positive-pressure, pressure-demand, self-contained breathing apparatus (SCBA). Due to fire and explosion hazards, do not enter atmospheres containing concentrations greater than 20% of the lower flammable limit under any circumstances. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134).

General Comments

Warning! Use of this material in spaces without adequate ventilation may result in generation of hazardous levels of combustion products and/or inadequate oxygen levels for breathing. Odor is an inadequate warning for hazardous conditions.

Occupational Exposure Guidelines

Substance	Applicable Workplace Exposure Levels

1) Diesel Fuel	**ACGIH TLV (United States).** TWA: 100 mg/m^3
2) Kerosene	**NIOSH** TWA: 100 mg/m^3
3) Nonane, all isomers	**ACGIH (United States).** TWA: 200 ppm
4) Trimethylbenzenes, all isomers	**ACGIH (United States).** TWA: 25 ppm
5) Naphthalene	**ACGIH (United States). Skin** TWA: 10 ppm STEL: 15 ppm **OSHA (United States).** TWA: 10 ppm
6) Biphenyl (Diphenyl)	**ACGIH (United States** TWA: 0.2 ppm **OSHA (United States** TWA: 0.2 ppm

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES (TYPICAL)

Physical State	Liquid.	**Color**	Clear to light amber.	**Odor**	Characteristic, kerosene-like.
Specific Gravity	0.82 (Water = 1)	**pH**	Not Applicable.	**Vapor Density**	4 (Air = 1)
Boiling Range	AP 150° C (AP 302° F)			**Melting/Freezing Point**	Not available.
Vapor Pressure	<0.3 kPa (<2 mmHg) (at 20°C)			**Viscosity (cSt @ 40°C)**	AP 3
Solubility in Water	Very slightly soluble in cold water.			**Volatile Characteristics**	AP 825 g/l VOC (W/V)
Additional Properties	Density = AP 6.8 lbs/gal.; Viscosity (ASTM D2161) = 30 - 40 SUS @ 100° F				

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability	Stable.	**Hazardous Polymerization**	Not expected to occur.
Conditions to Avoid	Keep away from heat, flame and other potential ignition sources. Keep away from strong oxidizing conditions and agents.		
Materials Incompatibility	Strong acids, alkalies, and oxidizers such as liquid chlorine, other halogens, hydrogen peroxide and oxygen.		
Hazardous Decomposition Products	No additional hazardous decomposition products were identified other than the combustion products identified in Section 5 of this MSDS.		

SECTION 11: TOXICOLOGICAL INFORMATION

For other health-related information, refer to the Emergency Overview on Page 1 and the Hazards Identification in Section 3 of this MSDS.

Toxicity Data

Middle distillates, petroleum:
The products represented by this MSDS contain a mixture of petroleum hydrocarbons commonly referred to as "middle distillates." Laboratory data have associated some middle distillates with skin cancer when the material is applied repeatedly over the lifetime of the test animal. Middle distillates similar to the products represented by this MSDS have been associated with liver and kidney damage in subchronic (90-day) inhalation studies of male rats. The relevance of these findings to human health is unclear.

Naphthalene:
ORAL (LD50): Acute: 1800 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig].

DERMAL (LD50): Acute: 969 mg/kg [Mouse].
INHALATION (LC50): Acute: >340 mg/m^3 1 hour(s) [Rat].

Naphthalene is a potential irritant to eyes, skin and lungs. Ingestion of naphthalene has been associated with severe red blood cell and liver damage leading to death. Following prolonged or repeated exposures, naphthalene has been shown to cause cataracts, optical neuritis, hemolytic and aplastic anemia, jaundice and possibly neurotoxicity. In animal studies, naphthalene caused fetal effects and decreased spleen weights in pregnant female mice. In an NTP sponsored study, naphthalene produced a dose related increase in tumors at the 30 and 60 ppm exposure level in both male and female rats. Higher incidences of respiratory epithelial adenomas, olfactory epithelial neuroblastomas and non-neoplastic lesions of the nose were observed as compared to controls. Cytogenic studies with Chinese hamster ovary cells have demonstrated sister chromatid exchanges and chromosomal aberrations. The relevance of these studies to human health is unclear.

Trimethylbenzenes, all isomers:
The TCLo for humans is 10 ppm, with somnolence and respiratory tract irritation noted. In inhalation studies with rats, four of ten animals died after exposures of 2400 ppm for 24 hours. An oral dose of 5 mL/kg resulted in death in one of ten rats. Minimum lethal intraperitoneal doses were 1.5 to 2.0 mL/kg in rats and 1.13 to 12 mL/kg in guinea pigs. Levels of total hydrocarbon vapors present in the breathing atmosphere of these workers ranged from 10 to 60 ppm. Mesitylene (1, 3, 5 Trimethylbenzene) inhalation at concentrations of 1.5, 3.0, and 6.0 mg/L for six hours was associated with dose-related changes in white blood cell counts in rats. No significant effects on the complete blood count were noted with six hours per day exposure for five weeks, but elevations of alkaline phosphatase and SGOT were observed. Central nervous system depression and ataxia were noted in rats exposed to 5,100 to 9,180 ppm for two hours.

Biphenyl (Diphenyl):
INHALATION, TCLo, Acute: 4,400 ug/m^3 for 4 hours [Human] - Flaccid paralysis of peripheral nerves without anesthesia and nausea or vomiting.
ORAL, LD50, Acute: >2,600 mg/kg [Cat screening level].
ORAL, LD50, Acute: 2,400 mg/kg [Rat and Rabbit].
ORAL, LD50, Acute: 1,900 mg/kg [Mouse] - Somnolence, hypermotility and diarrhea.
DERMAL, LD50, Acute: >5,010 mg/kg [Rabbit screening level].

Ethylbenzene:
ORAL (LD_{50}): Acute: 3,500 mg/kg [Rat].
DERMAL (LD_{50}): Acute: 17,800 uL/kg [Rabbit].
INTRAPERITONEAL (LD_{50}): Acute: 2,624 mg/kg [Rat].
NTP completed a 2-year inhalation bioassay of ethylbenzene in rodents. The study was conducted in rats and mice at exposure concentrations of 0, 75, 200 and 750 ppm. No significant effects were observed at the 75 and 200 ppm levels. However, compared to chamber controls, the severity of nephropathy was increased in rats at the 750 ppm level; and male rats had higher incidences of renal tubule carcinomas. Step section analyses of the kidneys found a significant increase hyperplasia and renal tubule adenomas in both male and female rats. Also at this 750 ppm level, male mice had a higher incidence of alveolar/bronchiolar adenomas and carcinomas and female mice had increased hepatocellular adenomas and carcinomas when compared to chamber controls. Also, hyperplasia was observed in the thyroid gland of both sexes of mice and in the pituitary gland of female mice. The relevance of these findings to human health is unclear. However, based upon this data, the IARC has designated ethylbenzene as possibly carcinogenic to humans (Group 2B).

Diesel exhaust particulate:
Lung tumor and lymphomas were identified in rats and mice exposed to unfiltered diesel fuel exhaust in chronic inhalation studies. Further, epidemiological studies have identified increase incidences of lung cancer in US railroad workers and bladder cancer in bus and truck drivers possibly associated with exposure to diesel engine exhaust. NTP has determined that exposure to diesel exhaust particulates, a complex mixture of combustion products of diesel fuel, is reasonably anticipated to be a human carcinogen. In addition, NIOSH has identified complete diesel exhaust as a potential carcinogen.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Freshwater Toxicity:
Concentration: 2400 ppm Exposure: 48 hrs. Species: Juven. Am. Shad (*Squalius cephalus*) Effect: TLM
Concentration: >127 ppm Exposure: 96 hrs. Species: Bluegill (*Lepomis macrochirus*) Effect: LC50

Saltwater Toxicity
Concentration: 10 ppm Exposure: 96 hrs. Species: Menhaden (*Brevoortia patronus*) Effect: LC50
Concentration: 10 ppm Exposure: 96 hrs. Species: Grass Shrimp Effect: LC50

Environmental Fate

If spilled, this material will normally evaporate. Hydrocarbon components may contribute to atmospheric smog. If released to the subsoils, petroleum middle distillate fuels will strongly adsorb to soils. Groundwater should be considered as an exposure pathway. Liquid and vapor can migrate through the subsurface and preferential pathways (such as utility line backfill) to downgradient receptors.

Middle distillates are potentially toxic to freshwater and saltwater ecosystems. Distillate fuels will normally float on water. In stagnant or slow-flowing waterways, a hydrocarbon layer can cover a large surface area. As a result, this oil layer can limit or eliminate natural atmospheric oxygen transport into the water. With time, if not removed, oxygen depletion in the waterway can cause a fish kill or create an anaerobic environment. Also, this coating action can also kill plankton, algae, and water birds.

SECTION 13: DISPOSAL CONSIDERATIONS

Hazard characteristic and regulatory waste stream classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper storage, transportation, treatment and/or disposal methodologies for spent materials and residues at the time of disposition.

Maximize material recovery for reuse or recycling. If spilled material is introduced into a wastewater treatment system, chemical and biological oxygen demand (COD and BOD) will likely increase. Vapor emissions from a bio-oxidation process contaminated with this material might be a potential health hazard.

Recovered non-usable material may be regulated by US EPA as a hazardous waste due to its ignitibility (D001). In addition, conditions of use may cause this material to become a hazardous waste, as defined by Federal or State regulations. It is the responsibility of the user to determine if the material is a hazardous waste at the time of disposal. Transportation, treatment, storage, and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR Parts 260 through 271). State and/or local regulations might be even more restrictive. Contact the RCRA/Superfund Hotline at (800) 424-9346 or your regional US EPA office for guidance concerning case specific disposal issues.

SECTION 14: TRANSPORT INFORMATION

The shipping description below may not represent requirements for all modes of transportation, shipping methods or locations outside of the United States.

US DOT Status

A U.S. Department of Transportation (DOT) regulated material. The following U. S. DOT hazardous materials shipping description applies to bulk packaged material that is transported by highway or rail. Alternate shipping descriptions may be required for product transported by marine vessel, air or other method and for non-bulk packaged material.

Proper Shipping Name

Diesel Fuel, No. 1, Combustible liquid, NA1993, PG III

Hazard Class

DOT Class: Combustible liquid with a flash point greater than 37.8°C (100°F).

Packing Group(s) III

UN/NA ID NA 1993 or UN 1202

Reportable Quantity

A Reportable Quantity (RQ) has not been established for this material.

Placards

Emergency Response Guide No.	128
HAZMAT STCC No.	49 122 12
MARPOL III Status	Not a DOT "Marine Pollutant" per 49 CFR 171.8.

SECTION 15: REGULATORY INFORMATION

TSCA Inventory

This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.

SARA 302/304

The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to Subparts 302 and 304 to submit emergency planning and notification information based on Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs) for "Extremely Hazardous Substances" listed in 40 CFR 302.4 and 40 CFR 355. No components were identified.

SARA 311/312

The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to this subpart to submit aggregate information on chemicals by "Hazard Category" as defined in 40 CFR 370.2. This material would be classified under the following hazard categories:

Fire, Acute (Immediate) Health Hazard, Chronic (Delayed) Health Hazard

SARA 313

This product contains the following components in concentrations above de minimis levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA:
Naphthalene [CAS No.: 91-20-3] Concentration: 0 - 2%
1, 2, 4 Trimethylbenzene [CAS No.: 95-63-6] Concentration: 0 - 1%

CERCLA

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center concerning release of quantities of "hazardous substances" equal to or greater than the reportable quantities (RQ's) listed in 40 CFR 302.4. As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically designated in 40 CFR 302.4. Chemical substances present in this product or refinery stream that may be subject to this statute are:
Naphthalene [CAS No.: 91-20-3] RQ = 100 lbs. (45.36 kg) Concentration: 0 - 3%
Ethylbenzene [CAS No.: 100-41-4] RQ = 1000 lbs. (453.6 kg) Concentration: 0.5%
Xylene, all isomers [CAS No.: 1330-20-7] RQ = 100 lbs. (45.36 kg) Concentration: 0.5%
Cumene [CAS No.: 98-82-8] RQ = 5000 lbs. (2268 kg) Concentration: 0.5%
Benzene [CAS No.: 71-43-2] RQ = 10 lbs. (4.536 kg) Concentration: <0.05%

CWA

This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.

California Proposition 65

This material may contain the following components which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):
Naphthalene: 0 - 3%
Toluene: <0.05%
Benzene: <0.05%
Diesel exhaust particulate

New Jersey Right-to-Know Label

Diesel Fuel

Additional Regulatory Remarks

Federal Hazardous Substances Act, related statutes, and Consumer Product Safety Commission regulations, as defined by 16 CFR 1500.14(b)(3) and 1500.83(a)(13): This product contains "Petroleum Distillates" which may require special labeling if distributed in a manner intended or packaged in a form suitable for use in the household or by children. Precautionary label dialogue should display the following: **DANGER: Contains Petroleum Distillates! Harmful or fatal if swallowed! Call Physician Immediately. KEEP OUT OF REACH OF CHILDREN!**

SECTION 16: OTHER INFORMATION

Refer to the top of Page 1 for the HMIS and NFPA Hazard Ratings for this product.

REVISION INFORMATION

Version Number	1.0
Revision Date	03/20/2003
Print Date	Printed on 03/20/2003.

ABBREVIATIONS

AP: Approximately EQ: Equal >: Greater Than <: Less Than NA: Not Applicable ND: No Data NE: Not Established

ACGIH: American Conference of Governmental Industrial Hygienists
AIHA: American Industrial Hygiene Association
IARC: International Agency for Research on Cancer
NTP: National Toxicology Program
NIOSH: National Institute of Occupational Safety and Health
OSHA: Occupational Safety and Health Administration
NPCA: National Paint and Coating Manufacturers Association
HMIS: Hazardous Materials Information System
NFPA: National Fire Protection Association
EPA: US Environmental Protection Agency

DISCLAIMER OF LIABILITY

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THE CONDITIONS OR METHODS OF HANDLING, STORAGE, USE, AND DISPOSAL OF THE PRODUCT ARE BEYOND OUR CONTROL AND MAY BE BEYOND OUR KNOWLEDGE. FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.

***** END OF MSDS *****

APPENDIX B

INCIDENT REPORTS

Approved By:

Signature on File	Signature on File
Richard L. Barcum, CSP, CHMM	David D. Alleman, CPA
Manager, Corporate Health and Safety	Vice President, CFO

Procedure

INCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish the requirements for incident reporting, investigation, and review. This procedure is an integral part of the company's overall incident prevention program and aids in the determination of causal factors and corrective actions necessary to prevent incident re-occurrence. Key elements of this procedure include:

- **Prompt reporting and investigation of all occupational injuries/illness, vehicle incidents, property damage incidents, and near miss incidents.**
- Review by an Incident Review Board of all Occupational Safety and Health Administration (OSHA) recordable injuries/illnesses and at-fault vehicle incidents. The Incident Review Board report is submitted/approved up through management to the appropriate Vice President.
- Immediate reporting to the Manager, Corporate Health and Safety, all incidents involving a fatality, injury/illness, or resulting in property damage in excess of $1000.

2.0 RESPONSIBILITY MATRIX

2.1 Procedure Responsibility

The Manager, Corporate Health and Safety is responsible for the issuance, revision and maintenance of this procedure.

2.2 Action/Approval Responsibilities

See Responsibility Matrix (See Attachment 1)

3.0 DEFINITIONS

3.1 **Company** - TolTest, Incorporated.

3.2 **OSHA Recordable Case** – All work-related fatalities and illnesses and those work-related injuries which result in loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid (see Attachment 6).

3.3 **Lost Workday Case** – Cases which involve days away from work or days of restricted work activity or both. Days away from work are the number of work days (consecutive or not), excluding the date of injury, the employee **would have worked**, but could not because of occupational injury or illness; and/or the number of work days (consecutive or not), excluding the date of injury, on which, because of injury or illness:

- The associate was assigned to another job on a temporary basis, or
- The associate worked at a permanent job less than full time, or
- The associate worked at a permanently-assigned job, but could not perform all duties **normally** connected with it.

3.4 **Near Miss Incident** – Any incident where no injury or property damage occurred, but where the potential for injury or property damage existed.

3.5 **At-Fault Vehicle Incident** – Any vehicle incident will be considered an At-Fault Incident when specific action or inaction by a TolTest associate or subcontract employee directly contributed to the cause and/or severity of the incident.

3.6 **Vehicle** – Any vehicle, including trucks, used upon the highway or in private facilities for transporting passengers and/or property. For the purpose of this procedure, off-road vehicles such as earthmoving equipment, forklifts, non-highway used trucks, etc. are not considered vehicles.

3.7 **Property Damage Incident** – Any incident, in which a company associate or subcontractor is a party which results in property damage, regardless of ownership, in excess of $1000. For the purpose of this procedure, off-road vehicles such as earthmoving equipment, forklifts, non-highway used trucks, etc. are considered property, even if the equipment is rented.

4.0 TEXT

4.1 Incident Reporting Process

Associates are required to immediately report to their direct supervisor all occupational injuries, illnesses, incidents and near miss incidents that have the potential for injury.

Any supervisor (but preferably the supervisor directly responsible for the involved associate(s)) with first-hand knowledge of the incident is required to ***immediately*** arrange for appropriate medical attention, *including drug and alcohol testing*, and contact the Manager, Corporate Health and Safety, **prior** to the associate receiving medical treatment (not applicable for life threatening situations). See Section 4.8 for the requirements regarding post incident drug and alcohol screening.

Prior to an injured associate returning to his/her job duties, a medical release shall be provided to the Manager, Corporate Health and Safety. The medical release shall be completed and signed by the attending physician and include probable release date, work restrictions (if any), dates of restrictions (if any), medicine prescribed (if any) and the date(s) of any required medical follow-up(if any).

If the supervisor does not feel that they will be able to accommodate the work restrictions, approval by the Manager, Corporate Health and Safety **and** the Manager, Human Resources is required **prior** to sending the associate home.

- The supervisor is to initiate/complete the appropriate company documentation in accordance with the following incident classifications:

  - <u>Injury/Illness</u>
    a. Associate Injury Report (Attachment 2)
    b. Incident Investigation Report (Attachment 4)
    c. Incident Review Board (Attachment 5) – if determined by Health and Safety to be an OSHA Recordable Incident

  - <u>Vehicle Incidents</u>
    a. Vehicle Incident Report (Attachment 6)
    b. Incident Investigation Report (Attachment 4)
    c. Incident Review Board - if company associate or subcontractor is at fault and damage exceeds $1000 (Attachment 5)

  - <u>Near Miss</u>
    a. Incident Investigation Report (Attachment 4)

  - <u>Property Damage/General Liability</u>
    a. General Liability, Property Damage, and Loss Report (Attachment 3)
    b. Incident Investigation Report (Attachment 4)

c. Incident Review Board - if company associate or subcontractor is at fault and damage exceeds $1000 (Attachment 5)

All forms, with the exception of the Incident Review Board and Incident Investigation Report, must be completed and forwarded to the Manager, Corporate Health and Safety within **one** business day of the incident.

