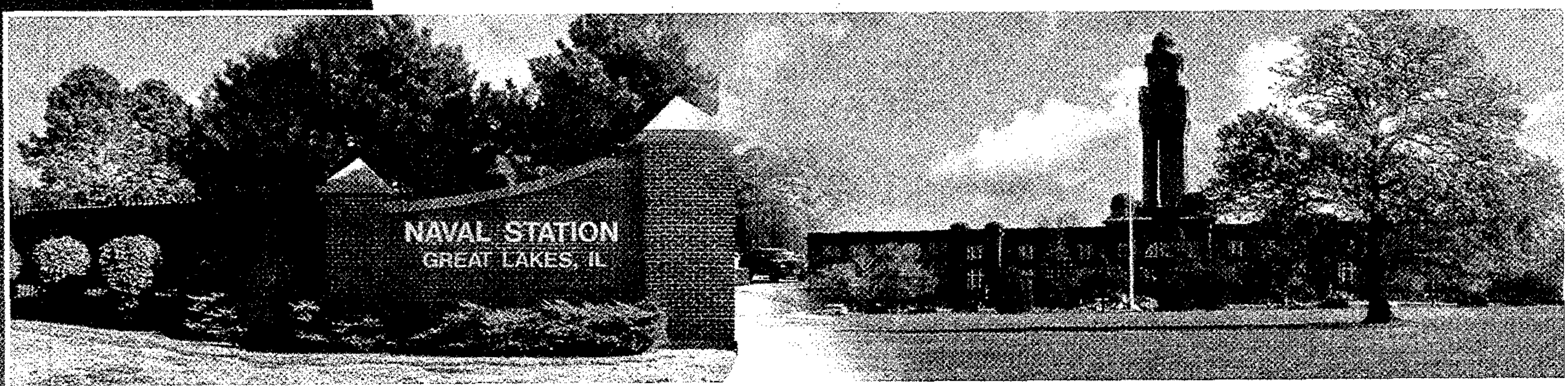
Work Plan

Forrestal Landfill Cap

Naval Station Great Lakes

Great Lakes, Illinois



Environmental Job Order Contract No. N68950-00-D-0200
Delivery Order No. 0069
TolTest Project No. 73706.01

Prepared for:
Department of the Navy
Naval Station Great Lakes
Environmental Department
Building 1-A, 201 Decatur Avenue
Great Lakes, Illinois 60088-5600

Submitted by:
TolTest, Inc.
1000 S. Northpoint Boulevard
Waukegan, Illinois 60085
Ph: (847) 689-0697
Fx: (847) 689-0698

May 2004

TOLTEST, INC.

EJOC CONTRACT NO. N68950-00-D-0200
DELIVERY ORDER NO. 0069

WORK PLAN
FORRESTAL 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
MAY 2004

BY

TOLTEST, INC.
1000 S. Northpoint Boulevard
Waukegan, Illinois 60085
(847) 689-0697
FAX (847) 689-0698

TOLTEST PROJECT NO. 73706.01

WORK PLAN
FORRESTAL LANDFILL CAP
NAVAL STATION GREAT LAKES
GREAT LAKES, ILLINOIS

EJOC NO. N68950-00-D-0200
DELIVERY ORDER NO. 0069

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: ______________________________ Date: 5/10/04
John McDonough, Hard Hat Services, Inc.

Reviewed/Approved By: Jeffrey M. Tinney Date: 5/10/04
Jeffrey Tinney, Project Manager

TABLE OF CONTENTS

Section **Page No.**

TABLE OF CONTENTS (continued)

LIST OF ACRONYMS

Clayton	Clayton Group Services, 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 Forrestal 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 Forrestal 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 Forrestal 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 FCCFCWP. 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 Forrestal Landfill is a 4.0-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 2000 and 2001 to determine the areal extent of the buried waste and to investigate 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 February 2002, a Project Plan and Report Final Cover Study was prepared for the Navy by Clayton Group Services, Inc. (Clayton). This Report forms the basis for the construction requirements outlined herein.

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

1.2 Overview of Final Cover Construction

The key elements of the FCC for the Forrestal 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 Forrestal 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, but at least by weekly.

1.6 Meetings and Reports

Weekly project reports shall be provided to the Owner no later than Tuesday of the following week. These reports shall detail all work performed, materials used, and will contain all related testing results and certifications, etc. The Project Plan does not specify progress meetings on a regular basis. Given the relatively small complexity of the work, it is expected that meetings will be arranged on an as-needed basis to discuss any issues that cannot be resolved via other communications.

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, Clayton, CQA Contractor, 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 weekly in the Contractor's field offices at the site during periods of major construction activities. Meetings will be attended by the Navy representatives, Clayton representatives, TolTest's Project Manager, major Subcontractors, CQA Contractor, 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, rental vehicles, 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 Owner's representative when the contractor personnel are working at the site, or will be faxed to the Owner's representative when field activities are intermittent, or when the Owner's representative is off Site.

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 Forrestal 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 preformed 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 remove 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 of 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 Manager, and crew foremen 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 occurs 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 (crew foremen, Project Manager, Health and Safety Manager), 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 Manager, and crew foremen 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
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 or the Health and Safety 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 Owner's Representative 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.

2.4 Dust Mitigation Plan

This Dust Mitigation Plan summarizes dust control procedures for construction activities associated with the FCC at the Forrestal 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.

2.5 Decontamination Plan

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

2.5.1 Vehicles to be decontaminated

Construction activities that are currently identified to require decontamination are excavation of passive landfill gas vent 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.

2.5.2 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 Forrestal 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.

2.5.3 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.

After each vehicle has been cleaned at the work area, it will be driven onto the temporary decontamination pad and washed using a pressure washer. The contaminated parts of the vehicle (e.g. trenching bucket) will be washed using clean water. Washing will continue until all visible soil is removed. Brushes and brooms will be used to scrub the vehicles as they are washed. Each vehicle will receive a final rinse with clean water after washing and before it is driven off the decontamination pad.

Wash water will be collected in the sump at the low end of the decontamination pad and will be pumped to and temporarily stored in portable tanks set up on the landfill surface. The wash water will not be allowed to overflow from the decontamination pad. Samples will be obtained from the water in the tanks and tested. The water quality test will be used to determine methods for water disposal. Depending on the test results and quantity of water, it may be used for on-site dust and fill moisture control or hauled off-site for disposal at a municipal wastewater treatment facility.

Sediments from the washing will be removed from the temporary decontamination pads and used as cover over the landfills. The sediments will be placed in areas of the landfills where the final cover will cover them.

The temporary decontamination pads will be removed from the landfill surfaces when vehicle decontamination is completed. The geomembrane will be cut into pieces and removed from the Site, to be disposed of properly as solid waste.

2.6 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 Forrestal 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.

2.6.1 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 Forrestal Landfill.

The selected site remedy for the Forrestal 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 Forrestal 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 crew foremen 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 crew foremen, 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.

Signs will be posted at the site indicating that unauthorized access to the site is prohibited, that all visitors must report to the site office, and that all deliveries must be checked through the site office. 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

TolTest will erect and maintain a temporary chain link fence along the north perimeter of the work area, connecting it to the fence along the west perimeter. The fences will be used to limit access into the work areas.

Signs will be placed on the fences and around the Forrestal 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 C-9.

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 Forrestal 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.

Sixteen trees (4-6 dia. trunk) and 5 shrub areas will be planted at the site. The shrub areas will be planted at locations along the footpath on the top of the landfill. The Navy will determine the tree locations.

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

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

Project Plans and Report
Final Cover Study

Forrestal Landfill
Great Lakes, Illinois

Clayton Project No. 15-03042.00
May 5, 2004

Prepared for:
DEPARTMENT OF THE NAVY
Engineering Field Activity, Midwest
Environmental Department

Prepared by:
CLAYTON GROUP SERVICES, INC.
3140 Finley Road
Downers Grove, Illinois 60515
630.795.3200

Clayton
GROUP SERVICES

CONTENTS

CONTENTS

(Continued)

EXECUTIVE SUMMARY

Clayton Group Services, Inc. (Clayton) was retained by the Department of the Navy, Naval Facilities Engineering Command under Contract/Order No. N68950-02-M-5172 to provide an engineering analysis and review of the existing soil cap of the Forrestal landfill and to provide designed improvements to the cap that could be directly implemented. The objectives for the improved design were to: improve the environmental integrity of the cap by reducing infiltration and managing landfill gas safely to prevent migration and odor problems, and to provide a finished landfill surface conducive to an end use of light recreational activities that would serve the needs of the surrounding base community.

Clayton studied all existing records of the landfill including other studies conducted since the landfill ceased operations. This study included obtaining records from regulatory agencies through the Freedom of Information Act (FOIA) and phone calls to regulatory agencies.

To develop accurate surface topography of the existing cap, Clayton used a subcontractor to perform an aerial survey or mapping of the site following the establishment of monuments and control points by a land surveyor to establish a datum and grid. A map was created to one-foot contour intervals from the aerial survey data.

In order to quantify the condition and performance of the existing cap, Clayton conducted a field investigation of the soil that defined the thickness of the soil overlying buried waste materials. Samples were taken of the existing soil cap and sent to a laboratory for analysis of engineering parameters, including the hydraulic conductivity (permeability) of the cap.

Piezometers were installed that allowed for samples of liquids in the waste mass to be recovered for chemical and biological analysis, and for the measurement and definition of the piezometric head elevation of the liquid/groundwater in the area of the site. Samples of the liquid were sent to a laboratory for analysis.

Methane concentrations and volatile organic compounds (VOCs) were sampled for in the gas headspace of the boreholes created during the field investigation of the soils, and in the headspace of the piezometers that were installed.

Utilizing the data resulting from these investigation and analysis activities, Clayton evaluated the performance of the existing soil cap using computer-modeling techniques. Using the appropriate end use requirements for recreational usage, such as a relatively flat slope and a mowed grass surface, Clayton developed plans and specifications for a low permeability cap, a passive gas management system, permanent drainage features, and landscaping that would eliminate the existing surface depressions and irregularities as well as intermittent releases of landfill gas through the cap that have been observed.

1.0 SITE INVESTIGATION

1.1 REVIEW EXISTING RECORDS

Clayton Group Services, Inc. (Clayton) was provided existing records, plans, and documentation by the Department of the Navy. Included in this documentation were results of two investigations by Tol Test, Inc. (Tol Test). One investigation defined the boundary of the Forrestal landfill, and the other investigation evaluated methane and volatile organic compounds (VOCs) in the landfill gas. These previous investigation reports are included in this document as Appendix A and B, respectively.

In order to establish any regulatory history of the Forrestal landfill, Clayton filed a Freedom of Information Act (FOIA) request with the Illinois Environmental Protection Agency (Illinois EPA) and contacted the Lake County, Illinois Solid Waste Department for all records pertaining to the site. For a brief period in the mid-1960s, the Forrestal landfill operated as a base sanitary landfill believed to have ceased operations prior to 1970. Little is known about the waste types or quantities placed in the landfill or the bottom depth or nature of operations at the facility. After reviewing its files, Lake County responded that it holds no records regarding the Forrestal site. Illinois EPA forwarded microfiche records that, upon examination, were all related to another base landfill (known as the Supply Side landfill). Given that the period of time Forrestal operated and closed its facility pre-dated the Illinois EPA permit program, it was not surprising to find no regulatory record for this facility.

1.2 FIELD INVESTIGATION OF EXISTING CAP

On December 20, 2002, Clayton personnel assisted by C. S. Drilling, Inc. (C.S. Drilling) conducted an investigation to ascertain the thickness of the existing soil cap. As a secondary function, the presence of landfill gas and the level at which it was found was measured at the top of each completed borehole. The presence or absence of waste material encountered at each location was noted and recorded. A Landtec® tri-gas meter was used after being first calibrated using standard O_2, CH_4, and CO_2 gases. Waste material was confirmed by visual examination of the soil cores after extraction. All fieldwork was performed under a Health and Safety Plan (Appendix C).

A Geoprobe® mounted on a small tractor was used to advance 2-inch sample tubes with clear plastic liners through the soil. The sampling tubes were advanced to either 4 feet or 8 feet as determined by: reaching refusal, or confirming the presence of buried wastes in the sample tube, thus indicating the depth of the soil cap had been confirmed at that location. Twenty-one (21) boreholes were advanced on an approximate 100-foot grid spacing across the landfill. Some locations needed to be adjusted from the grid intersections because of the landfill boundaries and configuration. Boring logs are found in Appendix D of this report.

Drawing C-3 (Appendix E) shows the locations of the boreholes and the results found at each location. At each location, the depth of soil cap encountered is noted, as well as if buried waste was encountered at the location. In general, the depth of the existing soil cap was found to be maximal along the south and west portions of the landfill, up to 5 feet thick, trending to minimal toward the northeast portion of the landfill with as little as 1 foot of soil depth encountered.

The boreholes where buried waste was encountered generally matched the landfill footprint and configuration determined by Tol Test in its boundary delineation study, which is found in Appendix A. *Combining both the observed locations of known buried waste and the visual appearance of the landform (i.e., the clearly apparent side slopes on the north, east, and south sides of some type of fill operation), Clayton concludes the probable footprint area of the Forrestal landfill occupies 3.2 acres. The assumed limits of the waste disposal area are shown on Drawing C-3 (*Appendix E).

Readings obtained from the landfill gas meter indicated a wide range of methane concentrations, generally higher (up to 58% CH_4) in the south central portion of the footprint area, and lower (2 to 3% CH_4) to non-detected in the boreholes roughly north of an east-west centerline through the site.

On December 23, 2002, Clayton personnel returned to the site to install three piezometers to detect, measure, and sample any liquids (presumably leachate) found in the waste fill. C.S. Drilling performed the drilling and installed the piezometers. An 8-inch auger was used to advance the hole for the piezometers. At this time, five Shelby tube (undisturbed) samples were taken for geotechnical analysis to determine engineering characteristics of the existing cap soil. The locations of the three piezometers are shown on Drawing C-3 (Appendix E). Boring logs and construction logs of each piezometer are shown on Drawing C-9 (Appendix E). Methane readings at the time of construction were found to be 18% of the lower explosive limit (LEL) in piezometer P-3, 56% of the LEL in piezometer P-2, and 36% of the LEL in piezometer P-1, respectively.

1.3 LEACHATE HEAD EVALUATION

On January 28, 2003, Clayton personnel measured the head elevations of liquid in each of the three piezometers. The head level was considered to have stabilized at its ambient seasonal elevation over one month since piezometer installation. The depth-to-liquid was measured to the top of the well casing, as well as the distance the well casing projected above ground level, thus allowing for a head level corrected to mean sea level (MSL) to be calculated. The average elevation of the piezometric surface based on an arithmetic average of the three piezometer readings (which were all very similar) was 675.7 MSL on January 28, 2002. This means that ambient piezometric water levels in the area of the landfill are quite close to the surrounding general ground surface elevation. Slight mounding of the liquid surface is indicated towards the center of the landfill, based on the highest head level in piezometer P-2.

The methane concentration of the headspace in each piezometer was measured immediately upon removing the cap of each piezometer. Piezometer P-2 exhibited a slight positive gas pressure when opened. The readings measured were: 58% LEL (42.4% CH_4) for P-3, 77% LEL (53.6% CH_4) for P-2, and 44% LEL (21.9% CH_4) for P-1.

1.4 LEACHATE CHARACTERIZATION AND ANALYSIS

On February 20, 2003, a representative from Clayton sampled each of the three piezometers (P-1, P-2, and P-3). The samples were sent to First Environmental Laboratories (First Environmental) in Naperville, Illinois to be analyzed for the following parameters: VOCs, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), pH, biological oxygen demand (BOD), and chemical oxygen demand (COD). Analytical results are provided in Appendix F. The results indicate that only one VOC, acetone, is slightly above Class I groundwater cleanup standards, and two metals, lead and selenium, are slightly above groundwater cleanup standards. Elevated levels of biological oxygen demand (BOD) and chemical oxygen demand (COD) are typical of municipal landfill leachate.

2.0 LANDFILL GAS INVESTIGATION

2.1 EVALUATION

The quantitative measurement of landfill gas was performed at various times throughout the field investigation process as previously described in Sections 1.2 and 1.3. The results indicated high concentrations of methane were found in a few boreholes and in each of the three piezometers, which extend deeper into the waste. The accumulation of methane to high concentrations, as measured in the piezometer headspace, is not unexpected considering they present a "dead" volume of airspace above the well screen, which is screened in the waste. On a qualitative basis, several observations provide additional perspective on the nature and extent of landfill gas at Forrestal:

- Only at P-2 – and only for a moment when the cap was removed – has any direct evidence of landfill gas under pressure been observed.
- The concentrations of methane are widely variable over the landfill footprint area – from 50%+(CH_4) to zero. This seems to indicate a lack of driving force, even within the waste mass.
- There is no evidence of vegetative stress on the surface.
- No odors are evident on or downwind of the landfill.
- Gas bubbles in water-filled depressions on the site are only an occasional occurrence, probably following wet periods or snowmelt.
- The amount of putrescible materials seen in the boring cores was very low.

The net conclusion is that very little methane is being generated by the site, and it is being generated at a minor rate. The cover soil was found to be relatively impermeable, so it is trapping what little gas is generated underneath, resulting in high readings when monitoring confined space beneath the existing landfill cap.

2.2 MANAGEMENT CONCEPT

Given the presence of landfill gas, but under little or no pressure, the appropriate management method is passive venting. The idea is to present a path of low resistance for gas below the cap to follow and exit to atmosphere that constitutes a preferred path compared to lateral migration or migration through the cap soil. Since the piezometric surface is close to ground level at the landfill perimeters, the venting system must be at a higher elevation within the unsaturated zone of the landfill. With the existing cap soils remaining in place and additional cover placed over them, a blanket-type vent layer (such as sand or geonet) is not feasible. The selected option is three parallel trenches containing a perforated pipe and backfilled with pea gravel. The pipes are connected to a stack-type vent with a turbine ventilator top to draw a small vacuum on the system with any wind.

The gas system design and details are shown on Drawings C-7 and C-9 (Appendix E), respectively.

3.0 GEOTECHNICAL EVALUATION OF EXISTING CAP

As previously discussed in Section 1.0, five undisturbed samples were taken during the field investigation part of this project. The samples were transported to Schleede – Hampton Associates in Elk Grove Village, Illinois for the following analyses:

• Moisture Content	ASTM D 2216
• Grain Size Analysis	ASTM D442
• Atterburg Limits	ASTM D4318
• Triaxial Permeability	ASTM D 5084

The full laboratory report is found in Appendix G of this document. All five samples were classified as a silty clay with some sand and a trace of gravel – classification CL. The moisture content, grain size, plasticity index, and permeability of all five samples were consistent with a suitable low permeability landfill cap material. The average permeability was found to be 3.7×10^{-8} cm./sec., actually better than the currently accepted regulatory minimum of 1×10^{-7} cm./sec. For this reason, the existing cover soil is to remain in place to act as a functional portion of the improved cap by placing additional low permeability compacted clay above it to achieve the designed grade and thickness.

4.0 HELP MODEL EVALUATION

The *Hydrologic Evaluation of Landfill Performance* model, Version 3.07 (developed by the US Corps of Engineers Waterways Experiment Station) was used to estimate the amount of infiltration of both the existing landfill cover and the proposed improved cap conditions. The amount of infiltration is an indication of how much precipitation in the form of rainfall and snow melt passes through the soil cover and enters the underlying waste mass, ultimately becoming leachate. The remaining portion of precipitation is accounted for as direct runoff, direct evaporation, or evapotranspiration from the vegetation taken up through the plants' root zone.

Both model runs used synthetically generated climatic data for the Chicago area over a 10-year period. Soil and site parameters for existing conditions were based on soil test results from Schleede-Hampton on five undisturbed samples taken from the cover in December 2002, and on the existing topography and vegetation conditions. Soil and site parameters for the proposed improved cap were based on the designed final contours, the characteristics of fill soils based on the project specifications, and vegetative type and quality based on the project specifications.

Allowance was made for a small percentage of the existing surface to not be free-draining to represent the areas where ponding occurs in depressions. The quality of the existing vegetation was judged "good" based on observation.

Results of each model run are provided as Appendix H. The modeling confirmed the expected effect of reduced infiltration through the improved cap compared to the existing cover due to improved slope to eliminate ponding and an increased thickness of low permeability material and increased root zone depth. Percolation through the existing cover was 2.8 inches per year average for the 10-year period versus 1.7 inches per year for the improved cap – a reduction of 40%.

5.0 CONSTRUCTION QUALITY CONTROL AND ASSURANCE

The Construction Contractor (Contractor) is responsible for all materials and procedures meeting or exceeding the specifications for this project found in Section 7.0. To this end, the Contractor shall obtain and provide to the Owner (or the Owner's designated representative, as applies also to all following references to "Owner") all required tests and certifications according to the test procedures listed in the specifications and at the test frequency per unit volume of each material as specified.

The Contractor shall provide all test results and certifications to the Owner a minimum of 10 working days before bringing material onsite. Where outside laboratory analysis is required, as in testing of soil materials, the Contractor shall submit the name, address, and contact information to the Owner for prior approval a minimum of 7 days before using the laboratory for analysis.

The Contractor shall notify the Owner at least 7 days before sampling imported soil materials from an offsite source. Borrow sources proposed by the Contractor are subject to inspection and approval of the Owner before use. The Owner may require the Contractor to provide (either written or verbal at behest of the Owner) a sampling plan describing where and how samples are to be obtained and how they will be composited (if applicable).

The Contractor shall subcontract a Registered Land Surveyor to establish monuments and control points for the proper location, elevation, and documentation of all elements of construction. Existing topography as shown in Drawing C-2 (Appendix E) is based on aerial topography performed in 2002. The Contractor and his Surveyor should satisfy themselves of the accuracy of this information, and bring to the Owner's attention any deviation prior to commencing work, as this topography will serve as the initial surface from which payment volumes will be determined.

The surveyor shall establish control grids on a spacing of 100 feet, beginning at the southwest corner of the project site, for the purpose of locating soil tests and other required site information.

The Contractor shall document the location, alignment, and elevation of all constructed features (e.g., gas management trenches and piping) and prepare as-built plans locating all features using the established site control system.

The Contractor shall notify the Owner a minimum of 10 days in advance of proposing to change suppliers or source of materials and submit all required test results and documentation as outlined previously.

The Contractor shall submit all test results and documentation data to the Owner at the end of each workweek. The Contractor shall inform the Owner immediately of any test result that fails to meet specified values.

The Contractor's surveyor shall perform a topographic survey of the landfill surface following completion of the placement, grading, and compaction of the low permeability fill layer, and again after completing placement and grading of the topsoil layer, and shall produce as-built topographic plan drawings to 1-foot contour intervals of each layer. The Contractor shall submit as-built topographic drawings to the Owner within 15 working days following completion of each layer.

6.0 EROSION CONTROL AND VEGETATION PLAN

6.1 EXISTING CONDITIONS

The Forrestal landfill is small in area (3.2 acres of actual landfill footprint) and relatively flat with a maximum elevation of 683.6 MSL near the center compared to the lowest surrounding land surface elevation of 674 MSL, which is along Skokie Creek to the east. The landfill comprises short side slopes of approximately 6 to1 (horizontal to vertical) maximum, again occurring on the east side of the landfill paralleling Skokie Creek, and a gently sloping top surface with irregular areas of settlement resulting in depressions that retain precipitation. A generally good grass cover exists over the entire surface with only small areas of poor vegetation. The causes of these small problem areas may be related to soil quality issues (excessive clay and gravel content) more than stress due to landfill gas. No significant erosion problems are evident on the existing surface or side slopes.

6.2 PROPOSED CONDITIONS

The general configuration of the landfill will be preserved after implementing the cap improvements. The top surface will be more sloped (2%) and without depressions to promote more rapid surface runoff and minimize infiltration. Side slopes will remain gentle, with the east slope reduced to approximately 7 to 1. Vegetation will consist of a durable blend of hardy grasses able to tolerate foot traffic consistent with the light recreational end use proposed for the landfill. Areas of shallow rooted type bushes and shrubs will be planted on the top surface of the landfill as shown on Drawing C-8 (Appendix E). Approximately 16 trees with a 4-to-6-inch trunk size will be planted around the landfill perimeter.

6.3 SHORT-TERM EROSION CONTROL MEASURES

In order to ensure low hydraulic conductivity and maximum performance of the cap improvements, existing vegetation and organic material must be stripped and removed, and the surface lightly graded and scarified before additional fill is placed and compacted. This will result in the entire site area temporarily consisting of bare soil until the completion and vegetation of the improved cap. The small area and lack of steep slopes will keep soil erosion rates low. Nonetheless, measures must be implemented to collect and contain any eroded soils carried by runoff and prevent them from reaching Skokie Creek (the primary surface water discharge from the site) and from leaving the site at any other location.

A standard commercial-type of polypropylene silt fencing attached to wooden stakes will be deployed around the entire perimeter of the site except across the construction entrance road, which will be slightly mounded to direct runoff inward towards the site. In addition, a continuous row of straw bales will be staked in place along the east site perimeter above Skokie Creek from Virginia Street on the north to a point south of the landfill where the row of bales will curve inward towards a higher elevation before termination. Both the silt fencing and straw bales are shown on Drawing C-2 (Appendix E). These measures will be fully implemented before any surface disruption begins on the existing site.

The silt fencing will be maintained throughout the construction period and until the grasses are deemed well established. The straw bales will be kept in place and maintained until the growing season following the initial planting, and until maintenance repairs and revegetating (if necessary) for that following season are performed and the new vegetation well established.

Predictive calculations for soil loss are imprecise to the point of being useless for a site as small as this project. The variations of short-term climatic conditions and rainfall over a construction period of only months will determine how favorable the growing conditions are which, in turn, will govern the amount of soil erosion occurring. Inspection and maintenance of erosion control features are the only necessary activities.

During construction, silt fencing and straw bales will be inspected on a weekly basis and repaired as needed. If eroded soil collects to the point that it impairs the continued function of either the fencing or bales, or threatens the structural stability of either, the soils will be removed and returned to the surface area. Following completion of final grading, planting, and mulching, silt fencing and straw bales will be inspected following significant (2 inches or more in 48 hours) rainfall events or, at a minimum, on a monthly basis. Repairs will be made as needed following each inspection.

A Notice of Intent (NOI) for generating storm water must be filed with the Illinois EPA before construction. A partially completed NOI is provided in Appendix I of this document.

6.4 LONG-TERM EROSION CONTROL MEASURES

The cap improvements are designed to be inherently erosion-resistant. A uniform thickness of topsoil (as shown on the project drawings) combined with the specified seed mixture, fertilizer, and mulch will support a dense and healthy turf surface. The drainage ditches are wide and gently sloped to keep flow velocities low and within the allowable range for grassed ditches. Once a mature vegetative cover is established, no surface erosion will occur at this site.

7.0 PROJECT SPECIFICATIONS

An engineer's cost estimate and project schedule are found in Appendix J of this document. This is for informational purposes only. The Contractor is responsible for developing a project schedule and cost estimate.

7.1 SITE PREPARATION

Prior to disturbing any part of the existing surface, the Contractor shall (1) identify and respond appropriately to protect any existing utilities, survey stakes, and benchmarks; (2) install temporary erosion controls around the site perimeter as shown on the project drawings.

Silt fencing must conform to Illinois Department of Transportation (IDOT) specifications, section 1080.02. Straw bales and stakes must conform to IDOT specifications, section 1081.15. Installation procedures must conform to IDOT specifications, section 280.

The Contractor is to provide, erect, and maintain temporary chain link security fencing around the north and south perimeters of the work area, connecting with the existing chain link fences on the west perimeters. A construction access gate suitable for all equipment used onsite shall be provided and installed in the west perimeter fence at the access road. The gate shall be provided with a suitable locking feature and kept locked at all times the site is unattended.

The Contractor shall strip existing vegetation including all roots and deleterious materials from the existing surface. Unless otherwise directed by the Owner (or the Owner's designated representative, as applies hereafter when reference is made to "Owner"), this material is to be handled and disposed of offsite by the Contractor. The Contractor shall notify the Owner of the location and means of disposal before proceeding.

7.2 GENERAL REQUIREMENTS

The Contractor is responsible for adequately controlling fugitive dust from the project. The site is located in a residential area, and excessive dust is unacceptable. A water truck with means of even dispersal is essential for this project. The Owner will designate a source(s) of water for construction. If conditions such as high winds or equipment breakdown make it impossible to control dust from leaving the site, the Contractor shall cease operations until conditions change.

The Contractor is to provide and construct all necessary access and haul roads for project construction. The access road onto the site shall be an all-weather road such as crushed aggregate or gravel, and crowned to direct runoff back toward the site or to the perimeter ditches, not allowing it to flow offsite.

The Contractor shall prevent mud tracking from vehicles and equipment leaving the site. Scraping, sweeping, and watering shall be used as required to control both dust and mud tracking onto offsite roads.

The Contractor shall prepare a Health and Safety Plan for all activities and submit the Plan to the Owner for review and approval before commencing work.

Weekly project summary reports are to be prepared and submitted to the Owner no later than Tuesday for each previous workweek. The report shall describe all work performed, all materials used, and shall have all pertinent testing results, product certifications, etc. appended to it.

The Contractor and his personnel shall follow all base rules, regulations, and security requirements.

The Contractor shall dispose of all spoil materials, construction debris, and refuse in accordance with federal, state, and local regulations.

7.3 LOW PERMEABILITY SOIL FILL (CLAY) MATERIAL

7.3.1 References

ASTM D75
Standard Practice for Sampling Aggregates

ASTM D421.422
Method for Sieve Analysis of Fine and Coarse Aggregates

ANSI/ASTM D698
Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop (Standard Proctor).

ASTM D155b
Test Method for Density of Soil and Soil – Aggregate in Place by Sand Cone Method

ASTM D2487
Classification of Soils for Engineering Purposes

ASTM D2922
Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D3017
Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

ASTM D3740
Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.

ASTM D4318
Test Method for Atterberg Limits Determination

ASTM 5804
Test Methods for Coefficient of Permeability Using the Constant-Head Method.

7.3.2 Definitions

Well Graded
A mixture of particle sizes with no specific concentration, or lack thereof, of one or more sizes. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain-size distribution parameters. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

7.3.3 Submittals

Submit name and location of proposed source for each type of imported material; provide certified source quality control test results for each type of material.

Submit name, address, and qualifications of proposed independent geotechnical inspection and testing laboratory to perform quality control tests for imported source materials. Obtain the Owner's approval of proposed laboratory.

The laboratory shall be an independent testing agency meeting requirements specified in ASTM D3740. Tests shall include, but not be limited to, determination of moisture-density relationships, minimum/maximum densities, grain-size distribution, Atterberg Limits, in-place density, optimum moisture content, and percent compaction measurements and calculations. The laboratory shall submit a certified test report to the contractor for each test performed.

7.3.4 Source Quality Control

For materials imported from offsite, notify the Owner when: (1) importing a material to the project site is scheduled to begin; (2) imported material appears to deviate from specification requirements or from previously supplied material.

Frequency of testing and test standards for imported fill at source:

- Gradation and Atterberg Limits (ASTM D421, D422): low permeability material: 1 sample/500 cubic yards.
- Hydraulic Conductivity (ASTM 5804): low permeability material: 1 sample/ 1,000 cubic yards.
- Standard Proctor Determination (ASTM D698): All fill materials except topsoil: 1 sample/1,000 cubic yards or when soil properties visibly change.

The Navy has stockpiled approximately 85,000 cubic yards of low permeability clay nearby, which has been tested and found to meet the requirements for this project. Results of the geotechnical testing of this material are found in Appendix K of this report.

7.3.5 Soil Materials

- Imported material, graded, with 100% passing the No. 4 sieve and at least 40% passing the No. 200 sieve.
- Liquid Limit <50 and Plasticity Index >10.
- Must have a hydraulic conductivity <1 x 10^{-7} cm/sec @ 90% relative compaction and -1% to +3% optimum water content in accordance with ASTM D5804 and ANSI/ASTM D698 (Standard Proctor).

7.4 PLACING AND COMPACTING

7.4.1 References

ANSI/ASTM D698
Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 kg) Rammer and 12-inch (304.8 mm) Drop (Standard Proctor).

ASTM D1556
Test Methods for Density of Soil and Soil-Aggregate in Place by Sand Cone Method.

ASTM D2922
Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D3017
Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

ASTM D4253
Test Methods for Maximum Index Density of Soils Using a Vibratory Table.

ASTM D4254
Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

7.4.2 Definitions

Relative Compaction
Ratio (in percent) of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D698. Apply corrections for oversize material to as-compacted field dry density and maximum dry density.

Optimum Moisture Content
Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction. Determine field moisture content on basis of fraction passing 3/4-inch sieve.

Relative Density

Calculated in accordance with ASTM D4254 based on maximum index density determined in accordance with ASTM D4253 and minimum index density determined in accordance with ASTM D4254.

Lift

Loose (uncompacted) layer of material.

7.4.3 Notification

Notify the Owner when (1) soft, loose, or otherwise unsuitable subgrade material is encountered under an area to receive fill, or when fill material appears unsuitable; (2) when operations are resumed after an extended period of inactivity; (3) when filling and compacting is completed to top of any finish grade elevation for a given soil layer.

7.4.4 Preparation

Rip or scarify subgrade to receive fill to a minimum depth of 6 inches before beginning fill placement. Do not place fill or backfill on frozen, wet, or spongy subgrade. Do not place frozen or excessively wet fill or backfill.

7.4.5 Placing/Compacting Fill – General

Avoid disturbing or damaging other work by method of placement. Maintain well-mixed gradation of soil throughout each lift.

Maintain moisture content of soil to attain required compaction. Prevent ponding of water within fill area. Add water to material at site of excavation if practicable; supplement as necessary by sprinkling the soil to achieve acceptable moisture content.

Clayton Group Services

Do not attempt to compact soil fill material that contains excessive moisture. Material that becomes too wet shall be removed or reworked. Aerate material by blading, disking, harrowing, or other methods to hasten the drying process. Maintain moisture conditions of the soil fill surface during nights, weekends, holidays, and other periods of temporary work stoppage.

Compact each lift to specified density before placing succeeding lifts. Excavate soft areas of subgrade and fill with suitable material to achieve compaction density at least equal to requirements of surrounding area.

Place and compact fill to plus/minus 3 inches of top of design elevation as shown on Drawing C-4 (Appendix E). Shape, trim, and finish slopes of embankments and channels to conform to the lines, grades, and cross sections shown.

Compact materials by mechanical means. Operate compaction equipment in strict accordance with the manufacturer's instruction and recommendations. Maintain equipment in such condition that it will deliver the manufacturer's rated compactive effort. Water flooding or jetting will not be permitted to perform compaction.

Compact fine-grained material using sheepsfoot or tamping foot compaction equipment. If minimum specified density requirements are met, but satisfactory breakdown of the soil clods and backfill has not occurred, provide additional compactive effort as necessary to break down and knead material into a uniform fill meeting specification requirements.

7.4.6 Placing/Compacting Low Permeability Fill

Construct to the grade and elevation shown on Drawing C-4 (Appendix E). Place fill in maximum 9-inch loose lifts and compact each lift to not less then 90% relative compaction and from -1% to +3% of the optimum moisture content as determined by ASTM D698 (Standard Proctor). Relative compaction and optimum moisture will be confirmed every lift using ASTM D2922 and ASTM D3017 at 100-foot grid centers.

7.5 TOPSOIL

Topsoil shall consist of a loose, loamy-type of soil with an organic content suitable for sustaining vegetation. Topsoil shall be clean and free of roots, debris, subsoil, and shall contain less than 5% by volume of cobbles or rock. Topsoil shall be spread evenly in a single lift thickness 30% thicker than the final design thickness shown on the project drawings to allow for consolidation. Topsoil layer shall not be compacted.

7.6 FERTILIZER

Fertilizer shall be applied to the bare earth surface prior to seedbed preparation at the rate of 270 lb/acre at 1:1:1 ratio as follows:

- Nitrogen fertilizer nutrients 90 lb/acre
- Phosphorus fertilizer nutrients 90 lb/acre
- Potassium fertilizer nutrients 90 lb/acre

7.7 SEEDBED PREPARATION

The seedbed must be in a loose condition free of weeds, clods, sticks, rivulets and gullies, crusting and caking. If necessary, the surface shall be worked with a disc tiller to a depth of 3 inches to achieve the proper condition.

7.8 SEEDING

Seeding can be performed with a mechanical seed drill that places seeds in contact with the soil and covers and packs in one operation, or by hydraulic seeder. Other methods are acceptable if approved by the Owner.

Seeding shall not be performed in high winds, or when surface is muddy, or when heavy rains are predicted in the next 24 hours. Equipment used must be pre-calibrated to ensure application at the specified rate.

The seed mixture and application rates are as follows:

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

Seed mixture is to have less than 3% of weed seeds by analysis. Certification of seed analysis must be provided to the Owner before seeding.

7.9 MULCHING

Straw mulch shall be applied within 24 hours after seeding. Mulch shall be applied by hand or machine application at the rate of 2 tons/acre and shall be loose enough to allow air circulation, but compact enough to reduce erosion. Following the mulching operation, foot and vehicular traffic on the surface is prohibited.

7.10 GAS TRENCH DRAINAGE STONE

Backfill for the gas management system trenches shall meet the gradation requirements of ASTM C33 – latest revision Size Number 6; $^3/_4$ to $^3/_8$-inch Nominal Size. Stone shall non-calcareous and be sound and clean, and free of deleterious substances. The Contractor shall inform the Owner of the proposed source of material and provide a laboratory gradation analysis and a sample of the material to the Owner for approval.

7.11 PERFORATED CORRUGATED HDPE PIPE

Corrugated, perforated HDPE pipe used for the gas trenches shall be single-wall pipe, Type C produced and sold by Advanced Drainage Systems, Inc. (ADS). The pipe shall meet the product specifications (provided in Appendix L) for the pipe diameter called out on the project drawings. A Manufacturer's Certification of compliance shall be provided to the Owner.

If an equivalent product from a different manufacturer is proposed, the Contractor shall supply product specifications to the Owner for prior approval.

8.0 LONG TERM OPERATIONS AND MAINTENANCE PLAN

As described in Section 6.0, some repair of the constructed cap is anticipated in the first season following construction and vegetating. After that, no erosion-related repairs are expected, and only normal mowing on the same schedule as currently performed is required.

For the first year following construction, it is expected that 5% (approximately 7,000 square feet) of surface will require additional topsoil, fine grading, reseeding, and mulching. The amount of topsoil expected to be required is 90 cubic yards. The total cost of the predicted repairs is estimated to be $3,000.

APPENDIX A

TOL TEST SITE DELINEATION REPORT

DELIVERY ORDER COMPLETION REPORT

FORRESTAL LANDFILL BOUNDARY DELINEATION
(IR SITE 2)
DEMOLITION DEBRIS DISPOSAL AREA
(IR SITE 13G)
NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS

ENVIRONMENTAL JOB ORDER CONTRACT (EJOC)
CONTRACT NO. N68950-96-D-0052
DELIVERY ORDER NO. 0092
TOLTEST PROJECT NO. 39749.01

Submitted to:

Department of the Navy
Naval Training Center (NTC) – Environmental Department
Building 1-A, 201 Decatur Avenue
Great Lakes, Illinois 60088-5600

Submitted by:

TOLTEST, INC.
1915 N. 12th Street
P.O. Box 2186
Toledo, Ohio 43603
(419-241-7175)

SEPTEMBER 2000

TABLE OF CONTENTS

APPENDICES

Executive Summary

TolTest, Inc. was retained by the Department of the Navy, Naval Facilities Engineering Command under Contract No. N68950-96-D-0952, Delivery Order (DO) No. 0092 to furnish all labor, supervision, and equipment in connection with a geoprobe investigation to evaluate the boundaries of the former Forrestal Landfill (IR Site 2) and the former Demolition Debris Disposal Area (IR Site 13G) located at the Naval Training Center (NTC) in Great Lakes, Illinois. Specifically, TolTest installed and evaluated 88 geoprobe borings to estimate the areal extent of the aforementioned sites. The depth and volume of the former landfill and demolition debris disposal area were not calculated since the scope of work for this DO was limited to evaluating the areal extent of the two sites.

TolTest installed 40 geoprobe borings in IR Site 2 to evaluate the location and extent of the landfill. Landfill debris was observed in 17 geoprobe borings located in the central portion of IR Site 2. Methane gas was observed bubbling through the groundwater in several of these borings. Based on the presence of landfill debris in the geoprobe boring samples, the approximate areal extent of the former landfill is 75,000 square feet. TolTest must emphasize that this areal extent for the former landfill is strictly an estimate.

TolTest installed 48 geoprobe borings in IR Site 13G to evaluate the location and extent of the demolition debris area. Demolition debris was observed in eight (8) geoprobe borings advanced in the southwest portion of IR Site 13G and in two (2) geoprobe borings advanced in the southeast portion of IR Site 13G. Surface debris consisting of concrete, asphalt, tires, and utility poles was observed in the southwest portion of IR Site 13G. Some surface debris consisting of concrete slabs was also observed in the southeast portion of IR Site 13G, however, this debris was located approximately 100 feet south of the two geoprobe borings that contained demolition debris in the southeast portion of IR Site 13G.

Based on the presence of demolition debris in the soil samples collected from the geoprobe borings, the approximate areal extent of the demolition debris area in the southwest portion of IR Site 13G is 90,000 square feet. TolTest must emphasize that this areal extent for the former demolition debris area is strictly an estimate.

1.0 Introduction

This Delivery Order Completion Report (DOCR) outlines the procedures utilized for the collection of geoprobe samples to evaluate the boundaries of the former Forrestal Landfill (IR Site 2) and the former Demolition Debris Disposal Area (IR Site 13G) located at the Naval Training Center (NTC) in Great Lakes, Illinois. The Forrestal Landfill was operated as a base sanitary landfill for a short period of time in the mid-1960s. The period of operation for the Demolition Debris Disposal Area is not known. Concrete and other demolition debris have been found in these areas during construction activities. The areal extent of these sites is limited and contradictory.

TolTest advanced 40 borings at IR Site 2 and 48 borings at IR Site 13G utilizing a geoprobe drill rig. Figures depicting the two sites and the geoprobe boring locations can be viewed in Appendix A. Soil samples collected from the geoprobe borings were logged by a geologist and observed for the presence of landfill or demolition debris. None of the soil samples were submitted for laboratory analytical results.

The tasks performed to complete the aforementioned scope of work are presented as follows:

- Mark the boring locations in IR Sites 2 and 13G to obtain a utility clearance from the Public Works Center (PWC);
- Advance the geoprobe borings at the marked locations until landfill or demolition debris is encountered or until refusal;
- Continuously collect soil samples from each geoprobe boring and record the stratigraphy on a boring log;
- Backfill the bore holes using bentonite chips; and
- Prepare a DOCR that will include a description of the field activities, site maps, boring logs, and conclusions regarding the boundaries for the former landfill and demolition debris area.

2.0 Field Activities

Field activities performed at the site included advancing 88 geoprobe soil borings and continuously collecting soil samples. Standard Occupational Safety and Health Administration (OSHA) health and safety procedures were followed during the field activities to ensure the safety of field personnel. The field activities are described in this section.

2.1 Utility Locate

On June 5, 2000, TolTest conducted a utility locate meeting with PWC, Ameritech, and Peoples Energy. Site diagrams depicting the study areas (IR Sites 2 and 13G) were given to the aforementioned utility representatives. It was agreed during this meeting that TolTest would mark the boring locations within the study areas using marking paint to further assist in appropriately locating the underground utilities. The utility clearance for IR Site 2 was completed for June 12, 2000 and the clearance for IR Site 13G was completed for June 19, 2000. A second utility locate meeting was held on June 15, 2000 to ensure that utility clearance for IR Site 13G was completed by June 19, 2000.

2.2 IR Site 2 Geoprobe Study

Between June 12 and 16, 2000, TolTest advanced 40 borings at IR Site 2. The boring locations for IR Site 2 are depicted in Appendix A. The soil borings were advanced by Terra Probe Environmental Services utilizing a geoprobe soil unit and completed when landfill debris was encountered or refusal occurred. Split-barrel (split-spoon) samples were collected in 4-foot increments from each borehole, with the sampling equipment decontaminated prior to each sampling run utilizing a Liquinox® soap and deionized water. The boreholes were backfilled with the soil cuttings and hydrated bentonite chips.

The stratigraphy for IR Site 2 consisted primarily of silty clay overlying a stiff clay. The interface depth between these soil types varied throughout the study area. Landfill debris was observed in 17 of the borings advanced in the central portion of IR Site 2. Specifically, landfill debris was observed in the samples collected from borings 4 through 15, 17 through 19, 34, and 35. Landfill debris was observed between 1.5 and 12 feet below ground surface (bgs) in these borings. These borings are located in the central portion of IR Site 2 (see Figure 4 in Appendix A).

Methane gas could be seen bubbling through the groundwater in the boreholes for borings 4, 5, 8, 13, 17, and 19. As previously stated, the boreholes were backfilled with soil cuttings and bentonite chips, except boring 4, which was left open so that the discharging methane could be observed. Methane gas bubbled through the groundwater in boring 4 for seven days before the borehole was backfilled with bentonite chips. A figure highlighting the borings that contained landfill debris is included in Appendix A. Boring logs for the geoprobe borings are included in Appendix B.

2.3 IR Site 13G Geoprobe Study

Between June 19 and 23, 2000, TolTest advanced 48 borings at IR Site 13G. The boring locations for IR Site 13G are depicted in Appendix A. The geoprobe borings advanced at IR Site 13G were advanced using the same methods as for IR Site 2.

The stratigraphy for IR Site 13G consists of a silty clay overlying a stiff clay. In several of the geoprobe borings a sand layer was observed between the silty clay and the stiff clay. The interface depth for these soil types varied throughout the study area. Demolition debris was observed in eight (8) of the borings advanced in the southwest portion of IR Site 13G. Specifically, demolition debris was observed in the samples collected from borings 65, 66, 67, 69, 70, 73, 74, and 79. The demolition debris was observed between two (2) and eight (8) bgs in these borings. Surface debris consisting of concrete, asphalt, tires, and a utility pole was observed in the vicinity of these borings. These borings are located in the southwest portion of IR Site 13G, directly south of the concrete retention pond for the water treatment station.

Concrete chips were observed in the samples collected from boring 54 and 58, which are located in the southeast portion of IR Site 13G. Refusal was encountered at 0.5 and 2 feet in borings 54 and 58, respectively. Slabs of concrete were observed on the ground surface approximately 100 feet south of boring 54.

A figure highlighting the borings that contained demolition debris is included in Appendix A. Boring logs for the geoprobe borings are included in Appendix B. Copies of the Contractor Daily Quality Control Reports are included in Appendix C.

3.0 Conclusions

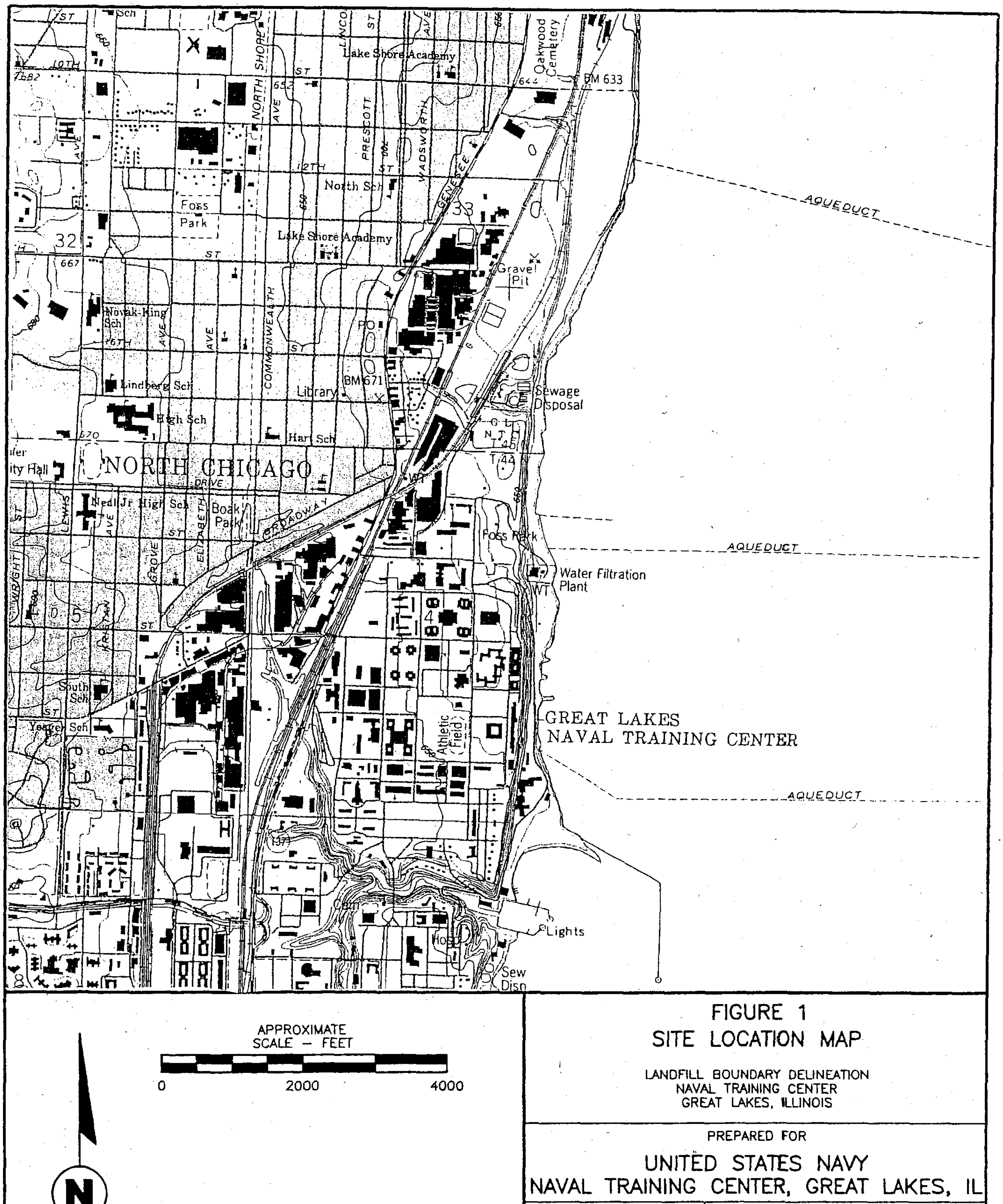
TolTest installed 40 geoprobe borings in IR Site 2 to evaluate the location and extent of the landfill. Landfill debris was observed in 17 geoprobe borings advanced in the central portion of IR Site 2. Methane gas was observed bubbling through the groundwater in several of these borings. Based on the presence of landfill debris in the geoprobe boring samples, the approximate areal extent of the former landfill is 75,000 square feet. TolTest must emphasize that this areal extent for the former landfill is strictly an estimate and no calculation were made to evaluate the depth and volume of the former landfill.

TolTest installed 48 geoprobe borings in IR Site 13G to evaluate the location and extent of the demolition debris area. Demolition debris was observed in eight (8) geoprobe borings advanced in the southwest portion of IR Site 13G and in two (2) geoprobe borings advanced in the southeast portion of IR Site 13G. Surface debris consisting of concrete, asphalt, tires, and utility poles was observed in the southwest portion of IR Site 13G. Some surface debris consisting of concrete slabs was also observed in the southeast portion of IR Site 13G, however, this debris was located approximately 100 feet south of the two geoprobe borings that contained demolition debris in the southeast portion of IR Site 13G.

Based on the presence of demolition debris in the soil samples collected from the geoprobe borings, the approximate areal extent of the demolition debris area in the southwest portion of IR Site 13G is 90,000 square feet. TolTest must emphasize that this areal extent for the former demolition debris area is strictly an estimate and no attempt was made to evaluate the depth and volume of the former demolition debris area.

APPENDIX A

Site Figures



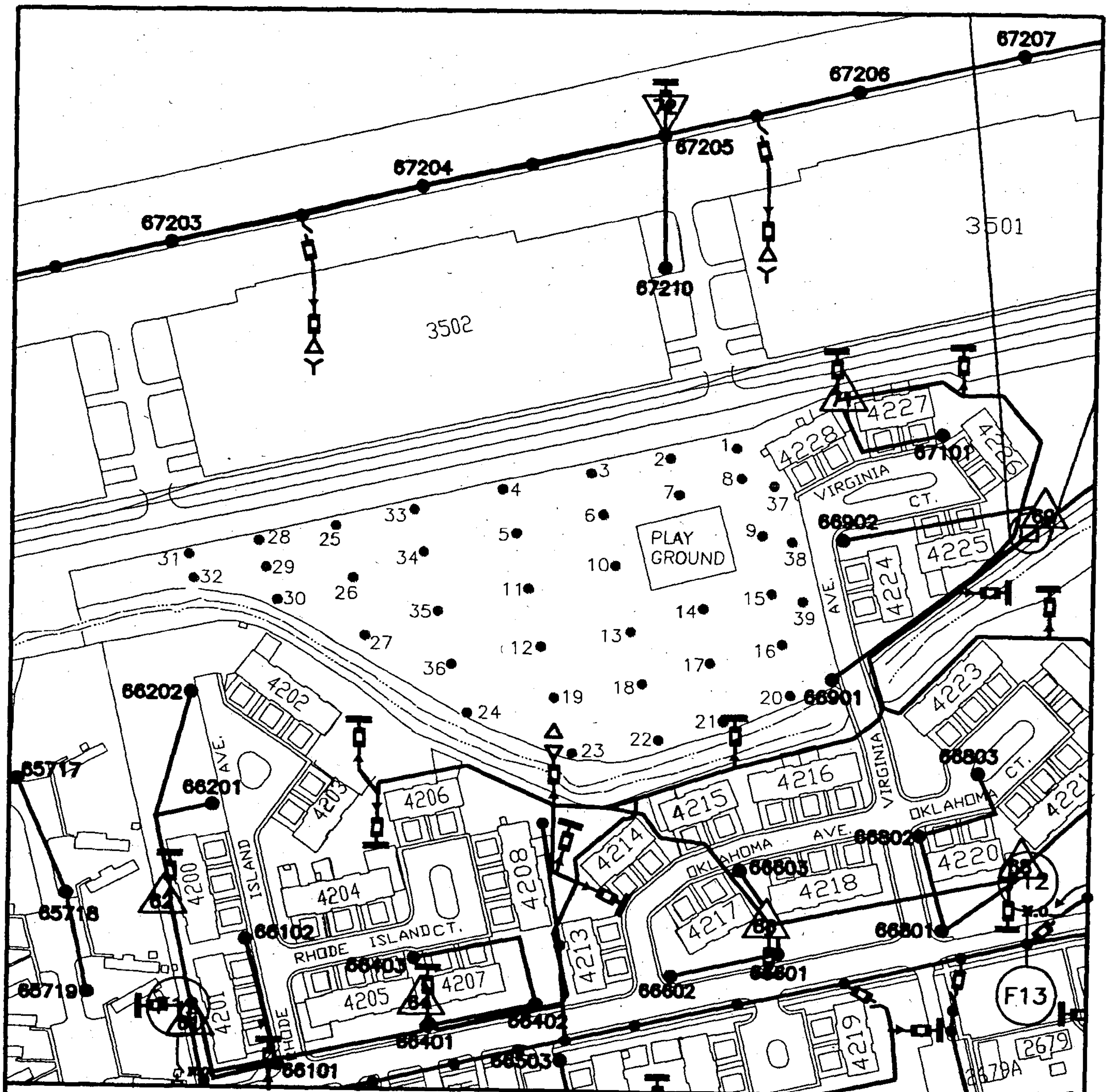
REFERENCE
USGS 7.5 MIN TOPOGRAPHIC QUADRANGLE
WAUKEGAN, ILLINOIS QUADRANGLE
DATED 1993
SCALE 1 : 24000

FIGURE 1
SITE LOCATION MAP

LANDFILL BOUNDARY DELINEATION
NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS

PREPARED FOR
UNITED STATES NAVY
NAVAL TRAINING CENTER, GREAT LAKES, IL

DRAWN MRC\7-11-00	CHECKED
REVISED	APPROVED
JOB NO.: 39749.01	TOLTEST, INC.
DRAWING NUMBER 397491	



APPROXIMATE SCALE – FEET

0 200 400

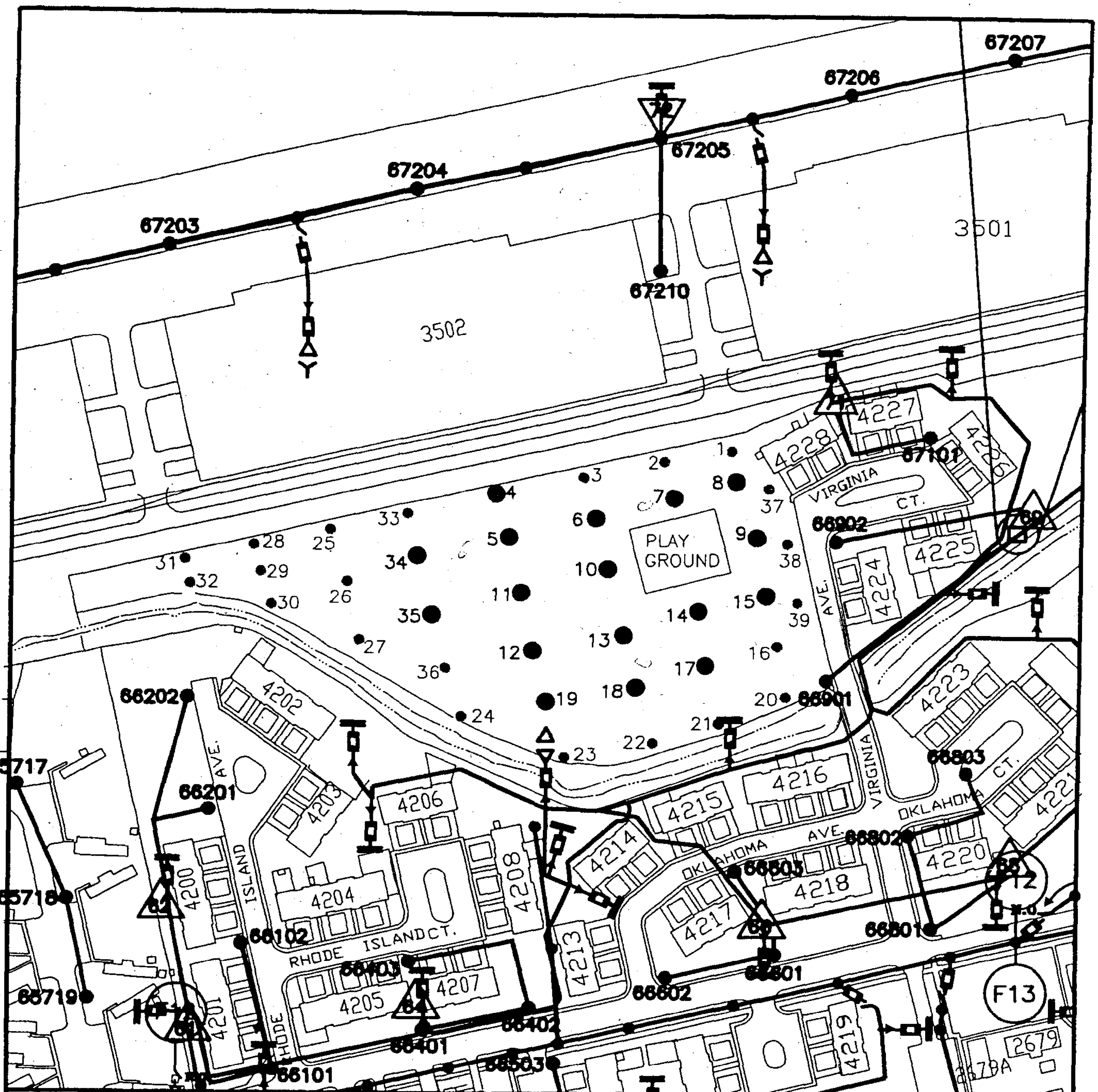
FIGURE 3
AREA 2 BORING LOCATIONS

LANDFILL BOUNDARY DELINEATION
NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS

PREPARED FOR

UNITED STATES NAVY
NAVAL TRAINING CENTER, GREAT LAKES, IL

DRAWN MRC\7-11-00	CHECKED
REVISED	APPROVED
JOB NO.: 39749.01	TOLTEST, INC.
DRAWING NUMBER 397493	



APPROXIMATE SCALE – FEET

0 200 400

N

2● – BORING LOCATION

11● – LANDFILL DEBRIS OBSERVED IN BORING

FIGURE 4
LANDFILL BOUNDARY AREA 2

LANDFILL BOUNDARY DELINEATION
NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS

PREPARED FOR

UNITED STATES NAVY
NAVAL TRAINING CENTER, GREAT LAKES, IL

DRAWN MRC\7-11-00	CHECKED
REVISED	APPROVED
JOB NO.: 39749.01	TOLTEST, INC.
DRAWING NUMBER 397494	

APPROXIMATE
SCALE - FEET
0 300 600

N

78● - BORING LOCATION

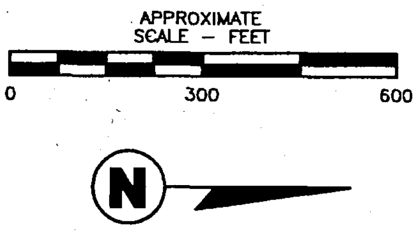
FIGURE 5
AREA 13G BORING LOCATIONS

LANDFILL BOUNDARY DELINEATION
NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS

PREPARED FOR

UNITED STATES NAVY
NAVAL TRAINING CENTER, GREAT LAKES, IL

DRAWN MMB/7-17-00	CHECKED
REVISED	APPROVED
JOB NO.: 39749.01	TOLTEST, INC.
DRAWING NUMBER 397495	



78● – BORING LOCATION

79● – LANDFILL DEBRIS OBSERVED IN BORING

FIGURE 6

LANDFILL BOUNDARY AREA 13G

LANDFILL BOUNDARY DELINEATION
NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS

PREPARED FOR

UNITED STATES NAVY
NAVAL TRAINING CENTER, GREAT LAKES, IL

DRAWN MMB/7-17-00	CHECKED
REVISED	APPROVED
JOB NO.: 39749.01	TOLTEST, INC.
DRAWING NUMBER 397496	

APPENDIX B

Boring Logs

Project No: 39749.01

Log of Borehole: GP-1

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–0.5	-0.5			*TOPSOIL - brown loam*				
0.5–5	-5	S-1 (0.5–4)		*SAND* brown, some clay with trace organic material	4.0	NA		
5–11	-11	S-2 (4–8)		*CLAY* gray	4.0	NA		
		S-3 (8–11)		Refusal at 11.0 ft	3.0	NA		
11				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-13-2000

Drilling Company: Terra Probe

Total Depth: 11.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-2

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam*				
1–3.5	-3.5	S-1		*FILL* brown, fine-grained sand with trace gravel	4.0	NA		
3.5–7.5	-7.5	S-2		*FILL* gray clay with some wood debris -with some concrete debris at 7.0 ft	4.0	NA		
7.5–11.8	-11.8	S-3		*CLAY* gray Refusal at 11.8 ft	3.8	NA		
11.8				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-13-2000

Drilling Company: Terra Probe

Total Depth: 11.8

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-3

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1.5	-1.5	S-1		*TOPSOIL - brown loam*	4.0	NA		
1.5–4	-4	S-1		*SILT* brown, some sand with trace gravel				
4–5.5	-5.5	S-2		*SAND* brown, some silt	4.0	NA		
5.5–14	-14	S-2, S-3, S-4		*CLAY* gray, with trace amount of pebbles -becomes dark gray at 7.5 ft Refusal at 14.0 ft	S-3: 0.0; S-4: 2.0	NA		
14				End of Borehole				

Drilling Method: Geoprobe	Total Depth: 14.0	Datum: Ground surface
Drilling Date: 6-13-2000	Initial Water Elevation (ft)/date: NA	Checked by:
Drilling Company: Terra Probe	Water Elevation (ft)/date: NA	Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-4

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2	-2	S-1		*TOPSOIL - brown loam*	4.0	NA		
2–4	-4			*FILL* brown clay with some silt and pebbles				
4–8	-8	S-2		*FILL* black silt with some glass, plastic, insulation material, and aluminum foil, strong septic odor	2.5	NA		
8				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-13-2000

Drilling Company: Terra Probe

Total Depth: 8.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Location: Forrestal Landfill

City, County: Great Lakes, Lake

Log of Borehole: GP-5

Geologist: k. Mander

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	ppm 1 2 3 4 5 6 7 8 9	
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam* with some organic material				
1–4	-4	S-1		*FILL* brown silty sand with some pebbles	4.0	NA		
4–8	-8	S-2		*FILL* gray silty clay with lots of glass, plastic, and insulation material, gas bubbling through the groundwater in the borehole	3.0	NA		
8				End of Borehole				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Drilling Method: Geoprobe

Drilling Date: 6-13-2000

Drilling Company: Terra Probe

Total Depth: 8.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-6

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm, 1–9)	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam* with trace organic material				
1–4	-4	S-1		*FILL* brown silty sand with landfill debris, strong septic odor	4.0	NA		
4				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-13-2000

Drilling Company: Terra Probe

Total Depth: 4.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-7

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–2.5	-2.5	S-1		*TOPSOIL - brown loam* with trace organic material	4.0	NA		
2.5–4	-4			*FILL* brown silty clay with pebbles, glass, and concrete				
4–6.5	-6.5	S-2		*FILL* brown silty clay with some glass, plastic, and aluminum foil, strong septic odor Refusal at 6.5 ft	2.5	NA		
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 6.5

Datum: Ground surface

Drilling Date: 6-13-2000

Initial Water Elevation (ft)/date: NA

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-8

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description (SUBSURFACE PROFILE)	Recovery (ft) (SAMPLE)	SPT Blows (SAMPLE)	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1	-1	S-1		*TOPSOIL - brown loam* with trace organic material	4.0	NA		
1–4	-4	S-1		*FILL* brown silty sand with landfill debris, strong septic odor				
4				End of Borehole				

Depth scale: 0 to 20 ft.

Drilling Method: Geoprobe

Total Depth: 4.0

Datum: Ground surface

Drilling Date: 6-13-2000

Initial Water Elevation (ft)/date: NA

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-9

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows		
	0			Ground Surface				
0–3		S-1		*TOPSOIL - brown loam* with organic material	4.0	NA		
3–4	-3			*FILL* gray silty clay with some bricks				
4–8	-4	S-2		*FILL* gray silty clay with landfill debris material and septic odor	2.0	NA		
8–12		S-3		Refusal at 14.0 ft	3.0	NA		
12	-12			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-13-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-10

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–2	-2	S-1		*TOPSOIL - brown loam* with trace organic material	3.5	NA		
2–4	-4			*FILL* gray silty sand with some pebbles and trace amounts of glass				
4–7	-7	S-2		*FILL* landfill debris with strong septic odor	2.0	NA		
7				Refusal at 7.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 7.0

Datum: Ground surface

Drilling Date: 6-13-2000

Initial Water Elevation (ft)/date: NA

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-11

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–2.5	-2.5	S-1		*TOPSOIL - brown loam* with trace organic material	3.0	NA		
2.5–6	-6	S-2		*FILL* gray silty clay	3.0	NA		
6–7.5	-7.5			*FILL* landfill debris with strong septic odor Refusal at 7.5 ft				
7.5				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 7.5

Datum: Ground surface

Drilling Date: 6-13-2000

Initial Water Elevation (ft)/date: NA

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Location: Forrestal Landfill

City, County: Great Lakes, Lake

Log of Borehole: GP-12

Geologist: k. Mander

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2		S-1		*TOPSOIL - brown loam*	4.0	NA		
2–5	-2			*FILL* brown silty clay with trace amounts of rock fragments, slight septic odor				
5–7	-5	S-2		*FILL* landfill debris with strong septic odor	2.5	NA		
7	-7			Refusal at 7.0 ft End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-13-2000

Drilling Company: Terra Probe

Total Depth: 7.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-13

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–2.5		S-1		*TOPSOIL - brown loam*	4.0	NA		
2.5–4	-2.5			*FILL* landfill debris with strong septic odor				
4	-4			Refusal at 4.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 4.0

Datum: Ground surface

Drilling Date: 6-13-2000

Initial Water Elevation (ft)/date: NA

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-14

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2	-2	S-1		*TOPSOIL - brown loam* with trace organic material	4.0	NA		
2–4	-4			*FILL* brown silty clay with trace amounts of pebbles				
4–7	-7	S-2		*FILL* landfill debris with slight septic odor	2.0	NA		
7				Refusal at 7.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 7.0

Datum: Ground surface

Drilling Date: 6-13-2000

Initial Water Elevation (ft)/date: NA

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-15

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–4	-4	S-1		*TOPSOIL - brown loam* with trace organic material and slight septic odor	4.0	NA		
4–8	-8	S-2		*FILL* gray silty clay with trace amounts of pebbles, wood debris, and strong septic odor	4.0	NA		
8–12		S-3		*CLAY* gray, some silt, slight septic oder	4.0	NA		
12–16	-16	S-4			0.0	NA		
16				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-13-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: 12.0/6-13-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Log of Borehole: GP-16

Project No: 39749.01

Location: Forrestal Landfill

City, County: Great Lakes, Lake

Geologist: k. Mander

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
	-0.5			*TOPSOIL - brown loam* with trace organic material				
1				*CLAY* brown, some silt				
2		S-1			4.0	NA		
4				-becomes gray with trace gravel at 4.0 ft				
6		S-2			4.0	NA		
10	-10.5	S-3			3.0	NA		
	-11			*GRAVEL* gray and wet				
	-12			*CLAY* gray				
12				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-14-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 10.5/6-14-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-17

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–1				*TOPSOIL - brown loam* with trace organic material				
1–4	-4	S-1		*FILL* brown silty clay	4.0	NA		
4–8	-8	S-2		*FILL* gray clay with slight septic odor	3.0	NA		
8–12	-12	S-3		*FILL* landfill debris with strong septic odor, wet	1.0	NA		
12				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 12.0

Datum: Ground surface

Drilling Date: 6-14-2000

Initial Water Elevation (ft)/date: 8.0/6-14-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-18

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam*				
1–4	-4	S-1		*FILL* brown silty clay	4.0	NA		
4–7	-7	S-2		*FILL* landfill debris with strong septic odor, wet	2.0	NA		
7				Refusal at 7.0 ft End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-14-2000

Drilling Company: Terra Probe

Total Depth: 7.0

Initial Water Elevation (ft)/date: 4.0/6-14-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-19

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–3	-3	S-1		*TOPSOIL - brown loam* with trace pebbles	4.0	NA		
3–5	-5			*FILL* black silty clay with slight septic odor -becomes wet at 4.0 ft				
5–8	-8	S-2		*FILL* landfill debris with strong septic odor, wet	2.0	NA		
8				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-14-2000

Drilling Company: Terra Probe

Total Depth: 8.0

Initial Water Elevation (ft)/date: 4.0/6-14-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Location: Forrestal Landfill

City, County: Great Lakes, Lake

Log of Borehole: GP-20

Geologist: k. Mander

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0		Ground Surface				
0–2.5		S-1	*TOPSOIL - brown loam*	4.0	NA		
2.5–5	-2.5		*CLAY* brown, some silt with trace stone chips				
5–5.3	-5	S-2	*GRAVEL* wet	4.0	NA		
5.3–12			*CLAY* gray				
8–12		S-3		4.0	NA		
12	-12		Refusal at 12.0 ft				
			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-14-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 5.0/6-14-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-21

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam*				
1–5	-5	S-1		*CLAY* brown, some silt	2.0	NA		
5–11	-11	S-2		*CLAY* gray	4.0	NA		
				-becomes wet at 8.0 ft				
		S-3		Refusal at 11.0 ft	3.0	NA		
11				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 11.0

Datum: Ground surface

Drilling Date: 6-14-2000

Initial Water Elevation (ft)/date: 8.0/6-14-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-22

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm	Well Data
0	0			Ground Surface				
0				*TOPSOIL - brown loam*				
1.5	-1.5	S-1		*CLAY* brown, some silt	4.0	NA		
4	-4			*CLAY* gray				
5	-5	S-2		*SAND*	4.0	NA		
				CLAY gray				
8		S-3		-becomes wet at 8.0 ft	4.0	NA		
12	-12			Refusal at 12.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 12.0

Datum: Ground surface

Drilling Date: 6-14-2000

Initial Water Elevation (ft)/date: 8.0/6-14-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-23

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm	Well Data
0	0			Ground Surface				
0–2		S-1		*TOPSOIL - brown loam*	3.5	NA		
2–5	-2			*CLAY* brown, some silt				
5–10	-5	S-2		*SAND* brown, coarse-grained, wet	4.0	NA		
		S-3			3.0	NA		
10–11	-10			*CLAY* brown				
11	-11			Refusal at 11.0 ft End of Borehole				

Drilling Method: Geoprobe	Total Depth: 11.0	Datum: Ground surface
Drilling Date: 6-14-2000	Initial Water Elevation (ft)/date: 5.0/6-14-2000	Checked by:
Drilling Company: Terra Probe	Water Elevation (ft)/date: NA	Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-24

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm	Well Data
0	0			Ground Surface				
0–1	-1	S-1		*TOPSOIL - brown loam*	4.0	NA		
1–3	-3	S-1		*CLAY* brown, some silt				
3–16	-16	S-1 (0–4), S-2 (4–8), S-3 (8–12), S-4 (12–16)		*SAND* brown with pebbles -becomes wet at 4.0 ft	S-2: 4.0; S-3: 0.0; S-4: 0.0	NA		
16				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 16.0

Datum: Ground surface

Drilling Date: 6-14-2000

Initial Water Elevation (ft)/date: 4.0/6-14-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Location: Forrestal Landfill

City, County: Great Lakes, Lake

Log of Borehole: GP-25

Geologist: k. Mander

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	ppm 1 2 3 4 5 6 7 8 9	
	0			Ground Surface				
0–1	-1	S-1		***TOPSOIL - brown loam*** with trace organic material	4.0	NA		
1–8.5		S-1 (0–4), S-2 (4–8)		*CLAY* brown, some silt -becomes wet at 7.5 ft	4.0 (S-1), 4.0 (S-2)	NA, NA		
8.5–10	-8.5	S-3		*SAND* brown, some silt, wet	4.0	NA		
10–12	-10	S-3		*CLAY* gray and dry Refusal at 12.0 ft				
12	-12			End of Borehole				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Drilling Method: Geoprobe	Total Depth: 12.0	Datum: Ground surface
Drilling Date: 6-15-2000	Initial Water Elevation (ft)/date: 7.5/6-15-2000	Checked by:
Drilling Company: Terra Probe	Water Elevation (ft)/date: NA	Sheet: 1 of 1

Project No: 39749.01

Location: Forrestal Landfill

City, County: Great Lakes, Lake

Log of Borehole: GP-26

Geologist: k. Mander

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam*				
1–7.5	-7.5	S-1 (1–4)		*CLAY* brown, some silt	3.5	NA		
		S-2 (4–8)			4.0	NA		
7.5–8.5	-8.5			*SAND* brown, some silt, wet				
8.5–11	-11	S-3 (8–11)		*CLAY* brown	3.0	NA		
11				Refusal at 11.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-15-2000

Drilling Company: Terra Probe

Total Depth: 11.0

Initial Water Elevation (ft)/date: 7.5/6-15-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-27

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	ppm 1 2 3 4 5 6 7 8 9	
0	0			Ground Surface				
0–3	-3	S-1		*TOPSOIL - brown loam*	3.0	NA		
3–5	-5			*SILT* brown, some clay				
5–10	-10	S-2		*SAND* brown and wet -becomes fine-grained with some silt at 7.5 ft	3.5	NA		
10–11.5	-11.5	S-3		*CLAY* gray abd dry Refusal at 11.5 ft	3.0	NA		
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-15-2000

Drilling Company: Terra Probe

Total Depth: 11.5

Initial Water Elevation (ft)/date: 5.0/6-15-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-28

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0				*TOPSOIL - brown loam*				
1	-1			*SILT* brown, some sand				
2		S-1			4.0	NA		
4.5				-becomes wet at 4.5 ft				
5.75	-5.75			*CLAY* brown, some silt				
6		S-2			4.0	NA		
10		S-3		-becomes gray at 10.0 ft	4.0	NA		
13.5		S-4			3.0	NA		
15	-15			Refusal at 15.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 15.0

Datum: Ground surface

Drilling Date: 6-15-2000

Initial Water Elevation (ft)/date: 4.5/6-15-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-29

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	ppm 1 2 3 4 5 6 7 8 9	
	0			Ground Surface				
0				*TOPSOIL - brown loam*				
1.5	-1.5	S-1		*CLAY* very stiff, brown, some silt	4.0	NA		
4	-4	S-2		*CLAY* very stiff, brown	4.0	NA		
8		S-3			3.0	NA		
11	-11			Refusal at 11.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 11.0

Datum: Ground surface

Drilling Date: 6-15-2000

Initial Water Elevation (ft)/date: NA

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-30

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1–9	Well Data
0	0			Ground Surface				
0–2		S-1		*TOPSOIL* - ***brown loam*** with trace organic material	3.0	NA		
2	-2							
2–12				*CLAY* brown, some silt				
4–8		S-2			4.0	NA		
8–12		S-3			0.0	NA		
12	-12			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-15-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Location: Forrestal Landfill

City, County: Great Lakes, Lake

Log of Borehole: GP-31

Geologist: k. Mander

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings (ppm)	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	1 2 3 4 5 6 7 8 9	
0	0			Ground Surface				
0				*TOPSOIL - brown loam*				
1.5	-1.5	S-1		*CLAY* brown, some silt with trace pebbles	4.0	NA		
4	-4	S-2		*CLAY* gray with trace organic material	3.5	NA		
8		S-3		-becomes wet at 8.0 ft	4.0	NA		
12	-12			Refusal at 12.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-15-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 8.0/6-15-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-32

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm	Well Data
0	0			Ground Surface				
	-0.5			*TOPSOIL - brown loam* with trace organic material				
2		S-1		*CLAY* brown, some silt	4.0	NA		
4				-becomes gray at 4.0 ft				
5	-5			*CLAY* gray				
6		S-2			4.0	NA		
10		S-3			3.5	NA		
11.5	-11.5			Refusal at 11.5 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-15-2000

Drilling Company: Terra Probe

Total Depth: 11.5

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-33

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm	Well Data
0	0			Ground Surface				
0–2	-2	S-1		*TOPSOIL - brown loam* with trace organic material	3.0	NA		
2–8	-8	S-1 / S-2		*FILL* gray clay with dried latex paint	3.0	NA		
8–12	-12	S-3		*CLAY* gray and wet	4.0	NA		
12				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 12.0

Datum: Ground surface

Drilling Date: 6-15-2000

Initial Water Elevation (ft)/date: 8.0/6-15-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-34

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–1	-1	S-1		*TOPSOIL - brown loam*	3.0	NA		
1–2	-2	S-1		*FILL* brown silty clay				
2–4	-4	S-1		*FILL* mulch				
4–8	-8	S-2		*FILL* gray silty clay with landfill debris and strong septic odor	4.0	NA		
8				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-15-2000

Drilling Company: Terra Probe

Total Depth: 8.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-35

Location: Forrestal Landfill

Geologist: k. Mander

TOLTEST, INC.