4.2 Associate Injury Report

The Associate Injury Report (Attachment 2) is to be completed for all incidents that result in an associate occupational injury or illness. It is to be initiated by the supervisor or the injured employee. The Manager, Corporate Health and Safety must receive a **completed** copy (including all signatures) of the report within one business day of the incident.

4.3 Vehicle Incident Report

The Vehicle Incident Report (Attachment) must be completed for any vehicle incident in which a company vehicle is involved. This includes company-owned or leased vehicles, rental vehicles, and personal vehicles being used for company business. This report is to be initiated by the associate involved in the incident or his/her direct supervisor. The Manager, Corporate Health and Safety must receive a **completed** copy (including all signatures) of the report within one business day of the incident.

4.4 General Liability, Property Damage, and Loss Report

The General Liability, Property Damage and Loss Report (Attachment 3) is to be used for all losses or damage to company property in excess of $1000. This form must be completed for all third party property damage, regardless of value, which occurred as a result of company activities. The associate most familiar with the events that contributed to the loss or damage will initiate the form, then forward it to the supervisor responsible for the project where the damage occurred. The Manager, Corporate Health and Safety must receive a **completed** copy (including all signature) of the report within one business day of the incident.

4.5 Incident Investigation Report

All injuries, illnesses, incidents, and near miss incidents will be investigated. Once arrangements for immediate medical care have been made, the associate's direct supervisor, with assistance from the appropriate Corporate Health and Safety Committee Representative and/or the Manager, Corporate Health and Safety, will:

- Reconstruct the conditions which lead to the incident (collect the <u>facts</u>)

- Describe and document (include sketch, photos, etc.) how the incident occurred.
- List witnesses and collect written statements when possible
- Identify and discuss the causative factors
- Identify the unsafe act(s) or unsafe condition(s) that contributed to the incident
- Identify possible systematic/management deficiencies
- List corrective action(s) which are to be taken to prevent re-occurrence of the incident, the person responsible for the corrective action, and the date by which the action(s) is/are to be completed.

The investigation will be started as soon as possible after the incident and a **completed** (i.e. including signatures) written report (Attachment 4) submitted to the Manager, Corporate Health and Safety within 3 business days.

4.6 Incident Review Board

The purpose of the Incident Review Board is to review the information gathered for each incident and take appropriate action to prevent its recurrence. The Incident Review Board shall be composed of the involved associate's direct supervisor, the appropriate Corporate Health and Safety Committee Representative, and the associate(s) involved in the incident. When appropriate, the Manager, Corporate Health and Safety should be involved.

An Incident Review Board will be convened, within **10 working days** of the incident, for all OSHA Recordable Incidents, At Fault Vehicle Incidents and roperty Damage Incidents in which a company associate or subcontractor is at fault and damage exceeds $1000.

The involved associate's Health and Safety Committee Representative is responsible for convening the Incident Review Board and completing the Incident Review Board form (Attachment 5). The Manager, Corporate Health and Safety must receive a **completed** copy (including supervisor and associate signatures) of the report within three (3) business day of the convening of the Incident Review Board.

It is generally not acceptable to discipline an associate for having an incident. However, if the Incident Review Board determines that the incident resulted

from an unsafe act or violation of company procedure on the associate's part, the employee may be subject to disciplinary action in accordance with the company's progressive disciplinary action system. Disciplinary action is NOT authorized to be taken without all of the appropriate (Manager, Corporate Health and Safety, Manager, Human Resources, Division Vice President) reviews and approvals.

4.7 Insurance Notification

Notification to the appropriate insurance carrier is the responsibility of the Health and Safety Department. No other individuals are authorized to contact an insurance carrier to report an incident.

4.8 Post Incident Drug and Alcohol Screening

Post incident drug and alcohol screening is required for the following associates:

- Associate's who receive **off site medical evaluation or treatment** as a result of an injury.
- Associate's who are at fault in a **vehicle incident** or **property damage** incident resulting in greater than **$5000 damage**.
- Associate's involved in **near misses and/or minor injuries** in which the **potential consequence** was much more **severe** than the actual result of the incident. This should be at the discretion of the Supervisor with the concurrence of a member of the Corporate Health and Safety Committee Representative.

5.0 EXCEPTION PROVISIONS

Variances to this procedure shall be requested in accordance with established variance procedures.

6.0 ATTACHMENTS

1. Responsibility Matrix
2. Associate Injury Report
3. General Liability, Property Damage, and Loss Report
4. Incident Investigation Report
5. Incident Review Board Report
6. Vehicle Incident Report

ATTACHMENT 1
RESPONSIBILITY MATRIX

Action	Procedure Section	Responsible Party					
		Associate	Supervisor	Corp. Health and Safety Committee Rep.	Manager, Corporate Health & Safety	Division Vice President	Manager, Human Resources
Issue, Revise and Maintain Procedure	2.1				X		
Report All Incidents to Supervisor	4.1	X					
Notify Manager, Corporate Health and Safety	4.1	X	X				
Arrange Medical Care	4/1		X	X	X		
Initiate/Complete Company Forms	4.1, 4.2, 4.3, 4.4, 4.5		X				
Complete Investigation of Incident	4.5, 4.6		X	X (if appropriate)	X (if appropriate)		
Conduct Incident Review Board	4.6			X			
Report Injury/Incident to Insurance	4.7				X		
Participate in Incident Review Board	4.6	X	X	X	X (if appropriate)		
Review and Sign Incident Review Board Report	4.6	X	X		X	X	X

ATTACHMENT 2
ASSOCIATE INJURY REPORT

This report is to be initiated by the associate's supervisor. Please answer all questions completely. This report must be forwarded to the Manager, Corporate Health and Safety within 24 hours of the injury/illness.

Injured's Name _____ Sex _____ SSN _____ Birth Date _____

Home Address _____

City _____ State _____ Zip _____ Phone ( ) _____

Job Title _____ Hire Date _____ Hourly Wage _____

ASSOCIATE

Date of Incident _____ Time _____ Time Reported _____ To Whom? _____

Project/Department Name _____ Address _____

Project No _____ Time Shift Began _____ Did Associate Leave Work? No Yes When? _____

Has associate returned to work? No Yes When _____ Did associate miss a regularly scheduled shift? No Yes

Doctor/Hospital Name _____ Address _____

Witness Name(s) _____ Statement Attached? No Yes

Nature of Injury _____ Exact Body Part _____

Medical Attention: None First Aid On Site Doctor's Office Hospital ER Hospitalized

Job Assignment at Time of Incident _____

Describe Incident _____

Associate: _____ _____ _____
Print Signature Date

SUPERVISOR

Comments on Incident and Corrective Action(s) _____

What Unsafe Condition(s) and/or Act(s) Contributed to the Incident? _____

What Corrective Action(s) Have Been Taken to Prevent Recurrence? _____

Supervisor: _____ _____ _____
Print Signature Date

ASSOCIATE INJURY REPORT

CONTINUED

Concur With Action Taken? Yes No Remarks _____

OSHA Classification: First Aid Recordable, No Lost/Restricted Workdays

Recordable, Lost Workdays Recordable, Restricted Activity Fatality

Days Away From Work _____ Days Restricted Work _____

Worker's Compensation Claim Number (if applicable) _____

TolTest Tracking No. _____

Verbal Received (Date/Time) _____ Report Received (Date/Time) _____

Drug Screen Yes No Alcohol Screen Yes No

Manager, Corporate Health and Safety:

Manager, Corporate Health and Safety

Print	Signature	Date

A. Type of Injury or Illness Code: _____ E. Agent Code: _____

B. Injured Body Part Code: _____ F. Safety Rule Violated Code: _____

C. Activity at Time of Incident Code: _____ G. Incident Prevention Code: _____

D. Injury Cause Code: _____ H. Instruction/RE-Instruction Code: _____

ATTACHMENT 3
GENERAL LIABILITY, PROPERTY DAMAGE AND LOSS REPORT

This report is to be completed for all losses or damage to company property in excess of $1000 and all third party damage, regardless of value, resulting from company activities.

Project/Department/Location _____ Project No. _____ Date _____

Address _____

How Did Damage or Loss Occur: _____

_____

_____

Description and Value ($) of Damaged/Lost/Stolen Property:

_____

Location of Damaged/Lost/Stolen Property (Before Loss): _____

Date and Time of Damage, Loss or Theft: _____

Owner of Damaged/Lost/Stolen Property:

Name _____ Phone No. ( ) _____

Address _____ City _____

Employer and Address _____

Injured Parties (Also completed a Supervisor's Associate Injury Report if a Company Associate):

Name _____ Phone No. ( ) _____

Address _____ City _____

Employer and Address _____

Description of Injury _____

Witnesses:

1. Name _____ Phone No. ( ) _____

   Address _____ City _____

   Employer and Address _____

2. Name _____ Phone No. ( ) _____

   Address _____ City _____

   Employer and Address _____

Were Pictures Taken? Yes No
Were Police Notified? Yes No Dept _____ Report No. _____

Completed By:

Print	Signature	Date

Manager, Corporate Health and Safety:

Print	Signature	Date

ATTACHMENT 4
INCIDENT INVESTIGATION REPORT

*** MUST BE COMPLETED WITHIN 72 HOURS ***

Investigation Date _____ Date of Incident _____

Employee Name _____

Supervisor Name _____

Dept. Name/Project Number/Project Name _____

Location of Incident _____

- Incident Classification

Injury	First Aid	Vehicle	Chargeable	DOT	DOT Vehicle
	OSHA Recordable		Non-Chargeable		DOT Reportable
	Lost Workday				
	Restricted Workday	Near Miss		General Liability	

- Description (Provide facts, describe how incident occurred, provide diagram [on back] or photos)

_____

_____

_____

- Analysis 1 (What unsafe acts or conditions contributed to the incident?)

_____

_____

_____

- Analysis 2 (What systematic or management deficiencies contributed to incident?)

_____

_____

- Corrective Action(s) (List corrective action items, responsible person, scheduled completion date)

_____

_____

_____

_____

- Witnesses (Attach statements or indicate why unavailable)

_____

_____

Investigated By	Print	Signature	Date
Manager, Corp. Health and Safety	Print	Signature	Date

ATTACHMENT 5
INCIDENT REVIEW BOARD

DATE:	LOCATION:
BOARD MEMBERS:	
INCIDENT DATE:	ASSOCIATE(S) INVOLVED IN INCIDENT:
INVESTIGATION COMPLETE: YES NO	INCIDENT CLASSIFICATION

THE FOLLOWING INFORMATION MUST BE PROVIDED BY THE REVIEW BOARD FOR THIS INCIDENT (PRINT)

SUPERVISOR: _____

CAUSE OF INCIDENT:

ACTION(S) RECOMMENDED BY BOARD*:

*ALL ACTIONS BY THE INCIDENT REVIEW BOARD ARE SUBJECT TO FINAL REVIEW BY THE INDIVIDUALS LISTED BELOW.

ACCEPTED:

_____ ASSOCIATE SIGNATURE

_____ SUPERVISOR SIGNATURE

ACCEPTED: _____ MANAGER, CORPORATE HEALTH AND SAFETY

REJECTED FOR: _____

ACCEPTED: _____ MANAGER, HUMAN RESOURCES

REJECTED FOR: _____

ACCEPTED: _____ DIVISION VICE PRESIDENT

REJECTED FOR: _____

ATTACHMENT 6
VEHICLE INCIDENT REPORT

INCIDENT DESCRIPTION

This report is to be initiated by the associate involved in the incident or his/her direct supervisor. Please answer all questions completely. This report must to forwarded to the Manager, Corporate Health and Safety within 24 hours of the incident.

INCIDENT DATE _____ TIME _____ A.M. or P.M.
LOCATION OF INCIDENT (ADDRESS, CITY AND STATE) _____
DESCRIPTION OF INCIDENT _____

WITNESS _____ PHONE NO. ( )
ADDRESS _____ CITY _____ STATE _____ ZIP _____
POLICE OFFICER'S NAME _____ DEPARTMENT _____

COMPANY VEHICLE

DRIVER _____ DRIVERS LICENSE _____ STATE _____
ADDRESS _____ CITY _____ STATE ____ ZIP: _____
WORK PHONE NO ( ) _____ SSN _____ PROJECT NAME/NO _____ OFFICE/DEPT _____
VEHICLE NO ____ YEAR _____ MAKE _____ MODEL _____ LICENSE PLATE NO _____
STATE _____ VEHICLE OWNER ___ COMPANY ___ LEASED/RENTED ___ PRIVATE VEHICLE
VEHICLE TYPE ___ COMMERCIAL MOTOR VEHICLE ___ NON COMMERCIAL
IF NOT COMPANY-OWNED: OWNER _____ PHONE NO ( )
ADDRESS _____ CITY _____ STATE ____ ZIP _____
VEHICLE DAMAGE _____
NO. OF VEHICLES TOWED FROM SCENE ___ NUMBER OF INJURIES ____ NUMBER OF FATALITIES ____
WERE HAZARDOUS MATERIALS RELEASE? ___ YES ___ NO IF YES, DESCRIBE MATERIALS _____

OTHER VEHICLE

DRIVER _____ DRIVERS LICENSE _____ STATE _____
ADDRESS _____ CITY _____ STATE ____ ZIP
PHONE NO ( ) _____ SSN _____
OWNERS NAME (CHECK IF SAME AS DRIVER __) _____
ADDRESS _____ CITY _____ STATE ____ ZIP _____
INSURANCE COMPANY _____ POLICY NO _____
ADDRESS _____ CITY _____ STATE ____ ZIP
VEHICLE: YEAR _____ MAKE _____ MODEL _____ PLATE NO _____ STATE _____
VEHICLE IDENTIFICATION NUMBER _____
VEHICLE DAMAGE _____
PASSENGERS YES NO INJURIES YES (List names and telephone numbers below) NO

WEATHER ____ CLEAR ___ CLOUDY ___ FOG ___ RAIN
____ SLEET ___ SNOW ___ OTHER _____

PAVEMENT ____ ASPHALT ___ STEEL ___ CONCRETE ___ WOOD
____ GRAVEL/DIRT ___ BRICK/STONE ___ OTHER

CONDITION ____ DRY ___ WET ___ ICY ___ POTHOLES
OTHER _____

TRAFFIC CONTROL ____ TRAFFIC LIGHT ___ STOP SIGN ___ RAILROAD
____ NO INTERSECTION ___ NO CONTROL

VEHICLE INCIDENT REPORT
(continued)

ROADWAY NUMBER OF LANES EACH DIRECTION ___ ___ RESIDENTIAL
_____ DIVIDED HIGHWAY ___ UNDIVIDED HIGHWAY

Draw and name roadways showing each vehicle, direction of travel, and point of impact. Indicate travel direction before the incident with a solid line and post-incident movement with a broken line.

SYMBOLS:

Your Vehicle ①

Other Vehicle(s) ②

③

Pedestrian

Stop Sign

Yield ▽

Railroad

ADDITIONAL INFORMATION: _____

ASSOCIATE _____ (Print) _____ (Signature) _____ (Date)

SUPERVISOR _____ (Print) _____ (Signature) _____ (Date)

DEPARTMENT SAFETY REPRESENTATIVE _____ (Print) _____ (Signature) _____ (Date)

CORPORATE HEATLH & SAFETY MNGR. _____ (Print) _____ (Signature) _____ (Date)

HEALTH & SAFETY DEPARTMENT

TRACKING # _____ INCIDENT REPORT ORDERED _____ AT FAULT Y N

ORIGINAL: ___ H&S FILE D&A SCREEN DEFENSIVE DRIVING Y N

CC: ___ ASSOCIATE ___ DEPT. SAFETY REP ___ W/C FILE ___ DENISE

APPENDIX C

EXCAVATING AND TRENCHING PROCEDURES

Approved By:

Signatures on File	Signatures on File
Richard L. Barcum, CSP, CHMM	David D. Alleman, CPA
Manager, Corporate Health and Safety	Vice President, CFO

Procedure

EXCAVATION AND TRENCHING

1.0 PURPOSE AND SUMMARY

This procedure presents the federal requirements for excavation safety. Excavation operations pose unique and serious hazards. With very few exceptions, protective systems must be designed and installed to protect associates who enter excavations. Accepted protective systems include; sloping (including benching), shoring and shielding. The protective system must be designed by a registered professional engineer (civil), and plans must be available for inspections on-site, under prescribed conditions.

In addition to federal requirements, some states (such as California) and localities may require notification of trenching/excavation operations prior to beginning work.

Compliance with this procedure is mandatory to ensure associate protection when working in or around excavations. Additional programs in the Corporate Health and Safety Program manual on confined space, hazard communication, lock-out/tag-out, respiratory protection, and any other safety programs or procedures deemed essential for associate protection, are to be used in conjunction with this program.

2.0 RESPONSIBILITY MATRIX

2.1 Procedure Responsibility

The Manager, Corporate Health and Safety is responsible for the issuance, revision and maintenance of this procedure.

2.2 Program Responsibility

This program will be monitored by the Corporate Health and Safety Department.

2.3 Supervisors and Managers

It is the responsibility of each Project Supervisor and Project Manager to implement and maintain the procedures and steps set forth in this program.

2.4 Associates

Each associate involved with excavation and trenching work is responsible to comply with all applicable safety procedures and requirements of this program.

3.0 DEFINITIONS

3.1 **Accepted Engineering Requirements** – Those requirements or practices which are compatible with standards required by a registered professional engineer (civil).

3.2 **Angle Of Repose** – The greatest angle above the horizontal plane at which a material will lie without sliding.

3.3 **Benching** - A method of protecting associates from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels.

3.4 **Cave-In** - The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by failing or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

3.5 **Competent Person** - One who is capable of identifying existing and predictable hazards in the surroundings or working conditions, which are unsanitary, hazardous, or dangerous to associates, and who has authorization to take prompt corrective measures to eliminate them.

3.6 **Confined Space** – A space that:

- Is large enough and so configured that an associate can bodily enter and perform assigned work; and

- Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults and pits are spaces that may have limited means of entry); and
- Is not designed for continuous associate occupancy.

3.7 **Design Engineer** – An individual, currently registered as a civil engineer in the applicable state, who, in all other respects, meets the requirements of a pertinent State OSHA Program, or Federal OSHA in terms of his or her ability to design shoring, sloping, benching, or alternate trench/excavation systems.

3.8 **Duration Of Exposure** - The longer an excavation is open, the longer the other factors have to work on causing it to collapse.

3.9 **Excavation** - Any man-made cut, trench, or depression in an earth surface, formed by earth removal.

3.10 **Hazardous Atmosphere** - An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

3.11 **Project Manager** – An individual who is responsible to coordinate and direct the activities of both the Design Engineer and the Project Supervisor. The Project Manager is responsible to assure that all pre-excavation requirements are met.

3.12 **Project Supervisor** – An individual, such as a supervisor or engineer, who is familiar with the installation of shoring or sloping/benching systems and the attendant hazards of excavation or trenching operations. Project supervisors shall meet the particular requirements of State OSHA programs, or where applicable, the requirements of a Federal OSHA competent person. Project Supervisors shall assure that excavation/trenching work practices are properly followed.

3.13 **Protective System** - A method of protecting associates from cave-ins, from material that could fall or roll from an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide necessary protection.

3.14 **Sheeting** – Means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

3.15 **Shield** - A structure that is capable of withstanding the forces imposed on it by a cave-in and thereby protects associates within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. All shields must be in accordance with 29 CFR 1926.652(c)(3) or (c)(4).

3.16 **Shoring** – Means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

3.17 **Sloping** - A method of protecting workers from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences such as soil type, length of exposure, and application of surcharge loads.

3.18 **Spoil** – The earth material that is removed in the formation of an excavation or trench.

3.19 **Support System** – Means a structure, such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

3.20 **Surcharge Loads** - Generated by the weight of anything in proximity to the excavation, push starts for a cave-in (anything up top pushing down). Common surcharge loads:

- weight of spoil pile
- weight of nearby buildings, poles, pavement, or other structural objects.
- weight of material and equipment

3.21 **Tabulated Data** – Means a table and charts approved by a registered professional engineer (civil) and used to design and construct a protective system.

3.22 **Trench** - A narrow excavation below the surface of the ground, less than 15 feet wide, with a depth no greater than the width.

3.23 **Undermining** - Undermining can be caused by such things as leaking, leaching, caving or over-digging. Undermined walls can be very dangerous.

3.24 **Vibration** - A force that is present on construction sites and must be considered. The vibrations caused by backhoes, dump trucks, compactors and traffic on job sites can be substantial.

4.0 EXCAVATION COMPETENT PERSON

Before any excavation activity begins, TolTest will designate an excavation competent person who will oversee all TolTest activities in and around the excavation. This procedure applies regardless of whether personnel will enter a trench or an excavation. The TolTest competent person will determine the safety measures needed at all TolTest projects which involve excavation.

4.1 Competent Person Responsibilities

The competent person is defined as one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to associates, and who has authorization to take prompt corrective measures to eliminate them.

Additionally, the competent person must be on-site during any excavation activity for which he or she is responsible. The competent person must also perform or be capable of performing the following tasks:

- Application of 29 CFR 1926 Subpart P to the excavation activity;
- Daily inspections of the excavation, including an inspection after a hazard increasing event such as rain;
- Classifying soil at the excavation;
- Determining proper protective requirements;
- Determining the need for excavation de-watering operations and monitoring all de-watering activity;
- Completing the TolTest Excavation Permit.

5.0 SOIL CLASSIFICATION

Appendix A of 29 CFR 1926 Subpart P outlines the minimum requirements for the classification of soil at TolTest project sites. Upon determining the soil type, the

competent person must then determine the protection systems which will be used to protect any associate or subcontractor who may enter the excavation.

5.1 OSHA Soil Classifications

The following are the soil classifications recognized by OSHA in 29 CFR 1926 Subpart P. The competent person must classify the soil based on the manual and visual tests conducted at the excavation site.

5.1.1 **Type A** soil means:

Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (TSF) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam, and, in some cases, silty clay loam and sandy clay loam. Cemented soils like caliche and hardpan are considered Type A.

However, Soil is **NOT** Type A if:

- It is fissured; or
- The soil is subject to vibration from heavy traffic, pile driving or similar effects; or
- The soil has been previously disturbed; or
- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- The material is subject to other factors that would require it to be classified as a less stable material.

The exclusions for Type A most generally eliminate it from most construction situations.

5.1.2 **Type B** soil means:

- Cohesive soil with an unconfined compressive strength greater than 0.5 TSF (48 kPa) but less than 1.5 TSF (144 kPa); or

- Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.

- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but has been previously disturbed; or

- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subjected to vibration; or

- Dry rock that is not stable; or

- Material that is part of a sloped, layered system where the layers dip into the excavation on a slope of less steep than 4 horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

However, Soil is **NOT** Type B if:

- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater.

5.1.3 **Type C** soil means:

- Cohesive soil with an unconfined compressive strength of 0.5 TSF (48 kPa) or less; or

- Granular soils including gravel, sand, and loamy sand; or

- Submerged soil or soil from which water is freely seeping; or

- Submerged rock that is not stable; or

- Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

5.2 Soil Classification Requirements

The competent person must be able to classify each soil and rock deposit associated with a trench or excavation as stable rock, Type A soil, Type B soil, or Type C soil.

5.3 Basis of Classification

The classification of soil type must be accomplished by at least one visual and one manual test. There are several allowable tests that can be used to determine soil type. This testing must be done by the competent person and performed prior to and during the job.

These tests should be run on freshly excavated samples from the excavation and are designed to determine stability based on a number of criteria: the cohesiveness, the presence of fissures, the presence and amount of water, the unconfined compressive strength, the duration of exposure, undermining, and the presence of layering, prior to excavation and vibration.

The cohesion tests are based on methods to determine the presence of clay. Clay, silt, and sand are size classifications, with clay being the smallest sized particles, silt intermediate and sand the largest. Clay minerals exhibit good cohesion and plasticity (can be molded). Sand exhibits no elasticity and virtually no cohesion unless surface wetting is present. The degree of cohesiveness and plasticity depend on the amounts of all three types and water.

When examining the soil, three questions must be asked: Is the sample granular or cohesive? Fissured or non-fissured? What is the unconfined compressive strength measured in TSF?

Note: The competent person has the option of following the requirements in section 5 of this procedure to determine soil type <u>or</u> assuming the soil to be Type C and following the protection requirements for Type C soil.

Methods of testing soils:

- *Visual test:* If the excavated soil is in clumps, it is cohesive. If it breaks up easily, not staying in clumps, it is granular.

- *Wet manual test:* Wet your fingers and work the soil between them. Clay is a slick paste when wet, meaning it is cohesive. If the clump falls apart in grains, it is granular.

- *Dry strength test:* Try to crumble the sample in your hands with your fingers. If it crumbles into grains, it is granular. Clay will not crumble into grains, only into smaller chunks.

- *Pocket penetrometer test:* This instrument is most accurate when soil is nearly saturated. This instrument will give unconfined compressive strength in tons per square foot. The spring-operated device uses a piston that is pushed into a coil up to a calibration groove. An indicator sleeve marks and retains the reading until it is read. The reading is calibrated in tons per square foot (TSF) or kilograms per cubic centimeter.

- *Thumb Penetration Test:* The competent person attempts to penetrate a fresh sample with thumb pressure. If the sample can be dented but penetrated only with great effort, it is Type A. If it can be penetrated several inches and molded by light pressure, it is Type C. Type B can be penetrated with effort and molded.

  The following should be used as guidelines when performing the Thumb Penetration Test.

  Type A – Penetrated to ½ of the thumb nail length with great effort.

  Type B – Penetrated to the first thumb knuckle with great effort. Can be molded with effort

  Type C – Penetrated several inches and easily molded with little effort or crumbles apart during the Thumb Penetration Test.

- *Shearvane:* Measures the approximate shear strength of saturated cohesive soils. The blades of the vane are pressed into a flat section of undisturbed soil, and the knob is turned slowly until soil failure. The dial is read directly when using the standard vane. The results will be in tons per square foot or kilograms per cubic centimeter.

  The competent person will perform several tests of the excavation to obtain consistent, supporting data along its depth and length.

The soil is subject to change several times within the scope of an excavation and the moisture content will vary with weather and job conditions. The competent person must also determine the level of protection based on what conditions exist at the time of the test, and allow for changing conditions.

5.4 Reclassification

If, after the soil has been classified, conditions change, the competent person is responsible for evaluating the situation and, if necessary, changing the classification.

5.5 OSHA Soil Types

5.5.1 Stable Rock

Stable rock is not one of the texture classes. However, it is one of the OSHA classifications of soil. Stable rock is solid mineral material which can be excavated; and the sides stand vertical and remain stable and vertical throughout construction. Coral is not considered stable rock.

5.5.2 Cemented Soil

Cemented soils are soils that are held together by a chemical agent such as calcium carbonate. Examples of cemented soils would include caliche and hardpan. Cemented soils are classified as Type A soils with an unconfined compressive strength greater than 1.5 TSF.

5.5.3 Cohesive Soil

Cohesive soils are basically fine grained soils. Cohesive soils range from clay through clay loam. A cohesive soil will stand unsupported when excavated and is plastic when moist. That is, cohesive soil can be rolled into a ribbon. A cohesive soil is hard to break up when it is dry. Cohesive soils are classified as Type A soils with an unconfined compressive strength greater than 1.5 TSF

5.5.4 Granular Soil

Granular soils are composed of coarse grained material that have very little cohesive strength. Granular soils include loamy sand, sand and gravel. A soil is classified as granular if more than 65% of the grains

are distinguishable with the unaided eye. Granular soils, when excavated, will not stand and the walls of the excavation can crumble easily. Some granular soils will exhibit cohesion when wet, but when dry will fall apart. This type of soil is especially dangerous when found at a construction site because the walls of the trench appear to stand with no support, however, when they dry they could crumble and fall into the trench bottom. Granular soils are classified as soil Type B or C, and may require the highest degree of protection. Type C soils would have an unconfined compressive strength of less than 0.5 TSF.

5.5.5 Granular Cohesionless

Soils that range from silt through sandy loam or are composed of angular particles are said to be granular cohesionless soils. These are difficult soils to work with because the group ranges from a very stable Type B soil to the unstable Type C soil.

5.5.6 Layered Soil System

A layered soils system is composed of two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered. The layers may lay on a horizontal plane or be sloped. When they are sloped into the excavation they represent a collapse hazard to the trench wall. A slope greater than 4H:1V would classify any soil as Type C. Sloped layers less than 4H:1V may be classified as Type B soil, depending upon the soil classification. No layered system can be Type A soil.

6.0 SELECTION OF PROTECTIVE SYSTEMS

29 CFR 1926.652 requires that each associate in an excavation be protected from cave-ins by an adequate protective system unless excavations are:

- made in stable rock; or
- are less than five (5) feet in depth **and** examination by the competent person provides no indication of potential cave-in.

Additionally, whichever protective system is chosen must have the capacity to resist without failure all loads that are intended or could reasonably be applied to the system.

6.1 Design of Sloping and Benching Systems

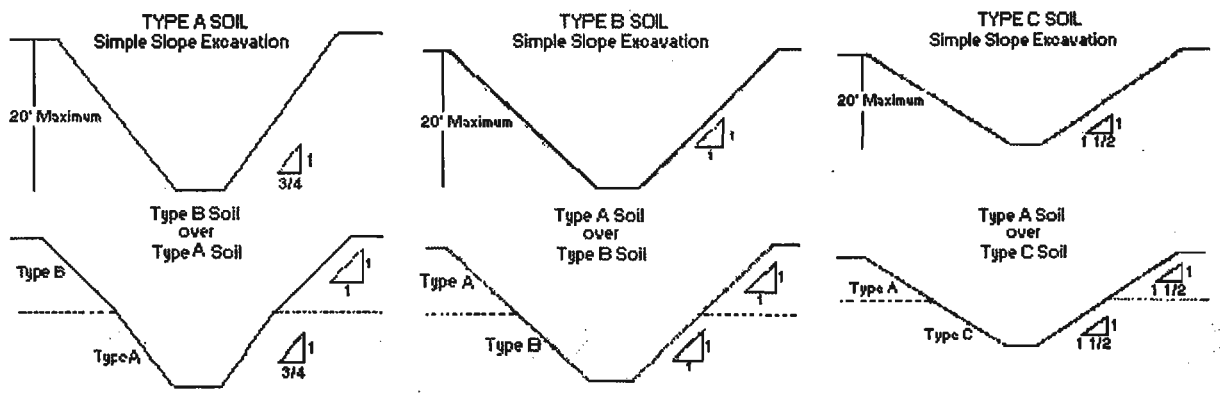
The slopes and configurations of sloping and benching systems must be determined by the competent person in accordance with the requirements of 29 CFR 1926(b)(1) through (b)(4) as well as 29 CFR 1926 Subpart P – Appendix B.

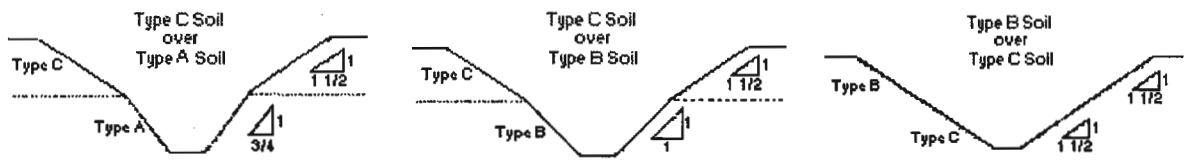
After the competent person has determined the soil type based on one visual and one manual test, he or she may design the sloping and benching systems for excavations less that 20 feet deep using the following table.

MAXIMUM ALLOWABLE SLOPES
BASED ON SOIL CLASSIFICATION

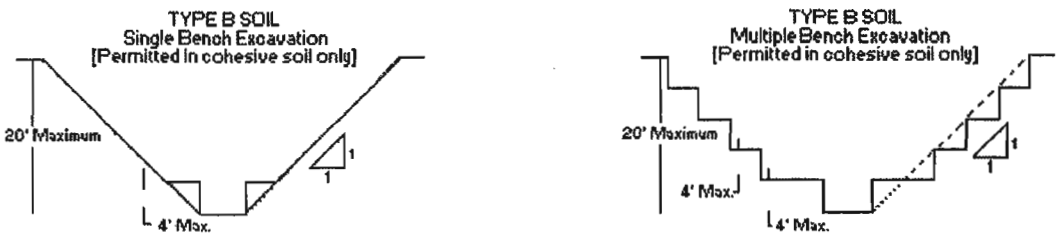
Soil Line	Maximum Allowable Slope/Bench for Excavations Less Than 20 Feet Deep
Stable Rock	Vertical Sides (90°)
Type A Soil	3/4H:1V (53°)
Type B Soil	1H:1V (45°)
Type C Soil	1 1/2H:1V (34°)
Note: If your sloped/benched soil shows any sign of distress you must increase the layback an additional 1/2H:1V.	
Note: Sloping and Benching for excavations greater than 20 feet deep must be designed by a registered professional engineer (civil).	
Note: Benching is not permitted in Type C soil unless the excavation is designed by a registered professional engineer (civil) and tabulated data provided.	

SLOPE CONFIGURATIONS





BENCH CONFIGURATIONS



6.2 Design of Support Systems, Shield Systems, and Other Protective Systems

If the competent person determines that personnel will be protected from cave-ins by a protective system other than sloping and benching, the design of the support systems, shield systems, and other protective systems must be based on the conditions at the project site and data provided by a TolTest or subcontracted registered professional engineer or from tabulated data provided by the manufacturers of the protective systems. Deviation from the engineering recommendations must be approved by the registered professional engineer.

The design of the protective system must be in accordance with the requirements of 29 CFR 1926.652(c)(1) through (c)(4) and 29 CFR 1926 Subpart P – Appendices C, D, E.

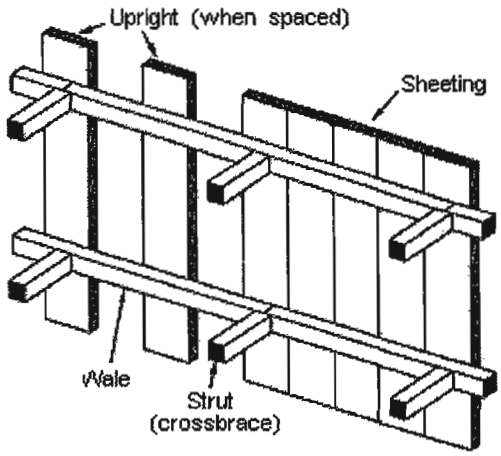
In large/deep excavations where traditional shoring and sloping are not practical, alternate protective measures may be implemented to protect personnel in the excavation. Additionally, the top of the excavation must be protected with stop logs, earthen berms, or other types of protective barriers which will keep pedestrians and vehicles from approaching the edge of the excavation. Any deviations from traditional protective systems must be approved by the Manager, Corporate Health and Safety and a registered professional engineer (civil).

6.2.1 Shoring Types

Shoring is the provision of a support system for trench faces used to prevent movement of soil, underground utilities, roadways, and foundations. Shoring or shielding is used when the location or depth of the cut makes sloping back to the maximum allowable slope

impractical. Shoring systems consist of posts, wales, struts, and sheeting. There are two basic types of shoring, timber and aluminum hydraulic.

TIMBER SHORING



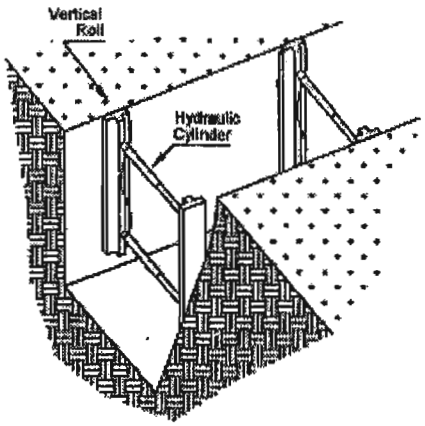
6.2.1.1 Hydraulic Shoring

Hydraulic shoring provides a critical safety advantage over timber shoring because workers do not have to enter the trench to install or remove hydraulic shoring. Other advantages of most hydraulic systems are that they:

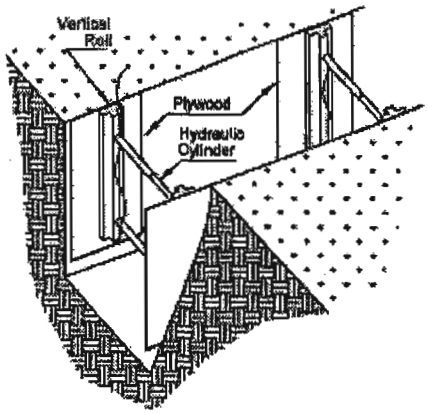
- Are light enough to be installed by one worker;
- Are gauge-regulated to ensure even distribution of pressure along the trench line;
- Can have their trench faces "preloaded" to use the soil's natural cohesion to prevent movement; and
- Can be adapted easily to various trench depths and widths.

All shoring should be installed from the top down and removed from the bottom up. Hydraulic shoring should be checked at least once per shift for leaking hoses and/or cylinders, broken connections, cracked nipples, bent bases, and any other damaged or defective parts.

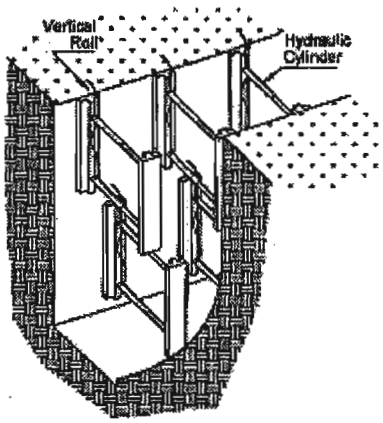
TYPICAL ALUMINUM HYDRAULIC SHORING INSTALLATIONS



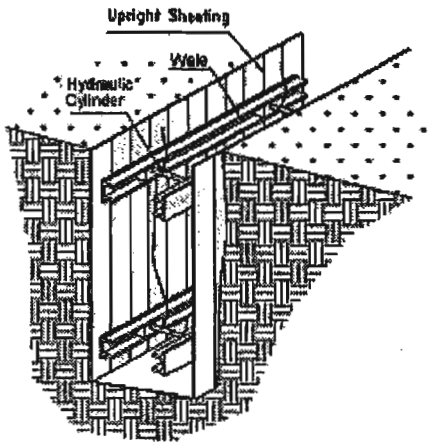
Vertical Aluminum Hydraulic Shoring (Spot Bracing)



Vertical Aluminum Hydraulic Shoring (With Plywood)



Vertical Aluminum Hydraulic Shoring (Stacked)



Aluminum Hydraulic Shoring Waler System (Typical)

6.2.1.2 Pneumatic Shoring

Pneumatic Shoring works in a manner similar to hydraulic shoring. The primary difference is that pneumatic shoring uses air pressure in place of hydraulic pressure. A disadvantage to the use of pneumatic shoring is that an air compressor must be on site.