City, County: Great Lakes, Lake

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam*				
1–4	-4	S-1		*FILL* brown silty clay	2.0	NA		
4–8	-8	S-2		*FILL* landfill debris with strong septic odor	4.0	NA		
8				End of Borehole				

Drilling Method: Geoprobe	Total Depth: 8.0	Datum: Ground surface
Drilling Date: 6-15-2000	Initial Water Elevation (ft)/date: NA	Checked by:
Drilling Company: Terra Probe	Water Elevation (ft)/date: NA	Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-36

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
				TOPSOIL - brown loam				
				FILL brown silty clay				
2		S-1			3.0	NA		
4	-4			-becomes gray at 3.75 ft				
				FILL landfill debris with strong septic odor				
6		S-2			1.0	NA		
8	-8			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-16-2000

Drilling Company: Terra Probe

Total Depth: 8.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-37

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam*				
1–4		S-1		*CLAY* stiff, brown, some silt	4.0	NA		
4–8	-8	S-2		Stopped boring due to the water line	4.0	NA		
8				End of Borehole				

Depth scale: 0–20 ft (SUBSURFACE PROFILE / SAMPLE)

Drilling Method: Geoprobe	*Total Depth:* 8.0	Datum: Ground surface
Drilling Date: 6-16-2000	Initial Water Elevation (ft)/date: NA	Checked by:
Drilling Company: Terra Probe	Water Elevation (ft)/date: NA	Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-38

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1.5	-1.5			*TOPSOIL - brown loam*				
1.5–4	-4	S-1		*CLAY* brown, some silt	4.0	NA		
4–8	-8	S-2		*FILL* gray clay with trace stone chip, wet	4.0	NA		
8–12	-12	S-3		*CLAY* gray and wet	4.0	NA		
12				End of Borehole				

Depth scale: 0 – 20 ft

Drilling Method: Geoprobe

Drilling Date: 6-16-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 8.0/6-16-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-39

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
	-0.5			*TOPSOIL - brown loam*				
1				*FILL* brown clay				
2		S-1			3.5	NA		
4				-becomes gray and wet at 4.0 ft				
6		S-2			4.0	NA		
8	-8			Refusal due to some red bricks at 8.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 8.0

Datum: Ground surface

Drilling Date: 6-16-2000

Initial Water Elevation (ft)/date: 4.0/6-16-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-40

Location: Forrestal Landfill

Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam*				
1–3	-3	S-1		*CLAY* brown, some silt	4.0	NA		
3–11.9	-11.9	S-2		*CLAY* gray -becomes brown and moist at 4.0 ft	4.0	NA		
		S-3		-becomes gray and wet at 8.0 ft	3.9	NA		
				Refusal at 11.9 ft				
				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 11.9

Datum: Ground surface

Drilling Date: 6-16-2000

Initial Water Elevation (ft)/date: 8.0/6-16-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-41

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam* with trace organic material				
1–4	-4	S-1		*FILL* brown silty clay with some gravel and stone chips	4.0	NA		
4–11	-11	S-2		*FILL* brown, coarse-grained sand with gravel, wet -becomes fine-grained at 7.0 ft	4.0	NA		
		S-3			4.0	NA		
11–14	-14	S-4		*CLAY* stiff, gray Refusal at 14.0 ft	2.0	NA		
14				End of Borehole				

SUBSURFACE PROFILE | SAMPLE

Drilling Method: Geoprobe

Drilling Date: 6-19-2000

Drilling Company: Terra Probe

Total Depth: 14.0

Initial Water Elevation (ft)/date: 4.0/6-19-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-42

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–4	-4	S-1		***TOPSOIL - brown loam*** with trace organic material	1.0	NA		
4–5	-5	S-2		***GRAVEL*** brown and wet	3.5	NA		
5–9	-9			***SAND*** brown, fine-grained, wet				
9–16	-16	S-3		***CLAY*** gray and dry	3.0	NA		
		S-4			3.0	NA		
16				End of Borehole				

Drilling Method: Geoprobe | Total Depth: 16.0 | Datum: Ground surface

Drilling Date: 6-19-2000 | Initial Water Elevation (ft)/date: 4.0/6-19-2000 | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-43

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1.5		S-1		*TOPSOIL - brown loam*	4.0	NA		
1.5–5.5	-1.5	S-1		*CLAY* brown, some silt with trace pebbles				
5.5–9.75	-5.5	S-2		*SAND* gray, some silt, wet	4.0	NA		
9.75–16	-9.75	S-3		*CLAY* gray and dry	4.0	NA		
		S-4			4.0	NA		
16	-16			End of Borehole				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Drilling Method: Geoprobe	Total Depth: 16.0	Datum: Ground surface
Drilling Date: 6-19-2000	Initial Water Elevation (ft)/date: 5.5/6-19-2000	Checked by:
Drilling Company: Terra Probe	Water Elevation (ft)/date: NA	Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-44

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
	-0.5			*TOPSOIL - brown loam*				
0.5–5.5		S-1		***CLAY*** brown, some silt	4.0	NA		
5.5–10.5	-5.5	S-2		***SAND*** gray, fine-grained with some silt, wet -with some gravel at 6.5 ft	4.0	NA		
		S-3			3.0	NA		
10.5–11	-10.5			***CLAY*** stiff, gray, dry				
11	-11			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-19-2000

Drilling Company: Terra Probe

Total Depth: 11.0

Initial Water Elevation (ft)/date: 5.5/6-19-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-45

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0		Ground Surface				
0–1.5	-1.5	S-1	***TOPSOIL - brown loam*** with trace organic material	4.0	NA		
1.5–8	-8	S-1, S-2	***SAND*** brown, fine-grained with some pebbles -becomes coarse-grained with some gravel and wet at 7.0 ft	4.0 (S-2)	NA		
8–10.5	-10.5	S-3	***SAND and GRAVEL*** brown and wet	4.0	NA		
10.5–12	-12	S-3	***CLAY*** gray and dry Refusal at 12.0 ft				
12			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-19-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 7.0/6-19-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-46

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description (SUBSURFACE PROFILE)	Recovery (ft) (SAMPLE)	SPT Blows (SAMPLE)	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–6		S-1 (0–4)		*CLAY* brown, some silt with trace organic material	4.0	NA		
		S-2 (4–8)			4.0	NA		
6–11	-6			*SAND* brown, coarse-grained with some pebbles				
		S-3 (8–12)			4.0	NA		
11–12	-11			*CLAY* gray Refusal at 12.0 ft				
12	-12			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-19-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-47

Location: Demolition Debris Disposal Area**Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–2		S-1		***TOPSOIL - brown loam***	4.0	NA		
2–3.5	-2			*SAND* brown with some gravel				
3.5–4	-3.5			*CLAY* brown				
4–16	-4	S-2		*CLAY* gray, some silt	4.0	NA		
		S-3			4.0	NA		
		S-4			4.0	NA		
16	-16			End of Borehole				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Drilling Method: Geoprobe

Drilling Date: 6-19-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-48

Location: Demolition Debris Disposal Area**Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2				*TOPSOIL - brown loam*				
2–4.5	-2	S-1 (2–4)		*CLAY* brown, some silt	4.0	NA		
4.5–12	-4.5	S-2 (4–8)		*CLAY* gray and wet	4.0	NA		
		S-3 (8–12)			4.0	NA		
12	-12			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-19-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 4.5/6-19-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-49

Location: Demolition Debris Disposal Area**Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–3	-3	S-1		*TOPSOIL - brown loam*	4.0	NA		
3–4	-4			*CLAY* brown, some silt				
4–6	-6	S-2		*SILT* brown	4.0	NA		
6–8	-8			*SAND* brown and wet				
8–11.5	-11.5	S-3		*SAND* brown, some silt, wet Refusal at 11.5 ft	3.5	NA		
				End of Borehole				

Drilling Method: Geoprobe	Total Depth: 11.5	Datum: Ground surface
Drilling Date: 6-19-2000	Initial Water Elevation (ft)/date: 6.0/6-19-2000	Checked by:
Drilling Company: Terra Probe	Water Elevation (ft)/date: NA	Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-50

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–2	-2	S-1		*CLAY* brown, some silt	3.0	NA		
2–7.5	-7.5	S-2		*SAND* brown, fine-grained, moist -becomes wet at 4.0 ft	3.5	NA		
7.5–12	-12	S-3		*CLAY* gray and wet	4.0	NA		
12				End of Borehole				

Drilling Method: Geoprobe | Total Depth: 12.0 | Datum: Ground surface

Drilling Date: 6-19-2000 | Initial Water Elevation (ft)/date: 4.0/6-19-2000 | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-51

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–3	-3	S-1		*TOPSOIL - brown loam*	4.0	NA		
3–5	-5			***CLAY*** brown, some silt				
5–11	-11	S-2		***SAND*** brown, fine-grained	4.0	NA		
		S-3			4.0	NA		
11–16	-16	S-4		***CLAY*** gray and wet -becomes stiff at 12.5 ft	4.0	NA		
16				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-19-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: 11.0/6-19-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-52

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1.5	-1.5	S-1		*TOPSOIL - brown loam*	4.0	NA		
1.5–6.5	-6.5	S-1 / S-2		*CLAY* dark brown, some silt; -becomes light brown at 4.25 ft				
4–8		S-2			4.0	NA		
6.5–7.5	-7.5			*CLAY* brown and wet				
7.5–16	-16	S-3		*SAND* brown, fine-grained, wet	3.0	NA		
12–16		S-4			0.0	NA		
16				End of Borehole				

Drilling Method: Geoprobe | Total Depth: 16.0 | Datum: Ground surface

Drilling Date: 6-20-2000 | Initial Water Elevation (ft)/date: 6.5/6-20-2000 | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-53

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Description	Recovery (ft)	SPT Blows
0	0		Ground Surface		
0–1	-1	S-1	*TOPSOIL - brown loam*	4.0	NA
1–3.75	-3.75	S-1	*CLAY* brown, some silt		
3.75–5	-5	S-1 / S-2	*SAND* brown,coarse-grained		
5–12	-12	S-2 (4–8), S-3 (8–12)	*CLAY* brown, some silt -becomes wet at 6.0 ft -becomes gray at 11.5 ft Refusal at 12.0 ft	4.0 (S-2); 4.0 (S-3)	NA; NA
12			End of Borehole		

Columns: SUBSURFACE PROFILE (Depth (ft), Elevation, Sample Number, Legend, Description); SAMPLE (Recovery (ft), SPT Blows); PID Readings ppm 1 2 3 4 5 6 7 8 9; Well Data

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 6.0/6-21-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Log of Borehole: GP-54

Project No: 39749.01

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings	
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
	-0.5	S-1		*FILL - concrete*	0.0	NA		
				Refusal at 0.5 ft				
1				End of Borehole				
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 0.5

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-55

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2		S-1		*TOPSOIL - brown loam*	4.0	NA		
2–7	-2	S-1 / S-2		*CLAY* gray, some silt	3.0	NA		
7–12	-7	S-2 / S-3		*CLAY* gray and wet	4.0	NA		
12	-12			End of Borehole				

SUBSURFACE PROFILE / SAMPLE — PID Readings scale: ppm 1 2 3 4 5 6 7 8 9. Depth scale 0–20 ft.

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 7.0/6-21-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-56

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–2.5		S-1		*TOPSOIL - brown loam*	4.0	NA		
2.5–4	-2.5			*CLAY* gray				
4–6	-4	S-2		*SAND* brown	4.0	NA		
6–10	-6			*CLAY* stiff, gray				
8–10		S-3			2.0	NA		
10	-10			Refusal at 10.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 10.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-57

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description (SUBSURFACE PROFILE)	Recovery (ft) (SAMPLE)	SPT Blows (SAMPLE)	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1.5	-1.5	S-1		*TOPSOIL - brown loam*	4.0	NA		
1.5–4	-4			*CLAY* gray, some silt				
4–7.75	-7.75	S-2		*SAND* gray, some silt with trace gravel, wet	4.0	NA		
7.75–12	-12	S-3		*CLAY* gray	3.0	NA		
12				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 4.0/6-21-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-58

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	ppm 1 2 3 4 5 6 7 8 9	
	0			Ground Surface				
0–2	-2	S-1		*FILL* brown silty clay with some concrete Refusal at 2.0 ft	2.0	NA		
2				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 2.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-59

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2		S-1		*TOPSOIL* - *brown loam*	4.0	NA		
2–4	-2			*FILL* gray silty clay with some concrete				
4–8	-4	S-2		*CLAY* brown, some silt -becomes gray at 5.0 ft	4.0	NA		
8–11.5	-8	S-3		*SAND* gray and wet	3.0	NA		
11.5–12	-11.5			*CLAY* gray				
12	-12			Refusal at 12.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 8.0/6-21-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-60

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
	0			Ground Surface				
0–6.5		S-1		*CLAY* gray, some silt with gravel	4.0	NA		
				-becomes brown at 3.5 ft				
	-6.5	S-2			4.0	NA		
6.5–11				*SAND* gray and wet				
	-11	S-3			3.0	NA		
11–12	-12			*CLAY* gray Refusal at 12.0 ft				
12				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 6.5/6-21-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-61

Location: Demolition Debris Disposal Area**Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1.5	-1.5	S-1		*FILL* brown silty clay and trace red bricks	4.0	NA		
1.5–5.5	-5.5	S-1, S-2		*CLAY* dark brown, some silt; -with some gravel at 4.0 ft				
5.5–16	-16	S-2		*SAND* dark gray, some silt and gravel with slight septic odor; -becomes wet at 8.0 ft	4.0	NA		
		S-3			4.0	NA		
		S-4		Refusal at 16.0 ft	4.0	NA		
16				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: 8.0/6-21-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Project No: 39749.01

Log of Borehole: GP-62

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–4		S-1		*CLAY* gray, some silt with trace gravel	4.0	NA		
4–8		S-2		-becomes brown with trace organic materialat 4.0 ft	3.5	NA		
8–12		S-3		-becomes wet at 8.0 ft	4.0	NA		
12	-12			Refusal at 12.0 ft				
				End of Borehole				

Drilling Method: Geoprobe | Total Depth: 12.0 | Datum: Ground surface

Drilling Date: 6-21-2000 | Initial Water Elevation (ft)/date: 8.0/6-21-2000 | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-63

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
	0			Ground Surface				
0–4		S-1		*CLAY* gray, some silt with trace gravel	4.0	NA		
4–8		S-2			4.0	NA		
8–12		S-3		-becomes wet at 9.0 ft	4.0	NA		
12	-12			Refusal at 12.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-21-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 9.0/6-21-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-64

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1	-1			*FILL - brown loam*				
1–7	-7	S-1 (0–4)		*FILL* brown silty clay with some sandstone chips	4.0	NA		
		S-2 (4–8)			4.0	NA		
7–11.5	-11.5	S-3 (8–12)		*CLAY* dark gray	4.0	NA		
11.5–16	-16	S-4 (12–16)		*SAND* gray -becomes wet at 12.0 ft	4.0	NA		
16				Refusal at 16.0 ft End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: 12.0/6-22-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-65

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm	Well Data
0	0			Ground Surface				
0–1	-1	S-1		*FILL* brown silty clay with some concrete	1.0	NA		
1				Refusal at 1.0 ft				
				End of Borehole				

Drilling Method: Geoprobe | Total Depth: 1.0 | Datum: Ground surface

Drilling Date: 6-22-2000 | Initial Water Elevation (ft)/date: NA | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-66

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	ppm 1 2 3 4 5 6 7 8 9	
0	0			Ground Surface				
0–3		S-1		*FILL* brown silty clay with some concrete	3.0	NA		
3	-3			Refusal at 3.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 3.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-67

Location: Demolition Debris Disposal Area**Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–4	-4	S-1		*FILL* dark brown silty clay with some concrete	3.0	NA		
4–8	-8	S-2		*FILL* brown silty clay with landfill debris	4.0	NA		
8				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 8.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-68

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–4		S-1		*CLAY* brown, some silt	4.0	NA		
4–7		S-2		-becomes gray at 4.0 ft	4.0	NA		
7	-7			*CLAY* brown -becomes wet at 8.0 ft				
8–12		S-3			4.0	NA		
12–16		S-4			4.0	NA		
16	-16			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: 8.0/6-22-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-69

Location: Demolition Debris Disposal Area Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–4		S-1		*FILL* brown silty clay with trace pebbles	4.0	NA		
4–8	-5.5	S-2		*FILL* brown silty clay with asphalt and red bricks	4.0	NA		
8	-8			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 8.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-70

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows		
0	0			Ground Surface				
0–6.5	-6.5	S-1 (0–4)		*FILL* brown silty clay with trace shale pebbles	4.0	NA		
		S-2 (4–8)			4.0	NA		
6.5–8	-8			*FILL* brown silty clay with asphalt and red bricks				
8				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 8.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-71

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm 1 2 3 4 5 6 7 8 9)	Well Data
0	0			Ground Surface				
0–2	-2	S-1		***TOPSOIL - brown loam*** with trace organic material	4.0	NA		
2–4	-4	S-1		***SAND*** brown, fine-grained				
4–9	-9	S-2		***CLAY*** gray and stiff -becomes wet at 7.75 ft	4.0	NA		
9–11	-11	S-3		***SAND*** gray	4.0	NA		
11–12	-12	S-3		***CLAY*** gray and wet				
12				Refusal at 12.0 ft End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 7.75/6-22-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-72

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm (1–9)	Well Data
0	0			Ground Surface				
0–3	-3	S-1		*FILL* brown silty clay with some red bricks	4.0	NA		
3–9	-9	S-2		*CLAY* brown, some silt; -becomes gray at 5.5 ft	4.0	NA		
9–11	-11	S-3		*SAND* gray and wet	4.0	NA		
11–12	-12			*CLAY* gray Refusal at 12.0 ft				
12				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 9.0/6-22-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-73

Location: Demolition Debris Disposal Area**Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
	0			Ground Surface				
0–3		S-1		*FILL* brown silty clay with some concrete	3.0	NA		
	-3			Refusal at 3.0 ft				
3				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 3.0

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-74

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	ppm 1 2 3 4 5 6 7 8 9	
0	0			Ground Surface				
0–3		S-1		*FILL* brown silty clay with some concrete	3.0	NA		
3	-3			Refusal at 3.0 ft				
				End of Borehole				

Drilling Method: Geoprobe | Total Depth: 3.0 | Datum: Ground surface

Drilling Date: 6-22-2000 | Initial Water Elevation (ft)/date: NA | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-75

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–3.5	-3.5	S-1		*CLAY* brown, some silt	4.0	NA		
3.5–6.5	-6.5	S-2		*CLAY* dark gray	4.0	NA		
6.5–10	-10	S-3		*SAND* gray and wet	3.0	NA		
10–11	-11			*CLAY* gray and wet				
11				Refusal at 11.0 ft End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 11.0

Initial Water Elevation (ft)/date: 6.5/6-22-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-76

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–5		S-1 (0–4)		*CLAY* brown, some silt with trace gravel	4.0	NA		
5–10.5	-5	S-2 (4–8)		*CLAY* gray	4.0	NA		
10.5–11.5	-10.5	S-3 (8–12)		*SAND* gray and wet	4.0	NA		
11.5–12	-11.5			*CLAY* gray				
12	-12			Refusal at 12.0 ft End of Borehole				

Drilling Method: Geoprobe | Total Depth: 12.0 | Datum: Ground surface

Drilling Date: 6-22-2000 | Initial Water Elevation (ft)/date: 10.5/6-22-2000 | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-77

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–4		S-1		*CLAY* brown, some silt with trace gravel	4.0	NA		
4–7.5		S-2			4.0	NA		
7.5	-7.5							
7.5–8				*CLAY* gray				
8–12		S-3		-becomes wet at 11.0 ft	4.0	NA		
12–16		S-4			4.0	NA		
16	-16			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: 11.0/6-22-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-78

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–6		S-1 (0–4)		*CLAY* brown, some silt with trace gravel	4.0	NA		
6–9	-6	S-2 (4–8)		*CLAY* gray	4.0	NA		
9–11	-9	S-3 (8–12)		*SAND* gray and wet	4.0	NA		
11–12	-11			*CLAY* gray				
12	-12			Refusal at 12.0 ft End of Borehole				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Drilling Method: Geoprobe

Drilling Date: 6-22-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 9.0/6-22-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-79

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm	Well Data
0	0			Ground Surface				
0–4		S-1		*FILL* brown silty clay with some concrete	4.0	NA		
4	-4			Refusal at 4.0 ft				
				End of Borehole				

Drilling Method: Geoprobe | Total Depth: 4.0 | Datum: Ground surface

Drilling Date: 6-22-2000 | Initial Water Elevation (ft)/date: NA | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-80

Location: Demolition Debris Disposal Area Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE		PID Readings (ppm) 1 2 3 4 5 6 7 8 9	Well Data
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows		
0	0			Ground Surface				
0–1	-1			*TOPSOIL - brown loam*				
1–4.5	-4.5	S-1		*CLAY* brown, some silt with trace gravel	4.0	NA		
4.5–16	-16	S-2		*SAND* brown, coarse-grained -becomes wet at 5.5 ft -becomes gray at 8.0 ft	4.0	NA		
		S-3			4.0	NA		
		S-4			4.0	NA		
16				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-23-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: 5.5/6-23-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-81

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2		S-1		*TOPSOIL - brown loam*	4.0	NA		
2–4.5	-2			*CLAY* brown, some silt				
4.5–7.25	-4.5	S-2		*SAND* brown, coarse-grained	4.0	NA		
7.25–9.5	-7.25	S-3		*CLAY* gray	1.0	NA		
9.5	-9.5			Refusal at 9.5 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-23-2000

Drilling Company: Terra Probe

Total Depth: 9.5

Initial Water Elevation (ft)/date: NA

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-82

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–3		S-1		*TOPSOIL - brown loam*	4.0	NA		
3	-3			*SAND* brown, fine-grained				
		S-2		-becomes gray, coarse-grained and wet at 5.5 ft	4.0	NA		
7.75	-7.75			*CLAY* gray				
		S-3			4.0	NA		
12	-12			End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-23-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 5.5/6-23-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-83

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2		S-1		*TOPSOIL - brown loam*	4.0	NA		
2–5.5	-2			*CLAY* brown, some silt				
4–8		S-2			4.0	NA		
5.5–11.75	-5.5			*CLAY* gray and wet				
8–11.75		S-3			3.75	NA		
11.75	-11.8			Refusal at 11.75 ft End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-23-2000

Drilling Company: Terra Probe

Total Depth: 11.75

Initial Water Elevation (ft)/date: 5.5/6-23-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-84

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–4		S-1		*TOPSOIL - brown loam* with trace organic material and gravel	4.0	NA		
4–8	-5	S-2		***SAND*** brown, fine-grained -becomes wet at 6.0 ft	4.0	NA		
8–12		S-3		-becomes coarse-grained at 8.0 ft	4.0	NA		
12	-12			Refusal at 12.0 ft				
				End of Borehole				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Drilling Method: Geoprobe

Drilling Date: 6-23-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 6.0/6-23-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-85

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0	-0.5			*TOPSOIL - brown loam*				
0.5–3	-3	S-1 (0.5–4)		*CLAY* brown, some silt	4.0	NA		
3–6	-6	S-2 (4–8)		*SAND* brown, fine-grained	4.0	NA		
6–16	-16	S-3 (8–12)		*CLAY* gray and wet	4.0	NA		
		S-4 (12–16)			4.0	NA		
16				Refusal at 16.0 ft				
				End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-23-2000

Drilling Company: Terra Probe

Total Depth: 16.0

Initial Water Elevation (ft)/date: 6.0/6-23-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-86

Location: Demolition Debris Disposal Area **Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–2		S-1		*TOPSOIL - brown loam* with trace organic material and gravel	4.0	NA		
2–7.5	-2	S-1 (0–4), S-2 (4–8)		*SAND* brown, fine-grained	4.0	NA		
7.5–11.5	-7.5	S-3 (8–11.5)		*CLAY* gray and wet	3.5	NA		
11.5	-11.5			Refusal at 11.5 ft End of Borehole				

Drilling Method: Geoprobe | Total Depth: 11.5 | Datum: Ground surface

Drilling Date: 6-23-2000 | Initial Water Elevation (ft)/date: 7.5/6-23-2000 | Checked by:

Drilling Company: Terra Probe | Water Elevation (ft)/date: NA | Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-87

Location: Demolition Debris Disposal Area Geologist: k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings (ppm)	Well Data
0	0			Ground Surface				
0–1.5	-1.5			*TOPSOIL - brown loam*				
1.5–6.5	-6.5	S-1		*CLAY* brown, some silt	4.0	NA		
		S-2			4.0	NA		
6.5–8	-8			*SAND* brown, fine-grained				
8–15	-15	S-3		*CLAY* gray and wet	4.0	NA		
		S-4		Refusal at 15.0 ft	3.0	NA		
15				End of Borehole				

Drilling Method: Geoprobe

Total Depth: 16.0

Datum: Ground surface

Drilling Date: 6-23-2000

Initial Water Elevation (ft)/date: 8.0/6-23-2000

Checked by:

Drilling Company: Terra Probe

Water Elevation (ft)/date: NA

Sheet: 1 of 1

Project No: 39749.01

Log of Borehole: GP-88

Location: Demolition Debris Disposal Area**Geologist:** k. Mander

City, County: Great Lakes, Lake

TOLTEST, INC.

SUBSURFACE PROFILE					SAMPLE			
Depth (ft)	Elevation	Sample Number	Legend	Description	Recovery (ft)	SPT Blows	PID Readings ppm 1 2 3 4 5 6 7 8 9	Well Data
0	0			Ground Surface				
0–1.5	-1.5			*TOPSOIL - brown loam* with trace organic material and gravel				
1.5–5.5	-5.5	S-1		*CLAY* brown, some silt with trace gravel	4.0	NA		
		S-2			4.0	NA		
5.5–12	-12			*CLAY* gray -becomes black at 7.5 ft -becomes wet at 8.0 ft				
		S-3			3.0	NA		
12				Refusal at 12.0 ft End of Borehole				

Drilling Method: Geoprobe

Drilling Date: 6-23-2000

Drilling Company: Terra Probe

Total Depth: 12.0

Initial Water Elevation (ft)/date: 8.0/6-23-2000

Water Elevation (ft)/date: NA

Datum: Ground surface

Checked by:

Sheet: 1 of 1

APPENDIX C

Contractor Daily Quality Control Report

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K.Mander

Date: June 12, 2000

Day: Monday

Project No.: ~~38206.01~~ 39749.01

Location: Forrestal Landfill - NTC

Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K.Mander	NTC													0

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~38806.01~~ 39749.01
Date: June 12, 2000
Location: Forrestal Landfill - NTC
Day: Monday
Client: US Navy

Events

No field work performed today due to severe thunderstorms and lightning. Waited for weather to break and told Terra Probe to leave for the day around 11 am.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Date: June 13, 2000
Day: Tuesday

Project No.: ~~38208.01~~ 39749.01
Location: Forrestal Landfill - NTC
Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K. Mander	NTC						X							8

ToITest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Date: June 13, 2000
Day: Tuesday
Project No.: ~~38808.01~~ 39749.01
Location: Forrestal Landfill - NTC
Client: US Navy

Events

Rained for most of the day - no thunderstorms or lightning.

Started work in Area 2 by Virginia Court. Installed a total of 15 geoprobe borings. There were several borings where methane could be seen bubbling through the water in the boreholes. Bubbles could also be seen forming on the surface water in several dirt patches in the grass field.

The methane bubbling through the groundwater in boring 4 was so intense that we called Utilities to make sure that we did not hit a utility. The crew from Utilities indicated that there were no lines in the vicinity of boring 4. We did not backfill boring 4 in case the Navy wanted to see the methane bubbling through the static water.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~38208.01~~ 39749.01
Date: June 14, 2000
Location: Forrestal Landfill - NTC
Day: Wednesday
Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K. Mander	NTC						8							8

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~38808.01~~ 39749.01
Date: June 14, 2000
Location: Forrestal Landfill - NTC
Day: Wednesday
Client: US Navy

Events

Rain and high winds in the morning.

Installed nine borings today before having to quit due to thunderstorms and lightning. Continued to drill borings that released methane.

Boring 4 was still bubbling methane through the groundwater found in the borehole.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Date: June 15, 2000
Day: Thursday

Project No.: ~~39208.01~~ 39749.01
Location: Forrestal Landfill - NTC
Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K. Mander	NTC						8							8

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Date: June 15, 2000
Day: Thursday

Project No.: ~~38808.04~~ 39749.01
Location: Forrestal Landfill - NTC
Client: US Navy

Events

Cloudy all day with some showers but no thunderstorms or lightning.

Installed 11 borings today. Have established landfill boundaries to the west, east, and south. Will need to place some borings parallel to Virginia Ave to establish northern boundary.

Methane was observed bubbling through the groundwater in boring 4.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander

Date: June 16, 2000

Day: Friday

Project No.: ~~38808.01~~ 39749.01

Location: Forrestal Landfill - NTC

Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total
K. Mander	NTC						8							8

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Monder
Date: June 16, 2000
Day: Friday

Project No.: ~~38008.01~~ 39749.01
Location: Forrestal Landfill - NTC
Client: US Navy

Events

Morning - cloudy and windy with rain.

Installed five borings before thunderstorms and lightning started by early afternoon. Placed borings parallel to Virginia Ave - no landfill debris observed in these borings.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander

Date: June 19, 2000

Day: Monday

Project No.: ~~38808.04~~ 39749.01

Location: Forrestal Landfill - NTC

Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K. Mander	Area BG						8							8

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Monder
Project No.: ~~38208.01~~ 39749.01
Date: June 19, 2000
Location: Forrestal Landfill - NTC
Day: Monday
Client: US Navy

Events

Started work in Area 13 G in play fields off of California Ave. Installed 11 borings throughout the play fields. None of the borings contained any landfill debris

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander | Project No.: ~~38208.01~~ 39749.01
Date: June 20, 2000 | Location: Forrestal Landfill - NTC
Day: Tuesday | Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K. Mander	Area BG						8							8

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~38808.01~~ 39749.01
Date: June 20, 2000
Location: Forrestal Landfill - NTC
Day: Tuesday
Client: US Navy

Events

Thunderstorms and lightning for most of the day. Installed one boring and then stopped work for the day around 1:30pm.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Date: June 21, 2000
Day: Wednesday
Project No.: ~~38208.01~~ 39749.01
Location: Forrestal Landfill - NTC
Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K. Mander	Area 136						8							8

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~38208.01~~ 39749.01
Date: June 21 2000
Location: Forrestal Landfill - NTC
Day: Wednesday
Client: US Navy

Events

Installed 11 borings in the grass field and gravel lot area on the south side of Alabama Ave. Two borings south of the ball field (borings 54 and 58) had refusal at less than four feet below ground surface. Other than these two borings, no landfill debris was observed in any of the borings.

A gentleman working for base housing told us that they used to dump construction debris in the southern portion of the grass area adjacent to the pump house. A survey of the area indicated that there was construction debris on the surface within an un-kept portion of this grass area. Concrete slabs, asphalt, tires, and a utility pole could be seen in this area.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~36208.01~~ 39749.01
Date: June 22, 2000
Location: Forrestal Landfill - NTC
Day: Thursday
Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K. Mander	Area 136						8							8

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~36208.04~~ 39749.01
Date: June 22, 2000
Location: Forrestal Landfill - NTC
Day: Thursday
Client: US Navy

Events

Started in the grass area south of the pumphouse. Did not place any boring in the areas where surface debris could easily be seen - which is predominantly ~~[illegible]~~ KSM along the southern boundary of the grass area.

Installed 16 borings in the grass area. Hit landfill in six of the borings in the southern portion of the grass area, and the western fence line.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~38308.01~~ 39749.01
Date: June 23, 2000
Location: Forrestal LandFill - NTC
Day: Friday
Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
K. Mander	Area BG						8							8

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) Terra Probe	8
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: K. Mander
Project No.: ~~38208.01~~ 39749.01
Date: June 23, 2000
Location: Forrestal Landfill-NTC
Day: Friday
Client: US Navy

Events

Installed 9 borings in the trailer park - 3 along Georgia Road, 3 along Arkansas Road and 3 along Great Lakes Drive between California Ave and Delaware Ave. No landfill debris found in any of the borings installed today.

APPENDIX B

TOL TEST LANDFILL GAS SAMPLING AND ANALYTICAL REPORT

DELIVERY ORDER COMPLETION REPORT

SAMPLING AND ANALYTICAL TESTING OF
VOLATILE ORGANIC COMPOUNDS
AT
FORRESTAL LANDFILL, NAVAL TRAINING CENTER (NTC)
GREAT LAKES, ILLINOIS

ENVIRONMENTAL JOB ORDER CONTRACT (EJOC)
CONTRACT NO. N68950-00-D-0200
DELIVERY ORDER NO. 0025
TOLTEST PROJECT NO. 41767.01

Submitted to:

Department of the Navy
Naval Training Center (NTC) – Environmental Department
Building 1-A, 201 Decatur Avenue
Great Lakes, Illinois 60088-5600

Submitted by:

TOLTEST, INC.
1915 N. 12th Street
P.O. Box 2186
Toledo, Ohio 43603
(419-241-7175)

APRIL 2003

TABLE OF CONTENTS

Page No.

APPENDICES

Executive Summary

TolTest, Inc. was retained by the Department of the Navy, Naval Facilities Engineering Command under Contract No. N68950-00-D-0200, Delivery Order (DO) No. 0025 to collect Direct Push gas samples from the Forrestal Landfill located on the Naval Training Center (NTC) in Great Lakes, Illinois. The purpose of this project was to evaluate the landfill for the presence of methane and/or volatile organic compounds (VOCs). Specifically, TolTest collected, field screened, and analyzed soil gas samples from 22 Direct Push borings advanced at the Forrestal Landfill. The Direct Push borings were advanced within the boundaries of the Forrestal Landfill as identified by TolTest in the September 2000 Delivery Order Closure Report (DOCR) for Environmental Job Order Contract (EJOC) No. N68950-96-D-0052 DO No. 0092, Forrestal Landfill Boundary Delineation.

The 22 Direct Push borings were advanced in August 2001 by Environmental Services Network Rocky Mountain (ESN). Soil gas samples were collected from each of the borings for laboratory analysis for volatile organic compounds (VOCs) and field screening for the presence of oxygen, carbon dioxide, and methane. The detection of methane gas typically indicates the presence of putrescible solid waste within a landfill.

The laboratory analytical results indicated that several VOCs were detected above their method detection limits (MDLs) in many of the soil gas samples. The VOCs detected above their respective MDLs consisted primarily of petroleum hydrocarbons such as benzene, toluene, ethylbenzene, and xylenes (BTEX). Trichloroethylene (TCE), a common solvent, was detected above the MDL in the soil gas sample collected from Boring No. 6. Boring No. 6 is located near the western edge of the Forrestal Landfill.

Although VOCs were detected above their respective MDLs in several of the soil gas samples, they were not detected above 10 micrograms per liter (ug/L). The detection of VOCs above their respective MDLs in the soil gas samples collected from the Forrestal Landfill indicate the presence of VOCs within the landfill. The degree of impact, if any, to the subsurface environmental quality conditions can not be evaluated from the soil gas analytical results.

As a voluntary action, the Navy could conduct further investigations at the Forrestal Landfill involving the collection and sampling of soil and groundwater samples to evaluate the extent, if any, of VOC impact to the subsurface environmental quality conditions.

The methane gas field results indicated that methane gas readings greater than zero percent were detected in most of the sample locations. The distribution shows a highly uniform presence of methane gas in most parts of the landfill. As previously stated, the detection of methane gas in the soil gas samples typically indicates the presence of putrescible solid waste within a landfill. Title 35 of the Illinois Administrative Code (IAC), Part 811 – Standards for New Solid Waste Landfills states that methane concentrations greater than 50% of the lower explosive limit (LEL) in air is detected below the ground surface by a monitoring device will require the installation of a gas management system. The field screening results indicate that soil gas samples collected from 15 of the 22 Direct Push borings exceeded the Action Level stated in Title 35 of the IAC. Therefore, it is recommended that a gas management system be installed at the Forestal Landfill. Further subsurface investigations may be required to evaluate the appropriate gas management system for the landfill.

The boundaries of the landfill show low or no methane presence except for Boring No. 1, which was advanced approximately 50 feet south of the residence at Building 4228. The percent LEL for methane result for the soil gas sample collected from Boring No. 1 exceeded the IAC Action Level. Title 35 of the IAC further states that a gas management system must be installed if greater than 25 percent of the LEL for methane is detected in air in any building on or near the facility unless the operator can demonstrate that the detected methane concentration is not attributed to the facility. No methane samples were collected from within Building 4228 or closer than 50 feet to the building. Further soil gas and/or air monitoring data will have to be collected to evaluate whether there is any methane gas impact within Building 4228.

1.0 Introduction

TolTest, Inc. was retained by the Department of the Navy, Naval Facilities Engineering Command under Contract No. N68950-00-D-0200, Delivery Order (DO) No. 0025 to collect Direct Push gas samples from the Forrestal Landfill located on the Naval Training Center (NTC) in Great Lakes, Illinois. The purpose of this project was to evaluate the landfill for the presence of methane and/or volatile organic compounds (VOCs). Specifically, TolTest collected, field screened, and analyzed soil gas samples from 22 Direct Push borings advanced at the Forrestal Landfill. The Direct Push borings were advanced within the boundaries of the Forrestal Landfill as identified by TolTest in the September 2000 Delivery Order Closure Report (DOCR) for Environmental Job Order Contract (EJOC) No. N68950-96-D-0052 DO No. 0092, Forrestal Landfill Boundary Delineation.

1.1 Site History

The Forrestal Landfill was operated as a base sanitary landfill for a short period of time in the mid-1960s. Concrete and other demolition debris have been found in this area during various construction activities over the past several years. The Department of the Navy's information regarding the areal extent of the landfill was limited prior to TolTest's installation of several soil borings to evaluate the areal extent of the landfill. Between June 12 and 16, 2000, TolTest advanced 40 soil borings at the Forrestal Landfill. The soil borings were advanced utilizing a Direct Push soil unit until landfill debris was encountered or refusal occurred (TolTest, September 2000).

The stratigraphy for the Forrestal Landfill consists primarily of a brown silty clay overlying a stiff brown to gray clay. The interface between these two soil types varied throughout the Forrestal Landfill. Landfill debris was observed in 17 of the borings advanced in the central portion of the Forrestal Landfill during the June 2000 study. The landfill debris was observed at varying depths between 1.5 and 12 feet below ground surface (bgs) in these borings.

Off gasing was observed bubbling through the liquid in many of the boreholes advanced throughout the landfill. Lower Explosive Limit (LEL) readings collected with an LEL meter at the ground surface by the borehole opening for one of these borings containing the off gasing were never detected above background levels for a seven day period. The LEL readings were collected at the beginning and end of each work day for seven work days.

Utilizing the presence of landfill debris in the Direct Push boring as a basis of measure, the approximate areal extent of the former Forrestal Landfill in TolTest's September 2000 DOCR was evaluated to be 75,000 square feet. This areal extent for the Forrestal Landfill is strictly an estimate and no attempts were made to evaluate the depth or volume of the former landfill.

1.2 Scope of Work

Activities associated with this delivery order (DO) included the following tasks:

- Installation of 22 Direct Push borings within the boundary of the Forrestal Landfill by Environmental Services Network Rocky Mountain (ESN);
- Collect gas samples from the Direct Push borings using Tedlar® bags;
- Field screen the gas samples for methane, oxygen, and carbon dioxide using a GEM 500 Landtec landfill gas meter; and
- Submit the gas samples to ESN's analytical laboratory for VOC analysis by United States Environmental Protection Agency (USEPA) Method 8260.
- Map the methane concentrations;
- Tabulate and interpret the laboratory analytical and field screening results; and
- Provide recommendations based on results and consistent with landfill regulations within Title 35 of the Illinois Administrative Code (IAC), Environmental Protection, Subtitle G: Waste Disposal, Part 811, Standards for New Solid Waste Landfills, Section 811.311, Landfill Gas Management System.

2.0 Field Activities

Field activities performed at the site included advancing 22 Direct Push borings and collecting soil gas samples for field screening and laboratory analysis as defined in TolTest's August 2001 Work Plan for this DO. Standard Occupational Safety and Health Administration (OSHA) health and safety procedures were followed during the field activities to ensure the safety of field personnel. The field activities are described in this section.

2.1 Notification

On August 6, 2001, TolTest notified the Joint Utility Locate Information for Excavators (JULIE) at (800) 892-0123 to mark the utilities within the work areas. TolTest also notified Ms. Judy Jarosz of the Public Works Center (PWC), Utilities Department, at (847) 688-2121, extension 18 of the utility locate.

On August 13, 2001, a pre-drilling meeting was held at the Forrestal Landfill. The meeting involved Mr. Carlo Luciano of the Department of the Navy, Ms. Lynn Smith and Mr. Khushwant Mander of TolTest, and the ESN field crew. At this meeting, procedures regarding safety, work times, access to the site and coordination of work activities were discussed. The approximate locations for the Direct Push borings were identified and approved by the Department of the Navy. Figures depicting the Forrestal Landfill and the Direct Push boring locations are provided in Appendix A.

2.2 Direct Push Sampling

Direct Push activities performed at the site included advancing 22 soil borings and collecting gas samples from each of the borings. The gas samples were submitted for laboratory analysis for VOCs using USEPA Method 8260 and field screened for methane, oxygen, and carbon dioxide. Between august 13 and 14, 2001, the 22 Direct Push borings were advanced in the vicinity of the borings that contained landfill debris identified in TolTest's September 2000 Forrestal Landfill Boundary Delineation DOCR. The sampling locations for this DO are depicted in Appendix A. The latitude and longitude for each of the sample locations was recorded using a Garmin 12-channel Global Positioning System (GPS) and is provided in Appendix B.

The soil borings were advanced utilizing a Direct Push soil unit and completed to four (4) feet beneath the base of the landfill cap. The depth of the landfill cap at the various sampling locations was determined from the boring logs contained in TolTest's September 2000 Forrestal Landfill Boundary Delineation DOCR. The Direct Push borings were advanced between four (4) and nine (9) feet below the ground surface (bgs). A table listing the sample depth, latitude, and longitude for each of the sample locations is included in Appendix B.

The gas samples were collected from the Direct Push borings utilizing the procedures outlined in ESN's Standard Operating Procedure (SOP) titled "Instantaneous or Active Soil Gas Vapor Sampling Using Direct Push Probe Tools and Post-Run Tubing (PRT) Adapter With Collection." This SOP also outlines the methane, oxygen, and carbon dioxide field screening methods. A copy of this SOP is provided in Appendix C.

The sampling equipment was decontaminated prior to each sampling run utilizing a Liquinox® soap and deionized water rinse to minimize the potential for sample cross-contamination. The Direct Push sampling equipment was decontaminated according to the following procedures:

- Wash in soapy water (Liquinox® or equivalent)
- Rinse in potable water
- Air dry
- Rinse with distilled water
- Air dry

Any soil cuttings generated while advancing the Direct Push borings were returned to the borehole and the boreholes were back filled with bentonite chips. The bentonite chips were hydrated with water to prevent surface runoff from entering the borehole.

2.3 Field Screening Results

As previously stated, the soil gas samples collected from the Direct Push borings were field screened for percent oxygen, carbon dioxide, and methane using a GEM 500 Landtec landfill gas meter. The oxygen and carbon dioxide provide assurance of landfill gas (low oxygen) and show that no leakage is occurring from the atmosphere. The methane is measured to evaluate the presence of putrescible solid waste within the landfill.

The methane gas field results indicated that methane gas readings greater than zero percent were detected in most of the sample locations. The distribution shows a highly uniform presence of methane gas in most parts of the landfill. The detection of methane gas in the soil gas samples typically indicates the presence of putrescible solid waste within a landfill.

Title 35 of the Illinois Administrative Code (IAC), Part 811 – Standards for New Solid Waste Landfills states that methane concentrations greater than 50% of the lower explosive limit (LEL) in air is detected below the ground surface by a monitoring device will require the installation of a gas management system. The field screening results indicate that soil gas samples collected from 15 of the 22 Direct Push borings exceeded the Action Level stated in Title 35 of the IAC. The field screening results, calculated percent LEL for methane, and the methodology for calculating the percent LEL for methane are presented in Table 2, Field Screening Results, which is located in Appendix D.

The boundaries of the landfill show low or no methane presence except for Boring No. 1, which was advanced approximately 50 feet south of the residence at Building 4228. The percent LEL for methane result for the soil gas sample collected from Boring No. 1 exceeded the IAC Action Level. Title 35 of the IAC further states that a gas management system must be installed if greater than 25 percent of the LEL for methane is detected in air in any building on or near the facility unless the operator can demonstrate that the detected methane concentration is not attributed to the facility. No methane samples were collected from within Building 4228 or closer than 50 feet to the building.

As previously stated, a table containing the percent oxygen, carbon dioxide, and methane field screening results for each of the Direct Push sample locations is provided in Appendix D. Figures depicting the sample locations and their respective methane concentrations and a contour map of the methane field screening results are provided in Appendix A.

2.4 Analytical Results

The soil gas samples collected from each of the Direct Push borings were analyzed for VOCs using USEPA Method 8260. The gas samples were collected in Tedlar bags and overnighted along with the appropriate Chain-of-Custody (COC) documentation to ESN's analytical laboratory in Golden, Colorado. A copy of the COC documentation and the laboratory analytical results are provided in Appendix E.

The laboratory analytical results indicated that several VOCs were detected above their method detection limits (MDLs) in many of the soil gas samples. The VOCs detected above their respective MDLs consisted primarily of petroleum hydrocarbons such as benzene, toluene, ethylbenzene, and xylenes (BTEX). The highest BTEX concentrations were detected in the soil gas sample collected from Boring No. 6 and the duplicate sample collected from the same Direct Push boring. Of the BTEX constituents, toluene was detected at the highest concentration at 8.6 ug/L in the duplicate soil gas sample collected from Boring No. 6. Boring No. 6 is located near the western edge of the Forrestal Landfill.

Trichloroethylene (TCE) and methylene chloride, common solvents, were detected at 1.7 and 0.8 ug/L, respectively, in the duplicate soil gas sample collected from Boring No. 6. TCE was not detected in any other samples and the only other sample that methylene chloride was detected was in the soil gas sample collected from Boring No. 14 at 0.5 ug/L.

Table 3 in Appendix F lists all of the VOC concentrations detected above their respective method detection limits. Copies of the Daily Contractor Reports detailing the field activities are provided in Appendix G.

3.0 Conclusions

On August 13 and 14, 2001, TolTest and ESN advanced 22 Direct Push borings at the Forrestal Landfill to evaluate for the presence of methane and VOCs in the soil gas beneath the landfill cap. Soil gas samples were collected from each of the borings and field screened for oxygen, carbon dioxide, and methane and submittal for laboratory analysis for VOCs.

The laboratory analytical results indicated that several VOCs were detected above their MDLs in many of the soil gas samples. The VOCs detected above their respective MDLs consisted primarily of petroleum hydrocarbons such as BTEX and two Direct Push boring soil gas samples contained detectable levels of TCE and methylene chlroide, two common solvents. Although these VOCs were detected above their respective MDLs in several of the soil gas samples, they were not detected above 10 ug/L. The detection of VOCs above their respective MDLs in the soil gas samples collected from the Forrestal Landfill indicate the presence of VOCs within the landfill. The degree of impact, if any, to the subsurface environmental quality conditions can not be evaluated from the soil gas analytical results.

As a voluntary action, the Navy could conduct further investigations at the Forrestal Landfill involving the collection and sampling of soil and groundwater samples to evaluate the extent, if any, of VOC impact to the subsurface environmental quality conditions.

The methane gas field results indicated that methane gas readings greater than zero percent were detected in most of the sample locations. The distribution shows a highly uniform presence of methane gas in most parts of the landfill. As previously stated, the detection of methane gas in the soil gas samples typically indicates the presence of putrescible solid waste within a landfill. Title 35 of the IAC states that methane concentrations greater than 50% of the LEL in air is detected below the ground surface by a monitoring device will require the installation of a gas management system. The field screening results indicate that soil gas samples collected from 15 of the 22 Direct Push borings exceeded the Action Level stated in Title 35 of the IAC. Therefore, it is recommended that a gas management system be installed at the Forestal Landfill. Further subsurface investigations may be required to evaluate the appropriate gas management system for the landfill.

The boundaries of the landfill show low or no methane presence except for Boring No. 1, which was advanced approximately 50 feet south of the residence at Building 4228. The percent LEL for methane result for the soil gas sample collected from Boring No. 1 exceeded the IAC Action Level. Title 35 of the IAC further states that a gas management system must be installed if greater than 25 percent of the LEL for methane is detected in air in any building on or near the facility unless the operator can demonstrate that the detected methane concentration is not attributed to the facility. No methane samples were collected from within Building 4228 or closer than 50 feet to the building. Further soil gas and/or air monitoring data will have to be collected to evaluate whether there is any methane gas impact within Building 4228.

APPENDIX A

Site Figures

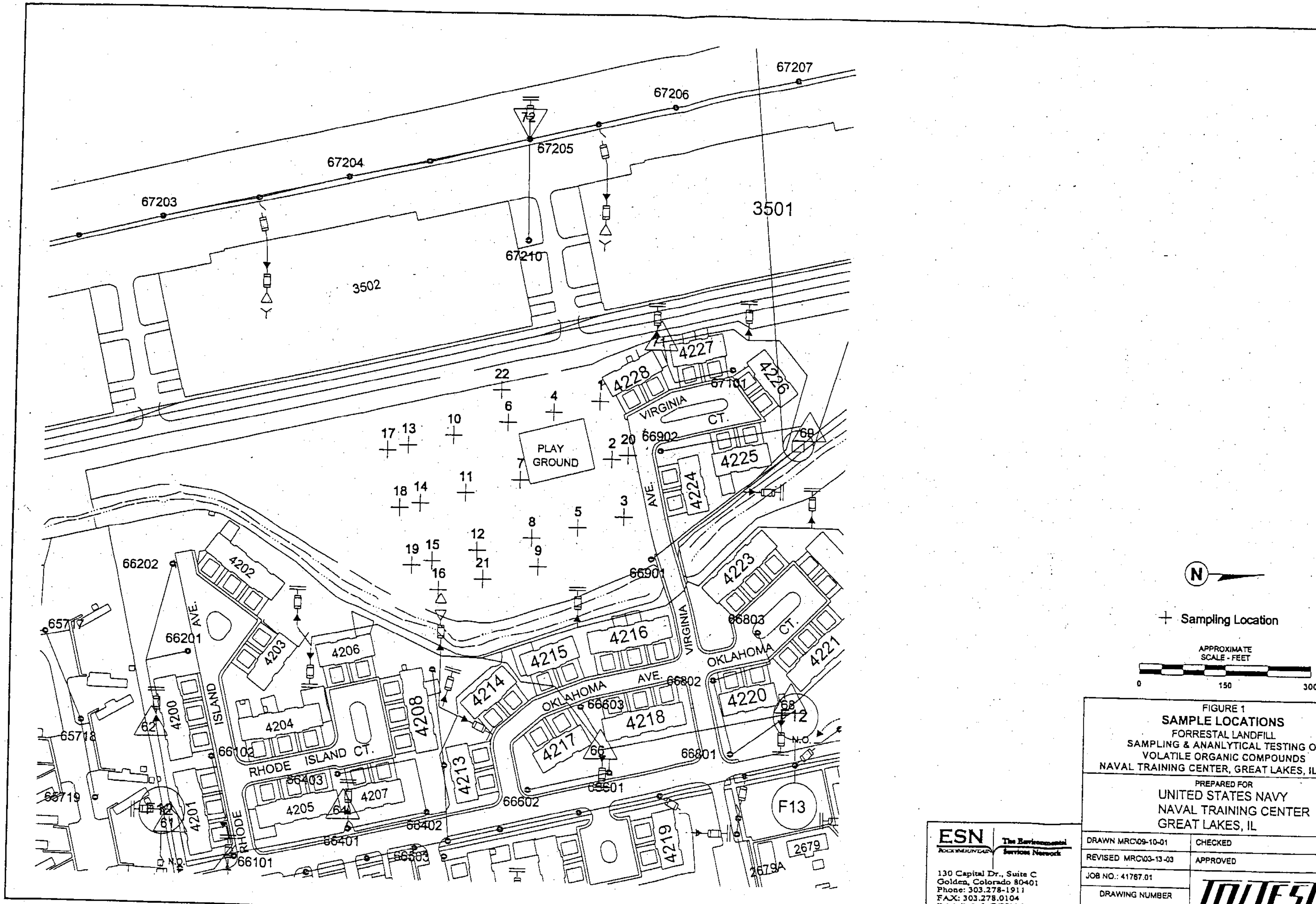
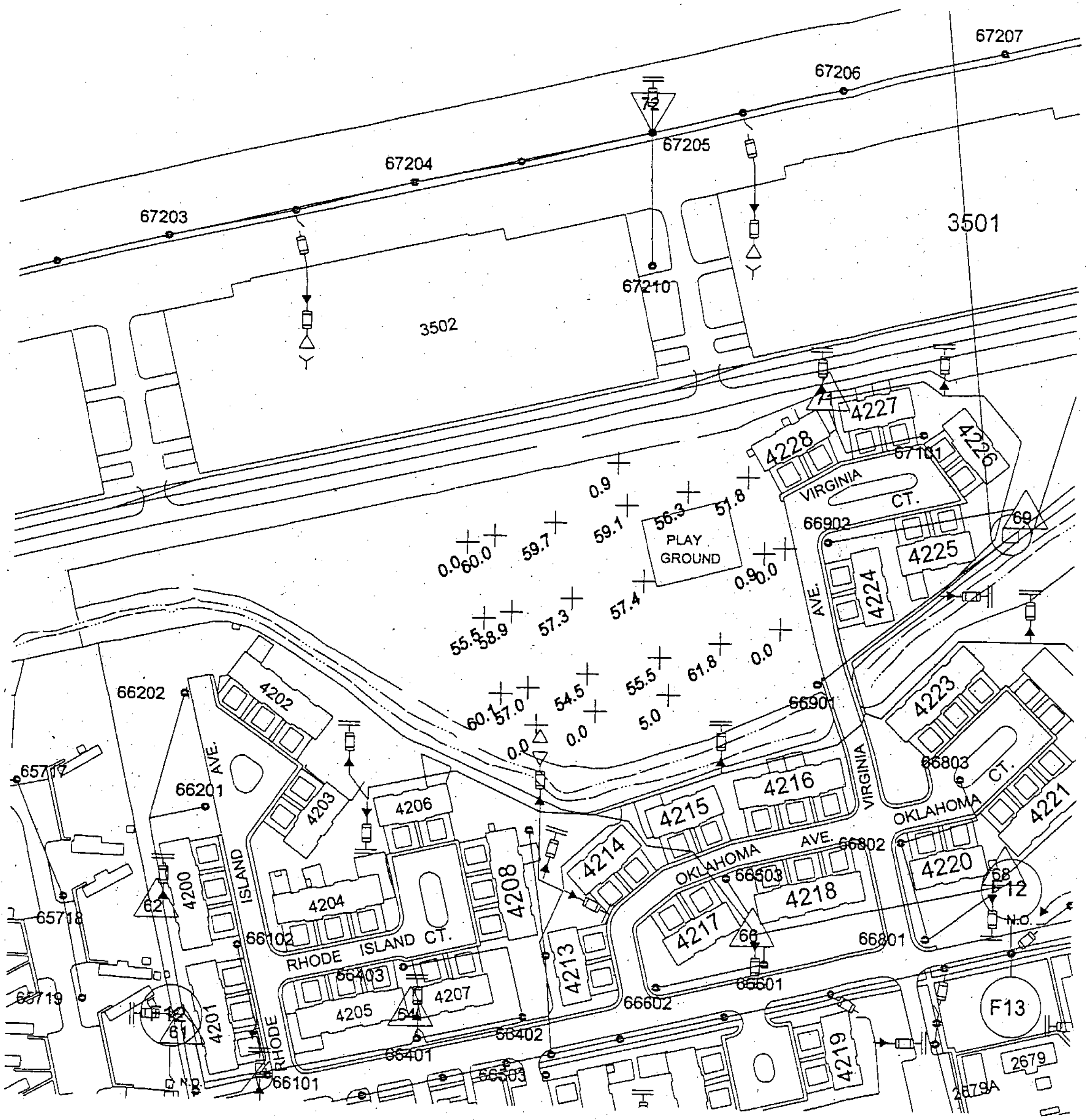


FIGURE 1
SAMPLE LOCATIONS
FORRESTAL LANDFILL
SAMPLING & ANANLYTICAL TESTING OF
VOLATILE ORGANIC COMPOUNDS
NAVAL TRAINING CENTER, GREAT LAKES, ILLINOIS

PREPARED FOR
UNITED STATES NAVY
NAVAL TRAINING CENTER
GREAT LAKES, IL

DRAWN MRC\09-10-01	CHECKED
REVISED MRC\03-13-03	APPROVED
JOB NO.: 41767.01	
DRAWING NUMBER 404832	TOLTEST, INC.

ESN Rocky Mountain
The Environmental Services Network
130 Capital Dr., Suite C
Golden, Colorado 80401
Phone: 303.278.1911
FAX: 303.278.0104
E-Mail: Info@ESN-RM.com



N

Sampling Location

58.6 Methane %

APPROXIMATE SCALE - FEET

0 150 300

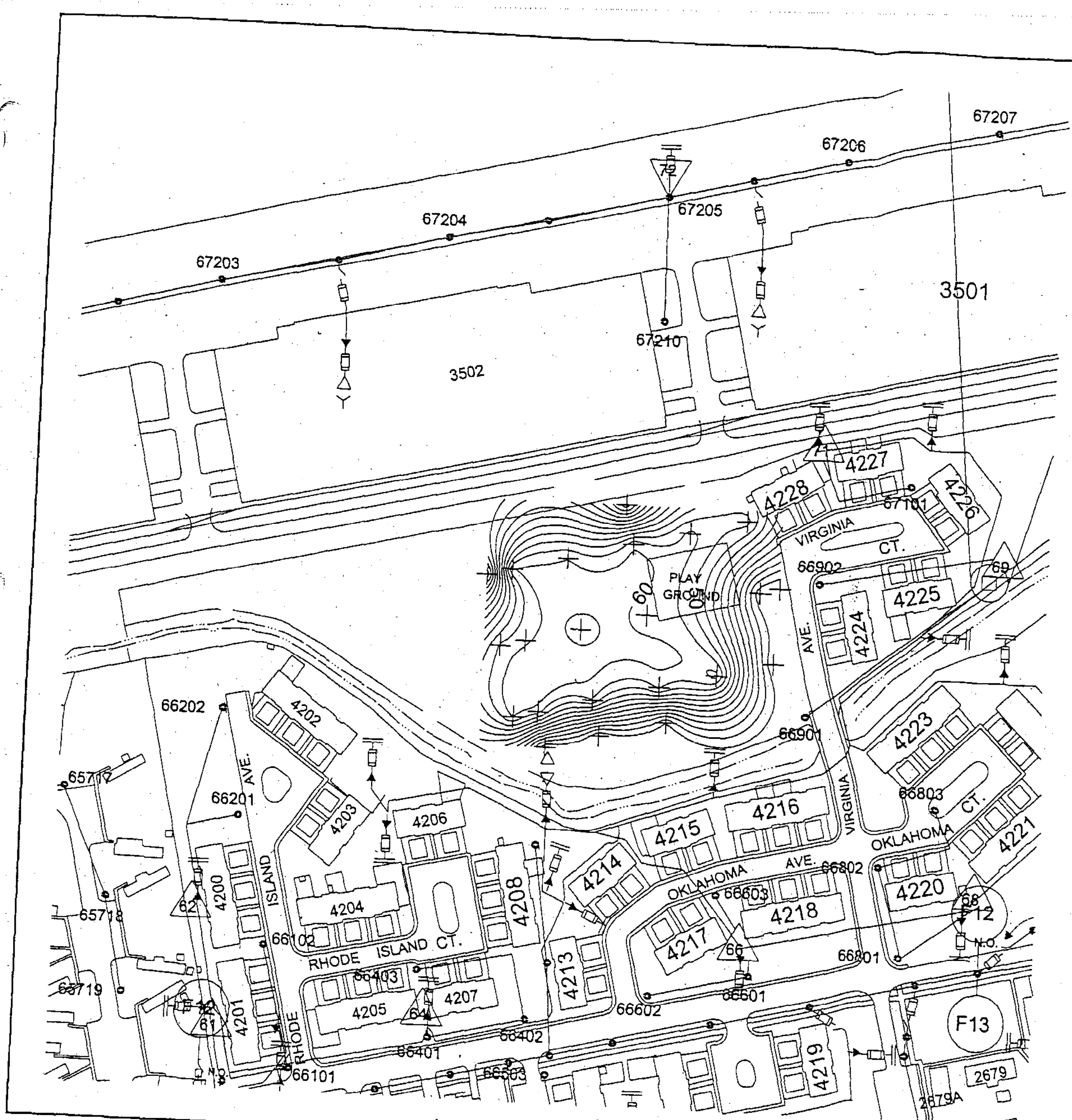
FIGURE 2
SOIL GAS METHANE
FORRESTAL LANDFILL
SAMPLING & ANANLYTICAL TESTING OF
VOLATILE ORGANIC COMPOUNDS
NAVAL TRAINING CENTER, GREAT LAKES, ILLINOIS

PREPARED FOR
UNITED STATES NAVY
NAVAL TRAINING CENTER
GREAT LAKES, IL

ESN ROCKY MOUNTAIN The Environmental Services Network

130 Capital Dr., Suite C
Golden, Colorado 80401
Phone: 303.278.1911
FAX: 303.278.0104
E-Mail: Info@ESN-RM.com

DRAWN MRC\09-10-01	CHECKED
REVISED MRC\03-13-03	APPROVED
JOB NO.: 41767.01	TOLTEST, INC.
DRAWING NUMBER 404832	



(N)

Contour Interval: 5%

+ Sampling Location

APPROXIMATE SCALE - FEET

0 150 300

FIGURE 3

SOIL GAS METHANE CONTOURS

FORRESTAL LANDFILL
SAMPLING & ANANLYTICAL TESTING OF
VOLATILE ORGANIC COMPOUNDS
NAVAL TRAINING CENTER, GREAT LAKES, ILLINOIS

PREPARED FOR

UNITED STATES NAVY
NAVAL TRAINING CENTER
GREAT LAKES, IL

ESN Rocky Mountain — The Environmental Services Network
130 Capital Dr., Suite C
Golden, Colorado 80401
Phone: 303.278.1911
FAX: 303.278.0104
E-Mail: Info@ESN-RM.com

DRAWN MRC\09-10-01	CHECKED
REVISED MRC\03-13-03	APPROVED
JOB NO.: 41767.01	
DRAWING NUMBER 404832	TOLTEST, INC.

APPENDIX B

Table 1 – Boring Locations and Depth

Table 1

Direct Push Boring Locations and Depths

Sampling and Analytical Testing of Volatile Organic Compounds
Forrestal Landfill
Great Lakes Naval Training Center
August 13 and 14, 2001

Boring Number	Depth (feet)	Longitude	Latitude
GP-1	5	42°17.941'	087°52.238'
GP-2	8	42°17.949'	087°52.217'
GP-3	8	42°17.944'	087°52.198'
GP-4	6	42°17.931'	087°52.233'
GP-5	9	42°17.937'	087°52.191'
GP-6	5	42°17.918'	087°52.228'
GP-7	6	42°17.924'	087°52.207'
GP-8	7	42°17.925'	087°52.187'
GP-9	8	42°17.929'	087°52.176'
GP-10	7	42°17.902'	087°52.226'
GP-11	6	42°17.915'	087°52.197'
GP-12	4	42°17.910'	087°52.180'
GP-12	6	42°17.909'	087°52.178'
GP-13	6	42°17.888'	087°52.223'
GP-14	7	42°17.894'	087°52.194'
GP-15	3	42°17.898'	087°52.175'
GP-16	6	42°17.905'	087°52.166'
GP-17	6	42°17.880'	087°52.219'
GP-18	8	42°17.892'	087°52.195'
GP-19	4	42°17.898'	087°52.175'
GP-20	8	42°17.953'	087°52.220'
GP-21	8	42°17.917'	087°52.171'
GP-22	6	42°17.916'	087°52.245'

APPENDIX C

ESN SOP – Instantaneous or Active Soil Gas Vapor Sampling Using Direct Push Probe Tools and Post-Run Tubing (PRT) Adapter With Collection

ESN ROCKY MOUNTAIN | Environmental Services Network

INSTANTANEOUS OR ACTIVE SOIL GAS VAPOR SAMPLING USING DIRECT PUSH PROBE TOOLS AND POST-RUN TUBING (PRT) ADAPTER WITH COLLECTION

SOP Number:	NFSV101	Revision Number:	
Page:	1 of 1	Revision Date:	October 6, 2000

Title: Soil Gas/Vapor Sampling using Direct Push Probe Tools and Post Run Tubing (PRT) Adapter with Collection	Approved By: K. Marcher 8/13/01 Signature Date

1.0 AREA OF APPLICABILITY

This method is for the active collection of soil gas from direct push probed holes created by a direct push rig or hand driven probes. A constant diameter probe sampling system is driven into soils and used to extract the soil gases from the vadose zone. The constant diameter probe is designed to be a self-sealing system that does not allow air dilution along the hole annulus or through tool joints. The gases are purged from the hole and can be accurately measured. The gases collected by this method are typically analyzed for light hydrocarbon gases, volatile hydrocarbon and/or solvent vapors, fixed (atmospheric) gases, or "biogenic" gases. Generally, heavier compounds, such as diesel fuels, oil and grease, PCBs, etc., are not considered volatile enough to be collected by this method.

This method of collecting soil gases can be used in areas where the depth to ground water (vadose zone) is sufficiently deep. Depending on lithology, sampling above three to five feet may not be recommended if the probe may not create an annular seal at this depth. The collected gases are analyzed on site or are stored in containers of appropriate design for the compounds to be analyzed. Gases may also be injected or pumped directly to a portable instrument or monitoring system.

2.0 MATERIALS REQUIRED

- Hydraulic or Hand Powered Probe Driving System
- Lengths of 1.0" – 1.5" O.D. Direct push type probe rod
- 1/4" or 3/8" extension rods and couplers and drive point poppers
- Post Run Tubing (PRT) Soil Gas tool with Retractable Point Shaft or. . .
  PRT-Expendable Point Holder with expendable drive points
- Extra o-rings for point shaft or expendable points
- Stainless steel PRT tubing adapter
- Sufficient length of 1/8", 3/16" or 1/4" polyethylene or nylon sampling tubing (Teflon optional)
- Sufficient length of 3/8" – 1/2" polyethylene tubing for outer sheath
- 3/8" x 3/16" silicone tubing - optional for connection to pumps
- Vacuum Pumps Device
  - 10L soil gas vacuum tank with vacuum pump, tank vacuum/volume gauge, sample line vacuum gauge
  - Peristaltic Pump and flow measuring gauge
  - Hand Vacuum pump with gauge with needle attachment or
  - 60cc Disposable Syringe and 3-way valves
- Surrogate chemical(s) for soil gas analysis (optional) & Microliter syringe
- Sample Containers Options:

- 5cc – 50cc gas tight glass/Teflon valve syringes with stainless needles
- Glass bulbs 125cc – 1000cc
- Summa Canisters
- Tedlar or other gas sampling bags (use multi layer bags for low molecular weight compounds)
- LandTec GA90 or equivalent CH_4, O_2 & CO_2 infra red meter (optional, required for Tier II Landfill Testing)

3.0 INSTRUCTIONS

1. Probe rod and all tools should be cleaned according to the "Tool Decontamination" SOP Number NSM501.

2. Inspect and assemble a clean PRT-Soil Gas Retractable Point assembly. A surrogate compound may be applied to the internal part of the soil gas tool, on top of the point shaft, **immediately before entry into the hole**. Do not leave soil gas points in direct sun where they will get hot and volatilize the surrogate when applied. If there is a delay in getting the point into the ground, then it must be opened and reloaded with surrogate. There are small holes in the top of the point shaft where the chemical can be injected with a microliter syringe. The chemist analyzing the soil gases will prescribe the appropriate surrogate and quantities to be used depending on the analysis required.

3. O-rings or Teflon tape may be wrapped around the point shaft to hold the retractable or expendable point in place before driving it into the hole. Put Teflon tape on the point holder threads also. Place the drive point on the end of the first length of probe rod.

4. Drive the point driven to the predetermined sampling depth by adding an appropriate number of drive rods. *NOTE: If you hit refusal, pull out, consult client for instructions on whether to collect or move over 1 – 2' and try again. If moving over and a surrogate was used, a new point will need to be reloaded with surrogate.*

5. After driving to the sampling depth, attach the stainless tubing adapter to an appropriate length of new, clean 1/8" – 1/4" tubing. Leave enough extra to extend out probe rod and connect to sampling devices. Slide the 3/8" or 1/2" tubing over the narrow tubing, making it easier to thread the PRT adapter into the point holder.

6. Feed the adapter down the center of the probe rod and thread it into the tool. With a slight downward to almost neutral force, twist the tubing counterclockwise to engage the **reverse** threads on the adapter with the PRT Soil Gas Point holder at the bottom of the hole. Give several light tugs on the tubing to insure that it is connected. Be familiar with how many turns it takes to seat the o-ring.

7. Attach the top end of the tubing to the sample pump, valve system, or collection device. Before pulling off the drive point, test the sample line to see if it holds a vacuum. (This is valid only if the drive point has a good o-ring seal.)

8. Retract the probe rod 1" – 6" to open the retractable point or drop the expendable point. If doing vertical profiling, only pull off the point far enough to expose the opening, and not off the drive point's neck. (Longer neck drive points are suggested for vertical profiling.) The larger the open hole, the more purge volume will be required. In some lithologies, it may be necessary to use the extension rods and the point popper tool to insure the retractable point or expendable point has opened. **Do not drop the extension rod into the probe rod, this may damage the threads on the PRT tool.**

9. Calculate the internal volume of the total system: soil gas tool + tubing I.D. + open hole volume + any inline sample containers. (Refer to the TEG tubing/hole volume chart or use the formula).

10. Purge a minimum of four times the system volume with one of the following options:

    a) Connect a syringe and 3-way valve to the sampling tubing. (The syringe can be a gas-tight gas sampling syringe to contain the sample, or a disposable plastic syringe for purging only.) The 3-way valve can be operated to evacuate the sample line and then purge this gas through the open port on the valve. Repeat this until the desired total volume has been purged from the system. Be careful not to open the sample line to atmosphere during this process. If this happens, re-purge the entire four volumes.

    b) Use a calibrated large volume (approximately 10L) vacuum tank (Geoprobe Vacuum/Volume Tank or similar) to purge 4 system volumes of gas from the soil. Pump down the vacuum tank to capacity. Connect the line of the vacuum tank to the 1/4" soil gas tubing using short lengths of silicone tubing. The silicone tubing can also be used as an "access" for the syringe withdrawal of soil gas by inserting the syringe needle through the silicone into the sample line. It is self-sealing with minimal punctures.

    c) A peristaltic pump with silicone tubing can be used as the vacuum device at the end of the sampling train. Volumes must be measured using either a flow meter, or a gas bag of known volume (filling success volumes until the desired volume is reached.

    d) Immediately after withdrawing the final purge volume, a sample may be collected. This sample is withdrawn through the septa or silicon tubing. When using syringes to collect soil gas, allow ample time after pulling back the syringe plunger for the soil gas pressure to equalize with atmospheric pressure, usually about 5 to 10 seconds.

    e) The same plastic syringe may be used to collect a sample for screening by injecting into an OVM detector, or other screening instruments that accept air samples.

    -or-

    f) A sample may be injected into an evacuated container. It is usually recommended that the container be flushed with soil gas prior to a final fill.

    -or-

g) A container may be placed in line and soil gas pulled through it, such as a glass bulb with valves at two ends. At least four container volumes of soil gas should pass through the container before the final sample is collected, and the pressure should be back to atmospheric before closing the container.

Samples can be collected with devices in line with a vacuum pump, or at the end of a peristaltic pump. Summa canisters require a t-fitting so that the canister can be filled in line after purging the system, without breaking a connection. Try to keep flow rates below 500cc/minute when purging and sampling to prevent surface breakthrough.

After the sample has been collected, remove the tubing by firmly pulling straight up on it to detach it from the stainless adapter, leaving the adapter attached to the soil gas PRT tool. This allows inspection of the tool when retrieved. DO NOT UNTHREAD THE TUBING ADAPTOR UNTIL IT IS RETRIEVED AND INSPECTED.

12. Pull the probe rod from the hole and inspect the PRT-Soil Gas tool. The o-ring seal on the adapter should be seated against the PRT point holder. If not, the soil gas sample must be declared invalid due to potential leakage.

13. Decontaminate the soil gas point tools according to the "Tool Decontamination" SOP Number NSM501. Typically, it is not necessary to decontaminate the probe rod since the interior of the rod is not exposed to the contamination. This is only necessary if soils or liquids have entered the interior of the probe rod or extreme contamination is suspected in the probed soil, or in areas where very hazardous contamination potential exists and crossover contamination is a concern.

NOTES:

Vertical Profiling or Re-entry: Often it is desirable to vertically profile the soil gas by hole re-entry or probing to take a deeper soil gas. Hole re-entry is not advised since annular leakage is more likely. Pulling off a retractable point or expendable point, and then re-pushing to the next interval will work on some soil conditions and not others. Often, soil will plug the point holder after the first push. It is therefore important to leak check and make sure soil gas flow can be re-established at each interval sampling. Downhole qualitative surrogate recovery will be more difficult to interpret with multiple pushes.

Always collect vertical profile samples starting with the shallowest hole first. If an offset must be sampled at the same or shallower depth, increase the distance away from the first hole to prevent communication (air dilution) with the first hole. The distance offset is a function of the required purge volumes. If large volumes (>1 liter) are required, offsets should be 3 – 5' (at the sampling point) from the nearest part in original hole. It is still recommended to be at least 2' from the nearest hole for smaller purges.

4.0 QUALITY CONTROL

- At any time a leak or plug is suspected in the system during the sampling procedure, or the sample may have been exposed to surface atmosphere, the sample should be declared a mis-run. If the sampling line was opened to air after purging, the test hole should be repurged.