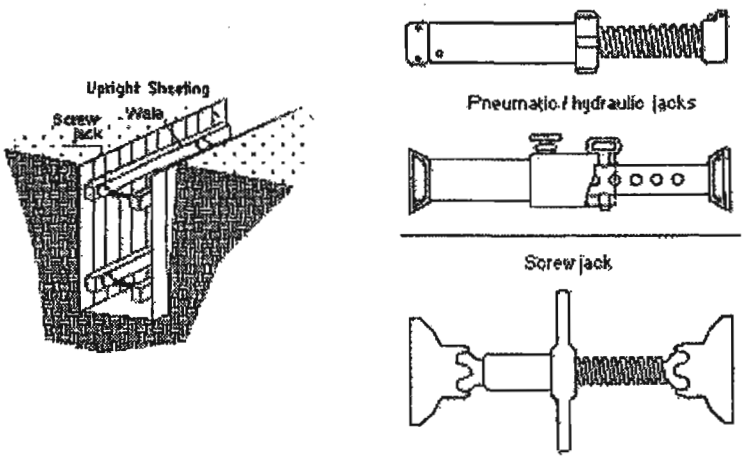
1. Screw Jacks. Screw jack systems differ from hydraulic and pneumatic systems in that the struts of a screw jack system

must be adjusted manually. This creates a hazard because the worker is required to be in the trench in order to adjust the strut. In addition, uniform "preloading" cannot be achieved with screw jacks, and their weight creates handling difficulties.

2. Single-Cylinder Hydraulic Shores. Shores of this type are generally used in a water system, as an assist to timber shoring systems, and in shallow trenches where face stability is required.

3. Underpinning. This process involves stabilizing adjacent structures, foundations, and other intrusions that may have an impact on the excavation. As the term indicates, underpinning is a procedure in which the foundation is physically reinforced. Underpinning should be conducted only under the direction and with the approval of a registered professional engineer.

SHORING VARIATIONS



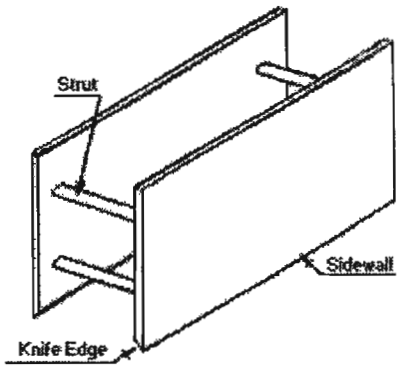
6.2.2 Shielding Types

6.2.2.1 Trench Boxes

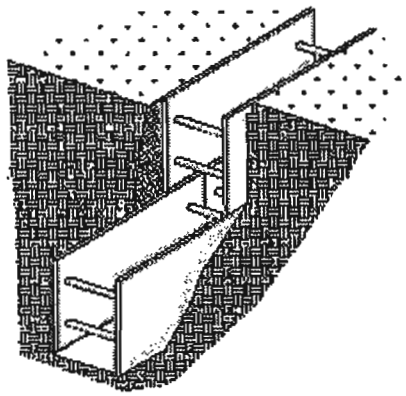
Trench Boxes are different from shoring because, instead of shoring up or otherwise supporting the trench face, they are intended primarily to protect workers from cave-ins and similar incidents. The excavated area between the outside of the trench box and the face of the trench should be as small as possible. The space between the trench boxes and the excavation side are backfilled to prevent lateral movement of the box. Shields may

not be subjected to loads exceeding those which the system was designed to withstand.

TRENCH SHIELD



TRENCH SHIELD STACKED

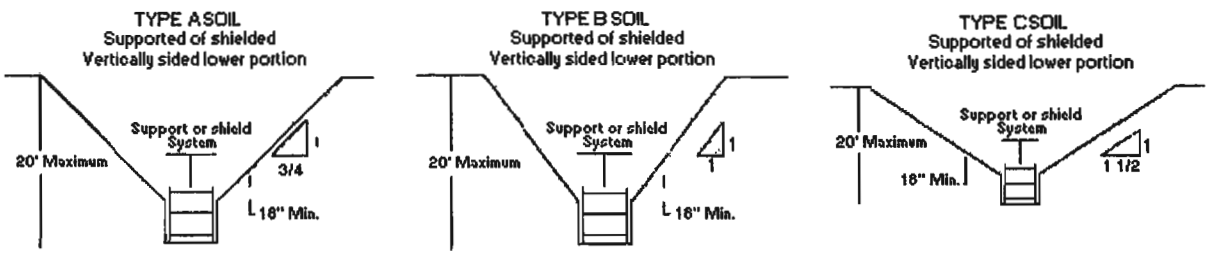


6.3 Combined Use

Trench boxes are generally used in open areas, but they also may be used in combination with sloping and benching. The box should extend at least 18 in (0.45 m) above the surrounding area if there is sloping toward excavation. This can be accomplished by providing a benched area adjacent to the box.

Earth excavation to a depth of 2 ft (0.61 m) below the shield is permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench and there are no indications while the trench is open of possible loss of soil from behind or below the bottom of the support system. Conditions of this type require observation on the effects of bulging, heaving, and boiling as well as surcharging, vibration, adjacent structures, etc., on excavating below the bottom of a shield. Careful visual inspection of the conditions mentioned above is the primary and most prudent approach to hazard identification and control.

SLOPE AND SHIELD CONFIGURATIONS



7.0 EXCAVATION SAFETY REQUIREMENTS

Excavation activity exposes TolTest personnel and subcontractors to many dangers which, if not recognized, can cause death or serious injury.

7.1 General

Each associate in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with 29 CFR 1926.652. The competent person shall ensure that the required protective system is installed and maintained per the design specifications.

No associates shall be permitted to enter the excavation unless they are specifically required to do so. Unauthorized persons shall not be allowed access.

7.2 Supervision

Work in an excavation shall at all times be supervised by a TolTest competent person. This individual will be responsible for identifying any unusual developments which may warn of impending earth movement.

7.3 Surface Hazards

The excavation area should be inspected and any debris, structures, and surface protrusions that are located so as to create a hazard to associates shall be evaluated for structural integrity and supported or removed if necessary.

7.4 Underground Installations/Utility Locations

Before conducting any excavation work, the location of utility installations, such as sewer, telephone, fuel, electric, water lines, fiber optic, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined.

Utility companies or the state utility protection service shall be contacted at least two (2) working days prior to excavation activities to be advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation.

Note: Some states and localities have notification requirements that differ from Federal OSHA. Prior to excavating in any area, the Project Manager or designee should contact the local service to identify their location specific requirements.

TolTest personnel and subcontractors should be careful to protect and preserve the markings of approximate locations of facilities until the markings are no longer required for safe and proper excavations.

If the markings of utility locations are destroyed or removed before excavation commences or is completed, the TolTest competent person must notify the utility company or utility protection service to inform them that the markings have been destroyed and need replaced. Normally, it will take two (2) to three (3) working days advance notice for the utility protection service to remark the locations.

TolTest equipment operators shall maintain at least 3 feet clearance between any underground utility and the cutting edge or point of powered equipment. When excavating within 36 inches of the markings of underground facilities, personnel should conduct the excavation in a careful and prudent manner, excavating by hand (i.e. shovel) to determine the precise location of the facility/utility and to prevent damage.

While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard associates and prevent damage.

7.5 Access and Egress

TolTest will provide a safe means of access to and egress from all excavations. The following are considered acceptable methods of entering and exiting excavations.

7.5.1 Structural Ramps

Structural ramps that are used solely by associates as a means of access or egress from excavations shall be designed by the competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design or structural engineering, and shall be constructed in accordance with the design.

Structural members used for ramps and runways shall be of uniform thickness. Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping. Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

7.5.2 Means of Egress from Trench Excavations

A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel for associates. Any ramp used for associate egress must be sloped at an angle which would allow associates to walk upright out of the excavation.

7.6 Exposure to Vehicular Traffic

TolTest and subcontract personnel who may be exposed to vehicular traffic both on projects and public highways shall be provided with and shall wear warning vests or other suitable garments marked with or made of reflectorized or high-visibility material Additionally, depending upon site conditions the use of flaggers and warning signs may be necessary.

7.7 Exposure to Falling Loads

No TolTest associate or subcontractor shall be permitted underneath loads handled by lifting or digging equipment. Personnel must stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Truck drivers may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped with over-cab protective structures, in accordance with 29 CFR 1926.601(b)(6), to provide adequate protection for the operator from falling objects during loading and unloading operations.

7.8 Warning System for Mobile Equipment

When heavy equipment and trucks operate adjacent to an excavation or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals or stop logs. If possible, the approach grade should be away from the excavation.

7.9 Hazardous Atmospheres

Because there is a possibility that excavation activity at TolTest project sites involve hazardous atmospheres, the TolTest competent person must ensure that acceptable atmospheric conditions exist.

The TolTest competent person or his/her designee shall perform direct reading atmospheric monitoring in all excavations of any depth into which TolTest personnel or subcontractors must enter where a hazardous atmosphere exists or

could reasonably be expected to exist. If there are any questions, the competent person should treat the excavation like a confined space and follow Procedure HS401 – Confined Spaces.

Based on the competent person's visual observation of the excavation and the soil and/or fill material, atmospheric monitoring may not be necessary. However, if conditions change, the competent person must re-evaluate whether atmospheric monitoring is required.

7.9.1 Atmospheric Monitoring

When atmospheric monitoring is required, the competent person or his/her designee must check the atmosphere for the following in the order shown:

- Oxygen Content – acceptable conditions: 20.8%, 20.9% or 21%
- Flammable Conditions – acceptable conditions: less than 10% LEL
- Toxic Atmospheres – based on the established PEL or TLV

Note: Any reading other than those listed above, must be investigated prior to associates entering the excavation.

7.9.2 Ventilation

Adequate precautions shall be taken, for example providing ventilation to prevent associate exposure to harmful atmospheres. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, direct reading air monitoring shall be conducted periodically as determined by the competent person or his/her designee to ensure that the atmosphere remains safe.

7.9.3 Emergency Response Equipment

Emergency rescue equipment, such as self-contained breathing apparatus (SCBA), a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be kept close to the excavation for use in an emergency.

7.10 Protection from Hazards Associated With Water Accumulation

Associates shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect associates against the hazards posed by water accumulation. The precautions necessary to protect associates adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

If excavation work interrupts the natural drainage of surface water (such as streams); diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to run-off from heavy rains will require an inspection by a competent person.

7.11 Stability of Adjacent Structures

Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing or underpinning shall be provided to ensure the stability of such structures for the protection of associates.

Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to associates shall not be permitted except when:

- A registered professional engineer (civil) has approved the determination that such excavation work will not pose a hazard to associates; or
- A support system, such as underpinning, designed by a registered professional engineer (civil) is provided to ensure the safety of associates and the stability of the structure; or
- The excavation is in stable rock; or
- A registered professional engineer (civil) has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity.

- If a support system has been put in place to stabilize an adjacent structure, it must be inspected for movement and structural integrity daily by the competent person.

- Sidewalks, pavements, and other structures shall not be undermined unless a support system or another method of protection is provided to protect associates from the possible collapse of such structures.

7.12 Protection from Loose Rock or Soil

Adequate protection shall be provided to protect associates from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the excavation face to stop and contain falling material; or other means that provide equivalent protection.

Associates shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

7.13 Inspections

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work each day and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are required when associate exposure can be reasonably anticipated. An Excavation/Trenching Permit must be completed by the competent person to document the inspections. Canceled Excavation/Trenching Permits should be placed in the project file upon completion of the project.

Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed associates shall be

removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

7.14 Fall Protection

Where associates or equipment are required or permitted to cross over excavations; walkways or bridges with standard guardrails shall be provided.

Since open excavations are often an attractive nuisance to the public, adequate barrier for physical protection shall be provided at all excavations. Remotely located excavations may require special protection including, but not limited to, highly visible snow fence, concrete "jersey" barriers, chain link fence and flashing warning light. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc. shall be covered or backfilled.

8.0 EXCAVATION PERMITS

An Initial Excavation/Trenching Permit (Attachment 1) must be completed by the competent person on the first day that personnel enter the excavation. On each subsequent day that an excavation is open and poses safety hazards to personnel who work around or may have to enter excavations, the competent person may complete the Daily Excavation/Trenching Permit (Attachment 2). However, when soil classification changes are evident or when additional protective systems are determined to be required, the competent person shall complete the Initial Excavation/Trenching Permit.

If a project site has several excavations open and active, each excavation must have its own permit completed. Conversely, a project site which has an open excavation that is not active does not require a daily Excavation/Trenching Permit if the competent person determines that the excavation is NOT posing hazards to site personnel or the public, and is adequately guarded. The competent person must determine what type of inspections and documentation will be required.

The Excavation/Trenching Permit should be retained in the project file and will serve as a record of daily excavation inspection.

9.0 TRAINING

Associates shall not be assigned, or permitted, to design, supervise, or work in or about excavations until they have completed an excavation briefing to include:

- Types of hazards associated with excavation operations,
- Safe work practices and techniques,

- A review of applicable Federal, State, and Local regulations, and
- A review of this procedure.

This briefing can be conducted by the Project Manager or Project Supervisor.

Associates shall not be assigned, or permitted, to act as an excavation competent person until they have completed the TolTest Excavation and Trenching Safety Program presented by the Corporate Health and Safety Department. In the event that it is not feasible to attend this training course, another course may be allowed at the discretion of the Manager, Corporate Health and Safety.

Tailgate Safety Meetings detailing the specific hazards of the work to be performed and safety precautions and procedures specific for the job shall be conducted by the Project Supervisor or designee at the beginning of each shift for each job. These shall be conducted according to the requirements of IPP150: Health and Safety Meetings.

10.0 EXCEPTION PROVISIONS

Variances to this procedure shall be requested in accordance with established variance procedures.

11.0 ATTACHMENTS

1. Initial Excavation/Trenching Permit
2. Daily Excavation/Trenching Permit
3. Selection of Protective Systems for Excavations 20 Feet or Less in Depth
4. Sloping Options
5. Shoring or Shielding Options
6. Utility Location Services

Attachment 1

Initial Excavation/Trenching Permit

Project Name:	
Project Location:	Project Number:
Name of Competent Person:	Permit Good on This Date Only:
Excavation Length, Depth and Width:	

EMPLOYEE TRAINING AND PRE-EXCAVATION BRIEFING

1. Does this job require special training: YES _____ NO _____
2. Mandatory pre-excavation briefing conducted on: _____ DATE

SOIL CLASSIFICATION and PROTECTIVE SYSTEM DETERMINATION

1. Will the competent person classify the soil based on its properties and site conditions? YES _____ NO _____
   If No, the soil is Type C, move to 9 of this section

VISUAL TEST

2. Based on visual observation, which best describes the soil in this excavation?
   ❑ Stable Rock ❑ Cemented Soil ❑ Cohesive Soil ❑ Granular Soil
   ❑ Granular Cohesionless ❑ Layered System Describe Layering: _____

3. Based on visual observation, which best describes the moisture condition of the soil? (check all that apply)
   ❑ Dry Soil ❑ Moist Soil ❑ Wet Soil ❑ Saturated Soil
   ❑ Seeping Water ❑ Surface Water Present ❑ Submerged

4. Is the excavation subject to vibration? YES _____ NO _____
5. Is the excavation in previously disturbed soil? YES _____ NO _____
6. Are fissures observed in the excavation walls or on the surface? YES _____ NO _____

MANUAL TEST (Must Perform At Least One of the Following)

THUMB PENETRATION TEST

7. Test Performed? YES _____ NO _____
   Soil indented with great effort (e.g. to ½ of the thumb nail) Type A
   Soil indented with some effort (e.g. to first thumb knuckle) Type B
   Soil easily penetrated several inches by thumb with little or no effort. Note: If soil is submerged seeping water, subjected to surface water, runoff, exposed to wetting. Type C

PENETROMETER OR SHEARVANE TEST

8. Test Performed? YES _____ NO _____

   Device Used/Serial Number: _____ Ave. TSF: _____

Soil with unconfined compressive strength of 1.5 TSF or greater	Type A
Soil with unconfined compressive strength of greater than 0.5 TSF and less than 1.5 TSF.	Type B
Soil with unconfined compressive strength of 0.5 TSF or less. Note: If soil is submerged seeping water, subjected to surface water, runoff, exposed to wetting.	Type C

9. Soil Classification
   ❑ Stable Rock ❑ Type A ❑ Type B ❑ Type C
   No soil is Type A if fissured, subject to vibration, previously disturbed, or layered dipping into excavation on a slope of 4H:1V or greater.

10. Which best describes the layering system of the excavation/trench?
    ❑ No Layering ❑ Horizontal Layering ❑ Less than 4H:1V ❑ 4H:1V or greater
    If the layering system is Horizontal Layering, complete 11 of this section, otherwise skip to 12

11. Horizontal Layering
    ❑ Type A over Type B ❑ Type A over Type C ❑ Type B over Type A
    ❑ Type B over Type C ❑ Type C over Type A ❑ Type C over Type B

PROTECTIVE SYSTEM

12. What Type of Protective System Will Be Used?
    ❑ None Required ❑ Sloping ❑ Simple Bench ❑ Multiple Bench
    ❑ Timber Shoring ❑ Trench Shield ❑ Hydraulic Shoring
    Note: All Protective Systems must have tabulated data, developed by a registered professional engineer, available.