- With onsite GC analysis, a qualitative surrogate can be used to confirm that collected gases were retrieved from the bottom of the tubing and made it through the entire sampling train to the chromatograph's injection port. This procedure is accomplished by adding a surrogate to the top of the point shaft inside the retractable point assembly immediately before running the tool into the hole. The surrogate compound used and quantity required depends on the analytical method. The on-site chemist must judge on a qualitative level if the surrogate recoveries indicate a sampling problem. Additionally, another surrogate can be added to a sample container after soil gas collection and prior to analysis. This is a quantitative surrogate that checks the sample withdrawal, injection, and GC response.

- Equipment Blanks: At the clients request, air or nitrogen may be collected through the assembled decontaminated tools and tubing and contained for analysis to demonstrate that the decontamination procedure is effective.

5.0 REFERENCES

1986, "Test Methods for Evaluating Solid Waste", SW-846, Third Ed., Office of Solid Waste and Emergency Response, United States Environmental Protection Agency.

1992, "ASTM D5314-93, Standard Guide for Soil Gas Monitoring in the Vadose Zone" in *ASTM Standards on Ground Water and Vadose Zone Investigations*, by ATSM Committee on D-18 Soil and Rock, 2nd ed. 1994.

APPENDIX D

Table 2 – Field Screening Results

Table 2

Field Screening Results

Sampling and Analytical Testing of Volatile Organic Compounds
Forrestal Landfill
Great Lakes Naval Training Center
August 13 and 14, 2001

Boring Number	Methane %	% LEL for Methane	CO2 %	O2 %	Balance %
GP-1	51.8	1,036	41.7	0.9	5.6
GP-2	0.9	18	0.8	20.7	77.6
GP-3	0	0	0	21.4	78.6
GP-4	56.3	1,126	41.2	0	1.7
GP-5	61.8	1,236	34.7	0.2	1.7
GP-6	59.1	1,182	38.3	0	2.5
GP-7	57.4	1,148	40.1	0.6	1.6
GP-8	55.5	1,110	43.5	0.2	0.8
GP-9	5	100	3.2	18.5	73.5
GP-10	59.7	1,194	38.1	0	2.8
GP-11	57.3	1,146	40.1	0.2	3.1
GP-12	54.5	1,090	42.3	0.3	3.1
GP-13	60	1,200	37.4	0.3	2.3
GP-14	58.9	1,178	39.1	0.3	1.1
GP-15	57	1,140	40	0.3	3.7
GP-16	0	0	0	21	79
GP-17	0	0	0	20.7	79.3
GP-18	55.5	1,110	41.1	0	2.5
GP-19	60.1	1,202	36.7	0.2	2
GP-20	0	0	0	21	79
GP-21	0	0	0	21	79
GP-22	0.9	18	0.3	20	79

Notes:

1. Percent gas readings were obtained in the field using a GEM 500 Landtec landfill gas meter in accordance with the procedures provided in TolTest's August 2001 Work Plan submitted to the Navy for this project.
2. % LEL (lower explosive limit) for methane was calculated by dividing the methane reading from the GEM 500 Landtec landfill gas meter by the LEL for methane (5%) and multiplying by 100.
3. Shaded - % LEL for methane readings indicate a value greater than the 50% of the LEL threshold established by Title 35 of the Illinois Administrative Code (IAC), Part 811, Standards For New Solid Waste Landfills.

APPENDIX E

Laboratory Analytical Report

CLIENT: TOLTEST
CLIENT REPRESENTATIVE: KHUSH MANDER
CLIENT PROJECT NUMBER:
SITE: GREAT LAKES , NAVAL TRAINING FACILITY-Forrestal Landfill

ESN PROJECT NUMBER: 1257.01
CHEMIST: JACKSON
VARIAN SATURN 2000 GC/MS
Analyzed in ESN Rocky Mountain's Fixed Laboratory

Selected Volatile Organic Compounds by GC/MS; EPA Method 8260; Purge & Trap

Sample Name	GP-1	GP-2	GP-3	GP-04	GP-5	GP-06	GP-07	GP-8	GP-9	GP-10
Sample Depth	5'	8'	9'	7'	7'	5'	6'	8'	8'	7'
Matrix	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor
Sample Amount	50cc	50cc	50cc	50cc	50cc	50cc	50cc	50cc	50cc	50cc
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Reporting Limit	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Reporting Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	<0.4	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	0.6	ND	ND	ND	<0.4
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	<0.4	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	<0.4	ND	<0.4	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	<0.4	ND	<0.4	ND	ND	ND	<0.4
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	<0.4	<0.4	ND	0.6	<0.4	2.6	<0.4	<0.4	<0.4	0.4
1,2-Dichloroethane	ND	ND	ND	ND	ND	<0.4	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	<0.4	ND	1.7	<0.4	ND	ND	<0.4
1,2-Dichloropropane	ND	ND	ND	ND	ND	<0.4	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	<0.4	<0.4	<0.4	3.1	<0.4	6.8	2.2	0.5	<0.4	4.6
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	<0.4	ND	<0.4	ND	ND	ND	<0.4
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	<0.4	0.5	<0.4	<0.4
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	<0.4	<0.4	ND	2.2	0.7	2.4	2.9	1.5	<0.4	2.1
m&p-Xylene	<0.8	<0.8	<0.8	4.6	2.1	5.8	9.3	3.9	<0.8	5.8
o-Xylene	<0.4	<0.4	ND	1.1	0.5	1.2	0.9	0.7	<0.4	1.0
Styrene	ND	ND	ND	ND	ND	<0.4	ND	ND	ND	<0.4
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	0.7	<0.4	0.9	0.4	<0.4	ND	0.7
1,1,2,2-Tetrachloroethane	<0.4	ND	ND	1.2	<0.4	0.5	0.4	0.4	<0.4	<0.4
Bromobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	<0.4	ND	0.5	<0.4	ND	ND	1.0
n-Propylbenzene	ND	ND	ND	<0.4	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	<0.4	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	0.5	<0.4	<0.4	<0.4	<0.4	ND	<0.4
tert-Butylbenzene	ND	ND	ND	<0.4	ND	ND	<0.4	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	1.1	<0.4	<0.4	ND	<0.4	<0.4	<0.4
sec-Butylbenzene	ND	ND	ND	<0.4	<0.4	ND	<0.4	<0.4	ND	<0.4
4-Isopropyltoluene	ND	ND	ND	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,3-Dichlorobenzene	ND	ND	ND	ND	<0.4	ND	<0.4	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	<0.4	ND	<0.4	ND	<0.4	ND	ND
n-Butylbenzene	ND	ND	ND	<0.4	ND	ND	<0.4	ND	ND	<0.4
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

CLIENT: TOLTEST
CLIENT REPRESENTATIVE: KHUSH MANDER
CLIENT PROJECT NUMBER:
SITE: GREAT LAKES , NAVAL TRAINING FACILITY-Forrestal Landfill

ESN PROJECT NUMBER: 1257.01
CHEMIST: JACKSON
VARIAN SATURN 2000 GC/MS
Analyzed in ESN Rocky Mountain's Fixed Laboratory

Selected Volatile Organic Compounds by GC/MS; EPA Method 8260; Purge & Trap

Sample Name	GP-11	GP-12	GP-13	GP-14	GP-15	GP-16	GP-17	GP-18	GP-19	GP-20
Sample Depth	6'	8'	6'	7'	6'	8'	6'	8'	4'	8'
Matrix	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor
Sample Amount	50cc	50cc	50cc	50cc	50cc	50cc	50cc	50cc	50cc	50cc
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Reporting Limit	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Reporting Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	<0.4	0.5	<0.4	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	<0.4	<0.4	<0.4	<0.4	<0.4	ND	<0.4	<0.4	<0.4	<0.4
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	<0.4	<0.4	ND	ND	ND	ND	<0.4
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1.8	<0.4	1.4	7.2	0.5	<0.4	0.4	<0.4	<0.4	<0.4
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	<0.4	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	<0.4	<0.4	<0.4	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	1.3	<0.4	0.9	1.7	<0.4	<0.4	0.5	1.1	0.5	<0.4
m&p-Xylene	3.1	0.9	3.3	3.9	<0.8	<0.8	1.5	2.1	2.1	<0.8
o-Xylene	0.6	<0.4	0.6	1.0	<0.4	<0.4	<0.4	0.5	<0.4	<0.4
Styrene	ND	ND	<0.4	<0.4	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	<0.4	<0.4	<0.4	0.6	<0.4	ND	<0.4	<0.4	<0.4	<0.4
1,1,2,2-Tetrachloroethane	<0.4	<0.4	<0.4	0.5	<0.4	ND	<0.4	<0.4	<0.4	<0.4
Bromobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	<0.4	<0.4	ND	ND	<0.4	ND	<0.4	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
tert-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	<0.4	<0.4	<0.4	0.5	<0.4	<0.4	<0.4	<0.4	0.4	<0.4
sec-Butylbenzene	ND	ND	<0.4	ND	ND	ND	ND	ND	<0.4	ND
4-Isopropyltoluene	0.5	<0.4	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	<0.4	<0.4	<0.4	ND	<0.4	<0.4	ND
n-Butylbenzene	ND	ND	<0.4	<0.4	ND	ND	ND	ND	<0.4	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

CLIENT: TOLTEST
CLIENT REPRESENTATIVE: KHUSH MANDER
CLIENT PROJECT NUMBER:
SITE: GREAT LAKES , NAVAL TRAINING FACILITY-Forrestal Landfill

Selected Volatile Organic Compounds by GC/MS; EPA Method 8260; Purge & Trap

Sample Name	GP-21	GP-22	GP-01Dup	GP-06 Dup	GP-09 Dup	GP-18 Dup	GP-18 Amb	GP-20 Dup
Sample Depth	4'	6'	5'	5'	8'	8'	8'	8'
Matrix	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor
Sample Amount	50cc	50cc	50cc	50cc	50cc	50cc	50cc	50cc
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Reporting Limit	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Reporting Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Dichlorodifluoromethane	ND	ND	<0.4	0.5	ND	<0.4	ND	ND
Chloromethane	ND	ND	ND	<0.4	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	<0.4	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	0.8	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	<0.4	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	<0.4	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	<0.4	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	<0.4	<0.4	ND	2.3	<0.4	<0.4	<0.4	<0.4
1,2-Dichloroethane	ND	ND	ND	<0.4	ND	ND	ND	ND
Trichloroethene	ND	<0.4	ND	1.9	ND	ND	ND	<0.4
1,2-Dichloropropane	ND	ND	ND	<0.4	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	<0.4	<0.4	<0.4	8.6	<0.4	<0.4	<0.4	<0.4
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	<0.4	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	<0.4	ND	ND	<0.4	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	<0.4	<0.4	<0.4	3.7	<0.4	1.1	<0.4	<0.4
m&p-Xylene	<0.8	<0.8	<0.8	9.7	1.1	2.0	<0.8	<0.8
o-Xylene	<0.4	<0.4	<0.4	1.9	<0.4	0.5	<0.4	<0.4
Styrene	ND	ND	ND	<0.4	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	<0.4	ND	ND	1.4	<0.4	<0.4	ND	<0.4
1,1,2,2-Tetrachloroethane	<0.4	<0.4	<0.4	0.8	<0.4	<0.4	<0.4	ND
Bromobenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	<0.4	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	0.8	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	<0.4	ND	<0.4	ND	<0.4	ND	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	<0.4	<0.4	ND	<0.4	ND	<0.4	ND	<0.4
sec-Butylbenzene	ND	ND	ND	<0.4	ND	ND	ND	ND
4-Isopropyltoluene	<0.4	<0.4	ND	<0.4	<0.4	<0.4	<0.4	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	<0.4	ND	<0.4	<0.4	ND
n-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropan	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND

ESN Rocky Mountain
130 Capital Drive, Ste. C
Golden CO 80401

Ph. 303-278-1911
Fx. 303-278-0104
E-mail: lab@esn-rm.com

ESN ROCKY MOUNTAIN

Chain of Custody Record

Client: 1257 TOLTEST
Address: 1000 NORTH POINT BLVD
WAUKEGAN IL 60085
Phone: 847-689-0697 Fax: 847-689-0698
Project Manager: KUSH MANDU

ESN Project #: 1257 Date: 8-13-01 Page 1 of 2 Control #:
Client Project Number:
Project Name: TOLTEST
Project Address: GREAT LAKES NAVAL TRAINING FACILITY / FORRESTAL LANDFILL

SAMPLE INFORMATION

Sampler Name: TOM COURTRIGHT
Signature:

Sample Disposal Instructions: ___ ESN Disposal (a fee may apply) ___ Return to Client ___ Pickup

ESN USE ONLY ☑	Lab ID	Sample Identification	Depth	Date	Time	Matrix	Container #	Container Size	Container Type	Preserv. Type	TAT	VOC-8021 (GC)	TEH-8015	BTEX-8020	VOC-8260 (MS)	SVOC-8270	PCB-8082	PEST-8081	PAH-8100
✓		GP-1	5'	8-13	10:10	AIR		1L	TEDLAR						X				
✓		GP-20	8'	"	10:30	"		"	"						X				
✓		GP-2	8'	"	11:00	"		"	"						X				
✓		GP-3	9'	"	11:25	"		"	"						X				
✓		GP-~~4~~5 *	7'	"	11:55	"		"	"						X				
✓		GP-8	8'	"	12:15	"		"	"						X				
✓		GP-9	8'	"	13:05	"		"	"						X				
✓		GP-12	8'	"	14:00	"		"	"						X				
✓		GP-21	4'	"	14:25	"		"	"						X				
✓		GP-15	6'	"	14:55	"		"	"						X				
✓		GP-19	4'	"	15:35	"		"	"						X				
✓		GP-18	8'	"	16:00	"		"	"						X				
✓		GP-14	7'	"	16:25	"		"	"						X				
✓		GP-11	~~4~~6'	"	17:00	"		"	"						X				
✓		GP-1 AMBIENT	0 ~~4~~	"	10:10	"		"	"						X				

Comments: ALL SAMPLES ACCIDENTALLY MIS-DATED 8-12-01, REAL DATE 8-13-01
* GP-4 = GP-5
Sample GP-16 not received

1. Relinquished by (print): THOMAS A. COURTRIGHT
Signature: Thomas A. Courtright
Date: 8-13-01 Time: 17:32

1. Received by (print):
Signature:
Date: Time:

2. Relinquished by (print):
Signature: Fed Ex
Date: Time:

2. Received by (print): Graham Jackson
Signature: [signature]
Date: 8/14/01 Time: 0956

White: File Copy Yellow: Return with Report Pink: Client's Field Copy

ESN ROCKY MOUNTAIN

Chain of Custody Record

Client: TOLTEST
Address: 1000 NORTH POINT BLVD
WAUKEGAN IL 60085
Phone: 847-689-0667 Fax: 847-689-0698
Project Manager: HUGH MANDU

ESN Project #: 1257 Date: 8-13-01 Page 2 of 2 Control #:
Client Project Number:
Project Name: TOLTEST
Project Address: GREAT LAKES NAVAL TRAINING FACILITY / FORESTAL LANDFILL

SAMPLE INFORMATION

Sampler Name: TOM COURTRIGHT
Signature:

Sample Disposal Instructions: ___ ESN Disposal (a fee may apply) ___ Return to Client ___ Pickup

ESN USE ONLY ☑	Lab ID	Sample Identification	Depth	Date	Time	Matrix	Container #	Container Size	Container Type	Preserv. Type	TAT	VOC-8021 (GC)	TEH-8015	BTEX-8020	VOC-8260 (MS)	SVOC-8270	PCB-8082	PEST-8081	PAH-8100
✓		GP-20 DUP.	8'	8-13	10:30	AIR		1L	TEDLAR						X				
✓		GP-9 DUP.	8'	"	13:05	"		"	"						X				
✓		GP-18 DUP.	8'	"	16:00	"		"	"						X				
✓		GP-18 AMBIENT	0	"	16:00	"		"	"						X				
✓		~~GP-16~~ TA			15:10	"		"	"						X				

Comments: ALL SAMPLES ACCIDENTALLY MISLABELED AS DATE 8-12-01. REAL DATE: 8-13-01

1. Relinquished by (print): THOMAS A. COURTRIGHT
Signature: Thomas A. Courtright TA
Date: 8-13-01 Time: 17:32

1. Received by (print):
Signature: Fed Ex
Date: Time:

2. Relinquished by (print):
Signature: Fed Ex
Date: Time:

2. Received by (print): Graham Jackson
Signature: [signature]
Date: 8/14/01 Time: 0856

White: File Copy Yellow: Return with Report Pink: Client's Field Copy

TOLTEST, INC. 1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186, Voice (419) 241-7175, Fax (419) 321-6259
Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304, Voice (419) 241-7175, Fax (419) 241-1808
Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☒ Other WAUKEGAN IL

Chain of Custody Record

31074 Page 1 of 3

Project No.: 1257
Client: TOLTEST
P.O. No.:
Project/Location: GREAT LAKES NAVAL/FORESTAL LANDFILL
Project Mgr.: KUSH MANOU
Sampler's Name: THOMAS A. CURTRIGHT
Phone No. 847-689-0697 / FAX 847-689-0698
Sampler's Signature: [signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	8260	Preserved Yes/No	LAB USE ONLY	Lab #
1	GP-7	8-14	8:15	TEDLAR	AIR	DEPTH: 6' FORESTAL	1	X	DARK		
2	GP-17	"	8:25	"	"	6' "	1	X			
3	GP-13	"	8:40	"	"	6' "	1	X			
4	GP-10	"	8:55	"	"	7' "	1	X			
5	GP-6	"	9:10	"	"	5' "	1	X			
6	GP-4	"	9:25	"	"	7' "	1	X			
7	GP-22	"	9:50	"	"	6' "	1	X			
8	GP-6 DUP	"	9:10	"	"	5' "	1	X			
9	GS-27	"	11:40	"	"	12' SUPPLY SIDE	1	X			
10	GS-26	"	12:10	"	"	12' " LANDFILL	1	X			

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	8-14 16:00		
			FED EX	
			[signature]	8/15 13:20

LAB USE ONLY
Were samples delivered ☐ in person ☒ by courier
Were samples preserved ☒ in field ☐ in lab ☐ N/A
Temp of samples ____ °C
Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A
Were proper containers used? ☐ yes ☐ no
Was container labeled properly for contents? ☐ yes ☐ no
Were samples packaged properly for type of material? ☐ yes ☐ no
Was shipping label completed properly per regulations? (49 CFR 170 etc.) ☐ yes ☐ no
Comments:
TAT

APPENDIX F

Table 3 – Soil Gas Analytical Results

Table 3
Soil Gas Analytical Results

Sampling and Analytical Testing of Volatile Organic Compounds
Forrestal Landfill
Great Lakes Naval Training Center
August 13 and 14, 2001

Analyte	GP-04-7'	GP-5-7'	GP-06-5'	GP-06 Dup-5'	GP-07-6'	GP-8-8'	GP-09 Dup-8'	GP-10-7'	GS-11-6'
Dichlorodifluoromethane	ND	ND	ND	0.5	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	0.6	0.8	ND	ND	ND	ND	ND
Benzene	0.6	ND	2.6	2.3	ND	ND	ND	0.4	ND
Trichloroethene	ND	ND	1.7	1.9	ND	ND	ND	ND	ND
Toluene	3.1	ND	6.8	8.6	2.2	0.5	ND	4.6	1.8
Chlorobenzene	ND	ND	ND	ND	ND	0.5	ND	ND	ND
Ethyl Benzene	2.2	0.7	2.4	3.7	2.9	1.5	ND	2.1	1.3
m&p-Xylene	4.6	2.1	5.8	9.7	9.3	3.9	1.1	5.8	3.1
o-Xylene	1.1	0.5	1.2	1.9	0.9	0.7	ND	1.0	0.6
Isopropylbenzene	0.7	ND	0.9	1.4	0.4	ND	ND	0.7	ND
1,1,2,2-Tetrachloroethane	1.2	ND	0.5	0.8	0.4	0.4	ND	ND	ND
1,2,4 Trimethylbenzene	1.1	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	0.5	0.8	ND	ND	ND	1.0	ND
1,3,5-Trimethylbenzene	0.5	ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND	ND	0.5

Table 3 (continued)
Soil Gas Analytical Results
Sampling and Analytical Testing of Volatile Organic Compounds
Forrestal Landfill
Great Lakes Naval Training Center
August 13 and 14, 2001

Analyte	GP-12-8'	GP-13-6'	GP-14-7'	GP-15-6'	GP-17-6'	GP-18-8'	GP-18 Dup-8'	GP-19-4'
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	0.5	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	1.4	7.2	0.5	0.4	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	ND	0.9	1.7	ND	0.5	1.1	1.1	0.5
m&p-Xylene	0.9	3.3	3.9	ND	1.5	2.1	2.0	2.1
o-Xylene	ND	0.6	1.0	ND	ND	0.5	0.5	ND
Isopropylbenzene	ND	ND	0.6	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	0.5	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	0.5	ND	ND	ND	ND	0.4
4-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	ND	0.4	ND	ND	ND	ND	ND	ND

NOTES:
1. All concentrations reported in µg/L, which is approximately equivalent to parts per billion (ppb).
2. ND indicates analyte not detected above laboratory method detection limit.
3. Dup indicates duplicate sample.

APPENDIX G

Daily Contractor Reports

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: Lynn Smith
Date: August 13, 2001
Day: Monday

Project No.: 41767.01
Location: Forrestal Landfill
Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
Lynn Smith	Forrestal						10							10

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9106	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) ESN	10
2)	
3)	
4)	

Materials delivered to site:

TOWEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: Lynn Smith
Project No.: 41767.01
Date: August 13, 2001
Location: Forrestal Landfill
Day: Monday
Client: US Navy

Events

Clear skies w/ temperatures in the 80's (°F)

Completed 15 sampling points. ESN was having some difficulty collecting some of the vapor samples due to the high groundwater level.

Site Diagram w/ sampling points and the gas screening results are attached to this Daily Log.

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: Lynn Smith
Date: 8/14/01
Day: Tuesday

Project No.: ~~40~~ 40483.01
Location: Forrestal Landfill / Supplyside
Client: US Navy

Associate	Site	BRICK LAYER	CEMENT MASON	CARPENTER	DRILLER	ELECTRICIAN	LABORER	PAINTER	PLUMBER/ PIPE FITTER	POWER EQUIP. OPERATOR	TRUCK DRIVER	WELDER	ASBESTOS WORKER	Total

Supervisor	Site													Total
Lynn Smith	Forrestal/SSL						10							10

TolTest equipment used at site:

Item #	Description	Quantity
5004	Field Vehicle	1
	Dump truck	
	Backhoe	
	Excavator	
	Hoe-Ram	
	Compactor	
5005	PID (photoionization detector)	
5006	LEL meter	
9100	Generator	
9103	Demo saw	
9104	Jack hammer	
9108	Air compressor	
9110	2" submersible pump	
	Nibbler	
	Power washer	
	Rigid pipe threader/pipe stand	
	Walk-behind concrete saw	

Rental/Other

Equipment used at site:	Hours used:

Subcontractors on site:	Hours worked:
1) ESN	10
2)	
3)	
4)	

Materials delivered to site:

TOLTEST, INC.

DAILY LABOR, EQUIPMENT, MATERIAL AND EVENT LOG

Field Supervisor: Lynn Smith
Project No.: 40483.01
Date: 8/14/01
Location: Forrestal /Supplyside Landfills
Day: Tuesday
Client: US Navy

Events

Completed the sampling at the Forrestal Landfill and began sampling at the Supplyside Landfill. Field screening results are attached.

APPENDIX C

HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN

Forrestal Landfill
Naval Training Center
Great Lakes, Illinois

Prepared by:
CLAYTON GROUP SERVICES, INC.
3140 Finley Road
Downers Grove, Illinois
630.795.3200

Project 15-03042.00-001

Timothy J. Gilles — 12/17/2002

Tim Gilles — Date
Site Safety Officer

~~Jeffery L. Pope~~ — ~~Date~~
~~Health and Safety Officer~~

CIH, CSP — 12/18/'02

Certified Health & Safety Officer — Date

A. GENERAL INFORMATION

SITE:	Forrestal Landfill
LOCATION:	Great Lakes, IL 60088-5600
PLAN PREPARED BY:	Clayton Group Services, Inc.
DATE:	November 30, 2002

PLAN UTILIZATION:

This health and safety plan was developed specifically for Clayton Group Services, Inc. personnel and is not intended for use by others unless proper written authorization is attached. All personnel using this health and safety plan are required to attend the health and safety meeting and sign the Tailgate Meeting Minutes form (Attachment A).

OBJECTIVE (Include description of work to be performed):

To complete soil borings with a geoprobe or auger, collect soil and groundwater samples for chemical analysis, log soil samples on the subject property, and install leachate piezometers.

PROPOSED DATE OF SITE ACTIVITIES: December, 2002

BACKGROUND REVIEW: Complete __X__ Preliminary ______

DOCUMENTATION/SUMMARY (Overall Hazard):

Serious ______ Moderate ______ Low __X__ Unknown ______

B. SITE/WASTE CHARACTERISTICS

WASTE TYPE(S):

Liquid	X	Solid	X
Sludge		Gas	X

CHARACTERISTIC(S):

Toxic		Corrosive		Ignitable	
Radioactive		Volatile	X	Flammable	X
Reactive		Unknown			
Other (Name)	biological				

FACILITY DESCRIPTION:

The work site is a former disposal site for solid waste and construction/demo wastes.

PRINCIPAL DISPOSAL METHOD (type and location):

landfill

UNUSUAL FEATURES (dike integrity, power lines, terrain, etc.):

All underground electrical lines and utility lines will be located prior to commencing field activities by notification through JULIE Hotline.

STATUS (active, inactive, unknown): inactive

PREVIOUS AGENCY ACTION: none

C. HAZARD EVALUATION

Specific compounds that may be encountered during the site activities are unknown, but are generally characterized as municipal landfill leachate, decomposed solid waste, and landfill gas (methane).

D. SITE SAFETY WORK PLAN

PERIMETER ESTABLISHMENT:

Map/Sketch Attached?	Yes
Site Secured?	No
Perimeter Identified?	Yes
Zone(s) of Contamination Identified?	No

PERSONAL PROTECTION:

Level of Protection: A _____ B _____ C _____ D _X_

Modifications: None

Action Levels:
The worker breathing area will be monitored and if total VOC concentrations exceed 5 parts per million (ppm), the work will be discontinued, and the work area will be evacuated.

Surveillance Equipment and Materials:
Photovac photo ionizer equipped with a 10.6 eV probe, steel-toe boots, safety glasses or goggles, hard hat, and disposable gloves. Smoking by any personnel will not be allowed.

GENERAL ONSITE WORK:

To complete soil borings, collect soil and groundwater samples for chemical analysis, log soil samples on the subject property, and install piezometers.

DECONTAMINATION PROCEDURES:

Probe and soil augers to be steam cleaned after completion of work and prior to leaving site.

SPECIAL EQUIPMENT, FACILITIES, OR PROCEDURES:

All underground electrical lines and utility lines will be located prior to commencing field activities by notification through JULIE's Hotline.

SITE ENTRY PROCEDURES:

All personnel must have had 40 hours of training, as required by OSHA, which includes medical surveillance requirements. Personnel will be dressed in level D protection before entering the site. Project representatives will be notified before commencing field activities.

WORK LIMITATIONS (time of day, etc.):

Daylight hours and weather conditions.

INVESTIGATION-DERIVED MATERIAL DISPOSAL:

Disposable materials will be placed in a designated container on site, or removed from site by driller, as required.

E. EMERGENCY INFORMATION

EMERGENCY CONTACTS:

Emergency Telephone Numbers:	Fire: 911 Police: 911
Community Hospital:	US Naval Hospital Great Lakes, Il 60088 (847) 688-4560
Poison Control Center:	(800) 322-5330
National Response Center:	(800) 424-8802
Clayton Group Services, Inc.:	(630) 795-3200
Site Address:	Great Lakes, IL 60088
Site Telephone:	847-688-5999 ext. 145
Site Contact:	Mr. Blayne Kirsch

Accident/injury reports, if any, must be completed and submitted to Clayton's Corporate Health and Safety Officer.

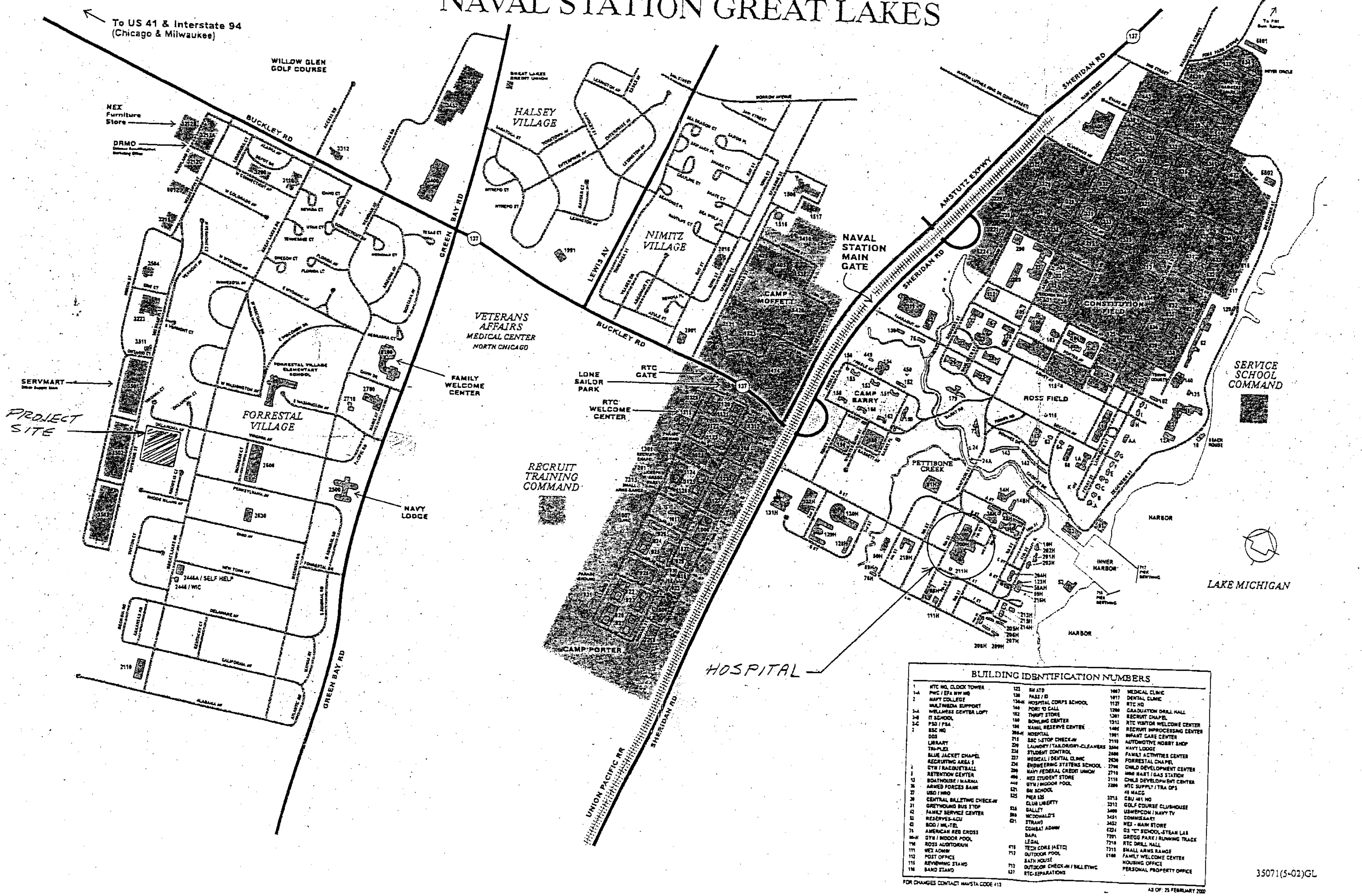
F. SITE RESOURCES

Electrical Power Source:	none
Water Supply:	none
Telephone:	Onsite, Clayton crew may also have a mobile phone.

G. EMERGENCY ROUTE

Proceed north on Great Lakes Dr. to Buckley Rd. (IL route 137). Proceed east on Buckley to Sheridan Rd. Turn south on Sheridan Rd. to hospital entrance road (D St.). Location shown on attached map of base.

NAVAL STATION GREAT LAKES



35071(5-02)GL

ATTACHMENT A

TAILGATE MEETING MINUTES FORM

Health & Safety Tailgate Meeting

CLAYTON GROUP SERVICES, INC.
Forrestal Landfill - Great Lakes, IL
Clayton Project No. 15-03042.00-001

Date: ____________________

Meeting Conducted by: ____________________ Title: ____________

Planned Field Activities

Potential Onsite Hazards

- ○ **Chemical:** Organic Vapors, Acid Gases, Toxic Metals, Liquid Waste, and Solid Waste
- ○ **Biological:** Snakes, Ticks, Spiders, Insects, Poison Ivy
- ○ **Physical:** Slips, Trips, and Falls, Pits and Holes, and Heavy Equipment.
- ○ **Heat Stress:** Dehydration, Heat Exhaustion, Heat Stroke, Heat Rash, etc.
- ○ **Cold Stress:** Frostbite, Hypothermia, Dehydration, etc.

Other Health & Safety Topics Discussed

Personal Protective Equipment (PPE)

Level D PPE: Hard Hat, Safety Glasses or Goggles, Steel-toe Boots, and Long Pants.
Level C PPE: Hard Hat, Steel-toe Boots, Tyvek, Boot Covers, Gloves, and Respirator.
Level B PPE: Hard Hat, Steel-toe Boots, Saranex, Boot Covers, Gloves, SCBA or Supplied Air

Areas Requiring **Level D** PPE: All areas

Areas Requiring **Level C** PPE: none

Areas Requiring **Level B** PPE: none

Signature	**Company or Agency**

ATTACHMENT B

ACCIDENT / INJURY REPORT FORM

CLAYTON GROUP SERVICES
ACCIDENT / INJURY REPORT

1. NAME of INJURIED: ______

2. SSN: ______

3. DOB: ______

4. SEX: ☐ M ☐ F

5. DATE of ACCIDENT: ______

6. NAME of SUPERVISOR: ______

7. JOB TITLE: ______

8. DUTIES AT TIME OF ACCIDENT: ______

9. OFFICE: ______

10. LENGTH of EMPLOYMENT:
☐ < 1 mo. ☐ 6 mos. to 5 yrs.
☐ 1 - 5 mos. ☐ > 5 yrs.

11. EXPERIENCE W/ DUTIES:
☐ < 1 mo. ☐ 6 mos. to 5 yrs.
☐ 1 - 5 mos. ☐ > 5 yrs.

12. NATURE of INJURY: ______

13. PART of BODY INJURIED: ______

14. NAMES / AFFILLATIONS of OTHERS INJURIED: ______

15. NAME and ADDRESS of PHYSICIAN: ______

16. TIME of INJURY: ______ ☐ AM ☐ PM

17. SEVERITY of INJURY:
☐ Fatality
☐ Lost Workdays - days away from work
☐ Lost Workdays - days of restricted duty
☐ Medical Treatment
☐ First Aid
☐ Other, specify ______

18. NAME and ADDRESS of HOSPITAL: ______

19. SPECIFIC LOCATION of ACCIDENT: ______

20. PHASE of WORKDAY at TIME of INJURY:
☐ During rest period ☐ Arriving/Leaving Work
☐ During meal period ☐ Performing Job Duties
☐ Working overtime ☐ Other ______

21. DESCRIBE HOW the ACCIDENT OCCURRED: ______

22. ACCIDENT SEQUENCE: Describe in reverse order of occurrence of events preceding the injury or accident. Starting with the injury and moving backward in time, reconstruct the sequence of events that led to the injury.

A. Injury Event: ______

B. Accident Event: ______

C. Preceding above event: ______

D. Preceding above event: ______

ACCIDENT / INJURY REPORT (cont'd)

23. TASK and ACTIVITY at Time of ACCIDENT:

A. General Type of Task: ______________________

B. Specific Activity: ______________________

C. Employee was Working: ______________________

☐ Alone ☐ With crew or fellow worker ☐ Other, Specify ______________

24. POSTURE of EMPLOYEE:

____

25. SUPERVISION at TIME of ACCIDENT:

____

26. PROTECTIVE EQUIPMENT: List any protective equipment that was available and state if it was used. (To be completed by Supervisor)

____

27. CAUSAL FACTORS: Events and conditions that contributed to the accident. (To be completed by Supervisor)

____

28. CORRECTIVE ACTIONS: Those that have been, or will be, taken to prevent recurrence. (To be completed by Supervisor)

____

ACCIDENT / INJURY REPORT (cont'd)

29. ADDITIONAL INFORMATION (If needed):

30. ILLUSTRATIONS RELATING TO THE INJURY / ACCIDENT:

PREPARED BY: ______	APPROVED (Supervisor): ______
TITLE: ______	TITLE: ______ DATE: ______
DEPT/OFFICE: ______	APPROVED (AHO): ______
DATE: ______	TITLE: ______ DATE: ______

Clayton
GROUP SERVICES

APPENDIX D

SOIL BORING LOGS

Clayton
GROUP SERVICES

BORING NO: B-1	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #501
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 09:24	FINISH TIME (hours): 09:45	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES: NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID: SCAN	HEADSPACE	REMARKS
0 - 2.5	**Topsoil** [0.0 - 2.5 FT BGS] Dusky Brown grading to brown at 2.0 FT BGS, Moist, Cohesive, With organic material, silt, and clay, Some medium and coarse sand, No odor.		A	4.0 / 4.0	HP	M	---	---	---	
2.5 - 4.0	**Silty Clay (CL)** [2.5 - 4.0 FT BGS] Brown with gray mottling, Moist, Medium stiff to stiff, Medium plasticity, Trace medium and coarse sand, No odor. Plastic debris at 3.0 - 3.5 FT BGS.					M		---	---	
4.0 - 5.5	**Sandy Clay (SC)** [4.0 - 5.5 FT BGS] Brown, Fine and medium sand, Moist, Stiff, Low plasticity, Faint septic odor.		B	2.5 / 4.0	HP	M	---	---	---	
5.5 - 8.0	**Fill Material (Trash)** [5.5 - 8.0 FT BGS] Miscellaneous debris (glass, paper, plastic, etc), Moist, Moderate septic odor.									End of Boring : 8.0 FT BGS Boring backfilled with soil cuttings.

Clayton GROUP SERVICES

BORING NO: B-2	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #502
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 09:47	FINISH TIME (hours): 10:00	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0–2	**Topsoil** [0.0 - 2.0 FT BGS] Dusky Brown grading to brown at 1.5 FT BGS, Moist, Cohesive, With organic material, fine and medium sand, silt, and clay, Some coarse sand, No odor.		A	3.4 / 4.0	HP	M	---	---	---	
2–3	**Sandy Clay (SC)** [2.0 - 3.0 FT BGS] Brown, Fine and medium sand, Moist to Wet, Very soft, Medium plasticity, Some coarse sand, No odor.				HP	M	---	---	---	
3–5	**Silty Clay (CL)** [3.0 - 5.0 FT BGS] Brown with gray mottling, Moist, Very Stiff, Low to medium plasticity, Trace coarse sand, No odor. Gray at 4.0 FT BGS.		B	2.0 / 2.0	HP	M	---	---	---	
5–6	**Fill Material (Trash)** [5.0 - 6.0 FT BGS] Miscellaneous debris (glass, paper, plastic, etc.), Moist.									

REFUSAL / END OF BORING: 6.0 FT BGS
Boring backfilled with soil cuttings.

Clayton GROUP SERVICES

BORING NO: B-3	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #505
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 10:03	FINISH TIME (hours): 10:12	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0 - 2.0	**Topsoil** [0.0 - 2.0 FT BGS] Dusky Brown grading to brown at 1.5 FT BGS, Moist, Cohesive, With organic material, Some fine and coarse sand, No odor.		A	4.0 / 4.0	HP	M	---	---	---	
2.0 - 3.5	**Sandy Clay (SC)** [2.0 - 3.5 FT BGS] Brown, Fine and medium sand, Moist, Soft, Medium plasticity, Some coarse sand, No odor.				HP	M	---	---	---	
3.5 - 4.5	**Silty Clay (CL)** [3.5 - 4.5 FT BGS] Brown with gray mottling,signs of oxidation, Moist, Very Stiff, Low to medium plasticity, Trace medium and coarse sand, No odor.		B	2.0 / 2.0	HP	M	---	---	---	
4.5 - 6.0	**Fill Material (Trash)** [4.5 - 6.0 FT BGS] Miscellaneous debris (glass, paper, plastic, etc.), Moist, strong septic odor.									

REFUSAL / END OF BORING: 6.0 FT BGS
Boring backfilled with soil cuttings.

Clayton GROUP SERVICES

BORING NO: B-4	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #506
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 10:16	FINISH TIME (hours): 10:26	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES: NUMBER	SAMPLES: RECOVERY	SAMPLES: METHOD	SAMPLES: MOISTURE	SAMPLES: BLOW CNT (6")	PID: SCAN	PID: HEADSPACE	REMARKS
0–4	**Topsoil** [0.0 - 1.6 FT BGS] Dusky Brown grading to brown, Moist, Cohesive, With organic material silt, clay, and some fine and coarse sand, No odor.		A	4.0 / 4.0	HP	M/W	---	---	---	
	Silty Clay (CL) [1.6 - 2.3 FT BGS] Brown with gray mottling, Moist, Very Stiff, Low to medium plasticity, Trace medium and coarse sand, No odor.									
	Sand (SM) [2.3 - 2.8 FT BGS] Black, Wet, Dense, Fine and medium grained, with silt, no odor									
	Sandy Clay (SC) [2.8 - 3.9 FT BGS] Brownish grey, Fine and medium sand, Moist, Stiff , Medium plasticity, No odor.									
	Fill Material (Trash) [3.9 - 4.0 FT BGS] Miscellaneous debris (glass, paper, plastic, etc.), Moist, faint septic odor.									
	END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									

Depth scale: ft 0–20; m 0–6

Clayton GROUP SERVICES

BORING NO: B-5	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #508
DRILLING CO: C.S. Drilling	DRILLER: R. Mitchell	
DRILLING EQUIP: GeoProbe	BOREHOLE DIA: 4 - Inches	
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 10:29	FINISH TIME (hours): 10:36	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES: NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID: SCAN	HEADSPACE	REMARKS
0.0 - 1.5	**Topsoil** [0.0 - 1.5 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With organic material.		A	4.0 / 4.0	HP	M	---	---	---	
1.5 - 3.0	**Sandy Clay (SC)** [1.5 - 3.0 FT BGS] Brown with grey mottling, Fine and medium sand, with some coarse sand and fine gravel, Moist, Medium stiff , Medium plasticity, No odor.									
3.0 - 4.0	**Silty Clay (CL)** [3.0 - 4.0 FT BGS] Olive green with gray mottling and signs of oxidation, Moist, Very Stiff, Medium plasticity, Trace coarse sand.									

END OF BORING: 4.0 FT BGS

Boring backfilled with soil cuttings.

Clayton GROUP SERVICES

BORING NO: B-6	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #509
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 10:38	FINISH TIME (hours): 10:47	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0 - 1.5	**Topsoil** [0.0 - 1.5 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With organic material, with silt, clay and sand.		A	3.5/ 4.0	HP	M	---	---	---	
1.5 - 5.0	**Sandy Clay (SC)** [1.5 - 5.0 FT BGS] Brown with grey mottling, Mediumand coarse sand, Moist, Very stiff, Low plasticity, Some coarse sand, No odor.				HP	M	---	---	---	
5.0 - 6.0	**Fill Material (Trash)** [5.0 - 6.0 FT BGS] Miscellaneous debris (glass, paper, plastic, etc.), Moist, moderate septic odor.		B	2.0 / 2.0	HP	M	---	---	---	

REFUSAL / END OF BORING: 6.0 FT BGS
Boring backfilled with soil cuttings.

Depth scale: 0–20 ft; 0–6 m

Clayton GROUP SERVICES

BORING NO: B-7	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #510
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 10:49	FINISH TIME (hours): 10:58	CHECKED BY: TG

DEPTH (ft)	DEPTH (m)	DESCRIPTION	GRAPHIC	SAMPLES: NUMBER	SAMPLES: RECOVERY	SAMPLES: METHOD	SAMPLES: MOISTURE	SAMPLES: BLOW CNT (6")	PID: SCAN	PID: HEADSPACE	REMARKS
0	0	**Topsoil** [0.0 - 2.5 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With organic material, with silt, clay and sand, No odor.		A	4.0/ 4.0	HP	M	---	---	---	
2		**Sandy Clay (SC)** [2.5 - 4.7 FT BGS] Brown with grey mottling, Medium and fine sand, Moist, Stiff, Low plasticity, Occasional fine gravel, No odor.				HP	M	---	---	---	
4		**Fill Material (Trash)** [4.7 - 6.0 FT BGS] Miscellaneous debris (glass, paper, plastic, etc.), Moist, moderate septic odor.		B	2.0 / 2.0	HP	M	---	---	---	
6	2										
8		REFUSAL / END OF BORING: 6.0 FT BGS Boring backfilled with soil cuttings.									
10											
12											
	4										
14											
16											
18											
	6										
20											

Clayton GROUP SERVICES

BORING NO: B-8	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #511 (5.0 FT to the East)
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 11:00	FINISH TIME (hours): 11:08	CHECKED BY: TG

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0–1.5 ft	**Topsoil** [0.0 - 1.5 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With silt, sand, and organic material, No odor.		A	4.0 / 4.0	HP	M	---	---	---	
1.5–3.7 ft	**Silty Clay (CL)** [1.5 - 3.7 FT BGS] Brown with gray mottling and signs of oxidation, Moist, Very Stiff, Low to medium plasticity, Some fine and medium sand, Trace coarse sand.									
3.7–4.0 ft	**Sandy Clay (SC)** [3.7 - 4.0 FT BGS] Grey, Fine and medium sand, With some coarse sand, Moist, Medium stiff , Medium plasticity, No odor.									

END OF BORING: 4.0 FT BGS

Boring backfilled with soil cuttings.

Depth scale: ft 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20; m 0, 2, 4, 6

Clayton GROUP SERVICES

BORING NO: B-9	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #512
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 11:10	FINISH TIME (hours): 11:22	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES: NUMBER	SAMPLES: RECOVERY	SAMPLES: METHOD	SAMPLES: MOISTURE	SAMPLES: BLOW CNT (6")	PID: SCAN	PID: HEADSPACE	REMARKS
0.0 - 0.5	**Topsoil** [0.0 - 0.5 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With silt, sand, clay, and organic material, No odor.		A	4.0 / 4.0	HP	M/D	---	---	---	
0.5 - 1.0	**Silty Clay (CL)** [0.5 - 1.0 FT BGS] Brown with gray mottling, Moist, Very Stiff, Low plasticity, Trace medium and coarse sand, No odor.									
1.0 - 1.3	**Sandy Gravel (FILL)** [1.0 - 1.3 FT BGS] Brown, Medium and coarse sand, Fine gravel, With glass debris, Dry, No odor.									
1.3 - 2.0	**Silty Clay (CL)** [1.3 - 2.0 FT BGS] Olive green with gray mottling, With fine and medium sand, Trace coarse sand, With organic material, No odor.									
2.0 - 3.6	**Sandy Clay (SC)** [2.0 - 3.6 FT BGS] Black, Fine and medium sand, Uncohesive, Moist, Medium stiff , Medium plasticity, No odor.									
3.6 - 4.0	**Silty Clay (CL)** [3.6 - 4.0 FT BGS] Olive green, Moist, Medium stiff, Medium plasticity, Trace medium and coarse sand, No odor.									

END OF BORING: 4.0 FT BGS

Boring backfilled with soil cuttings.

Clayton GROUP SERVICES

BORING NO: B-10	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #513
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 11:24	FINISH TIME (hours): 11:35	CHECKED BY: TG

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	SAMPLES: NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID: SCAN	HEADSPACE	REMARKS
0 / 0	**Topsoil** [0.0 - 2.5 FT BGS] Dusky Brown grading to brown at 1.5 FT BGS, Moist, Cohesive, With organic material, sand, silt, and clay, No odor.		A	3.0 / 4.0	HP	M	---	---	---	
2	**Sandy Clay (SC)** [2.5 - 4.0 FT BGS] Brown, Fine and medium sand, Moist, Soft, Medium plasticity, With wood debris, No odor.				HP	M	---	---	---	
4	**Silty Clay (CL)** [4.0 - 4.5 FT BGS] Olive green, signs of oxidation, Moist, Medium Stiff, Trace coarse sand, Occasional fine gravel, No odor.		B	1.0 / 2.0	HP	M	---	---	---	
6 / 2	**Fill Material (Trash)** [4.5 - 6.0 FT BGS] Miscellaneous debris (glass, paper, plastic, etc.), Moist, No odor.									
8										
10	REFUSAL / END OF BORING: 5.5 FT BGS Boring backfilled with soil cuttings.									
12 / 4										
14										
16										
18 / 6										
20										

Clayton
GROUP SERVICES

BORING NO: B-11	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #514
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 11:37	FINISH TIME (hours): 11:46	CHECKED BY: TG

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0.0 - 2.0	**Topsoil** [0.0 - 2.0 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With silt, sand, and organic material,Trace fine gravel, No odor.		A	4.0 / 4.0	HP	M	---	---	---	
2.0 - 3.0	**Sandy Clay (SC)** [2.0 - 3.0 FT BGS] Brown, Medium and coarse sand, Moist, Medium stiff , Low to medium plasticity, No odor.									
3.0 - 4.0	**Fill Material (Trash)** [3.0 - 4.0 FT BGS] Soil with brick material, Some Gravel, No odor.									
	END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									

Depth scale: ft 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20; m 0, 2, 4, 6

Clayton GROUP SERVICES

BORING NO: B-12	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #515
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 11:49	FINISH TIME (hours): 11:59	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**Topsoil** [0.0 - 1.9 FT BGS] Dusky Brown, Moist, Cohesive, Medium Stiff, With organic material, silt, and clay, Some fine sand, No odor.		A	4.0 / 4.0	HP	M	---	---	---	
2	**Fill Material (Trash)** Fibrous debris.				HP	M	---	---	---	
	Silty Clay (CL) [2.0 - 5.0 FT BGS] Brown with gray mottling, grades olive geen at 4.0 FT BGS ,signs of oxidation, Moist, Soft, Medium plasticity, Trace coarse sand, No odor.		B	1.7/ 2.0	HP	M	---	---	---	
6	**Fill Material (Trash)** [5.0 - 6.0 FT BGS] Miscellaneous debris (glass, paper, plastic, etc.).									
10	REFUSAL / END OF BORING: 6.0 FT BGS Boring backfilled with soil cuttings.									

Depth scale: ft 0–20; m 0–6

Clayton GROUP SERVICES

BORING NO: B-13	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #516
DRILLING CO: C.S. Drilling	DRILLER: R. Mitchell	
DRILLING EQUIP: GeoProbe	BOREHOLE DIA: 4 - Inches	
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 12:01	FINISH TIME (hours): 12:06	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 - 2	**Topsoil** [0.0 - 2.0 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With organic material, silt, and clay , No odor.		A	2.5/ 4.0	HP	M/W	---	---	---	
2 - 4	**Fill Material (Trash)** [2.0 - 4.0 FT BGS] Soil material and miscellaneous debris (glass, paper, plastic, etc.).									
6	END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									

Depth scale: ft 0–20; m 0–6

Clayton GROUP SERVICES

BORING NO: B-14	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #517
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 12:08	FINISH TIME (hours): 12:13	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0–2	**Topsoil** [0.0 - 2.0 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With organic material, silt, and clay , Some medium to coarse sand, No odor.		A	4.0/ 4.0	HP	M/W	---	---	---	
2–4	**Fill Material (Trash)** [2.0 - 4.0 FT BGS] Black stained soil material and miscellaneous debris (glass, paper, plastic, etc.) Stong septic odor.									

END OF BORING: 4.0 FT BGS
Boring backfilled with soil cuttings.

Depth scale: 0–20 ft (0–6 m)

Clayton GROUP SERVICES

BORING NO: B-15	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #518
DRILLING CO: C.S. Drilling	DRILLER: R. Mitchell	
DRILLING EQUIP: GeoProbe	BOREHOLE DIA: 4 - Inches	
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 12:16	FINISH TIME (hours): 12:22	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES: NUMBER	SAMPLES: RECOVERY	SAMPLES: METHOD	SAMPLES: MOISTURE	SAMPLES: BLOW CNT (6")	PID: SCAN	PID: HEADSPACE	REMARKS
0 - 2.0	**Topsoil** [0.0 - 2.0 FT BGS] Dusky Brown grading to brown at 1.0 FT BGS, Moist, Cohesive, With organic material, silt, and clay , Some medium to coarse sand, Some fine gravel, No odor.		A	4.0/ 4.0	HP	M/W	---	---	---	
2.0 - 4.0	**Fill Material (Trash)** [2.0 - 4.0 FT BGS] Black stained soil material and miscellaneous debris (glass, paper, plastic, etc.) Slight septic odor.									
	END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									

Depth scale: ft 0–20; m 0–6.

Clayton
GROUP SERVICES

BORING NO: B-16	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #519
DRILLING CO: C.S. Drilling	DRILLER: R. Mitchell	
DRILLING EQUIP: GeoProbe	BOREHOLE DIA: 4 - inches	
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 12:24	FINISH TIME (hours): 12:30	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0–0.7	**Topsoil** [0.0 - 0.7 FT BGS] Dusky Brown, Moist, Cohesive, With organic material, silt, clay, and some fine and coarse sand and fine gravel, No odor.		A	4.0 / 4.0	HP	M/W	---	---	---	
0.7–4.0	**Silty Clay (CL)** [0.7 - 4.0 FT BGS] Brown with gray mottling, Moist, Very Stiff, Low to medium plasticity, No odor.									
	END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									

Depth scale: ft 0–20 (0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20); m 0, 2, 4, 6

Clayton GROUP SERVICES

BORING NO: B-17	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #520
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 12:32	FINISH TIME (hours): 12:45	CHECKED BY:

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0–0.5	**Topsoil** [0.0 - 0.5 FT BGS] Dusky brown, Moist, Cohesive, With organic material, silt, and clay, No odor.		A	4.0/ 4.0	HP	M	---	---	---	
0.5–4.0	**Silty Clay (CL)** [0.5 - 4.0 FT BGS] Brown with gray mottling, Moist, Very Stiff, Low plasticity, Trace coarse sand, No odor.				HP	M	---	---	---	
4.0–7.5	**Sandy Clay (SC)** [4.0 - 7.5 FT BGS] Brown with grey mottling, Fine and medium sand, Moist, Stiff, Low plasticity, Trace coarse sand, Wet 6.0 to 7.5 FT BGS, No odor.		B	4.0 / 4.0	HP	W / M	---	---	---	
7.5–8.0	**Silty Clay (CL)** [7.5 - 8.0 FT BGS] Brown with gray mottling, Moist, Stiff, Low to medium plasticity, No odor.									

END OF BORING: 8.0 FT BGS

Boring backfilled with soil cuttings.

Clayton GROUP SERVICES

BORING NO: B-18	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #523
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 12:49	FINISH TIME (hours): 12:55	CHECKED BY: TG

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**Topsoil** [0.0 - 0.5 FT BGS] Dusky brown, Moist, Cohesive, With organic material, silt, and clay, No odor.									
2	**Silty Clay (CL)** [0.5 - 2.0 FT BGS] Brown with grey mottling, Trace coarse sand, Moist, Medium stiff , Low plasticity, No odor.		A	4.0 / 4.0	HP	M	---	---	---	
4	**Fill Material (Trash)** [3.0 - 4.0 FT BGS] Soil with fibrous material, Some glass.									
6 / 2	END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									
8										
10										
12 / 4										
14										
16										
18										
20 / 6										

BORING NO: B-19	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #524
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 12:57	FINISH TIME (hours): 13:04	CHECKED BY: TG

DEPTH (ft)	DEPTH (m)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	0	**Topsoil** [0.0 - 1.0 FT BGS] Dusky brown, Moist, Cohesive, With organic material, silt, and clay, No odor.									
2		**Silty Clay (CL)** [1.0 - 2.0 FT BGS] Brown with grey mottling, signs of oxidation, Moist, Medium stiff , Medium plasticity, No odor.		A	4.0 / 4.0	HP	M/W	---	---	---	
4		**Fill Material (Trash)** [2.0 - 4.0 FT BGS] Soil with glass and wood debris, Moist to wet.									
6	2										
8		END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									
10											
12											
14	4										
16											
18											
20	6										

Clayton GROUP SERVICES

BORING NO: B-20	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #527
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 13:07	FINISH TIME (hours): 13:12	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**Topsoil** [0.0 - 1.0 FT BGS] Dusky Brown, Moist, Cohesive, With organic material, silt, and clay , No odor. **Fill Material (Trash)** [1.0 - 1.5 FT BGS] Soil material with glass debris. REFUSAL/ END OF BORING: 1.5 FT BGS Boring backfilled with soil cuttings.		A	1.5/ 4.0	HP	M	---	---	---	

Depth scale: 0–20 ft (0–6 m)

Clayton GROUP SERVICES

BORING NO: B-21	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: Stake #522
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 13:17	FINISH TIME (hours): 13:25	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0–0.5	**Topsoil** [0.0 - 0.5 FT BGS] Dusky brown, Moist, Cohesive, With organic material, silt, and clay, No odor.		A	4.0 / 4.0	HP	M	---	---	---	
0.5–4.0	**Silty Clay (CL)** [0.5 - 4.0 FT BGS] Brown with grey mottling, signs of oxidation, Moist, Medium stiff , Medium plasticity, No odor.									

END OF BORING: 4.0 FT BGS

Boring backfilled with soil cuttings.

Clayton GROUP SERVICES

BORING NO: B-22	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: 32.9 ft - stake # 521 & 57.10 ft - stake # 520
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 20, 2002	FINISH DATE: December 20, 2002	LOGGED BY: T. Gilles
START TIME (hours): 13:30	FINISH TIME (hours): 13:37	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0 – 0.5	**Topsoil** [0.0 - 0.5 FT BGS] Dusky Brown, Moist, Cohesive, With organic material, silt, and clay, No odor		A	4.0 / 4.0	HP	M	---	---	---	
0.5 – 3.0	**Silty Clay (CL)** [0.5 - 3.0 FT BGS] Brown, Moist, Very stiff, Low to medium plasticity, Trace coarse sand and fine gravel, No odor.									
3.0 – 4.0	**Sandy Clay (SC)** [3.0 - 4.0 FT BGS] Brown, Fine and medium sand, Moist, Stiff , Low plasticity, No odor.									

END OF BORING: 4.0 FT BGS
Boring backfilled with soil cuttings.

Clayton GROUP SERVICES

BORING NO: B-23	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: 76.4 ft - stake #501 & 74.0 ft - stake # 502
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 23, 2002	FINISH DATE: December 23, 2002	LOGGED BY: T. Gilles
START TIME (hours): 8:20	FINISH TIME (hours): 8:46	CHECKED BY: TG

DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES METHOD	SAMPLES MOISTURE	SAMPLES BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**Topsoil** [0.0 - 2.0 FT BGS]		A	4.0/ 4.0	HP	M	---	---	---	
2	**Shelby Tube- FLGT-001 (8:35)** [2.0 - 4.0 FT BGS]									
4	END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									

Depth scale: ft 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20; m 0, 2, 4, 6

Clayton GROUP SERVICES

BORING NO: B-27	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: 54.3 ft - stake #517 & 64.1 ft - stake # 516
DRILLING CO: C.S. Drilling		DRILLER: R. Mitchell
DRILLING EQUIP: GeoProbe		BOREHOLE DIA: 4 - Inches
START DATE: December 23, 2002	FINISH DATE: December 23, 2002	LOGGED BY: T. Gilles
START TIME (hours): 13:45	FINISH TIME (hours): 14:00	CHECKED BY: TG

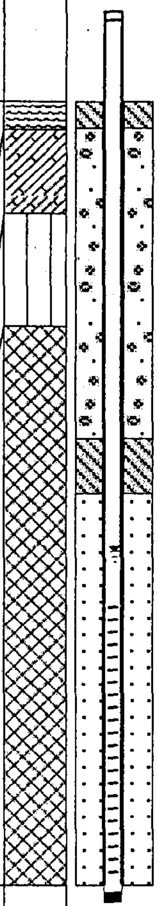
DEPTH (ft)	DESCRIPTION	GRAPHIC	SAMPLES: NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID: SCAN	HEADSPACE	REMARKS
0–2	**Topsoil** [0.0 - 2.0 FT BGS]		A	2.0/2.0	HP	M	---	---	---	
2–4	**Shelby Tube- FLGT-005 (13:55)** [2.0 - 4.0 FT BGS]		B	2.0/2.0	HP	---	---	---	---	
4	END OF BORING: 4.0 FT BGS Boring backfilled with soil cuttings.									

Depth scale: ft 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20; m 0, 2, 4, 6

Clayton GROUP SERVICES

BORING NO: B-26	WELL NO: P-1	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Traning Center		COORDINATES: 54'3" - Stake#517: 64'1" - Stake#516	

DRILLING CO: C.S. Drilling	DRILLER: M. Hatal	LOGGED BY: T. Gilles
DRILLING EQUIP: Diedrich D-120	SCREEN INTERVAL: 9.0 - 14.0 FT BGS	CHECKED BY: TG
STATIC WATER LEVEL: Not Measured	SCREEN MTL/SLOT: 2-Inch / PVC / 0.010 - Inch	START DATE: December 23, 2002
BOREHOLE DIA: 8 - Inches	STICKUP: 1.6 Feet	START TIME (hours): 12:15
TOP of CASING ELEVATION: Not Measured	G.S. ELEVATION: Not Measured	FINISH DATE: December 23, 2002
RISER DIA/MTL/LGTH: 2 - Inch / PVC / 10.6 Feet	DEV. METHODS: Not Applicable	FINISH TIME (hours): 13:40



DEPTH (ft)	DESCRIPTION	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0–2	**Topsoil** [0.0 - 0.5 FT BGS] Dusky brown, Moist, Cohesive, With organic material, silt, and clay. **Sandy Clay (SC)** [0.5 - 2.0 FT BGS] Brown, Fine and medium sand, with coarse sand, Trace fine gravel, Moist, Medium stiff.	A	2.0/2.0	HS	M	---	---	---	
2–4	**Shelby Tube : FLGT-004 (12:17)** [2.0 - 4.0 FT BGS]	B	2.0/2.0	HS	---	---	---	---	
4–6	**Fill Material (Trash)** [4.0 - 14.0 FT BGS] Paper, Plastic, Glass, Wood debris, Moist, Septic odor. Wet at 8.0 FT BGS.	C	2.0/2.0	HS	M	---	---	---	
6–8		D	2.0/2.0	HS	M/W	---	---	---	
8–10		E	2.0/2.0	HS	W/S	---	---	---	
10–12		F	2.0/2.0	HS	S	---	---	---	
12–14		G	2.0/2.0	HS	S	---	---	---	End of Boring : 14.0 GT BGS

Boring/Well No.: B-26 / P-1

Clayton GROUP SERVICES

BORING NO: B-25	WELL NO: P-2	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: 22'1" - Stake#514; 78'9" - Stake#513	
DRILLING CO: C.S. Drilling	DRILLER: M. Hatal	LOGGED BY: T. Gilles	
DRILLING EQUIP: Diedrich D-120	SCREEN INTERVAL: 9.0 - 14.0 FT BGS	CHECKED BY: TG	
STATIC WATER LEVEL: Not Measured	SCREEN MTL/SLOT: 2-Inch / PVC / 0.010 - Inch	START DATE: December 23, 2002	
BOREHOLE DIA: 8 - Inches	STICKUP: 1.6 Feet	START TIME (hours): 10:53	
TOP of CASING ELEVATION: Not Measured	G.S. ELEVATION: Not Measured	FINISH DATE: December 23, 2002	
RISER DIA/MTL/LGTH: 2 - Inch / PVC / 10.6 Feet	DEV. METHODS: Not Applicable	FINISH TIME (hours): 12:10	

DEPTH (ft)	DESCRIPTION	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0.0 - 2.0	**Topsoil** [0.0 - 2.0 FT BGS] Dusky brown, Moist, Cohesive, With organic material, silt, and clay.	A	2.0/2.0	HS	M	---	---	---	
2.0 - 4.0	**Shelby Tube : FLGT-003 (11:03)** [2.0 - 4.0 FT BGS]	B	2.0/2.0	HS	---	---	---	---	
4.0 - 14.0	**Fill Material (Trash)** [4.0 - 14.0 FT BGS] Paper, Plastic, Glass, Wood debris, Moist, Septic odor. Wet at 8.0 FT BGS.	C	2.0/2.0	HS	M	---	---	---	
		D	2.0/2.0	HS	M	---	---	---	
		E	2.0/2.0	HS	M/W	---	---	---	
		F	2.0/2.0	HS	M/W	---	---	---	
		G	2.0/2.0	HS	W	---	---	---	
14.0									End of Boring : 14.0 FT BGS

Clayton
GROUP SERVICES

BORING NO: B-24	WELL NO: P-3	PROJECT NO: 15-03042.01-001	PROJECT NAME: Forrestal Landfill
BORING LOCATION: Great Lakes Naval Training Center		COORDINATES: 29'2" - Stake #505: 52'8" - Stake#509	
DRILLING CO: C.S. Drilling	DRILLER: M. Hatal	LOGGED BY: T. Gilles	
DRILLING EQUIP: Diedrich D-120	SCREEN INTERVAL: 8.0 - 13.0 FT BGS	CHECKED BY: TG	
STATIC WATER LEVEL: Not Measured	SCREEN MTL/SLOT: 2-Inch / PVC / 0.010 - Inch	START DATE: December 23, 2002	
BOREHOLE DIA: 8 - Inches	STICKUP: 1.0 Feet	START TIME (hours): 8:47	
TOP of CASING ELEVATION: Not Measured	G.S. ELEVATION: Not Measured	FINISH DATE: December 23, 2002	
RISER DIA/MTL/LGTH: 2 - Inch / PVC / 9.6 Feet	DEV. METHODS: Not Applicable	FINISH TIME (hours): 10:48	

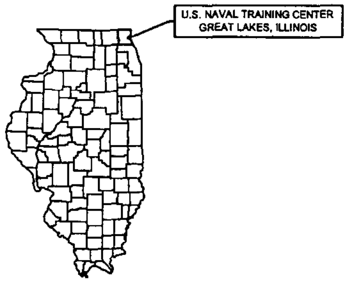
DEPTH (ft)	DESCRIPTION	NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0.0 - 2.0	**Topsoil** [0.0 - 2.0 FT BGS] Dusky brown, Moist, Cohesive, With organic material, silt, and clay.	A	2.0/2.0	HS	M	---	---	---	
2.0 - 4.0	**Shelby Tube : FLGT-002 (9:00)** [2.0 - 4.0 FT BGS]	B	2.0/2.0	HS	--	---	---	---	
4.0 - 13.0	**Fill Material (Trash)** [4.0 - 14.0 FT BGS] Paper, Plastic, Glass, Wood debris, Moist, Septic odor. Wet at 9.0 FT BGS.	C	2.0/2.0	HS	M	---	---	---	
		D	2.0/2.0	HS	M	---	---	---	
		E	2.0/2.0	HS	M/W	---	---	---	
		F	2.0/2.0	HS	W	---	---	---	
		G	1.0/1.0	HS	W	---	---	---	Refusal / End of Boring: 13.0 FT BGS

APPENDIX E

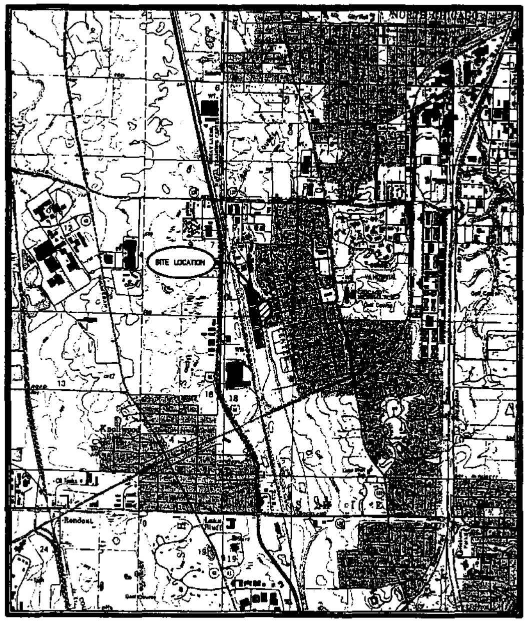
PROJECT DRAWINGS

DESIGN PLAN FOR
FINAL LANDFILL CAP IMPROVEMENTS

UNITED STATES NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS



SITE LOCATION MAP



SCHEDULE OF DRAWINGS:

1. COVER SHEET
2. EXISTING TOPOGRAPHY AND EROSION CONTROL PLAN
3. SOIL INVESTIGATION
4. LANDFILL CAP DESIGN - FINISH GRADING AND SURFACE DRAINAGE PLAN
5. LANDFILL CROSS SECTIONS - EAST TO WEST
6. LANDFILL CROSS SECTIONS - NORTH TO SOUTH
7. GAS MANAGEMENT SYSTEM PLAN
8. END USE AND VEGETATION PLAN
9. CAP CROSS SECTION AND CONSTRUCTION DETAILS

Order No. N68950-02-M-5172

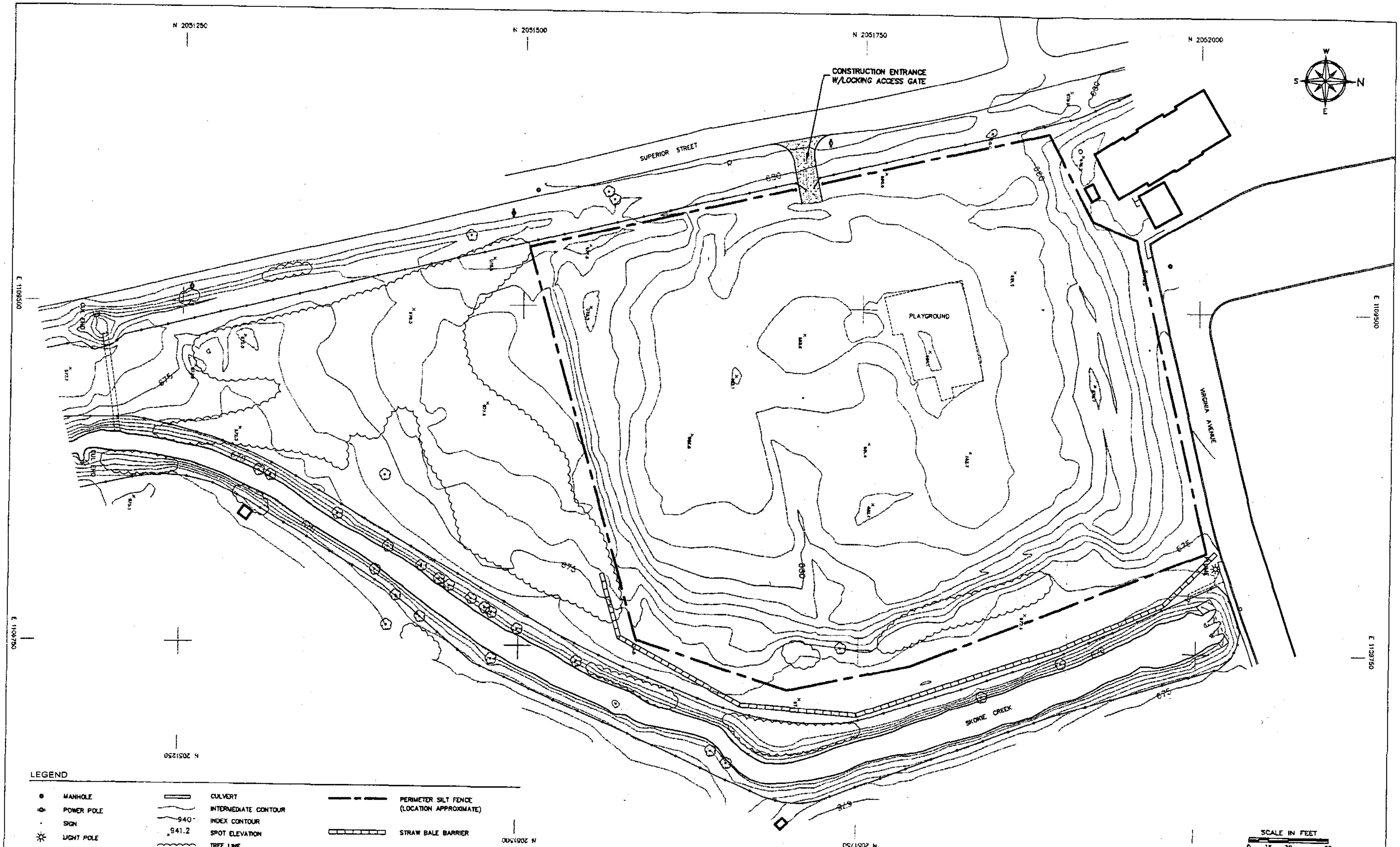
Clayton GROUP SERVICES
3140 Finley Road • Downers Grove, Illinois 60515 • 630 795 3240

United States Department of the Navy
Naval Facilities Engineering Command
Naval Training Center
Great Lakes, Illinois

ENGINEERS' SEAL

COVER SHEET
FORRESTAL LANDFILL CAP IMPROVEMENTS
LAKE COUNTY
GREAT LAKES, ILLINOIS

PLATE C-1
SHEET 1 of 9



LEGEND

●	MANHOLE	▭	CULVERT	— - —	PERIMETER SILT FENCE (LOCATION APPROXIMATE)
	POWER POLE		INTERMEDIATE CONTOUR		
·	SIGN	940	INDEX CONTOUR		
☼	LIGHT POLE	x 941.2	SPOT ELEVATION		STRAW BALE BARRIER
	SPOT ELEVATIONS		TREE LINE		
	FENCE		INDIVIDUAL TREE		
		W.E. 935.4	WATER/STREAM		

NOTES:

1. EXISTING TOPOGRAPHY BY MARTINEZ CORP. FROM AERIAL PHOTOGRAPH DATED DECEMBER, 2002.

NO	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY:	JJR
CHECKED BY:	JJR
DRAWN BY:	BCP
DATE:	1-15-03
SCALE:	AS SHOWN
CAD NO.:	03042002B-rev2
PROJECT NO.:	15-03042

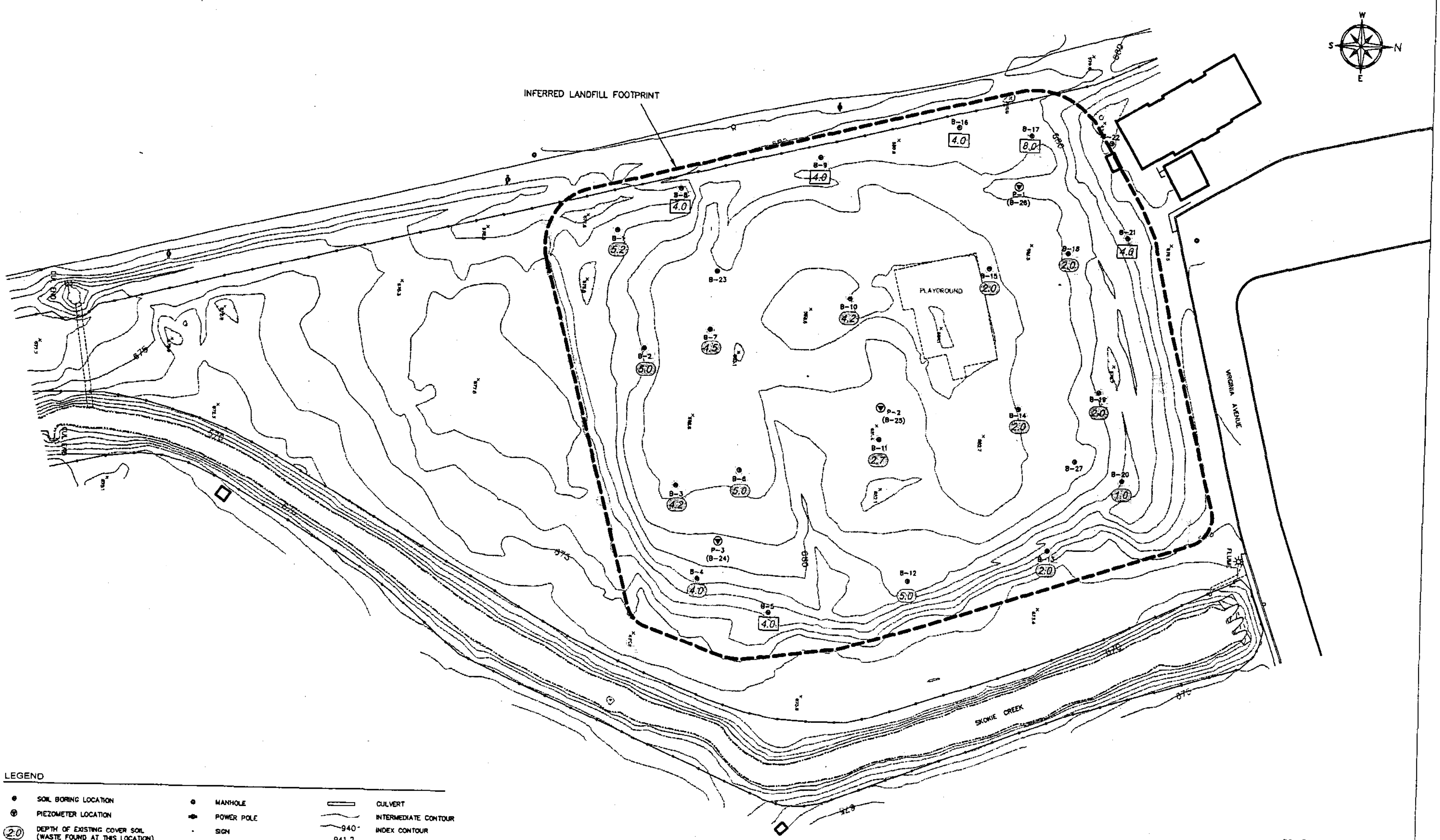
Clayton GROUP SERVICES

EXISTING TOPOGRAPHY AND EROSION PLAN

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE C-2

SHEET 2 of 9



LEGEND

●	SOIL BORING LOCATION	○	MANHOLE	▭	CULVERT
⊕	PIEZOMETER LOCATION		POWER POLE		INTERMEDIATE CONTOUR
(2.0)	DEPTH OF EXISTING COVER SOIL (WASTE FOUND AT THIS LOCATION)	·	SIGN	940	INDEX CONTOUR
[2.0]	DEPTH OF EXISTING COVER SOIL	☼	LIGHT POLE	941.2	SPOT ELEVATION
		Ω	SPOT ELEVATIONS	W.E. 935.4	WATER/STREAM
			FENCE		