ELECTRICAL SAFETY

1. Are all electrical devices grounded and/or GFCI protected? YES ___ NO ___ N/A ___

SURFACE ENCUMBRANCES

1. Have all surface encumbrances that are located so as to create a hazard to associates been removed or supported, as necessary, to safeguard associates? YES ___ NO ___ N/A ___

UNDERGROUND INSTALLATIONS

1. Have the estimated locations of all underground installations been determined prior to excavation? YES ___ NO ___ N/A ___
2. Have utility companies been contacted and advised of proposed work? YES ___ NO ___ N/A ___
3. If underground installations are exposed, are they protected, supported or removed while the excavation is open? YES ___ NO ___ N/A ___

ACCESS AND EGRESS

1. Are stairways, ladders, or ramps provided every 25 feet? YES ___ NO ___ N/A ___
2. Are structural ramps that are used for access and egress of equipment and/or personnel designed by a competent person qualified in structural design and constructed in accordance with the design? YES ___ NO ___ N/A ___

EXPOSURE TO VEHICULAR TRAFFIC

1. Are personnel exposed to public of project vehicular traffic wearing reflectorized or high visibility vests? YES ___ NO ___ N/A ___

EXPOSURE TO FALLING LOADS

1. Are associates prohibited from standing underneath loads handled by lifting or diffing equipment? YES ___ NO ___ N/A ___

WARNING SYSTEMS FOR MOBILE EQUIPMENT

1. Are warning systems utilized when mobile equipment is operated adjacent to or the edge of an excavation? YES ___ NO ___ N/A ___

   If yes, which type is being used?
   ❑ Hand Signal ❑ Stop Logs ❑ Earthen Berm ❑ Other _____

TESTING FOR HAZARDOUS ATMOSPHERES

1. Are the atmospheric hazards that can be reasonably expected to exist in excavations greater than 4 feet deep tested and controlled? YES ___ NO ___ N/A ___
2. Is testing conducted as often as necessary to ensure safety of personnel? YES ___ NO ___ N/A ___

TIMES & READINGS:	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____
SPECIAL PRECAUTIONS:					

EMERGENCY RESCUE EQUIPMENT

1. Is emergency rescue equipment such as SCBA, safety harness and lifeline, or basket stretcher available and attended when hazardous atmospheric conditions exist? YES ___ NO ___ N/A ___

PROTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION

1. Is water being controlled or prevented from accumulating in excavation by the use of water removal equipment? YES ___ NO ___ N/A ___
2. Is water control equipment operation being monitored by a competent person? YES ___ NO ___ N/A ___

STABILITY OF ADJACENT STRUCTURES

1. Are support systems such as shoring, bracing, or underpinning provided to ensure stability of adjoining structures (i.e. buildings, walls) endangered by excavation activities? YES ___ NO ___ N/A ___
2. Has the support system been designed by a registered professional engineer (civil)? YES ___ NO ___ N/A ___

PROTECTION OF ASSOCIATES FROM LOOSE ROCK OR SOIL

1. Are associates protected from excavated or other material and equipment by placing spoils a minimum of two (2) feet from the edge of excavations or by the use of retaining devices? YES ___ NO ___ N/A ___

INSPECTIONS

1. Are daily inspections of excavations where associate exposure can be reasonably anticipated being done by the competent person? YES ___ NO ___ N/A ___
2. Are inspections being performed by a competent person after every rainstorm or other hazard increasing occurrence? YES ___ NO ___ N/A ___
3. Are associates removed from the excavation if the competent person finds evidence at any time of a situation that could result in a possible cave-in, protective system failure, hazardous atmosphere, or other hazardous condition? YES ___ NO ___ N/A ___

FALL PROTECTION

1. Are standard guardrails provided on walkways and bridges that cross over excavations? YES ___ NO ___ N/A ___
2. Are all remotely located excavations adequately barricaded or covered? YES ___ NO ___ N/A ___

SHORING AND OTHER PROTECTIVE SYSTEM

1. Have all shoring and/or protective systems been designed by a registered professional engineer (civil) or is it accompanied by tabulated data from the manufacturer? YES ___ NO ___ N/A ___
2. Are shoring and other protective systems checked/measured each day to detect movement and possible failure? YES ___ NO ___ N/A ___

_____ _____
(Signature of Competent Person) (Date)

ATTACHMENT 2

Daily Excavation/Trenching Permit

Project Name:	
Project Location:	Project Number:
Name of Competent Person:	Permit Good on This Date Only:
Excavation Length, Depth and Width:	

SOIL CLASSIFICATION and PROTECTIVE SYSTEM DETERMINATION

1. Has the soil classification changed from the previous day? YES _____ NO _____
   If Yes, an Initial Excavation/Trenching Permit must be completed.

2. Are additional protective systems needed which differ from those used during the previous day? YES _____ NO _____
   If Yes, an Initial Excavation/Trenching Permit must be completed.

HAZARDS

1. Are all electrical devices grounded and/or GFCI protected? YES ___ NO ___ N/A ___

2. Have all surface encumbrances that are located so as to create a hazard to associates been removed or supported, as necessary, to safeguard associates? YES ___ NO ___ N/A ___

3. If underground installations are exposed, are they protected, supported or removed while the excavation is open? YES ___ NO ___ N/A ___

4. Are stairways, ladders, or ramps provided every 25 feet? YES ___ NO ___ N/A ___

5. Are personnel exposed to public of project vehicular traffic wearing reflectorized or high visibility vests? YES ___ NO ___ N/A ___

6. Are associates prohibited from standing underneath loads handled by lifting or diffing equipment? YES ___ NO ___ N/A ___

7. Are warning systems utilized when mobile equipment is operated adjacent to or the edge of an excavation? YES ___ NO ___ N/A ___

   If yes, which type is being used?
   ❑ Hand Signal ❑ Stop Logs ❑ Earthen Berm ❑ Other _____

8. Are the atmospheric hazards that can be reasonably expected to exist in excavations greater than 4 feet deep tested and controlled? YES ___ NO ___ N/A ___

9. Is testing conducted as often as necessary to ensure safety of personnel? YES ___ NO ___ N/A ___

TIMES & READINGS:	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____	Time:_____ LEL:_____% Oxygen:_____% Toxic:_____ppm of _____
SPECIAL PRECAUTIONS:					

10. Is emergency rescue equipment such as SCBA, safety harness and lifeline, or basket stretcher available and attended when hazardous atmospheric conditions exist? YES ___ NO ___ N/A ___

11. Is water being controlled or prevented from accumulating in excavation by the use of water removal equipment? YES ___ NO ___ N/A ___

12. Is water control equipment operation being monitored by a competent person? YES ___ NO ___ N/A ___

13. Are support systems such as shoring, bracing, or underpinning provided to ensure stability of adjoining structures (i.e. buildings, walls) endangered by excavation activities? YES ___ NO ___ N/A ___

14. Are associates protected from excavated or other material and equipment by placing spoils a minimum of two (2) feet from the edge of excavations or by the use of retaining devices? YES ___ NO ___ N/A ___

15. Are daily inspections of excavations where associate exposure can be reasonably anticipated being done by the competent person? YES ___ NO ___ N/A ___

16. Are inspections being performed by a competent person after every rainstorm or other hazard increasing occurrence? YES ___ NO ___ N/A ___

17. Are associates removed from the excavation if the competent person finds evidence at any time of a situation that could result in a possible cave-in, protective system failure, hazardous atmosphere, or other hazardous condition? YES ___ NO ___ N/A ___

18. Are standard guardrails provided on walkways and bridges that cross over excavations? YES ___ NO ___ N/A ___

19. Are all remotely located excavations adequately barricaded or covered? YES ___ NO ___ N/A ___

20. Are shoring and other protective systems checked/measured each day to detect movement and possible failure? YES ___ NO ___ N/A ___

_____ _____
(Signature of Competent Person) (Date)

Copy: Project File

ATTACHMENT 3

SELECTION OF PROTECTIVE SYSTEMS FOR EXCAVATIONS 20 FEET OR LESS IN DEPTH

ATTACHMENT 4

SLOPING OPTIONS

ATTACHMENT 5

SHORING OR SHIELDING OPTIONS

ATTACHMENT 6

UTILITY LOCATION SERVICES

ALABAMA	Alabama One Call	1-800-292-8525
ALASKA	Locate Call Center of Alaska, Inc.	1-907-278-3121
ARIZONA	Arizona Blue Stake, Inc.	1-602-263-1100
ARKANSAS	Arkansas One Call System, Inc.	1-800-482-8998
CALIFORNIA	Underground Service Alert North Underground Service Alert South	1-800-422-4133 1-800-422-4133
COLORADO	Utility Notification Center of Colorado	1-800-922-1987
CONNECTICUT	Call Before You Dig	1-800-922-4455
DELAWARE	Miss Utility of Delmarva	1-800-282-8555
FLORIDA	Sunshine State One Call of Florida, Inc.	1-800-432-4770
GEORGIA	Utilities Protection Center, Inc.	1-800-282-7411
HAWAII	Hawaii One-Call	1-800-227-2600
IDAHO	Dig Line Palouse Empire Undrgrnd Crd. Cncl. Kootenai County Utility Coord. Cncl. Utilities Underground Location Center One Call Concepts – Idaho Shoshone county One Call	1-800-342-1585 1-800-822-1974 1-800-428-4950 1-800-424-5555 1-800-626-4950 1-800-398-3285
ILLINOIS	Julie, Inc. Chicago: Digger	1-800-892-0123 1-312-744-7000
INDIANA	Indiana Underground Plant Prototection Service. Inc.	1-800-382-5544
IOWA	Underground Plant Loc. Service, Inc.	1-800-292-8989
KANSAS	Kansas One Call Center	1-800-DIG-SAFE

KENTUCKY	Kentucky Underground Protec., Inc.	1-800-752-6007
LOUISIANA	Louisiana One Call	1-800-272-3020
MAINE	Dig Safe - Maine	1-888-344-7233
MARYLAND	Miss Utility of Delmarva Miss Utility	1-800-282-8555 1-800-257-7777
MASSACHUSETTS	Dig Safe - Massachusetts	1-888-344-7233
MICHIGAN	MISS DIG System Inc	1-800-482-7171
MINNESOTA	Gopher State One Call	1-800-252-1166
MISSISSIPPI	Mississippi One Call System, Inc.	1-800-227-6477
MISSOURI	Missouri One Call System, Inc.	1-800-344-7483
MONTANA	Utilities Underground Loc. Center Montana One Call	1-800-424-5555 1-800-551-8344
NEBRASKA	Diggers Hotline of Nebraska	1-800-331-5666
NEVADA	Underground Service Alert of NV	1-800-227-2600
NEW HAMPSHIRE	Dig Safe - New Hampshire	1-888-344-7233
NEW JERSEY	Garden State Undrgrnd. Plnt. Loc. Ser.	1-800-272-1000
NEW MEXICO	New Mexico One Call system, Inc.	1-800-321-ALERT
NEW YORK	Dig Safely New York New York City - Long Island One Call Center	1-800-962-7962 1-800-272-4480
NORTH CAROLINA	North Carolina One-Call Center	1-800-632-4949
NORTH DAKOTA	Utilities Underground Location Center	1-800-795-0555
OHIO	Ohio Utilities Protection Service	1-800-362-2764
OKLAHOMA	Call Okie	1-800-522-6543

OREGON	Utility's Underground Location Center	1-800-424-5555
	Douglas Utility's Coordinating Council	1-503-673-6676
	Josephine Utility's Coord Council	1-503-476-6676
	Utility's Notification Center	1-800-332-2344
	Rogue Basin Utility Coord Council	1-503-779-6676
PENNSYLVANIA	Pennsylvania One Call System, Inc.	1-800-242-1776
RHODE ISLAND	Dig Safe - Rhode Island	1-888-344-7233
SOUTH CAROLINA	Palmetto Utility Protection Srvce Inc.	1-800-922-0983
SOUTH DAKOTA	South Dakota One Call	1-800-781-7474
TENNESSEE	Tennessee One Call System	1-800-351-1111
TEXAS	Lone Star Notification Center	1-800-669-8344
	Texas Excavation Safety System	1-800-344-8377
	Texas One Call system	1-800-245-4545
UTAH	Blue Stakes of Utah Utility Notification	1-800-662-4111
VERMONT	Dig Safe - Vermont	1-888-344-7233
VIRGINIA	Miss Utility of Virginia	1-800-552-7001
	Miss Utility of Northern Virginia	1-800-257-7777
WASHINGTON	Utilities Notification Center	1-800-332-2344
	Grays Harbor & Pacific County Utility Coordinating Council	1-206-532-3550
	Utilities Underground Location Center	1-800-424-5555
	Chelan-Douglas Utility Coord Council	1-509-663-6111
	Upper Yakima County Underground Utilities Council	1-800-553-4344
	Inland Empire Utility Coord. Council	1-509-456-8000
	Utilities Council of Cowlitz County	1-360-425-2506
	Palouse Empire Utility Cord. Council	1-800-822-1974
WASHINGTON, DISTRICT OF COLUMBIA	Miss Utility	1-800-257-7777

WEST VIRGINIA	Miss Utility of West Virginia, Inc.	1-800-245-4848
WISCONSIN	Diggers Hotline, Inc.	1-800-242-8511
WYOMING	Wyoming One-Call Call Before You Dig Of Wyoming	1-800-348-1030 1-800-849-2476
CANADA	Alberta: Alberta One-Call Location Corp. British Columbia: BC One Call Ontario: Ontario One Call Ltd Quebec:Info-Excavation	1-800-242-3447 1-800-474-6886 1-800-400-2255 or 905-709-1717 1-800-663-9228
AUSTRALIA	Dial Before You Dig 1100	1100

Note: Many of the above utility location services can be accessed via their website by following the appropriate links at www.underspace.com/refs/ocdir.htm.

APPENDIX D

ACTIVITY HAZARD ANALYSES

TOLTEST, INC.

ACTIVITY HAZARD ANALYSIS

ACTIVITY Site Preparation/Layout ANALYZED BY/DATE K. Mander 04/03 REVIEWED BY/DATE R. Barcum 04/03

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Site walk through Identification of work zones for construction activities	1.Exposure to irritant and toxic plants such as poison ivy and sticker bushes may cause allergic reactions. 2. Surfaces covered with heavy vegetation and under growth create a tripping hazard. 3. Back strain due to carrying instruments. 4. Native wildlife such as rodents, ticks, and snakes present the possibility of insect bites and associated diseases such as Lyme disease. 5. Driving vehicles on uneven or unsafe surfaces can result in incidents such as overturned vehicles or flat tires. 6. Electrical hazard due to fallen lines. 7. Thermal stress due to hot/cold temperature extremes.	1. Wear long sleeved clothing and slacks to minimize contact with irritant and toxic plants and to protect against insect bites. Appropriate first aid for personnel's known allergic reactions. 2. Be alert and observe terrain while walking to minimize slips and falls. Steel-toed boots provide additional support and stability. 3. Use proper lifting techniques to prevent back strain. 4. Avoid wildlife when possible. In case of an animal bite, perform first aid and capture the animal, if possible, for rabies testing. Perform a tick check after leaving a wooded or vegetated area. 5. Ensure all maintenance is performed on vehicles before going to the field. Site surveillance on foot might be required to choose clear driving paths. 6. Ensure fallen power lines are not energized. 7. Implement thermal stress management techniques such as shifting work hours, fluid intake, and monitoring employees, especially high risk
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
		1. Review hazard analysis with personnel performing the site walk through prior to start

TOLTEST, INC.

ACTIVITY HAZARD ANALYSIS

ACTIVITY Soil Excavation ANALYZED BY/DATE K. Mander 04/03 REVIEWED BY/DATE J. Tinney 04/03

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Excavation	1. Exposure to airborne contaminants released during intrusive activities. 2. Sides of excavation can cave in. Possible burying or crushing of workers due to 1) absence of shoring, 2) misjudgment of stability, 3) defective shoring, and/or 4) undercut sides. 3. Falling during access/egress or while monitoring or dismounting equipment, or stumbling into excavation. 4. Congested work area due to too many workers in a small area. 5. Existing utilities.	1. Monitor for airborne contaminants, wear PPE as appropriate. 2. Regularly inspect trenches for conditions. 3.Provide adequate shoring or sloping of sides of the excavation ** See Appendix H. 4. Provide an adequate barrier around open pits. Material from pit must be placed away from edge to prevent cave ins and instability of pit. 5. To prevent overexertion, limit manual lifting and emphasize mechanical means where practical. 6. Maintain ample workroom between workers. 7. Find and mark utilities before excavating utilizing the Joint Utility Locating Information for Excavators (JULIE) service 72 hours prior to excavation activities. Use care while excavating, shore existing utilities crossing excavation area. Watch for overhead lines. 8. Check the performance of JULIE locate prior to digging.
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Backhoe	Daily, prior to use per manufacturer's recommendations, Fill our Safety Inspection Checklist	OSHA 1910.120 40-hr. training, 3 day OJT, 8 hr. Supervisory, 8 hr. refresher, OSHA Hazard Communication, Respirator and operator training
2. Rolloff Boxes	Use of assistive climbing equipment when covering or placing tarp on box	
3. PPE	Use of particulate filter/VOC breathing PPE as needed.	Lead Hazard Awareness, OSHA 1910.120 40-hr. training, 3 day OJT, 8 hr. Supervisory, 8 hr. refresher, OSHA Hazard Communication, Respirator and operator training

TOLTEST, INC.

ACTIVITY HAZARD ANALYSIS

ACTIVITY Backfill & Site Restoration ANALYZED BY/DATE K. Mander 04/03 REVIEWED BY/DATE R. Barcum 04/03

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Backfill excavation Compact backfill, subgrade base Asphalt	1. Noise levels exceeding the OSHA PEL of 85 dBs are both a hazard and a hindrance to communication. 2. Carbon monoxide from the heavy equipment. 3. Overhead utility wires, i.e., electrical and telephone, can be hazardous when the dump truck bed is in the upright position. 4. Falling backfill material from dump truck may cause injury. 5. Moving the equipment over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. Be aware of hazards associated with moving heavy machinery and other associated injury. 6. High-pressure hydraulic lines and airlines used on heavy equipment are hazardous when they are in ill repair or incorrectly assembled. 7. Heat/contact hazards for asphalt and asphalt placement equipment.	1. Ear muffs or earplugs effectively reduce noise levels. 2. Review the contaminants suspected to be on-site and perform air monitoring as required. Shut down equipment and/or divert exhaust fumes. 3. All chains, lines, cables shall be inspected daily for weak spots. 4. Hard hats shall be worn at all times when working around heavy equipment. 5. Secure loose clothing. 6. To avoid contact with any overhead lines, the truck bed shall be lowered prior to moving the truck. Overhead utilities shall be considered "live" until determined otherwise. 7. The truck bed should not be erected within 10 feet of an overhead electrical line until the line is de-energized, grounded, or shielded and an electrician has certified that arcing cannot occur. 8. All high-pressure lines shall be checked prior to and during use. 9. Maintain a safe distance from moving equipment. 10. Maintain a safe distance from hot asphalt placement equipment. Wear appropriate clothing and boots if working with hot asphalt.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Backhoe	Daily, prior to use per manufacturer's recommendations, Fill our Safety Inspection Checklist	OSHA 1910.120 40-hr. training, 3 day OJT, 8 hr. Supervisory, 8 hr. refresher, OSHA Hazard Communication, Respirator and operator training
2. Compactor / Roller	Daily, prior to use per manufacturer's recommendations, Fill our Safety Inspection Checklist	OSHA 1910.120 40-hr. training, 3 day OJT, 8 hr. Supervisory, 8 hr. refresher, OSHA Hazard Communication, Respirator and operator training
3. Dump truck	Upon arrival at site, check for proper operation.	Subcontractor activity.
4. Asphalt Equipment	Upon arrival at site, check for proper operation. Only trained personnel shall conduct asphalt work.	Subcontractor activity.

TOLTEST, INC.