NO.	DATE	BY	REVISIONS
2	2-[illegible]-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY: JJR
CHECKED BY: JJR
DRAWN BY: BCP
DATE: 1-15-03
SCALE: AS SHOWN
CAD NO.: 03042002C-rev2
PROJECT NO.: 15-03042

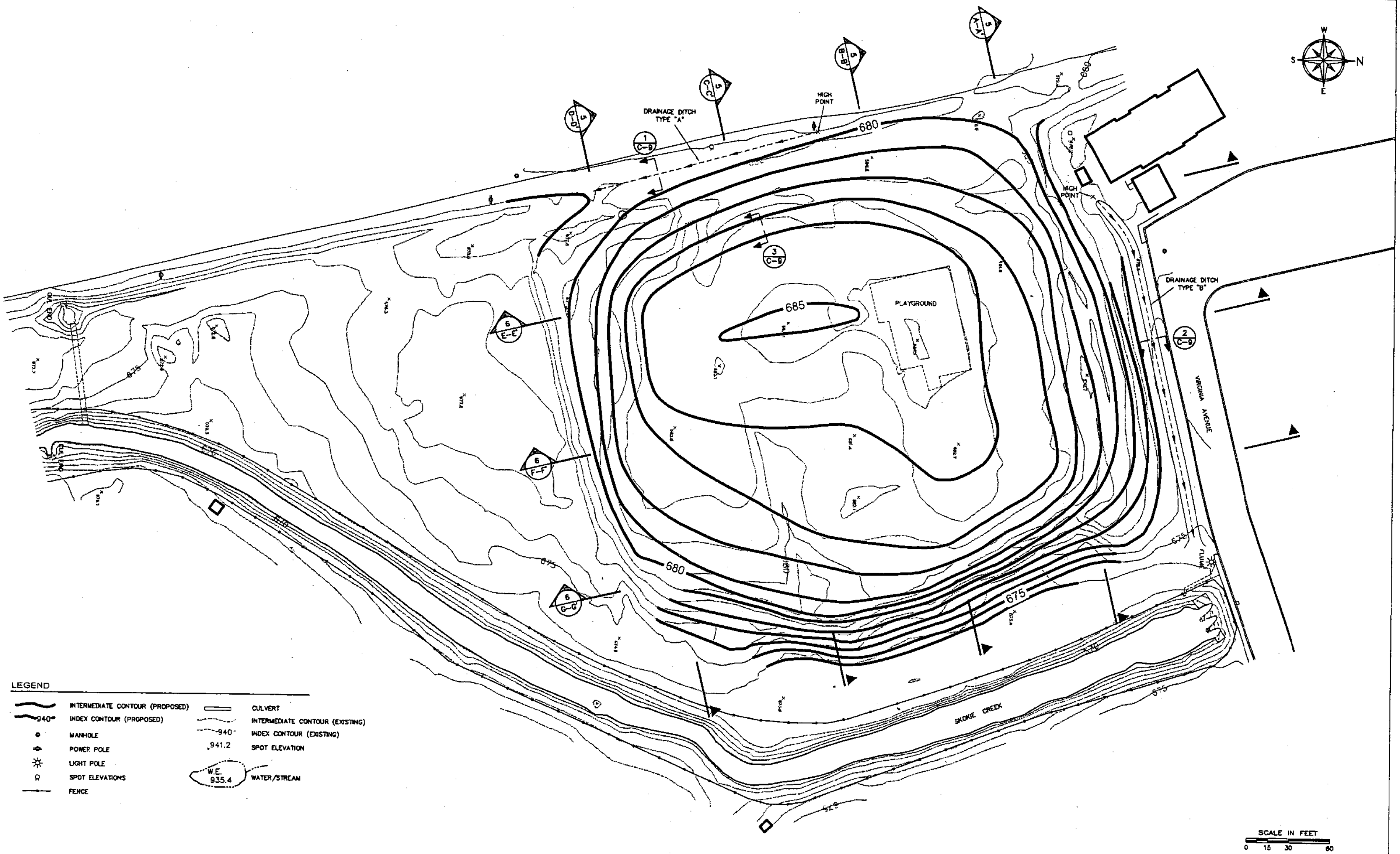
Clayton GROUP SERVICES

SOIL INVESTIGATION MAP

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE
C-3

SHEET
3 of 9



LEGEND

INTERMEDIATE CONTOUR (PROPOSED)	CULVERT
940 INDEX CONTOUR (PROPOSED)	INTERMEDIATE CONTOUR (EXISTING)
MANHOLE	940 INDEX CONTOUR (EXISTING)
POWER POLE	941.2 SPOT ELEVATION
LIGHT POLE	
SPOT ELEVATIONS	W.E. 935.4 WATER/STREAM
FENCE	

NOTES:

1. EXISTING PLAYGROUND TO BE DISMANTLED AND REMOVED.
2. RECREATION FACILITIES AND FOOTPATH BY OTHERS.

NO.	DATE	BY	REVISIONS
2	2-20-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

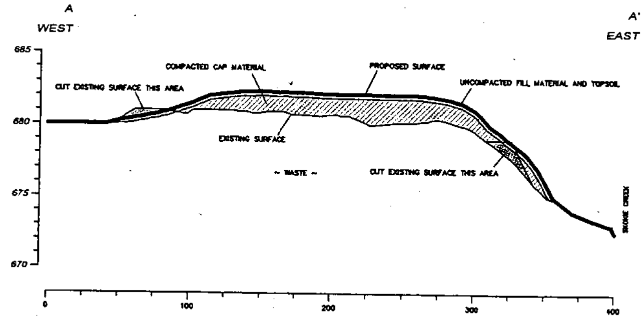
DESIGN BY:	JJR
CHECKED BY:	JJR
DRAWN BY:	BCP
DATE:	1-15-03
SCALE:	AS SHOWN
CAD NO.:	03042002D-rev2
PROJECT NO.:	15-03042

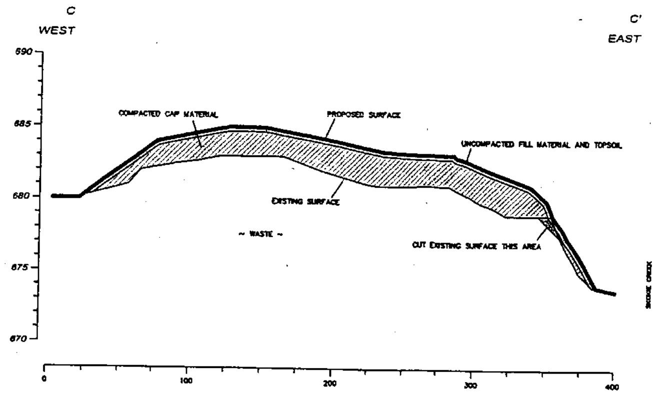
Clayton GROUP SERVICES

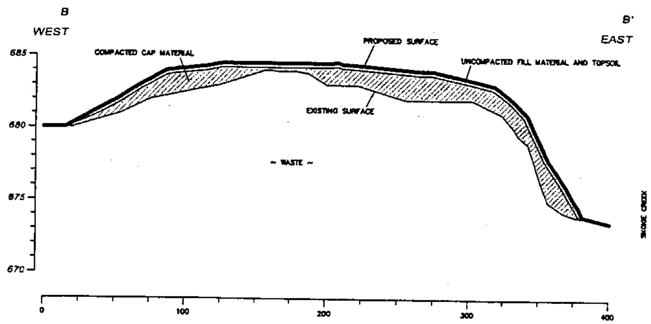
LANDFILL CAP DESIGN
FINISH GRADING
AND SURFACE DRAINAGE PLAN
U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

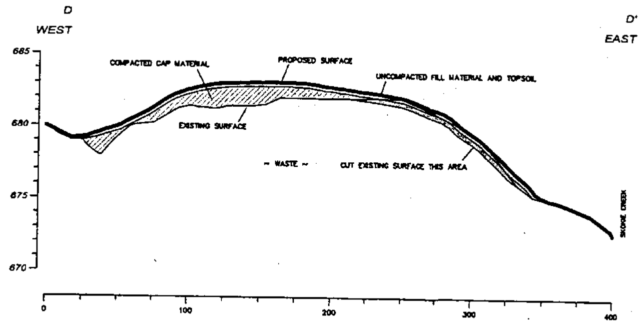
PLATE
C-4

SHEET
4 of 9









SCALE IN FEET

0 20 40 80

VERTICAL EXAGGERATION: 10x

NOTE: "EXISTING SURFACE" IS NOT TOP OF WASTE. APPROXIMATE DEPTHS OF EXISTING COVER SOIL ARE SHOWN ON SHEET C-3.

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY:	JJR
CHECKED BY:	JJR
DRAWN BY:	BCP
DATE:	2-28-03
SCALE:	AS SHOWN
CAD NO.:	03042002H-rev2
PROJECT NO.:	15-03042

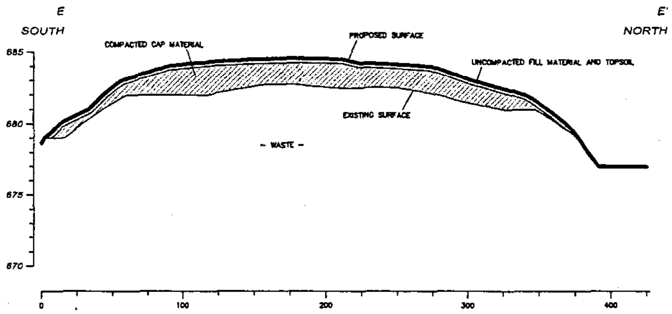
Clayton GROUP SERVICES

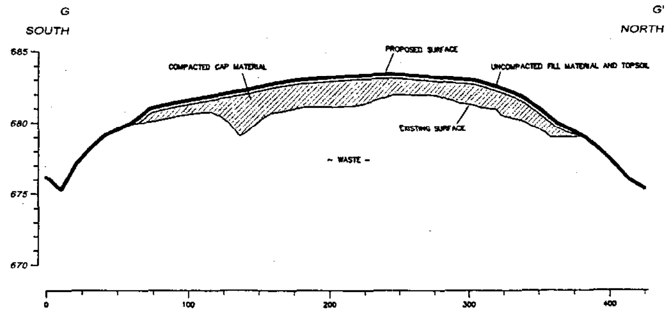
LANDFILL CROSS SECTIONS
EAST TO WEST

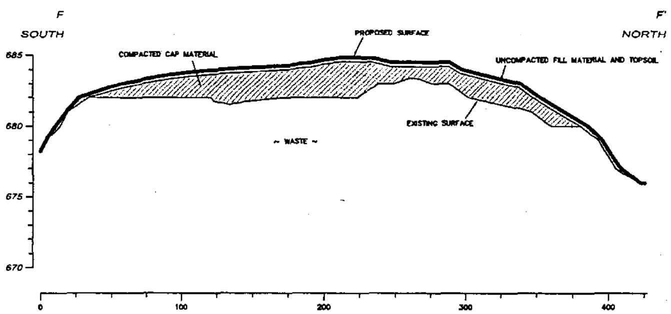
U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE
C-5

SHEET
5 of 9







NOTE: "EXISTING SURFACE" IS NOT TOP OF WASTE. APPROXIMATE DEPTHS OF EXISTING COVER SOIL ARE SHOWN ON SHEET C-3.

SCALE IN FEET
0 20 40 80
VERTICAL EXAGGERATION: 10x

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY:	JJR
CHECKED BY:	JJR
DRAWN BY:	BCP
DATE:	2-28-03
SCALE:	AS SHOWN
CAD NO.:	03042002H-rev2
PROJECT NO.:	15-03042

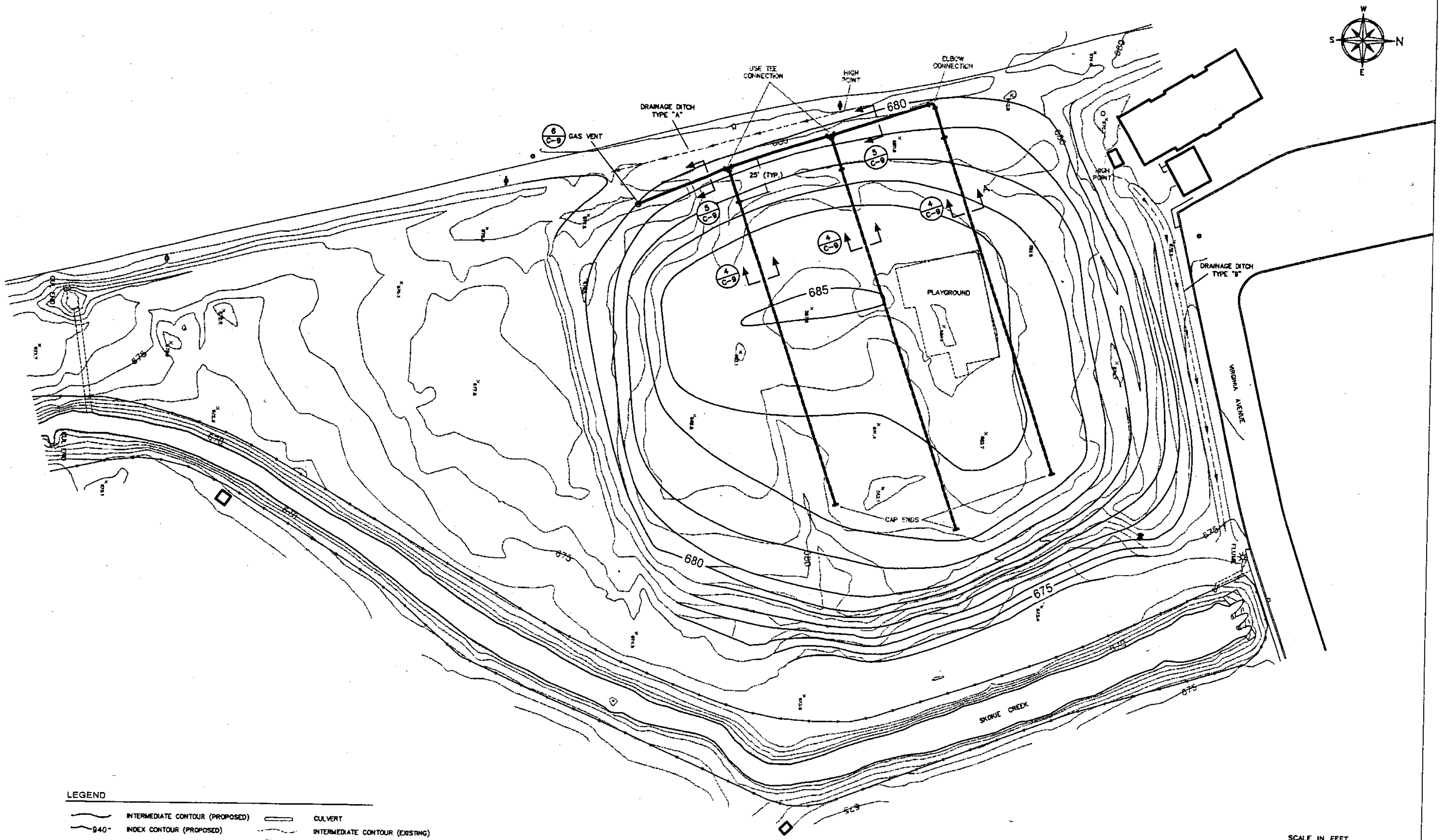
Clayton GROUP SERVICES

LANDFILL CROSS SECTIONS
NORTH TO SOUTH

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE
C-6

SHEET
6 of 9



LEGEND

	INTERMEDIATE CONTOUR (PROPOSED)		CULVERT
940	INDEX CONTOUR (PROPOSED)		INTERMEDIATE CONTOUR (EXISTING)
	MANHOLE	940	INDEX CONTOUR (EXISTING)
	POWER POLE	941.2	SPOT ELEVATION
	LIGHT POLE		TREE LINE
	SPOT ELEVATIONS	W.E. 935.4	WATER/STREAM
	FENCE		
	SOLID WALL GAS VENT HEADER (6")		
	GAS CONTROL TRENCH		

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY: JJR
CHECKED BY: JJR
DRAWN BY: BCP
DATE: 1-15-03
SCALE: AS SHOWN
CAD NO.: 03042002E-rev2
PROJECT NO.: 15-03042

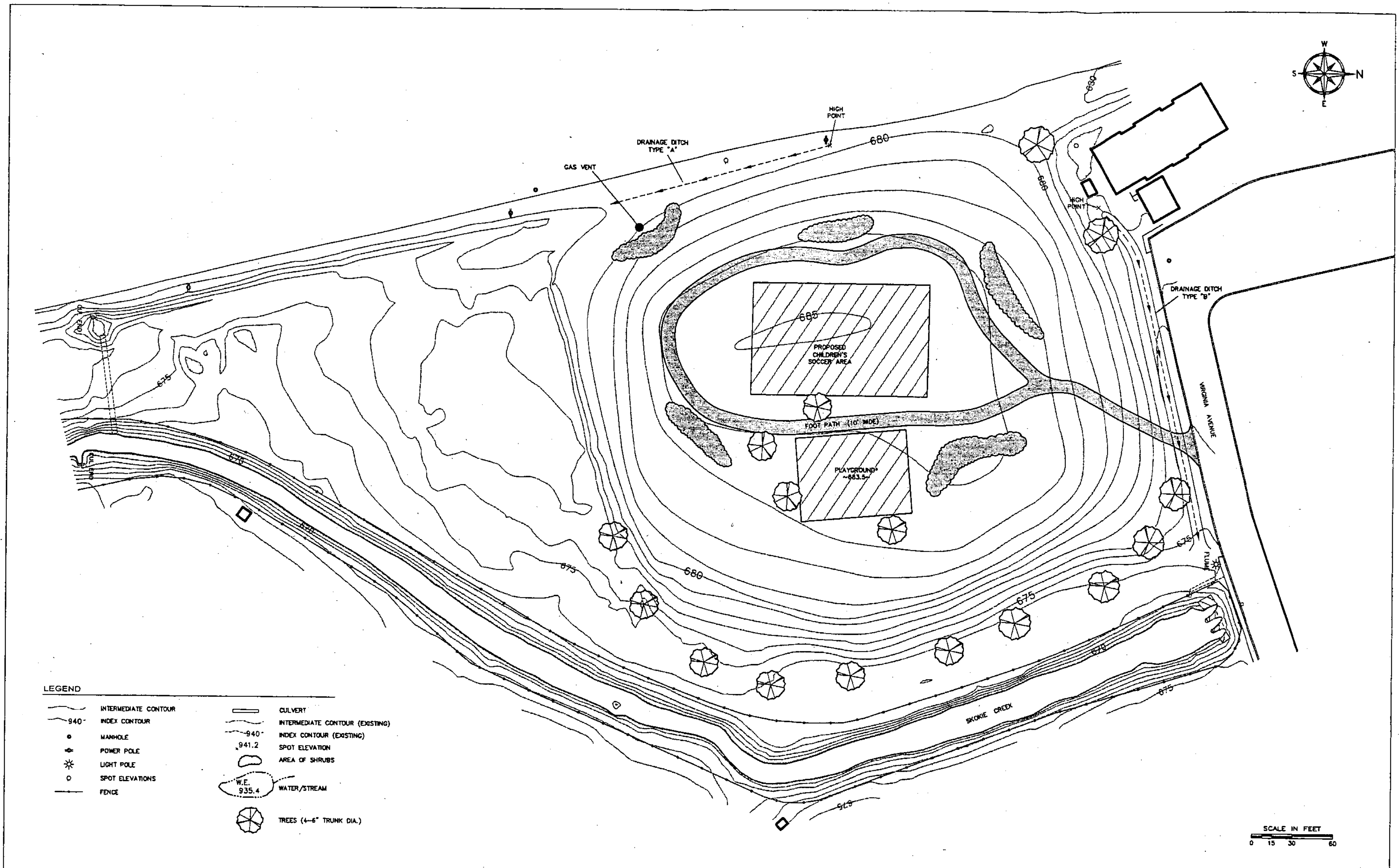
Clayton GROUP SERVICES

GAS MANAGEMENT SYSTEM PLAN

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE C-7

SHEET 7 of 9



NOTES:

1. EXISTING PLAYGROUND TO BE DISMANTLED AND REMOVED.
2. RECREATION FACILITIES AND FOOTPATH BY OTHERS.

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-13-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY: JJR
CHECKED BY: JJR
DRAWN BY: BCP
DATE: 2-28-03
SCALE: AS SHOWN
CAD NO.: 03042002F-rev2
PROJECT NO.: 15-03042

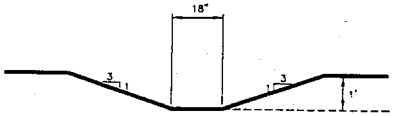
Clayton GROUP SERVICES

END USE AND VEGETATION PLAN

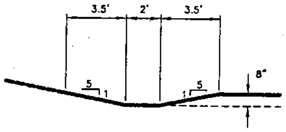
U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE C-8

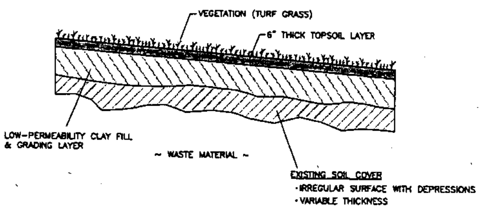
SHEET 8 of 9



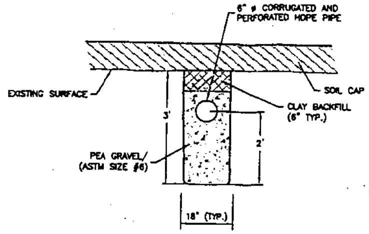
1 C-4 DETAIL - DRAINAGE DITCH TYPE "A"



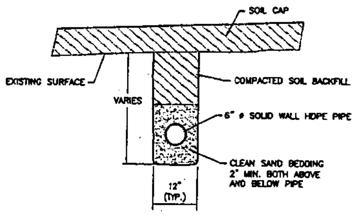
2 C-4 DETAIL - DRAINAGE DITCH TYPE "B"



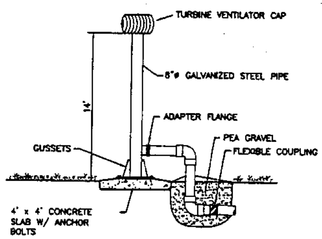
3 C-4 CROSS SECTION - TYPICAL CAP IMPROVEMENT



4 C-4 CROSS SECTION - GAS COLLECTION TRENCH

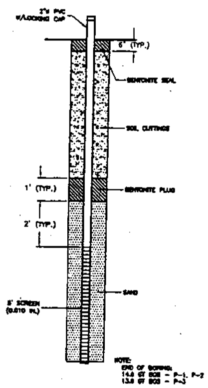


5 C-4 CROSS SECTION - GAS HEADER TRENCH



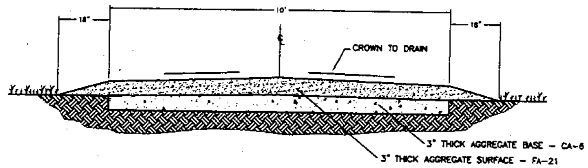
6 C-7 DETAIL - PASSIVE GAS TRENCH

(LOCATION WHERE SHOWN ON PLAN SHEET C-7)



8 C-3 DETAIL - TYPICAL PIEZOMETER

(P-1, P-2, P-3)



7 C-8 CROSS SECTION - FOOT PATH

NOTE: FA-21 GRAVEL SCREENINGS SHALL BE 100% CRUSHED AGGREGATE MATERIAL. NO LIMESTONE SCREENINGS. MATERIAL SHALL BE OBTAINED FROM: MEYER MATERIAL DRYER LAKE, WISCONSIN QUARRY

OR: THELAN SAND & GRAVEL ROUTE 173, NORTH PIT ANTIOCH, ILLINOIS (PRIME BIKE PATH MIX)

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN

ENGINEERS' SEAL

DESIGN BY:	JJR
CHECKED BY:	JJR
DRAWN BY:	BCP
DATE:	2-28-03
SCALE:	AS SHOWN
CAD NO.:	03042002G-rev2
PROJECT NO.:	15-03042

Clayton GROUP SERVICES

CAP CROSS SECTION AND CONSTRUCTION DETAILS

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE C-9

SHEET 9 of 9

APPENDIX F

LEACHATE ANALYTICAL RESULTS

TABLE 1A
Leachate Analytical Results

Forrestal Landfill / Great Lakes Naval Training Center

Chemical Name	Groundwater Remediation Objectives for the Groundwater Ingestion Route Class I (mg/L)	Class II (mg/L)	Piezometers P-1 (02/20/03) (mg/L)	P-2 (02/20/03) (mg/L)	P-3 (02/20/03) (mg/L)
Volatile Organic Compounds					
Acetone	0.7	0.7	0.069	**3.89**	**2.37**
Benzene	0.005	0.025	0.0055	<0.1	<0.05
2-Butanone	NCO	NCO	0.175	14.7	12.6
Ethylbenzene	0.7	1.0	0.0757	0.0951	0.0541
4-Methyl-2-pentanone	NCO	NCO	<0.01	1.05	0.137
Methylene chloride	0.005	0.05	<0.005	<0.05	0.193
Toluene	1.0	2.5	0.0129	0.404	0.322
Xylenes	10.0	10.0	0.237	0.317	0.164
Base-Neutrals / Acid Compounds					
1,4-Dichlorobenzene	0.075	0.375	0.032	<1.0	<0.5
3&4-Methylphenol	NCO	NCO	0.136	6.02	5.62
Naphthalene	0.14	0.22	0.01	<1.0	<0.5
RCRA Metals					
Arsenic	0.05	0.2	0.024	0.04	0.02
Barium	2.0	2.0	1.17	0.26	0.245
Cadmium	0.005	0.05	**0.006**	<0.01	<0.01
Chromium	0.1	1.0	**0.129**	0.081	0.073
Lead	0.0075	0.1	**1.54**	**0.057**	**0.136**
Mercury	0.002	0.01	**0.0062**	0.0008	0.0006
Selenium	0.05	0.05	0.003	**0.14**	**0.086**
Silver	0.05	---	0.004	<0.01	0.015
Other Parameters					
Biological Oxygen Demand (BOD)	NCO	NCO	152	36,900	41,100
Chemical Oxygen Demand (COD)	NCO	NCO	1260	51,400	68,060
			(units)	**(units)**	**(units)**
pH @ 25°C	NCO	NCO	6.63	5.87	5.83

Notes:

1. NCO = No Cleanup Objective included in IEPA TACO Tier I Tables for Industrial/Commercial properties.
2. Bold results exceed Class I groundwater cleanup objectives.
3. Red and Bold results exceed both Class I and Class II groundwater cleanup objectives.
4. No concentrations of pesticides or polychlorinated biphenyls were detected above laboratory detection limits.

TABLE 1B
Leachate Analytical Results
Base-Neutral / Acid Compounds

Forrestal Landfill / Great Lakes Naval Training Center

Chemical Name	Groundwater Remediation Objectives for the Groundwater Ingestion Route		Piezometers		
	Class I (mg/L)	Class II (mg/L)	P-1 (02/20/03) (mg/L)	P-2 (02/20/03) (mg/L)	P-3 (02/20/03) (mg/L)
1,4-Dichlorobenzene	0.075	0.375	0.032	<1.0	<0.5
3&4-Methylphenol	NCO	NCO	0.136	6.02	5.62
Naphthalene	0.14	0.22	0.01	<1.0	<0.5

Notes:

1. NCO = No Cleanup Objective included in IEPA TACO Tier I Tables for Industrial/Commercial properties
2. NTF = Not Tested For
3. Bold results exceed Class I groundwater cleanup objectives
4. Red and Bold results exceed both Class I and Class II groundwater cleanup objectives

TABLE 1C
Leachate Analytical Results
Pesticides and Polychlorinated Biphenyls

Forrestal Landfill / Great Lakes Naval Training Center

Chemical Name	Groundwater Remediation Objectives for the Groundwater Ingestion Route		Piezometers		
	Class I (mg/L)	Class II (mg/L)	P-1 (02/20/03) (mg/L)	P-2 (02/20/03) (mg/L)	P-3 (02/20/03) (mg/L)
Polychlorinated Biphenyls	0.0005	0.0025			

Notes:

1. NCO = No Cleanup Objective included in IEPA TACO Tier I Tables for Industrial/Commercial properties
2. NTF = Not Tested For
3. Bold results exceed Class I groundwater cleanup objectives
4. Red and Bold results exceed both Class I and Class II groundwater cleanup objectives

TABLE 1D
Leachate Analytical Results
Metals

Forrestal Landfill / Great Lakes Naval Training Center

Chemical Name	Groundwater Remediation Objectives for the Groundwater Ingestion Route		Piezometers		
	Class I (mg/L)	Class II (mg/L)	P-1 (02/20/03) (mg/L)	P-2 (02/20/03) (mg/L)	P-3 (02/20/03) (mg/L)
Arsenic	0.05	0.2	0.024	0.04	0.02
Barium	2.0	2.0	1.17	0.26	0.245
Cadmium	0.005	0.05	**0.006**	<0.01	<0.01
Chromium	0.1	1.0	**0.129**	0.081	0.073
Lead	0.0075	0.1	**1.54**	**0.057**	**0.136**
Mercury	0.002	0.01	**0.0062**	0.0008	0.0006
Selenium	0.05	0.05	0.003	**0.14**	**0.086**
Silver	0.05	---	0.004	<0.01	0.015

Notes:

1. NCO = No Cleanup Objective included in IEPA TACO Tier I Tables for Industrial/Commercial properties
2. NTF = Not Tested For
3. Bold results exceed Class I groundwater cleanup objectives
4. Red and Bold results exceed both Class I and Class II groundwater cleanup objectives

TABLE 1E
Leachate Analytical Results
BOD, COD, & pH

Forrestal Landfill / Great Lakes Naval Training Center

Parameter	Groundwater Remediation Objectives for the Groundwater Ingestion Route		Piezometers		
	Class I (mg/L)	Class II (mg/L)	P-1 (02/20/03) (mg/L)	P-2 (02/20/03) (mg/L)	P-3 (02/20/03) (mg/L)
Biological Oxygen Demand (BOD)	NCO	NCO	152	36,900	41,100
Chemical Oxygen Demand (COD)	NCO	NCO	1260	51,400	68,060
			(units)	**(units)**	**(units)**
pH @ 25°C	NCO	NCO	6.63	5.87	5.83

Notes:

1. NCO = No Cleanup Objective included in IEPA TACO Tier I Tables for Industrial/Commercial properties
2. NTF = Not Tested For
3. Bold results exceed Class I groundwater cleanup objectives
4. Red and Bold results exceed both Class I and Class II groundwater cleanup objectives

First
Environmental
Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

February 28, 2003

Mr. John Rohr
CLAYTON GROUP SERVICES INC.
3140 Finley Road
Downers Grove, IL 60515

Project ID: 15-03042
First Environmental File ID: 80663-65
Date Received: February 20, 2003

Dear Mr. Rohr:

The above referenced samples were analyzed as directed on the enclosed chain of custody record.

PROJECT SUMMARY

Analyses were performed in accordance with the methods found in the USEPA publication: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, December 1996. Specific method references are listed on the Analytical Report.

Some reporting limits have been elevated due to sample matrix interferences.

All analyses were performed within established holding times, and all Quality Control criteria as outlined in the methods have been met. All QA/QC documentation and raw data will remain on file for future reference

I thank you for the opportunity to be of service and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data, please contact me at (630) 778-1200.