ACTIVITY HAZARD ANALYSIS

ACTIVITY Equipment Decontamination ANALYZED BY/DATE K. Mander 04/03 REVIEWED BY/DATE R. Barcum 04/03

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Decontaminate Heavy Equipment Using High Pressure Wash or Hand Scrubbing Decontaminate Sampling Equipment by Hand Washing	1. Contact with contaminated material, inhalation of airborne aerosols, contact with high-pressure wash stream, unexpected movement of material to be decontaminated. 2. Contact with decon solution.	1. Decontamination area to provide isolation and controlled access. 2. Level D PPE with face shield. Secure items to be decontaminated. Visually inspect integrity of containment liners and containers used for wastewater. CRZ provided for worker decontamination. 3. MSDSs obtained and reviewed for all cleaning solution chemicals.

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Soap solution, deionized water rinse, scrub brushes.	Use general safety rules and procedures listed in HASP, review manufacturer's recommendation and guidance on inspection of equipment. Complete on daily basis.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory, 8 hour Refresher, HASP, OSHA Hazard Communication and Respirator training.

APPENDIX E

STORMWATER POLLUTION PREVENTION PLAN

STORMWATER POLLUTION PREVENTION PLAN
(SWPPP)
GREAT LAKES NAVAL TRAINING CENTER
SUPPLY SIDE LANDFILL
FINAL COVER CONSTRUCTION

TABLE OF CONTENTS

Section **Page No.**

1.0 Stormwater Management Guidelines 1
2.0 Site Description 2
3.0 Final Cover Construction Overview 3
3.1 Installation of Stormwater Control Measures 3
3.2 Clearing and Grubbing/Scarifications 3
3.3 Passive Landfill Gas Collection System 3
3.4 Placement of Cover Material 4
3.5 Topsoil Placement 4
3.6 Restoration 4
4.0 Site Map 5
5.0 Control Measures 6
5.1 Silt Fence 6
5.2 Berms 6
5.3 Temporary Sediment Basins 6
5.4 Sewer Drains 6
5.5 Ditch Checks 6
5.6 Erosion Control Mats 6
5.7 Rock Check Dams 7
5.8 Temporary Seeding 7
5.9 Winter Maintenance Activities 7
6.0 Erosion and Sediment Control 8
7.0 Reporting, Recordkeeping, and Monitoring Requirements 9
8.0 Certification 10

FIGURE

FIGURE E1 Stormwater Control Measure Locations
FIGURE E2 Low Permeability Soil Layer Plan

APPENDICES

APPENDIX E1 Great Lakes Naval Center NPDES Permit
APPENDIX E2 SWPPP Inspection Checklist Form
APPENDIX E3 Certification Forms

1.0 STORMWATER MANAGEMENT GUIDELINES

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared to outline stormwater management techniques to be implemented in conjunction with the Supply Side Landfill Final Cap Construction at Great Lakes Naval Training Center. The provisions of this plan are in accordance with 35 IAC, Subtitle C, Chapter 1. This regulation requires landowners of construction projects disturbing five or more acres of land to obtain coverage under a general IEPA Construction Site Activities National Pollutant Discharge Elimination System (NPDES) Storm Water Permit No. ILR10. A copy of the general permit is contained in **Appendix E1**. Completion of this SWPPP is one of the requirements contained in this permit.

2.0 SITE DESCRIPTION

The Supply Side Landfill is an 18.0-acre, former Department of the Navy base sanitary landfill. It is located within the Naval Training Center in Great Lakes, Illinois, approximately 40 miles north of Chicago, along the western shores of Lake Michigan. The site was used for a short period of time in the mid-1960s. In addition to typical sanitary landfill wastes, concrete and other demolition debris have been found during various construction activities in the area of the landfill. The location of and the existing site plan for the Supply Side Landfill are shown on the drawings in **Appendix B** of the Final Cover Work Plan.

3.0 FINAL COVER CONSTRUCION OVERVIEW

The key elements of the Final Cover Construction for the Supply Side Landfill include:

- Permitting;
- Installation of erosion control measures and site fencing;
- Installation of passive landfill gas collection system;
- Placing/compacting cover material;
- Placing topsoil and seeding;
- Long-term maintenance; and,
- Implementation of land use controls that allow for the future use of the open land space on the landfill surfaces while preventing potentially adverse/damaging activities and allowing unrestricted limited use of the adjacent areas.

Refer to Section 5 of this SWPPP for Best Management Practices (BMPs) that are to be followed at this site.

3.1 Installation of Stormwater Control Measures

Prior to beginning construction at the site, silt fencing will be installed around the entire perimeter of the work area except across the construction entrance road. Stormwater control measures will be inspected and maintained. Inspection of the control measures shall be performed weekly and/or after major rainfall events. Deficiencies noted during inspections will be corrected in a timely manner. Excessive sediment deposits will be removed as required.

3.2 Clearing and Grubbing/Scarifications

Prior to initiation of construction activities at the site, preparation activities will be performed (as necessary) including: removal of trees to improve access; grubbing and removing stumps; clearing brush and debris; and properly disposing of these materials. In addition, temporary roadways may be constructed as needed. During construction, the existing vegetative layer will be stripped and scarified, resulting in an area of bare soil. The amount of time that this area remains bare will be kept to a minimum. The small slope of the area will prevent excessive erosion.

3.3 Passive Landfill Gas Collection System

The components of the LFG system will include a network of perforated shallow pipe laterals and a wind-powered turbine ventilator cap. Perforated pipe laterals will be installed in trenches (approximately 4ft deep/1ft wide) through the existing soil cover and waste mass layers and backfilled with pea gravel. The seven collection trenches range

from 480 linear feet to 330 linear feet and run east to west across the landfill approximately 185ft apart.

3.4 Placement of Cover Material

Low permeability soil (clay) will be mechanically placed and compacted in lifts (maximum 9 inches) to the just below the grades shown on **Figure E2**.

3.5 Topsoil Placement

A 7 – 8 inch layer of topsoil will be loosely placed (mechanically) atop the low permeability clay to the finished grades as shown on **Figure E2**.

3.6 Restoration

Following completion of Final Cover Construction activities, disturbed areas will be reseeded in accordance with the specification found in Section 4.2.3.2 of the Final Cover Work Plan. Fertilizer, seed, and mulch will be placed during recommended seeding windows. If necessary, erosion control blankets will be utilized on areas of concentrated flows. Mulch will be inspected after every major rainfall until vegetation is established and additional mulch may be applied if necessary.

4.0 SITE MAP

Figure E1 depicts stormwater control measure locations during Final Cover Construction as required under 35 IAC, Subtitle C, Chapter 1. The project area will be surrounded by silt fence and/or other control measures to divert stormwater runoff from reaching work areas and control erosion from the work areas. Specific stormwater runoff flow information for the site is discussed in Section 5 of this SWPPP.

5.0 CONTROLL MEASURES

The following is a discussion of control measures and Best Management Practices (BMPs) that may be employed during Final Cover Construction activities at Supply Side Landfill.

5.1 Silt Fence

Silt fence will be placed in construction areas to intercept and redirect surface water runoff. The silt fence will be inspected weekly and/or after rainfall events. Excessive sediment deposits will be removed. Deficiencies identified during the inspections will be corrected in a timely manner. Additional fencing will be maintained at the site for repair purposes. Based on the inspections, additional fencing may be utilized.

5.2 Berms

It is not anticipated that berms will be needed to direct overland flow and channel flow away from surface waters.

5.3 Temporary Sediment Basins

Under 35 IAC, Subtitle C, Chapter 1, sediment basins are required in drainage locations where more than 10 acres of the upstream drainage area are disturbed at any one time. Based on the size of the Final Cover Construction, it is not anticipated that temporary sediment basins will be required.

5.4 Sewer Drains

It is not anticipated that any sewer drains or catch basins will be encountered in the area where Final Cover Construction activities are taking place.

5.5 Ditch Checks

It is not anticipated that ditch checks will be required at any time during Final Cover Construction. Ditch checks are used to slow flow in swales and to limit erosion of soils.

5.6 Erosion Control Mats

It is not anticipated that erosion control mats will be required during Final Cover Construction. Erosion control mats are used in areas of concentrated flow such as in swales and ditches to prevent erosion until vegetation is established.

5.7 Rock Check Dams

It is not anticipated that rock check dam construction will be required during Final Cover Construction. Rock check dams are constructed in swales and ditches with concentrated flow to prevent sediment migration.

5.8 Temporary Seeding

It is not anticipated that temporary seeding of disturbed (work) areas will be required during Final Cover Construction. Temporary seeding is required in disturbed areas when it is anticipated the work will be interrupted for 21 days or longer.

5.9 Winter Maintenance Activities

It is not anticipated that any winter maintenance activities will be required, as the Final Cover Construction will be complete prior to the end of the construction season.

6.0 EROSION AND SEDIMENT CONTROL

Excessive erosion caused by construction activities is dependent on climate and site conditions. The frequency, intensity, and duration of rainfall are fundamental factors in determining the amount of erosion created. Implementation of physical and structural controls including silt fence and straw bales, and applying control measures to divert flow away from excavated areas to minimize the potential for erosion, will be utilized

In accordance with Illinois General NPDES Permit No. ILR10 for construction sites, disturbed areas at a construction site that will not be redisturbed for 21 days will be stabilized by the 14th day after the last disturbance. Stabilization measures will include temporary seeding, permanent seeding, and mulching.

7.0 REPORTING, RECORDKEEPING, AND MONITORING REQUIREMENTS

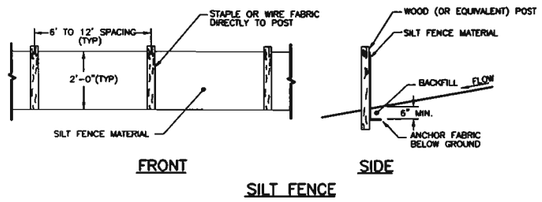
Areas of construction and their associated control measures will be inspected weekly and the results documented on the inspection form included in **Appendix E2**. Inspections will also occur within 24 hours of a storm event involving 0.5 inches or more of precipitation. The inspection sheet summarizes the scope of inspection, lists names and qualifications of personnel making the inspection, and includes the date of the inspection, major observations made during the inspection, and any actions to correct deficiencies found during the inspection. The inspection form will be signed by the inspector and an authorized representative. Deficiencies will be corrected as soon as possible but no later than 7 days. The corrective actions will be documented and the SWPPP will be revised if warranted. In addition to the inspection forms, the facility will keep records of construction activities including dates when major grading activities occur, construction activities cease, temporarily or permanently, and when an area is stabilized, either temporarily or permanently. For any violation of the SWPPP observed during the inspection, the facility shall submit within five days an "Incidence of Noncompliance" report. Forms can be obtained by the IEPA and must be signed by a responsible authority. Refer to General Permit ILR10, Section IV (D) (4) (f) for further information on noncompliance reporting. A copy of the SWPPP will be kept at the construction site until termination of activities. The plan and all associated records will be kept for 3 years after the completion of final site stabilization or as requested by the IEPA.

8.0 CERTIFICATION

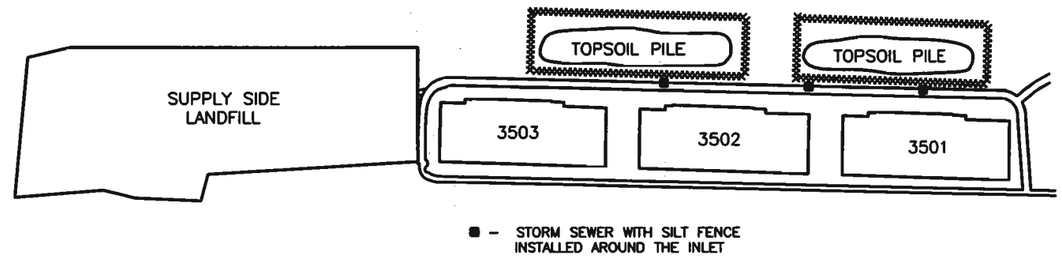
The Illinois General NPDES permit requires that the SWPPP be certified by an authorized representative (Form E1). Additionally, all contractors and subcontractors identified in the plan must sign a copy of a certification form (Form E2) designed especially for them. These two certification forms are located in **Appendix E3**.

FIGURE E1

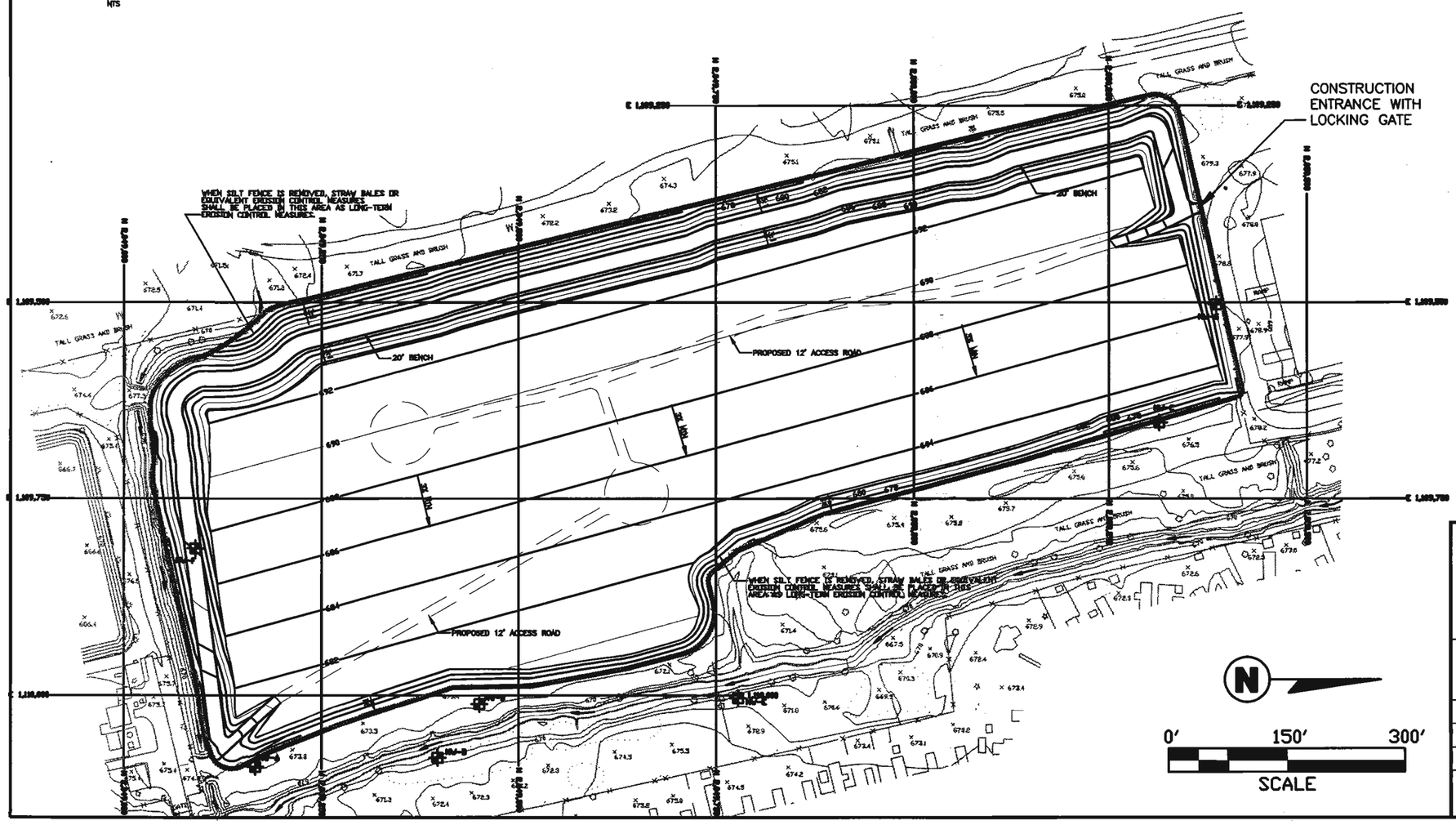
STORMWATER CONTROL MEASURE LOCATIONS



TYPICAL TEMPORARY EROSION CONTROL DEVICES
NTS



EXISTING STOCKPILE EROSION CONTROL DETAIL
NTS



LEGEND

- GRID COORDINATES
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING TRANSMISSION TOWER
- EXISTING UTILITY POLE
- EXISTING LIGHT POLE
- EXISTING FIRE HYDRANT
- EXISTING POST OR OBJECT
- EXISTING SMALL SIGN
- EXISTING SIGN POST
- EXISTING GAS VENT
- EXISTING GUARD RAIL
- EXISTING RETAINING WALL
- EXISTING TREE LINE
- EXISTING DECIDUOUS/PINE TREE
- EXISTING WATER
- EXISTING SWAMP
- EXISTING CHAIN LINK FENCE
- EXISTING SPOT ELEVATION
- EXISTING GROUND WATER MONITORING POINTS
- EXISTING ACCESS ROAD
- LIMIT OF REGRADING
- PROPOSED 10' CONTOUR
- PROPOSED SILT FENCING
- PROPOSED STRAW BALE
- EROSION CONTROL BLANKET
- DRAINAGE FLOW DIRECTION

NOTES:

1. SITE LOCATION: NORTHEAST 1/4 OF SECTION 18, TOWNSHIP 44 NORTH, RANGE 12 EAST, SHIELDS TOWNSHIP, LAKE COUNTY, ILLINOIS.
2. TOPOGRAPHIC BASE MAP PREPARED BY JACOB & HEFNER ASSOCIATES, P.C., GLEN ELLYN, ILLINOIS, FROM AERIAL SURVEY BY CHICAGO AERIAL SURVEY, 1400 ELMHURST ROAD, ELK GROVE VILLAGE, ILLINOIS, 60007. DATE OF PHOTOGRAPHY – NOVEMBER 23, 2002.
3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
4. HORIZONTAL DATUM BASED ON NAD 83 (1997) ILLINOIS STATE PLANE COORDINATES, ILLINOIS EAST ZONE.
5. LIMIT OF REGRADING AREA IS APPROXIMATELY 636,530 SQUARE FEET (14.61 ACRES).
6. THE 6" THICK VEGETATIVE LAYER SHALL BE VEGETATED WITH A TYPICAL SEED MIXTURE CONSISTING OF BLUEGRASS AND FESCUE AS INDICATED IN THE PROJECT SPECIFICATIONS.
7. IN ADDITION TO THE TYPICAL FEATURES AND LOCATIONS SHOWN, EROSION CONTROL MEASURES WILL BE UTILIZED AS NECESSARY.
8. BASED ON DRAWING CREATED BY VERSAR, INC., LOMBARD, ILLINOIS.

FIGURE 1.0
EROSION CONTROL AND VEGETATION PLAN

SUPPLY SIDE LANDFILL
NAVAL STATION GREAT LAKES
GREAT LAKES, ILLINOIS

PREPARED FOR
DEPARTMENT OF THE NAVY
GREAT LAKES, ILLINOIS

DRAWN MRC/6-4-04	CHECKED
REVISED	APPROVED
JOB NO.: 73738.01	TOLTEST, INC.
DRAWING NUMBER 7373801-01F	

6/4/2004 4:7:02 PM

FIGURE E2

LOW PERMEABILITY SOIL LAYER PLAN

PROPOSED TOP OF 18" LOW PERMEABILITY SOIL LAYER CONSTRUCTION CONTROL DATA

CONTROL POINT NUMBER	GRID COORDINATES		TOP OF 18" LOW PERMEABILITY SOIL LAYER	
	NORTHING	EASTING	PROPOSED (FT.)	RECORD (FT.)
1	2,049,038.15	1,109,650.00	677.65	
2	2,049,042.67	1,109,700.00	676.57	
3	2,049,045.17	1,109,750.00	675.85	
4	2,049,050.01	1,109,601.65	679.48	
5	2,049,055.04	1,109,650.00	683.58	
6	2,049,055.62	1,109,800.00	675.60	
7	2,049,061.42	1,109,610.93	683.58	
8	2,049,063.94	1,109,700.00	683.58	
9	2,049,066.06	1,109,850.00	675.22	
10	2,049,068.17	1,109,750.00	683.45	
11	2,049,074.80	1,109,800.00	681.67	
12	2,049,075.89	1,109,650.00	684.18	
13	2,049,076.86	1,109,900.00	676.11	
14	2,049,079.13	1,109,620.70	684.18	
15	2,049,081.44	1,109,850.00	680.23	
16	2,049,084.19	1,109,700.00	684.18	
17	2,049,088.06	1,109,900.00	678.74	
18	2,049,088.34	1,109,750.00	684.05	
19	2,049,088.61	1,109,950.00	674.62	
20	2,049,094.72	1,109,950.00	676.75	
21	2,049,094.98	1,109,800.00	682.14	
22	2,049,098.40	1,110,000.00	673.34	
23	2,049,100.00	1,109,574.14	679.18	
24	2,049,100.00	1,109,587.82	683.58	
25	2,049,100.00	1,109,608.00	684.18	
26	2,049,101.15	1,109,999.96	674.25	
27	2,049,101.62	1,109,850.00	680.75	
28	2,049,105.91	1,109,750.00	688.71	
29	2,049,105.98	1,109,650.00	691.61	
30	2,049,106.67	1,110,050.00	673.39	
31	2,049,107.49	1,110,050.00	673.65	
32	2,049,108.26	1,109,900.00	679.24	
33	2,049,108.62	1,109,700.00	690.14	
34	2,049,110.61	1,109,800.00	687.23	
35	2,049,114.90	1,109,950.00	677.16	
36	2,049,116.85	1,109,850.00	685.73	
37	2,049,119.52	1,110,061.70	673.45	
38	2,049,121.31	1,110,000.00	674.89	
39	2,049,123.60	1,109,900.00	684.23	
40	2,049,130.17	1,110,052.74	674.14	
41	2,049,132.23	1,109,950.00	682.72	
42	2,049,140.33	1,110,000.00	681.21	
43	2,049,141.63	1,110,028.17	680.38	
44	2,049,150.00	1,109,543.69	670.42	
45	2,049,150.00	1,109,584.60	683.58	
46	2,049,150.00	1,109,605.06	684.18	
47	2,049,150.00	1,109,634.68	691.70	
48	2,049,167.06	1,110,053.12	679.46	
49	2,049,179.60	1,110,010.42	679.58	
50	2,049,184.12	1,109,514.59	670.10	
51	2,049,190.15	1,110,017.03	679.58	
52	2,049,190.27	1,110,000.65	680.79	
53	2,049,198.38	1,110,009.30	680.47	
54	2,049,200.00	1,109,507.97	670.93	
55	2,049,200.00	1,109,555.35	683.58	
56	2,049,200.00	1,109,582.17	684.18	
57	2,049,200.00	1,109,617.46	691.60	
58	2,049,200.00	1,110,040.87	679.55	
59	2,049,200.00	1,110,060.67	673.40	
60	2,049,250.00	1,109,496.30	671.36	
61	2,049,250.00	1,109,534.27	683.68	
62	2,049,250.00	1,109,564.87	684.27	
63	2,049,250.00	1,109,580.70	692.47	
64	2,049,250.00	1,109,750.00	687.57	
65	2,049,250.00	1,110,000.00	680.34	
66	2,049,250.00	1,110,020.86	679.73	
67	2,049,250.00	1,110,040.76	673.55	
68	2,049,300.00	1,109,484.15	671.33	
69	2,049,300.00	1,109,522.00	683.59	
70	2,049,300.00	1,109,542.59	684.20	
71	2,049,300.00	1,109,568.03	692.44	
72	2,049,300.00	1,110,003.48	679.84	
73	2,049,300.00	1,110,022.95	673.67	
74	2,049,350.00	1,109,472.00	671.36	
75	2,049,350.00	1,109,509.70	683.57	
76	2,049,350.00	1,109,530.32	684.18	
77	2,049,350.00	1,109,555.72	692.40	
78	2,049,350.00	1,109,986.81	679.93	
79	2,049,350.00	1,110,006.53	673.66	
80	2,049,400.00	1,109,459.85	672.05	
81	2,049,400.00	1,109,496.38	683.58	
82	2,049,400.00	1,109,517.62	684.18	
83	2,049,400.00	1,109,543.36	692.38	
84	2,049,400.00	1,109,970.18	680.01	
85	2,049,400.00	1,109,990.12	673.69	
86	2,049,450.00	1,109,447.70	672.78	
87	2,049,450.00	1,109,481.31	683.58	
88	2,049,450.00	1,109,502.08	684.18	
89	2,049,450.00	1,109,527.75	692.42	
90	2,049,450.00	1,109,966.37	679.73	
91	2,049,450.00	1,109,984.44	673.70	
92	2,049,500.00	1,109,435.56	673.16	
93	2,049,500.00	1,109,467.80	683.59	
94	2,049,500.00	1,109,488.41	684.19	
95	2,049,500.00	1,109,513.67	692.42	
96	2,049,500.00	1,109,750.00	685.59	
97	2,049,500.00	1,109,966.64	679.32	
98	2,049,500.00	1,109,983.47	673.71	
99	2,049,550.00	1,109,423.41	673.24	
100	2,049,550.00	1,109,455.37	683.58	
101	2,049,550.00	1,109,478.96	684.18	
102	2,049,550.00	1,109,501.35	692.39	
103	2,049,550.00	1,109,961.29	679.08	
104	2,049,550.00	1,109,976.89	673.85	
105	2,049,600.00	1,109,411.26	673.32	
106	2,049,600.00	1,109,442.96	683.58	
107	2,049,600.00	1,109,463.57	684.18	
108	2,049,600.00	1,109,488.84	692.35	
109	2,049,600.00	1,109,953.80	678.90	
110	2,049,600.00	1,109,967.74	674.30	
111	2,049,650.00	1,109,399.09	673.38	
112	2,049,650.00	1,109,430.59	683.58	
113	2,049,650.00	1,109,451.18	684.18	
114	2,049,650.00	1,109,476.32	692.32	
115	2,049,650.00	1,109,945.85	678.73	
116	2,049,650.00	1,109,957.45	674.97	
117	2,049,700.00	1,109,386.89	673.38	
118	2,049,700.00	1,109,418.39	683.58	
119	2,049,700.00	1,109,438.98	684.18	
120	2,049,700.00	1,109,463.99	692.28	
121	2,049,700.00	1,109,931.38	678.76	
122	2,049,700.00	1,109,944.22	674.64	
123	2,049,715.26	1,109,850.00	680.99	
124	2,049,717.78	1,109,920.86	678.92	
125	2,049,727.22	1,109,900.00	679.45	
126	2,049,728.87	1,109,929.02	674.34	
127	2,049,735.58	1,109,850.00	674.34	
128	2,049,742.57	1,109,900.00	674.41	
129	2,049,750.00	1,109,374.69	675.12	
130	2,049,750.00	1,109,400.86	683.58	
131	2,049,750.00	1,109,421.49	684.18	
132	2,049,750.00	1,109,447.48	692.38	
133	2,049,750.00	1,109,500.00	690.84	
134	2,049,750.00	1,109,750.00	683.81	
135	2,049,750.00	1,109,809.28	681.90	
136	2,049,750.00	1,109,832.98	675.61	
137	2,049,800.00	1,109,362.49	675.24	
138	2,049,800.00	1,109,388.29	683.58	
139	2,049,800.00	1,109,408.91	684.18	
140	2,049,800.00	1,109,434.19	692.36	
141	2,049,800.00	1,109,779.97	682.35	
142	2,049,800.00	1,109,801.62	675.50	
143	2,049,850.00	1,109,350.29	675.36	
144	2,049,850.00	1,109,376.71	683.58	
145	2,049,850.00	1,109,396.33	684.18	
146	2,049,850.00	1,109,421.62	692.32	
147	2,049,850.00	1,109,760.73	682.51	
148	2,049,850.00	1,109,780.12	676.65	
149	2,049,900.00	1,109,338.09	676.74	
150	2,049,900.00	1,109,359.69	683.58	
151	2,049,900.00	1,109,380.85	684.18	
152	2,049,900.00	1,109,406.79	692.35	
153	2,049,900.00	1,109,742.09	682.65	
154	2,049,900.00	1,109,761.18	678.47	
155	2,049,950.00	1,109,325.69	676.16	
156	2,049,950.00	1,109,348.59	683.59	
157	2,049,950.00	1,109,368.97	684.18	
158	2,049,950.00	1,109,393.92	692.33	
159	2,049,950.00	1,109,729.27	682.63	
160	2,049,950.00	1,109,747.76	676.67	
161	2,050,000.00	1,109,313.33	675.38	
162	2,050,000.00	1,109,338.73	683.58	
163	2,050,000.00	1,109,359.38	684.17	
164	2,050,000.00	1,109,383.85	692.22	
165	2,050,000.00	1,109,500.00	688.86	
166	2,050,000.00	1,109,716.99	682.59	
167	2,050,000.00	1,109,734.33	676.96	
168	2,050,050.00	1,109,301.10	674.50	
169	2,050,050.00	1,109,327.91	683.58	
170	2,050,050.00	1,109,347.83	684.18	
171	2,050,050.00	1,109,371.84	692.17	
172	2,050,050.00	1,109,704.79	682.54	
173	2,050,050.00	1,109,720.90	677.34	
174	2,050,100.00	1,109,289.26	674.22	
175	2,050,100.00	1,109,316.40	683.58	
176	2,050,100.00	1,109,340.84	684.18	
177	2,050,100.00	1,109,366.05	691.98	
178	2,050,100.00	1,109,690.98	682.55	
179	2,050,100.00	1,109,707.35	677.29	
180	2,050,150.00	1,109,277.43	675.35	
181	2,050,150.00	1,109,302.62	683.58	
182	2,050,150.00	1,109,323.40	684.18	
183	2,050,150.00	1,109,347.78	692.08	
184	2,050,150.00	1,109,675.96	682.59	
185	2,050,150.00	1,109,693.21	677.12	
186	2,050,200.00	1,109,265.67	675.26	
187	2,050,200.00	1,109,291.04	683.50	
188	2,050,200.00	1,109,311.59	684.11	
189	2,050,200.00	1,109,335.91	692.03	
190	2,050,200.00	1,109,659.46	682.67	
191	2,050,200.00	1,109,678.29	676.70	
192	2,050,250.00	1,109,253.91	675.38	
193	2,050,250.00	1,109,279.24	683.60	
194	2,050,250.00	1,109,299.80	684.20	
195	2,050,250.00	1,109,323.83	691.98	
196	2,050,250.00	1,109,500.00	686.88	
197	2,050,250.00	1,109,640.07	682.83	
198	2,050,250.00	1,109,663.38	675.39	
199	2,050,250.74	1,109,420.07	689.19	
200	2,050,258.49	1,109,430.24	688.83	
201	2,050,269.62	1,109,414.20	687.58	
202	2,050,275.59	1,109,425.38	687.58	
203	2,050,281.76	1,109,410.53	686.87	
204	2,050,283.49	1,109,315.12	691.97	
205	2,050,286.38	1,109,421.60	686.57	
206	2,050,287.38	1,109,318.45	691.93	
207	2,050,289.84	1,109,318.48	691.82	
208	2,050,291.39	1,109,265.07	683.79	
209	2,050,298.84	1,109,360.00	690.84	
210	2,050,299.15	1,109,283.51	684.40	
211	2,050,300.00	1,109,242.16	677.84	
212	2,050,300.00	1,109,625.12	682.87	
213	2,050,300.00	1,109,648.46	675.41	
214	2,050,303.08	1,109,283.79	683.22	
215	2,050,305.61	1,109,288.88	684.83	
216	2,050,307.62	1,109,380.07	688.90	
217	2,050,312.70	1,109,266.28	684.64	
218	2,050,320.83	1,109,243.68	678.70	
219	2,050,322.79	1,109,380.00	683.01	
220	2,050,324.58	1,109,280.34	684.03	
221	2,050,325.89	1,109,391.06	682.70	
222	2,050,330.31	1,109,386.20	682.28	
223	2,050,330.69	1,109,378.89	682.26	
224	2,050,332.25	1,109,256.50	679.28	
225	2,050,337.77	1,109,418.09	688.56	
226	2,050,343.52	1,109,350.00	682.27	
227	2,050,347.39	1,109,450.00	687.56	
228	2,050,348.18	1,109,367.11	684.83	
229	2,050,350.00	1,109,610.18	682.91	
230	2,050,350.00	1,109,633.54	675.44	
231	2,050,352.23	1,109,372.75	681.33	
232	2,050,353.62	1,109,390.00	679.00	
233	2,050,354.07	1,109,390.24	681.37	
234	2,050,358.99	1,109,374.34	680.78	
235	2,050,361.70	1,109,386.41	680.93	
236	2,050,362.45	1,109,500.00	685.89	
237	2,050,363.24	1,109,393.28	678.58	
238	2,050,375.96	1,109,450.00	678.22	
239	2,050,377.52	1,109,550.00	684.43	
240	2,050,387.20	1,109,500.00	677.91	
241	2,050,393.11	1,109,600.05	682.66	
242	2,050,398.43	1,109,550.00	677.61	
243	2,050,409.66	1,109,600.00	677.48	
244	2,050,412.97	1,109,614.76	677.38	

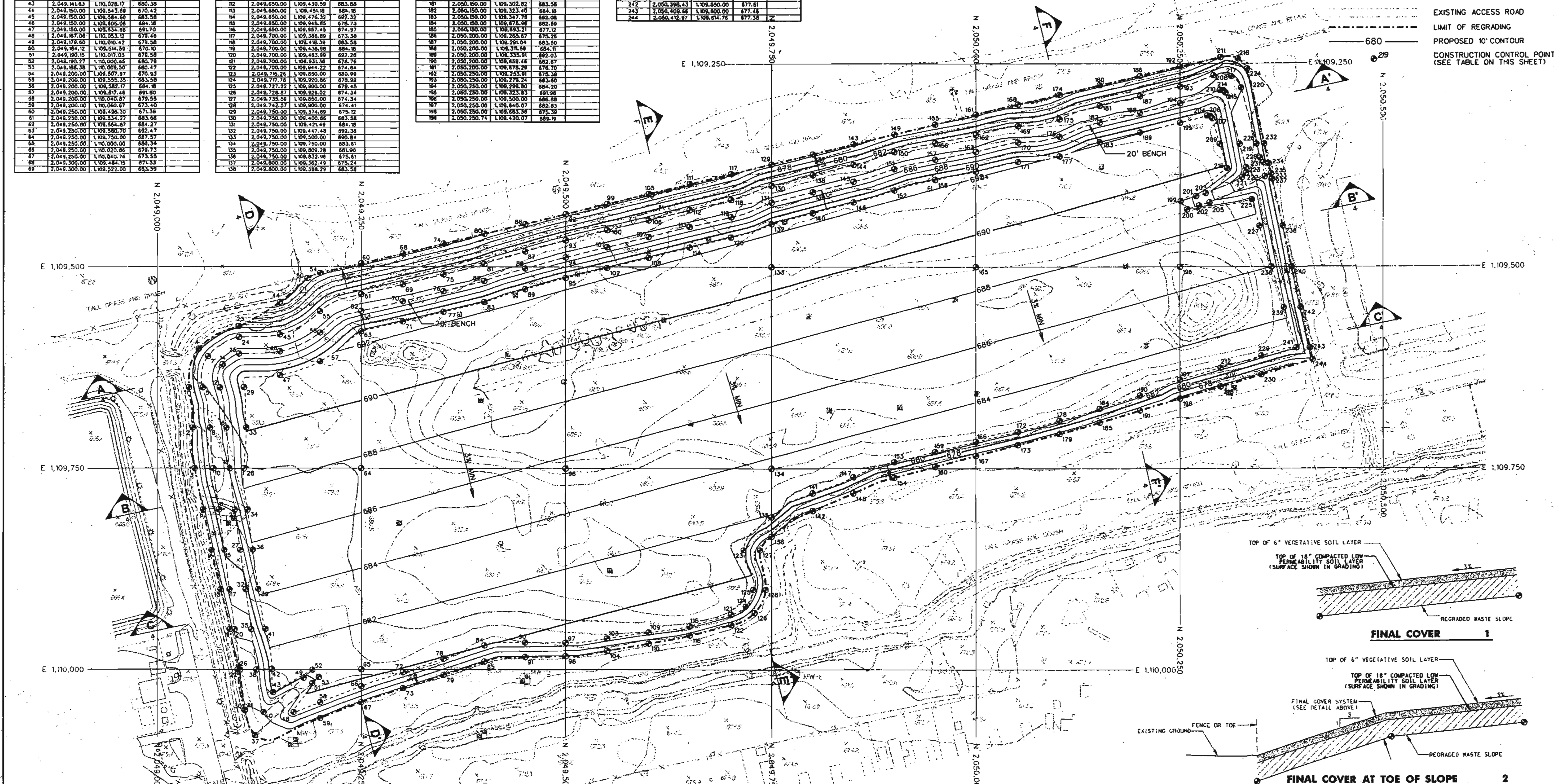
SCALE 0' 60' 120'

NOTE:

1. SITE LOCATION: NORTHEAST 1/4 OF SECTION 18, TOWNSHIP 44 NORTH, RANGE 12 EAST, SHIELDS TOWNSHIP, LAKE COUNTY, ILLINOIS.
2. TOPOGRAPHIC BASE MAP PREPARED BY JACOB & HEFNER ASSOCIATES, P.C., GLEN ELLYN, ILLINOIS, FROM AERIAL SURVEY BY CHICAGO AERIAL SURVEY, 1400 ELMHURST ROAD, ELK GROVE VILLAGE, ILLINOIS, 60007. DATE OF PHOTOGRAPHY - NOVEMBER 23, 2002.
3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
4. HORIZONTAL DATUM BASED ON NAD 83 (1997) ILLINOIS STATE PLANE COORDINATES, ILLINOIS EAST ZONE.
5. LIMIT OF REGRADING AREA IS APPROXIMATELY 636,530 SQUARE FEET (14.61 ACRES).
6. THIS DRAWING SHOWS CONTOURS REPRESENTING THE TOP OF THE 18" THICK LOW PERMEABILITY SOIL LAYER.
7. THE VOLUME OF LOW PERMEABILITY SOIL (18" THICK) REQUIRED IS APPROXIMATELY 35,363 CUBIC YARDS.

LEGEND

- E 1,109,250 — GRID COORDINATES
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING TRANSMISSION TOWER
- EXISTING UTILITY POLE
- EXISTING LIGHT POLE
- EXISTING FIRE HYDRANT
- EXISTING POST OR OBJECT
- EXISTING SMALL SIGN
- EXISTING SIGN POST
- EXISTING GAS VENT
- EXISTING GUARD RAIL
- EXISTING RETAINING WALL
- EXISTING TREE LINE
- EXISTING DECIDUOUS/PINE TREE
- EXISTING WATER
- EXISTING SWAMP
- EXISTING CHAIN LINK FENCE
- EXISTING SPOT ELEVATION
- EXISTING GROUND WATER MONITORING POINTS
- EXISTING ACCESS ROAD
- LIMIT OF REGRADING
- 680 — PROPOSED 10' CONTOUR
- CONSTRUCTION CONTROL POINT (SEE TABLE ON THIS SHEET)



NO	DATE	REVISIONS	DRN	CHK	DATE

DRN	PAA	7-30-2003
DES	PAA	7-30-2003
CHK	CR	7-30-2003
APP	AJO	7-30-2003

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Versar INC.
200 W. 22nd STREET, SUITE 250
LOMBARD, IL 60148

EARTH TECH

EXISTING CONDITIONS INVESTIGATION AND PROPOSED MODIFICATIONS TO LANDFILL COVER SYSTEM
SUPPLY SIDE LANDFILL
NAVAL STATION GREAT LAKES

PROPOSED TOP OF 18" LOW PERMEABILITY SOIL LAYER PLAN

DATE: JULY 2003
PROJECT NO: 61637
FILENAME: REGRADE_18_NAVY.DGN
SHEET NO: 6 OF 15
DRAWING NO: 6

APPENDIX E1

GREAT LAKES NAVAL CENTER NPDES PERMIT

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601

ROD R. BLAGOJEVICH, GOVERNOR RENEE CIPRIANO, DIRECTOR

217/782-0610

May 29, 2003

NAVAL STATION GREAT LAKES
BLDG 1A 201 DECATUR AVE
GREAT LAKES, IL 60088

Re: FACILITY: SUPPLY SIDE LANDFILL GREAT LAKES
NPDES Permit No: ILR108418
COUNTY: LAKE

Notice of Coverage Under Construction Storm Water General Permit

Dear NPDES Permittee:

We have reviewed your application and determined that storm water discharges associated with industrial activity from construction sites are appropriately covered by the attached General NPDES Permit issued by the Agency.

Your discharge is covered by this permit effective as of the date of this letter. The Permit as issued covers application requirements, a storm water pollution prevention plan and reporting requirements.

This letter shows your facility permit number below the construction site name. Please save this number and reference it in all future correspondance. Should you have any questions concerning the Permit, please contact the Permit Section at the above telephone number and address.

Very truly yours,

Toby Frevert, P.E.
Manager
Division of Water Pollution Control

TF:med:concoverage 3

Enclosure

cc: Records Unit

Region 2

NPDES Permit No. ILR10

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand East
Post Office Box 19276
Springfield, Illinois 62794-9276

CONSTRUCTION SITE ACTIVITIES

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) Storm Water Permit

Expiration Date: May 31, 2003

Issue Date: May 14, 1998

Effective Date: June 1, 1998

In compliance with the provisions of the Illinois Environmental Protection Act, the Illinois Pollution Control Board Rules and Regulations (35 Ill. Adm. Code, Subtitle C, Chapter I), and the Clean Water Act, and the regulations thereunder the following discharges are authorized by this permit, in accordance with the conditions and attachments herein:

Thomas G. McSwiggin, P.E.
Manager, Permit Section
Division of Water Pollution Control

Part I. COVERAGE UNDER THIS PERMIT

A. **Permit Area.** The permit covers all areas of the State of Illinois with discharges to any waters of the State.

B. **Eligibility.**

1. This permit shall authorize all discharges of storm water associated with industrial activity from construction sites, (those sites or common plans of development or sale that will result in the disturbance of five or more acres total land area), (heretofore referred to as storm water discharges from construction activities) occurring after the effective date of this permit (including discharges occurring after the effective date of this permit where the construction activity was initiated before the effective date of this permit), except for discharges identified under paragraph I.B.3 (Limitations on Coverage).

2. This permit may only authorize a storm water discharge associated with industrial activity from a construction site that is mixed with a storm water discharge from an industrial source other than construction, where:

   a. the industrial source other than construction is located on the same site as the construction activity;

   b. storm water discharges associated with industrial activity from the areas of the site where construction activities are occurring are in compliance with the terms of this permit; and

   c. storm water discharges associated with industrial activity from the areas of the site where industrial activity other than construction are occurring (including storm water discharges from dedicated asphalt plants and dedicated concrete plants) are covered by a different NPDES general permit or individual permit authorizing such discharges.

3. **Limitations on Coverage.** The following storm water discharges from construction sites are not authorized by this permit:

   a. storm water discharges associated with industrial activity that originate from the site after construction activities have been completed and the site has undergone final stabilization.

   b. discharges that are mixed with sources of non-storm water other than discharges identified in Part III.A (Prohibition on Non-Storm Water Discharges) of this permit and in compliance with paragraph IV.D.5 (Non-Storm Water Discharges) of this permit.

   c. storm water discharges associated with industrial activity that are subject to an existing NPDES individual or general permit or which are issued a permit in accordance with Part VI.N (Requiring an Individual Permit or an Alternative General Permit) of this permit. Such discharges may be authorized under this permit after an existing permit expires provided the existing permit did not establish numeric limitations for such discharges; and

   d. storm water discharges from construction sites that the Agency has determined to be or may reasonably be expected to be contributing to a violation of a water quality standard.

D. **Where to Submit.**

1. Facilities which discharge storm water associated with construction site activity must use a NOI form provided by the Agency. NOIs must be signed in accordance with Part VI.G (Signatory Requirements) of this permit. NOIs are to be submitted certified mail to the Agency at the following address:

   Illinois Environmental Protection Agency
   Division of Water Pollution Control
   Attention: Permit Section
   1021 North Grand East
   Post Office Box 19276
   Springfield, Illinois 62794-9276

2. A copy of the letter of notification of coverage or other indication that storm water discharges from the site are covered under an NPDES permit shall be posted at the site in a prominent place for public viewing (such as alongside a building permit).

E. **Additional Notification**. Facilities which are operating under approved local sediment and erosion plans, grading plans, or storm water management plans, in addition to filing copies of the Notice of Intent in accordance with Part D above, shall also submit signed copies of the Notice of Intent to the local agency approving such plans in accordance with the deadlines in Part A above. See Part IV.D.2.d (Approved State or Local Plans).

F. **Notice of Termination**. Where a site has been finally stabilized and all storm water discharges from construction sites that are authorized by this permit are eliminated, the permittee of the facility may submit a Notice of Termination that is signed in accordance with Part VI.G (Signatory Requirements) of this permit.

1. The Notice of Termination shall include the following information:

   a. The mailing address, and location of the construction site for which the notification is submitted. Where a mailing address for the site is not available, the location can be described in terms of the latitude and longitude of the approximate center of the facility to the nearest 15 seconds, or the nearest quarter section (if the section, township and range is provided) that the construction site is located in;

   b. The owner's name, address, telephone number, and status as Federal, State, private, public or other entity.

   c. The name, address and telephone number of the general contractor(s);

   d. The following certification signed in accordance with Part VI.G (Signatory Requirements) of this permit:

      "I certify under penalty of law that all storm water discharges associated with construction site activity from the identified facility that are authorized by NPDES general permit ILR100000 have otherwise been eliminated. I understand that by submitting this notice of termination, that I am no longer authorized to discharge storm water associated with construction site activity by the general permit, and that discharging pollutants in storm water associated with construction site activity to Waters of the State is unlawful under the Environmental Protection Act and Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Clean Water Act."

      For the purposes of this certification, elimination of storm water discharges associated with industrial activity means that all disturbed soils at the identified facility have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with construction activities from the identified site that are authorized by a NPDES general permit have otherwise been eliminated.

2. All Notices of Termination are to be sent, using the form provided by the Agency to the address in paragraph II.D.1.

Part III. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, AND OTHER NON-NUMERIC LIMITATIONS

A. **Prohibition on Non-Storm Water Discharges.**

1. Except as provided in paragraph I.B.2 and 2 below, all discharges covered by this permit shall be composed entirely of storm water.

2. a. Except as provided in paragraph b below, discharges of materials other than storm water must be in compliance with a NPDES permit (other than this permit) issued for the discharge.

   b. The following non-storm water discharges may be authorized by this permit provided the non-storm water component of the discharges is in compliance with paragraph IV.D.5 (Non-Storm Water Discharges): discharges from fire fighting activities; fire hydrant flushings; waters used to wash vehicles or control dust; potable water sources including waterline flushings; irrigation drainages; routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; springs; uncontaminated ground water; and foundation or footing drains where flows are not contaminated with process materials such as solvents.

(i). **Stabilization Practices.** A description of interim and permanent stabilization practices, including site-specific scheduling of the implementation of the practices. Site plans should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be included in the plan. Except as provided in paragraphs (A) and (B) below, stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

(A). Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

(B). Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of site by the 14th day after construction activity temporarily ceased.

(ii). **Structural Practices.** A description of structural practices to the degree attainable, to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Such practices may include silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. Structural practices should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA.

b. **Storm Water Management.** A description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA. This permit only addresses the installation of storm water management measures, and not the ultimate operation and maintenance of such structures after the construction activities have been completed and the site has undergone final stabilization. Permittees are responsible for only the installation and maintenance of storm water management measures prior to final stabilization of the site, and are not responsible for maintenance after storm water discharges associated with industrial activity have been eliminated from the site.

(i). Such practices may include: storm water detention structures (including wet ponds); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff onsite; and sequential systems (which combine several practices). The pollution prevention plan shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed predevelopment levels.

(ii). Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g. maintenance of hydrologic conditions, such as the hydroperiod and hydrodynamics present prior to the initiation of construction activities).

c. **Other Controls.**

(i). **Waste Disposal.** No solid materials, including building materials, shall be discharged to Waters of the State, except as authorized by a Section 404 permit.

(ii). The plan shall ensure and demonstrate compliance with applicable State and/or local waste disposal, sanitary sewer or septic system regulations.

d. **Approved State or Local Plans.**

(i). The management practices, controls and other provisions contained in the storm water pollution prevention plan must be at least as protective as the requirements contained in Illinois Environmental Protection Agency's Illinois Urban Manual, 1995. Facilities which discharge storm water associated with construction site activities must include in their storm water pollution prevention plan procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials. Requirements specified in sediment and erosion site plans or site permits or storm water management site plans or site permits approved by local officials that are applicable to protecting surface water resources are, upon submittal of an NOI to be authorized to discharge under this permit, incorporated by reference and are enforceable under this permit even if they are not specifically included in a storm water pollution prevention plan required under this permit. This provision does not apply to provisions of master plans, comprehensive plans, non-enforceable guidelines or technical guidance documents that are not identified in a specific plan or permit that is issued for the construction site.

(ii) Dischargers seeking alternative permit requirements are not authorized by this permit and shall submit an individual permit application in accordance with 40 CFR 122.26 at the address indicated in Part II.D (Where to Submit) of this permit, along with a description of why requirements in approved local plans or permits should not be applicable as a condition of an NPDES permit.

3. **Maintenance.** A description of procedures to maintain in good and effective operating conditions vegetation, erosion and sediment control measures and other protective measures identified in the site plan.

4. **Inspections.** Qualified personnel (provided by the permittee) shall inspect disturbed areas of the construction site that have not been finally stabilized, structural control measures, and locations where vehicles enter or exit the site at least once every seven calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater or equivalent snowfall.

B. The permittee shall retain a copy of the storm water pollution prevention plan required by this permit at the construction site from the date of project initiation to the date of final stabilization.

Part VI. STANDARD PERMIT CONDITIONS

A. **Duty to Comply.**

1. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Illinois Environmental Protection Act and the CWA and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

2. **Penalties for Violations of Permit Conditions.**

a. Criminal

(1). Negligent Violations The CWA provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 years, or both. The Environmental Protection Act provides that any person who negligently violates subsection (f) of Section 12 of the Act, any provision of any regulation, standard, or filing requirement under subsection (b) of Section 39 of the Act, or any NPDES permit issued under the Act is subject to a fine not to exceed $10,000 for each day of violation.

(2). Knowing Violations The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 year, or both. The Environmental Protection Act provides that any person who knowingly violates subsection (f) of Section 12 of the Act, any provision of any regulation, standard, or filing requirement under subsection (b) of Section 39 of the Act, or any NPDES permit issued under the Act commits a Class 4 felony, and in addition to any other penalty prescribed by law is subject to a fine not to exceed $25,000 for each day of violation.

(3). Knowing Endangerment The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

(4). False Statement The CWA provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than 2 years, or by both. If a conviction of a permitee is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or by both. (See Section 309.c.4 of the Clean Water Act). The Environmental Protection Act provides that any person who knowingly makes any false statement, representation, or certification in an application form, or form pertaining to a NPDES permit or who knowingly renders inaccurate any monitoring device or record required in connection with any such permit or with any discharge which is subject to the provisions of subsection (f) of Section 12 of the Act commits a Class A misdemeanor, and in addition to any other penalties provided by law is subject to a fine not to exceed $10,000 for each day of violation.

b. Civil Penalties - The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed $25,000 per day for each violation. The Environmental Protection Act provides that any person who violates subsection (f) of Section 12 of the Act, any provision of any regulation, standard, or filing requirement under subsection (b) of Section 39 of the Act, or any NPDES permit issued under the Act is subject to a civil penalty not to exceed $50,000 for each violation and an additional civil penalty of not to exceed $10,000 for each day during which the violation continues.

c. Administrative Penalties - The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows:

(1). Class I penalty Not to exceed $10,000 per violation nor shall the maximum amount exceed $25,000.

(2). Class II penalty Not to exceed $10,000 per day for each day during which the violation continues nor shall the maximum amount exceed $125,000.

B. **Continuation of the Expired General Permit.** This permit expires five years from the date of issuance. An expired general permit continues in force and effect until a new general permit or an individual permit is issued. Only those facilities authorized to discharge under the expiring general permit are covered by the continued permit.

C. **Need to halt or reduce activity not a defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. **Duty to Mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. **Duty to Provide Information.** The permittee shall furnish within a reasonable time to the Agency or local agency approving sediment and erosion plans, grading plans, or storm water management plans; or in the case of a storm water discharge associated with industrial activity which discharges through a municipal separate storm sewer system with an NPDES permit, to the municipal operator of the system, any information which is requested to determine compliance with this permit. Upon request, the permittee shall also furnish to the Agency or local agency approving sediment and erosion

N. Requiring an Individual Permit or an Alternative General Permit.

1. The Agency may require any person authorized by this permit to apply for and/or obtain either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition the Agency to take action under this paragraph. Where the Agency requires a discharger authorized to discharge under this permit to apply for an individual NPDES permit, the Agency shall notify the discharger in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the discharger to file the application, and a statement that on the effective date of the individual NPDES permit or the alternative general permit as it applies to the individual permittee, coverage under this general permit shall automatically terminate. Applications shall be submitted to the Agency indicated in Part II.D (Where to Submit) of this permit. The Agency may grant additional time to submit the application upon request of the applicant. If a discharger fails to submit in a timely manner an individual NPDES permit application as required by the Agency under this paragraph, then the applicability of this permit to the individual NPDES permittee is automatically terminated at the end of the day specified by the Agency for application submittal.

2. Any discharger authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit. In such cases, the permittee shall submit an individual application in accordance with the requirements of 40 CFR 122.26(c)(1)(ii), with reasons supporting the request, to the Agency at the address indicated in Part II.D (Where to Submit) of this permit. The request may be granted by issuance of any individual permit or an alternative general permit if the reasons cited by the permittee are adequate to support the request.

3. When an individual NPDES permit is issued to a discharger otherwise subject to this permit, or the discharger is authorized to discharge under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit, whichever the case may be. When an individual NPDES permit is denied to a discharger otherwise subject to this permit, or the discharger is denied for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee remains in effect, unless otherwise specified by the Agency.

O. **State/Environmental Laws.** No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

P. **Proper Operation and Maintenance.** The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

Q. **Inspection and Entry.** The permittee shall allow the Agency or, in the case of a construction site which discharges through a municipal separate storm sewer, an authorized representative of the municipal operator or the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

R. **Permit Actions.** This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Part VII. REOPENER CLAUSE

A. If there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with industrial activity covered by this permit, the discharger may be required to obtain individual permit or an alternative general permit in accordance with Part I.C (Authorization) of this permit or the permit may be modified to include different limitations and/or requirements.

B. Permit modification or revocation will be conducted according to provisions of 35 Ill. Adm. Code, Subtitle C, Chapter I and the provisions of 40 CFR 122.62, 122.63, 122.64 and 124.5.

Part VIII. DEFINITIONS

"Agency" means the Illinois Environmental Protection Agency.

"Best Management Practices" ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Commencement of Construction" - The initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

"CWA" means Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. (96-483 and Pub. L. 97-117, 33 U.S.C. 1251 et.seq.)

"Dedicated portable asphalt plant" - A portable asphalt plant that is located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to. The term dedicated portable asphalt plant does not include facilities that are subject

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42, 44, and 45 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under subparagraphs (i)-(vii) or (ix)-(xi) of this subsection are associated with industrial activity;

(ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR 403. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with 40 CFR 503;

(x) Construction activity including clearing, grading and excavation activities except: operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale;

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 31 (except 311), 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25, (and which are not otherwise included within categories (i)-(x)).

"Waters" mean all accumulations of water, surface and underground, natural, and artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon the State of Illinois, except that sewers and treatment works are not included except as specially mentioned; provided, that nothing herein contained shall authorize the use of natural or otherwise protected waters as sewers or treatment works except that in-stream aeration under Agency permit is allowable.

APPENDIX E2

SWPPP INSPECTION CHECKLIST FORM

TolTest, Inc.

FORRESTAL LANDFILL FINAL COVER CONSTRUCTION ACTIVITIES SWPPP INSPECTION CHECKLIST

Inspections of each item will be performed weekly and within 24 hours after a precipitation event of 0.5 inches or greater which results in runoff.

Inspection Item	Person Conducting Inspection	Date and Time of Inspection	Observations of Erosion and Sediment Controls	Corrective Action and/or Maintenance Performed
Silt Fencing				
hay bales				
SW inlet protection				

Inspection Items Include(but not limited to):

- Silt Fence
- Berms
- Straw Bales
- Rock Checks

Date: _____

Title: _____

ignature: _____

ompany: _____

Phase: Circle as Appropriate

Site Prep/Clear-Grub Construction Restoration

APPENDIX E3

CERTIFICATION FORMS

CERTIFICATION FORM E1

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information; the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print Name of Authorized Representative	Title
Signature of Authorized Representative	Date

CONTRACTORS/SUBCONTRACTORS

CERTIFICATION FORM E2

"I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit (ILR1000000) that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification."

Name of Contracting Firm _____ Telephone Number _____

Address of Contracting Firm _____

Address of Site _____

Print Name of Representative _____ Title _____

Signature of Representative _____ Date _____