Sincerely,

for William H. Mottashed
Project Manager

First Environmental Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80663	Date Taken:	02/20/03
Sample Description:	P-1-03020	Time Taken:	12:50
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Volatile Organic Compounds Method 5030B/8260B			
Analysis Date: 02/26/03			
Acetone	69.6	ug/L	
Benzene	5.5	ug/L	
Bromodichloromethane	< 1.0	ug/L	
Bromoform	< 1.0	ug/L	
Bromomethane	< 5.0	ug/L	
2-Butanone	175	ug/L	
Carbon disulfide	< 5.0	ug/L	
Carbon tetrachloride	< 5.0	ug/L	
Chlorobenzene	< 5.0	ug/L	
Chlorodibromomethane	< 1.0	ug/L	
Chloroethane	< 10.0	ug/L	
Chloroform	< 1.0	ug/L	
Chloromethane	< 10.0	ug/L	
1,1-Dichloroethane	< 5.0	ug/L	
1,2-Dichloroethane	< 5.0	ug/L	
1,1-Dichloroethene	< 5.0	ug/L	
cis-1,2-Dichloroethene	< 5.0	ug/L	
trans-1,2-Dichloroethene	< 5.0	ug/L	
1,2-Dichloropropane	< 5.0	ug/L	
cis-1,3-Dichloropropene	< 1.0	ug/L	
trans-1,3-Dichloropropene	< 1.0	ug/L	
Ethyl benzene	75.7	ug/L	
2-Hexanone	< 10.0	ug/L	
4-Methyl-2-pentanone	< 10.0	ug/L	
Methylene chloride	< 5.0	ug/L	
MTBE	< 5.0	ug/L	
Styrene	< 5.0	ug/L	
1,1,2,2-Tetrachloroethane	< 5.0	ug/L	
Tetrachloroethene	< 5.0	ug/L	
Toluene	12.9	ug/L	
1,1,1-Trichloroethane	< 5.0	ug/L	
1,1,2-Trichloroethane	< 5.0	ug/L	
Trichloroethene	< 5.0	ug/L	
Vinyl Acetate	< 10.0	ug/L	
Vinyl Chloride	< 2.0	ug/L	
Xylenes (total)	237	ug/L	

First
Environmental
Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80663	Date Taken:	02/20/03
Sample Description:	P-1-03020	Time Taken:	12:50
Lab File ID:	80663-65	Date Reported:	02/28/03

Base-Neutral/Acid Compounds Method 3510C/8270C
Preparation Date: 02/25/03
Analysis Date: 02/25/03

Analyte	Result	Units	Flags
Acenaphthene	< 10	ug/L	
Acenaphthylene	< 10	ug/L	
Anthracene	< 10	ug/L	
Benzidine	< 10	ug/L	
Benzo[a]anthracene	< 10	ug/L	
Benzo[b]fluoranthene	< 10	ug/L	
Benzo[k]fluoranthene	< 10	ug/L	
Benzo[g,h,i]perylene	< 10	ug/L	
Benzo[a]pyrene	< 10	ug/L	
Benzoic Acid	< 50	ug/L	
Benzyl Alcohol	< 20	ug/L	
bis(2-chloroethoxy)methane	< 10	ug/L	
bis(2-chloroethyl)ether	< 10	ug/L	
bis(2-chloroisopropyl)ether	< 10	ug/L	
bis(2-ethylhexyl)phthalate	< 5	ug/L	
4-Bromophenyl-phenylether	< 10	ug/L	
Butylbenzylphthalate	< 10	ug/L	
4-Chloroaniline	< 10	ug/L	
4-Chloro-3-methylphenol	< 20	ug/L	
2-Chloronaphthalene	< 10	ug/L	
2-Chlorophenol	< 10	ug/L	
4-Chlorophenyl-phenylether	< 10	ug/L	
Chrysene	< 10	ug/L	
Dibenz[a,h]anthracene	< 10	ug/L	
Dibenzofuran	< 10	ug/L	
1,2-Dichlorobenzene	< 10	ug/L	
1,3-Dichlorobenzene	< 10	ug/L	
1,4-Dichlorobenzene	32	ug/L	
3,3-Dichorobenzidine	< 20	ug/L	
2,4-Dichlorophenol	< 10	ug/L	
Diethylphthalate	< 10	ug/L	
2,4-Dimethylphenol	< 10	ug/L	
Dimethylphthalate	< 10	ug/L	
Di-n-butylphthalate	< 10	ug/L	
4,6-Dinitro-2-methylphenol	< 50	ug/L	
2,4-Dinitrophenol	< 50	ug/L	
2,4-Dinitrotoluene	< 10	ug/L	
2,6-Dinitrotoluene	< 10	ug/L	
Di-n-octylphthalate	< 10	ug/L	

First Environmental Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80663	Date Taken:	02/20/03
Sample Description:	P-1-03020	Time Taken:	12:50
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Fluoranthene	< 10	ug/L	
Fluorene	< 10	ug/L	
Hexachlorobenzene	< 10	ug/L	
Hexachlorobutadiene	< 10	ug/L	
Hexachlorocyclopentadiene	< 10	ug/L	
Hexachloroethane	< 5	ug/L	
Indeno[1,2,3-cd]pyrene	< 10	ug/L	
Isophorone	< 10	ug/L	
2-Methylnaphthalene	< 10	ug/L	
2-Methylphenol	< 10	ug/L	
3&4-Methylphenol	136	ug/L	
Naphthalene	10	ug/L	
2-Nitroaniline	< 50	ug/L	
3-Nitroaniline	< 50	ug/L	
4-Nitroaniline	< 20	ug/L	
Nitrobenzene	< 10	ug/L	
2-Nitrophenol	< 10	ug/L	
4-Nitrophenol	< 50	ug/L	
N-Nitrosodimethylamine	< 10	ug/L	
N-Nitroso-di-n-propylamine	< 10	ug/L	
n-Nitrosodiphenylamine	< 10	ug/L	
Pentachlorophenol	< 50	ug/L	
Phenanthrene	< 10	ug/L	
Phenol	< 10	ug/L	
Pyrene	< 10	ug/L	
1,2,4-Trichlorobenzene	< 10	ug/L	
2,4,5-Trichlorophenol	< 10	ug/L	
2,4,6-Trichlorophenol	< 10	ug/L	

First Environmental Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80663	Date Taken:	02/20/03
Sample Description:	P-1-03020	Time Taken:	12:50
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Pesticides/PCBs Method 3510C/8081A/8082			
Preparation Date: 02/24/03			
Analysis Date: 02/27/03			
Aldrin	< 0.25	ug/L	
Aroclor 1016	< 2.5	ug/L	
Aroclor 1221	< 2.5	ug/L	
Aroclor 1232	< 2.5	ug/L	
Aroclor 1242	< 2.5	ug/L	
Aroclor 1248	< 2.5	ug/L	
Aroclor 1254	< 2.5	ug/L	
Aroclor 1260	< 2.5	ug/L	
alpha-BHC	< 0.25	ug/L	
beta-BHC	< 0.25	ug/L	
delta-BHC	< 0.25	ug/L	
Lindane (gamma-BHC)	< 0.25	ug/L	
alpha-Chlordane	< 0.50	ug/L	
gamma-Chlordane	< 0.50	ug/L	
4,4'-DDD	< 0.50	ug/L	
4,4'-DDE	< 0.50	ug/L	
4,4-DDT	< 0.50	ug/L	
Dieldrin	< 0.50	ug/L	
Endosulfan I	< 0.25	ug/L	
Endosulfan II	< 0.50	ug/L	
Endosulfan sulfate	< 0.50	ug/L	
Endrin	< 0.50	ug/L	
Endrin aldehyde	< 0.50	ug/L	
Endrin ketone	< 0.50	ug/L	
Heptachlor	< 0.25	ug/L	
Heptachlor epoxide	< 0.25	ug/L	
Methoxychlor	< 2.5	ug/L	
Toxaphene	< 5.0	ug/L	

First
Environmental
Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80663	Date Taken:	02/20/03
Sample Description:	P-1-03020	Time Taken:	12:50
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Date Analyzed	Method
BOD	152	mg/L	02/21/03	405.1
COD	1,260	mg/L	02/25/03	410.4
pH @ 25°C	6.63	units	02/20/03 15:15	9040B
Total Metals				
Arsenic	0.024	mg/L	02/24/03	3010A/6010B
Barium	1.17	mg/L	02/24/03	3010A/6010B
Cadmium	0.006	mg/L	02/24/03	3010A/6010B
Chromium	0.129	mg/L	02/24/03	3010A/6010B
Lead	1.54	mg/L	02/24/03	3010A/6010B
Mercury	0.0062	mg/L	02/25/03	7470A
Selenium	0.003	mg/L	02/24/03	3010A/6010B
Silver	0.004	mg/L	02/25/03	3010A/6010B

First Environmental Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80664	Date Taken:	02/20/03
Sample Description:	P-2-03020	Time Taken:	12:25
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Volatile Organic Compounds Method 5030B/8260B			
Analysis Date: 02/26/03			
Acetone	3,890	ug/L	
Benzene	< 100	ug/L	
Bromodichloromethane	< 10.0	ug/L	
Bromoform	< 10.0	ug/L	
Bromomethane	< 50.0	ug/L	
2-Butanone	14,700	ug/L	
Carbon disulfide	< 50.0	ug/L	
Carbon tetrachloride	< 50.0	ug/L	
Chlorobenzene	< 50.0	ug/L	
Chlorodibromomethane	< 10.0	ug/L	
Chloroethane	< 100	ug/L	
Chloroform	< 10.0	ug/L	
Chloromethane	< 100	ug/L	
1,1-Dichloroethane	< 50.0	ug/L	
1,2-Dichloroethane	< 50.0	ug/L	
1,1-Dichloroethene	< 50.0	ug/L	
cis-1,2-Dichloroethene	< 50.0	ug/L	
trans-1,2-Dichloroethene	< 50.0	ug/L	
1,2-Dichloropropane	< 50.0	ug/L	
cis-1,3-Dichloropropene	< 10.0	ug/L	
trans-1,3-Dichloropropene	< 10.0	ug/L	
Ethyl benzene	95.1	ug/L	
2-Hexanone	< 100	ug/L	
4-Methyl-2-pentanone	1,050	ug/L	
Methylene chloride	< 50.0	ug/L	
MTBE	< 50.0	ug/L	
Styrene	< 50.0	ug/L	
1,1,2,2-Tetrachloroethane	< 50.0	ug/L	
Tetrachloroethene	< 50.0	ug/L	
Toluene	404	ug/L	
1,1,1-Trichloroethane	< 50.0	ug/L	
1,1,2-Trichloroethane	< 50.0	ug/L	
Trichloroethene	< 50.0	ug/L	
Vinyl Acetate	< 100	ug/L	
Vinyl Chloride	< 2.0	ug/L	
Xylenes (total)	317	ug/L	

First Environmental Laboratories, Inc.

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80664	Date Taken:	02/20/03
Sample Description:	P-2-03020	Time Taken:	12:25
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Base-Neutral/Acid Compounds Method 3510C/8270C			
Preparation Date: 02/25/03			
Analysis Date: 02/25/03			
Acenaphthene	< 1,000	ug/L	
Acenaphthylene	< 1,000	ug/L	
Anthracene	< 1,000	ug/L	
Benzidine	< 1,000	ug/L	
Benzo[a]anthracene	< 1,000	ug/L	
Benzo[b]fluoranthene	< 1,000	ug/L	
Benzo[k]fluoranthene	< 1,000	ug/L	
Benzo[g,h,i]perylene	< 1,000	ug/L	
Benzo[a]pyrene	< 1,000	ug/L	
Benzoic Acid	< 5,000	ug/L	
Benzyl Alcohol	< 2,000	ug/L	
bis(2-chloroethoxy)methane	< 1,000	ug/L	
bis(2-chloroethyl)ether	< 1,000	ug/L	
bis(2-chloroisopropyl)ether	< 1,000	ug/L	
bis(2-ethylhexyl)phthalate	< 1,000	ug/L	
4-Bromophenyl-phenylether	< 1,000	ug/L	
Butylbenzylphthalate	< 1,000	ug/L	
4-Chloroaniline	< 1,000	ug/L	
4-Chloro-3-methylphenol	< 2,000	ug/L	
2-Chloronaphthalene	< 1,000	ug/L	
2-Chlorophenol	< 1,000	ug/L	
4-Chlorophenyl-phenylether	< 1,000	ug/L	
Chrysene	< 1,000	ug/L	
Dibenz[a,h]anthracene	< 1,000	ug/L	
Dibenzofuran	< 1,000	ug/L	
1,2-Dichlorobenzene	< 1,000	ug/L	
1,3-Dichlorobenzene	< 1,000	ug/L	
1,4-Dichlorobenzene	< 1,000	ug/L	
3,3-Dichorobenzidine	< 2,000	ug/L	
2,4-Dichlorophenol	< 1,000	ug/L	
Diethylphthalate	< 1,000	ug/L	
2,4-Dimethylphenol	< 1,000	ug/L	
Dimethylphthalate	< 1,000	ug/L	
Di-n-butylphthalate	< 1,000	ug/L	
4,6-Dinitro-2-methylphenol	< 5,000	ug/L	
2,4-Dinitrophenol	< 5,000	ug/L	
2,4-Dinitrotoluene	< 1,000	ug/L	
2,6-Dinitrotoluene	< 1,000	ug/L	

First Environmental Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80664	Date Taken:	02/20/03
Sample Description:	P-2-03020	Time Taken:	12:25
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Fluoranthene	< 1,000	ug/L	
Fluorene	< 1,000	ug/L	
Hexachlorobenzene	< 1,000	ug/L	
Hexachlorobutadiene	< 1,000	ug/L	
Hexachlorocyclopentadiene	< 1,000	ug/L	
Hexachloroethane	< 1,000	ug/L	
Indeno[1,2,3-cd]pyrene	< 1,000	ug/L	
Isophorone	< 1,000	ug/L	
2-Methylnaphthalene	< 1,000	ug/L	
2-Methylphenol	< 1,000	ug/L	
3&4-Methylphenol	6,020	ug/L	
Naphthalene	< 1,000	ug/L	
2-Nitroaniline	< 5,000	ug/L	
3-Nitroaniline	< 5,000	ug/L	
4-Nitroaniline	< 2,000	ug/L	
Nitrobenzene	< 1,000	ug/L	
2-Nitrophenol	< 1,000	ug/L	
4-Nitrophenol	< 5,000	ug/L	
N-Nitrosodimethylamine	< 1,000	ug/L	
N-Nitroso-di-n-propylamine	< 1,000	ug/L	
n-Nitrosodiphenylamine	< 1,000	ug/L	
Pentachlorophenol	< 5,000	ug/L	
Phenanthrene	< 1,000	ug/L	
Phenol	< 1,000	ug/L	
Pyrene	< 1,000	ug/L	
1,2,4-Trichlorobenzene	< 1,000	ug/L	
2,4,5-Trichlorophenol	< 1,000	ug/L	
2,4,6-Trichlorophenol	< 1,000	ug/L	

First Environmental Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80664	Date Taken:	02/20/03
Sample Description:	P-2-03020	Time Taken:	12:25
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Pesticides/PCBs Method 3510C/8081A/8082			
Preparation Date: 02/24/03			
Analysis Date: 02/27/03			
Aldrin	< 0.50	ug/L	
Aroclor 1016	< 5.0	ug/L	
Aroclor 1221	< 5.0	ug/L	
Aroclor 1232	< 5.0	ug/L	
Aroclor 1242	< 5.0	ug/L	
Aroclor 1248	< 5.0	ug/L	
Aroclor 1254	< 5.0	ug/L	
Aroclor 1260	< 5.0	ug/L	
alpha-BHC	< 0.50	ug/L	
beta-BHC	< 0.50	ug/L	
delta-BHC	< 0.50	ug/L	
Lindane (gamma-BHC)	< 0.50	ug/L	
alpha-Chlordane	< 5.0	ug/L	
gamma-Chlordane	< 5.0	ug/L	
4,4'-DDD	< 1.0	ug/L	
4,4'-DDE	< 1.0	ug/L	
4,4-DDT	< 1.0	ug/L	
Dieldrin	< 1.0	ug/L	
Endosulfan I	< 0.50	ug/L	
Endosulfan II	< 1.0	ug/L	
Endosulfan sulfate	< 1.0	ug/L	
Endrin	< 1.0	ug/L	
Endrin aldehyde	< 1.0	ug/L	
Endrin ketone	< 1.0	ug/L	
Heptachlor	< 0.50	ug/L	
Heptachlor epoxide	< 0.50	ug/L	
Methoxychlor	< 5.0	ug/L	
Toxaphene	< 10.0	ug/L	

First
Environmental
Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80664	Date Taken:	02/20/03
Sample Description:	P-2-03020	Time Taken:	12:25
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Date Analyzed	Method
BOD	36,900	mg/L	02/21/03	405.1
COD	51,400	mg/L	02/25/03	410.4
pH @ 25°C	5.87	units	02/20/03 15:15	9040B
Total Metals				
Arsenic	0.040	mg/L	02/24/03	3010A/6010B
Barium	0.260	mg/L	02/24/03	3010A/6010B
Cadmium	<0.01	mg/L	02/24/03	3010A/6010B
Chromium	0.081	mg/L	02/24/03	3010A/6010B
Lead	0.057	mg/L	02/24/03	3010A/6010B
Mercury	0.0008	mg/L	02/21/03	7470A
Selenium	0.140	mg/L	02/24/03	3010A/6010B
Silver	<0.01	mg/L	02/25/03	3010A/6010B

First Environmental Laboratories, Inc.

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80665	Date Taken:	02/20/03
Sample Description:	P-3-03020	Time Taken:	12:00
Lab File ID:	80663-65	Date Reported:	02/28/03

Volatile Organic Compounds Method 5030B/8260B
Analysis Date: 02/26/03

Analyte	Result	Units	Flags
Acetone	2,370	ug/L	
Benzene	< 50.0	ug/L	
Bromodichloromethane	< 10.0	ug/L	
Bromoform	< 10.0	ug/L	
Bromomethane	< 50.0	ug/L	
2-Butanone	12,600	ug/L	
Carbon disulfide	< 50.0	ug/L	
Carbon tetrachloride	< 50.0	ug/L	
Chlorobenzene	< 50.0	ug/L	
Chlorodibromomethane	< 10.0	ug/L	
Chloroethane	< 100	ug/L	
Chloroform	< 10.0	ug/L	
Chloromethane	< 100	ug/L	
1,1-Dichloroethane	< 50.0	ug/L	
1,2-Dichloroethane	< 50.0	ug/L	
1,1-Dichloroethene	< 50.0	ug/L	
cis-1,2-Dichloroethene	< 50.0	ug/L	
trans-1,2-Dichloroethene	< 50.0	ug/L	
1,2-Dichloropropane	< 50.0	ug/L	
cis-1,3-Dichloropropene	< 10.0	ug/L	
trans-1,3-Dichloropropene	< 10.0	ug/L	
Ethyl benzene	54.1	ug/L	
2-Hexanone	< 100	ug/L	
4-Methyl-2-pentanone	137	ug/L	
Methylene chloride	193	ug/L	
MTBE	< 50.0	ug/L	
Styrene	< 50.0	ug/L	
1,1,2,2-Tetrachloroethane	< 50.0	ug/L	
Tetrachloroethene	< 50.0	ug/L	
Toluene	322	ug/L	
1,1,1-Trichloroethane	< 50.0	ug/L	
1,1,2-Trichloroethane	< 50.0	ug/L	
Trichloroethene	< 50.0	ug/L	
Vinyl Acetate	< 100	ug/L	
Vinyl Chloride	< 20.0	ug/L	
Xylenes (total)	164	ug/L	

First Environmental Laboratories, Inc.

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80665	Date Taken:	02/20/03
Sample Description:	P-3-03020	Time Taken:	12:00
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Base-Neutral/Acid Compounds Method 3510C/8270C			
Preparation Date: 02/25/03			
Analysis Date: 02/25/03			
Acenaphthene	< 500	ug/L	
Acenaphthylene	< 500	ug/L	
Anthracene	< 500	ug/L	
Benzidine	< 500	ug/L	
Benzo[a]anthracene	< 500	ug/L	
Benzo[b]fluoranthene	< 500	ug/L	
Benzo[k]fluoranthene	< 500	ug/L	
Benzo[g,h,i]perylene	< 500	ug/L	
Benzo[a]pyrene	< 500	ug/L	
Benzoic Acid	< 2,500	ug/L	
Benzyl Alcohol	< 1,000	ug/L	
bis(2-chloroethoxy)methane	< 500	ug/L	
bis(2-chloroethyl)ether	< 500	ug/L	
bis(2-chloroisopropyl)ether	< 500	ug/L	
bis(2-ethylhexyl)phthalate	< 500	ug/L	
4-Bromophenyl-phenylether	< 500	ug/L	
Butylbenzylphthalate	< 500	ug/L	
4-Chloroaniline	< 500	ug/L	
4-Chloro-3-methylphenol	< 1,000	ug/L	
2-Chloronaphthalene	< 500	ug/L	
2-Chlorophenol	< 500	ug/L	
4-Chlorophenyl-phenylether	< 500	ug/L	
Chrysene	< 500	ug/L	
Dibenz[a,h]anthracene	< 500	ug/L	
Dibenzofuran	< 500	ug/L	
1,2-Dichlorobenzene	< 500	ug/L	
1,3-Dichlorobenzene	< 500	ug/L	
1,4-Dichlorobenzene	< 500	ug/L	
3,3-Dichorobenzidine	< 1,000	ug/L	
2,4-Dichlorophenol	< 500	ug/L	
Diethylphthalate	< 500	ug/L	
2,4-Dimethylphenol	< 500	ug/L	
Dimethylphthalate	< 500	ug/L	
Di-n-butylphthalate	< 500	ug/L	
4,6-Dinitro-2-methylphenol	< 2,500	ug/L	
2,4-Dinitrophenol	< 2,500	ug/L	
2,4-Dinitrotoluene	< 500	ug/L	
2,6-Dinitrotoluene	< 500	ug/L	
Di-n-octylphthalate	< 500	ug/L	

First
Environmental
Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80665	Date Taken:	02/20/03
Sample Description:	P-3-03020	Time Taken:	12:00
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Flags
Fluoranthene	< 500	ug/L	
Fluorene	< 500	ug/L	
Hexachlorobenzene	< 500	ug/L	
Hexachlorobutadiene	< 500	ug/L	
Hexachlorocyclopentadiene	< 500	ug/L	
Hexachloroethane	< 500	ug/L	
Indeno[1,2,3-cd]pyrene	< 500	ug/L	
Isophorone	< 500	ug/L	
2-Methylnaphthalene	< 500	ug/L	
2-Methylphenol	< 500	ug/L	
3&4-Methylphenol	5,620	ug/L	
Naphthalene	< 500	ug/L	
2-Nitroaniline	< 2,500	ug/L	
3-Nitroaniline	< 2,500	ug/L	
4-Nitroaniline	< 1,000	ug/L	
Nitrobenzene	< 500	ug/L	
2-Nitrophenol	< 500	ug/L	
4-Nitrophenol	< 2,500	ug/L	
N-Nitrosodimethylamine	< 500	ug/L	
N-Nitroso-di-n-propylamine	< 500	ug/L	
n-Nitrosodiphenylamine	< 500	ug/L	
Pentachlorophenol	< 2,500	ug/L	
Phenanthrene	< 500	ug/L	
Phenol	< 500	ug/L	
Pyrene	< 500	ug/L	
1,2,4-Trichlorobenzene	< 500	ug/L	
2,4,5-Trichlorophenol	< 500	ug/L	
2,4,6-Trichlorophenol	< 500	ug/L	

First Environmental Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80665	Date Taken:	02/20/03
Sample Description:	P-3-03020	Time Taken:	12:00
Lab File ID:	80663-65	Date Reported:	02/28/03

Pesticides/PCBs Method 3510C/8081A/8082
Preparation Date: 02/24/03
Analysis Date: 02/27/03

Analyte	Result	Units	Flags
Aldrin	< 0.50	ug/L	
Aroclor 1016	< 5.0	ug/L	
Aroclor 1221	< 5.0	ug/L	
Aroclor 1232	< 5.0	ug/L	
Aroclor 1242	< 5.0	ug/L	
Aroclor 1248	< 5.0	ug/L	
Aroclor 1254	< 5.0	ug/L	
Aroclor 1260	< 5.0	ug/L	
alpha-BHC	< 0.50	ug/L	
beta-BHC	< 0.50	ug/L	
delta-BHC	< 0.50	ug/L	
Lindane (gamma-BHC)	< 0.50	ug/L	
alpha-Chlordane	< 5.0	ug/L	
gamma-Chlordane	< 5.0	ug/L	
4,4'-DDD	< 1.0	ug/L	
4,4'-DDE	< 1.0	ug/L	
4,4-DDT	< 1.0	ug/L	
Dieldrin	< 1.0	ug/L	
Endosulfan I	< 0.50	ug/L	
Endosulfan II	< 1.0	ug/L	
Endosulfan sulfate	< 1.0	ug/L	
Endrin	< 1.0	ug/L	
Endrin aldehyde	< 1.0	ug/L	
Endrin ketone	< 1.0	ug/L	
Heptachlor	< 0.50	ug/L	
Heptachlor epoxide	< 0.50	ug/L	
Methoxychlor	< 5.0	ug/L	
Toxaphene	< 10.0	ug/L	

First
Environmental
Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	CLAYTON GROUP SERVICES		
Project ID:	15-03042	Date Received:	02/20/03
Sample Number:	80665	Date Taken:	02/20/03
Sample Description:	P-3-03020	Time Taken:	12:00
Lab File ID:	80663-65	Date Reported:	02/28/03

Analyte	Result	Units	Date Analyzed	Method
BOD	41,100	mg/L	02/21/03	405.1
COD	68,060	mg/L	02/25/03	410.4
pH @ 25°C	5.83	units	02/20/03 15:15	9040B
Total Metals				
Arsenic	0.020	mg/L	02/25/03	3010A/6010B
Barium	0.245	mg/L	02/25/03	3010A/6010B
Cadmium	<0.01	mg/L	02/25/03	3010A/6010B
Chromium	0.073	mg/L	02/25/03	3010A/6010B
Lead	0.136	mg/L	02/25/03	3010A/6010B
Mercury	0.0006	mg/L	02/21/03	7470A
Selenium	0.086	mg/L	02/25/03	3010A/6010B
Silver	0.015	mg/L	02/25/03	3010A/6010B

APPENDIX G

GEOTECHNICAL ANALYTICAL RESULTS

SCHLEEDE HAMPTON ASSOCIATES INC
CONSULTING ENGINEERS

January 21, 2003

Mr. John Rohr
Clayton Group Services
3140 Finley Road
Downers Grove, IL 60515

Re: Laboratory Testing Services
Clayton Job No. 15-03042.01-001
SHA File No. 72377

Dear Mr. Rohr,

Schleede-Hampton Associates, Inc. has completed the laboratory testing on material submitted for the above referenced project. The samples were picked up at your office on December 30, 2002.

Laboratory Test Methods

The samples were tested in accordance with the following standard methods of test:

Moisture Content of Soils	ASTM D 2216
Grain Size Analysis	ASTM D 422
Atterberg Limits Determination	ASTM D 4318
Permeability Using Triaxial Chamber and Back Pressure Saturation	ASTM D 5084

Results of the laboratory testing are summarized on the attached Table 1. Laboratory test data is attached.

Thank you for the opportunity to be of service. If you have any questions regarding the test data, please contact us at your convenience.

Very truly yours,
SCHLEEDE-HAMPTON ASSOCIATES, INC.

Hugh Gilgunn

Hugh Gilgunn
Project Engineer

HG/dsc
Attachments

FROM / REPLY TO:

CORPORATE OFFICE
3966 WEST DAYTON STREET, SUITE D
McHENRY, ILLINOIS 60050-8376
815-578-8900 • FAX: 815-578-8862

LABORATORY
1612 LANDMEIER ROAD, UNIT C
ELK GROVE VILLAGE, ILLINOIS 60007-2463
847-228-1079 • FAX: 847-228-0633

LABORATORY
3966 WEST DAYTON STREET, SUITE A
McHENRY, ILLINOIS 60050-8376
815-385-8351 • FAX: 815-385-8456

CLIENT: Clayton Group Services, Inc.

SHA FILE NO. 72377

SCHLEEDE HAMPTON ASSOCIATES, INC.
CONSULTING ENGINEERS

Clayton 15-03042.01-001

Sample No.	Moisture Content	Bulk Density, pcf	Atterberg Limits			Permeability cm/sec	Classification
			LL	PL	PI		
FLGT-001	16.7%	125.4	38	17	21	2.64E-08	Silty CLAY, Some Sand, Trace Gravel, CL
FLGT-002	14.5%	132.2	38	18	20	2.77E-08	Silty CLAY, Some Sand, Trace Gravel, CL
FLGT-003	26.4%	121.2	43	19	24	5.69E-08	Silty CLAY, Some Sand, Little Gravel, CL
FLGT-004	13.8%	135.1	39	18	21	2.75E-08	Silty CLAY, Some Sand, Trace Gravel, CL
FLGT-005	31.2%	115.9	47	25	22	4.43E-08	Silty CLAY, Some Sand, Little Gravel, CL

Table 1

SCHLEEDE-HAMPTON ASSOCIATES, INC. • CONSULTING ENGINEERS

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Clayton 15-03042.001-001		
SAMPLE NO.	FLGT-001	**REPORT NO:**	1 perm
CLASSIFICATION	Brown Silty CLAY, Some Sand, Trace Gravel, CL	**DATE:**	Jan-03
SAMPLE TYPE	3" SHELBY TUBE	**PROJECT NO:**	72377

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.43 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	20.3

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	3.07E-08
TEST INTERVAL 2	2.37E-08
TEST INTERVAL 3	2.40E-08
TEST INTERVAL 4	2.70E-08
AVERAGE k	2.64E-08
k 20	**2.64E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.80	2.81
LENGTH, in	5.58	5.44
VOLUME, cu in	34.36	33.81
WEIGHT, gm	1132.0	1165.0
UNIT WEIGHT, pcf	125.4	131.1
MOIST. CONTENT, %	16.7	20.1
DRY DENSITY, pcf	107.5	109.2
GREE OF SATUR, %	79	100

;HLEEDE-HAMPTON ASSOCIATES, INC. • CONSULTING ENGINEERS

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Clayton 15-03042.001-001		
SAMPLE NO.	FLGT-002	**REPORT NO:**	2 perm
CLASSIFICATION	Brown Silty CLAY, Some Sand, Trace Gravel, CL	**DATE:**	Jan-03
SAMPLE TYPE	3" SHELBY TUBE	**PROJECT NO:**	72377

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.43 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	20.1

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	3.28E-08
TEST INTERVAL 2	2.99E-08
TEST INTERVAL 3	2.11E-08
TEST INTERVAL 4	2.70E-08
AVERAGE k	2.77E-08
k 20	**2.77E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.85	2.86
LENGTH, in	5.62	5.50
VOLUME, cu in	35.85	35.21
WEIGHT, gm	1245.5	1261.8
UNIT WEIGHT, pcf	132.2	136.4
'OIST. CONTENT, %	14.5	16.0
RY DENSITY, pcf	115.5	117.6
EGREE OF SATUR, %	85	100

SCHLEEDE-HAMPTON ASSOCIATES, INC. • CONSULTING ENGINEERS

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Clayton 15-03042.001-001		
SAMPLE NO.	FLGT-003	**REPORT NO:**	3 perm
CLASSIFICATION	Brown Silty CLAY, Some Sand, Little Gravel, CL	**DATE:**	Jan-03
SAMPLE TYPE	3" SHELBY TUBE	**PROJECT NO:**	72377

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.43 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	20.1

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	6.19E-08
TEST INTERVAL 2	5.89E-08
TEST INTERVAL 3	5.11E-08
TEST INTERVAL 4	5.55E-08
AVERAGE k	5.69E-08
k 20	**5.69E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.81	2.82
LENGTH, in	5.63	5.50
VOLUME, cu in	34.92	34.30
WEIGHT, gm	1112.0	1117.3
UNIT WEIGHT, pcf	121.2	124.0
MOIST. CONTENT, %	26.4	27.0
DRY DENSITY, pcf	95.9	97.6
EGREE OF SATUR, %	94	100

SCHLEEDE-HAMPTON ASSOCIATES, INC. • CONSULTING ENGINEERS

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Clayton 15-03042.001-001		
SAMPLE NO.	FLGT-004	**REPORT NO:**	4 perm
CLASSIFICATION	Brown Silty CLAY, Some Sand, Trace Gravel, CL	**DATE:**	Jan-03
SAMPLE TYPE	3" SHELBY TUBE	**PROJECT NO:**	72377

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.43 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	28.8

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	2.91E-08
TEST INTERVAL 2	3.10E-08
TEST INTERVAL 3	2.13E-08
TEST INTERVAL 4	2.85E-08
AVERAGE k	2.75E-08
k 20	**2.75E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.79	2.80
LENGTH, in	3.91	3.85
VOLUME, cu in	23.83	23.62
WEIGHT, gm	846.1	855.0
UNIT WEIGHT, pcf	135.1	137.8
MOIST. CONTENT, %	13.8	15.0
/ DENSITY, pcf	118.7	119.8
GREE OF SATUR, %	89	100

SCHLEEDE-HAMPTON ASSOCIATES, INC. • **CONSULTING ENGINEERS**

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Clayton 15-03042.001-001		
SAMPLE NO.	FLGT-005	**REPORT NO:**	5 perm
CLASSIFICATION	Brown Silty CLAY, Some Sand, Little Gravel, CL	**DATE:**	Jan-03
SAMPLE TYPE	3" SHELBY TUBE	**PROJECT NO:**	72377

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.43 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	20.6

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	4.17E-08
TEST INTERVAL 2	4.48E-08
TEST INTERVAL 3	4.84E-08
TEST INTERVAL 4	4.21E-08
AVERAGE k	4.43E-08
k 20	**4.43E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.83	2.84
LENGTH, in	5.52	5.39
VOLUME, cu in	34.72	33.99
WEIGHT, gm	1057.6	1064.0
UNIT WEIGHT, pcf	115.9	119.1
MOIST. CONTENT, %	31.2	32.0
DRY DENSITY, pcf	88.4	90.3
GREE OF SATUR, %	93	100

SCHLEEDE - HAMPTON ASSOCIATES, INC.

CONSULTING ENGINEERS

1612 LANDMEIER ROAD, SUITE C, ELK GROVE VILLAGE, ILLINOIS 60007 (847) 228-1079

HYDROMETER/COMBINED ANALYSIS

TestUniqueID: 2886 **Project Name:** Clayton 15-03042.01-001 **ProjectID:** 72377

Date: 1/9/2003 **Boring No. 0** **Sample No. FLGT-001** **Depth: 0** Test No. 1

Total Sample Wt.: 259.0

	Sieve Size	Cum Wt. Ret	% Retaining	% Passing	Total Passing %	Dia (mm)
+#10 Sieve Portion.	1	0.0	0.0	100.0	100.0	25.0000
	3/4	0.0	0.0	100.0	100.0	19.0000
	1/2	6.9	2.6	97.4	97.4	12.5000
	3/8	9.7	3.7	96.3	96.3	9.5000
	No.4	22.9	8.8	91.2	91.2	4.7500
	No.10	37.3	14.4	85.6	85.6	2.0000
-#10 Sieve Portion.	No.20	2.4	4.6	95.4	81.6	0.8500
	No.40	4.4	8.7	91.3	78.2	0.4200
	No.100	8.4	16.5	83.5	71.5	0.1500
	No.200	10.4	20.4	79.6	68.2	0.0750

Wt of Sample at Start of Hydrometer : 51.0

Temperature (C): 20.2

Temp Bath Bulb Reading: 5.0

Specific Gravity: 2.70

	Elaps. Time (min)	Uncorrected	Corrected	% Passing	Total Passing %	Dia (mm)
Hydrometer Portion.	1	43.0	38.0	73.6	63.0	0.0409
	2	41.5	36.5	70.7	60.5	0.0293
	5	39.0	34.0	65.9	56.4	0.0189
	15	34.5	29.5	57.1	48.9	0.0113
	30	33.0	28.0	54.2	46.4	0.0081
	60	29.0	24.0	46.5	39.8	0.0059
	120	26.5	21.5	41.6	35.7	0.0042
	250	24.0	19.0	36.8	31.5	0.0030
	1440	20.0	15.0	29.1	24.9	0.0013

LL : 38 **PL:** 17 **PI :** 21 **Organic :** No

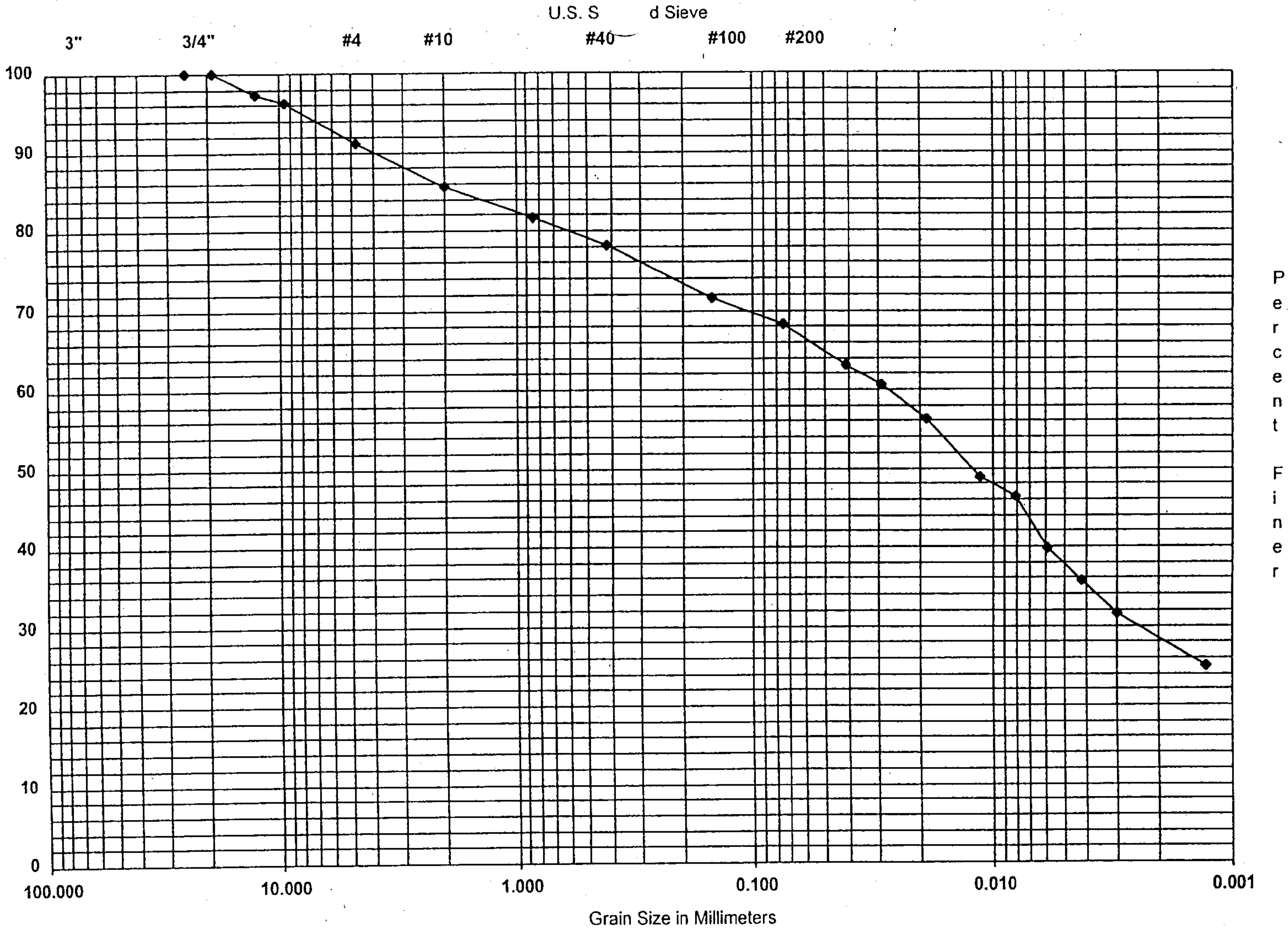
Gravel : 9 **Sand :** 23 **Silt :** 40 **Clay :** 28

Cu: 28.0 **Cc:** 0.2 **D10:** 0.001 **D30:** 0.003 **D60:** 0.028

Unified Classification: Silty CLAY, Some Sand, Trace Gravel, CL

REPORT OF GRAIN SIZE ANALYSIS

SCHLEEDE-HAMPTON ASSOCIATES, INC.



GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Boring No.: 0 **Sample No.:** FLGT-001 **Depth:** 0 **LL%:** 38 **PL %:** 17 **PI %:** 21

Gravel: 9 **Sand:** 23 **Silt:** 40 **Clay:** 28 **Cu:** 28.0 **Cc:** 0.2 **Dia10:** 0.001 **Dia30:** 0.003 **Dia60:** 0.028

Unified Classification: Silty CLAY, Some Sand, Trace Gravel, CL

Project Name: Clayton 15-03042.01-001 **Client:** Clayton Group Services, Inc. **ProjectID:** 72377

SCHLEEDE - HAMPTON ASSOCIATES, INC.

CONSULTING ENGINEERS

1612 LANDMEIER ROAD, SUITE C, ELK GROVE VILLAGE, ILLINOIS 60007 (847) 228-1079

HYDROMETER/COMBINED ANALYSIS

TestUniqueID: 2887 **Project Name:** Clayton 15-03042.01-001 **ProjectID:** 72377

Date: 1/9/2003 **Boring No.** 0 **Sample No.** FLGT-002 **Depth:** 0 Test No. 2

Total Sample Wt.: 244.9

	Sieve Size	Cum Wt. Ret	% Retaining	% Passing	Total Passing %	Dia (mm)
+#10 Sieve Portion.	1	0.0	0.0	100.0	100.0	25.0000
	3/4	0.0	0.0	100.0	100.0	19.0000
	1/2	2.6	1.0	99.0	99.0	12.5000
	3/8	9.4	3.9	96.1	96.1	9.5000
	No.4	18.2	7.4	92.6	92.6	4.7500
	No.10	27.8	11.4	88.6	88.6	2.0000
-#10 Sieve Portion.	No.20	2.0	3.8	96.2	85.2	0.8500
	No.40	4.1	8.1	91.9	81.5	0.4200
	No.100	8.8	17.2	82.8	73.4	0.1500
	No.200	11.1	21.7	78.3	69.4	0.0750

Wt of Sample at Start of Hydrometer : 51.0

Temperature (C): 20.2

Temp Bath Bulb Reading: 5.0

Specific Gravity: 2.70

	Elaps. Time (min)	Uncorrected	Corrected	% Passing	Total Passing %	Dia (mm)
Hydrometer Portion.	1	41.0	36.0	69.8	61.9	0.0416
	2	39.0	34.0	65.9	58.4	0.0299
	5	37.0	32.0	62.0	55.0	0.0192
	15	33.0	28.0	54.3	48.1	0.0115
	30	31.0	26.0	50.4	44.7	0.0082
	60	27.5	22.5	43.6	38.7	0.0060
	120	25.0	20.0	38.8	34.4	0.0043
	250	22.5	17.5	33.9	30.1	0.0030
	1440	19.0	14.0	27.1	24.1	0.0013

LL : 38 **PL:** 18 **PI :** 20 **Organic :** No

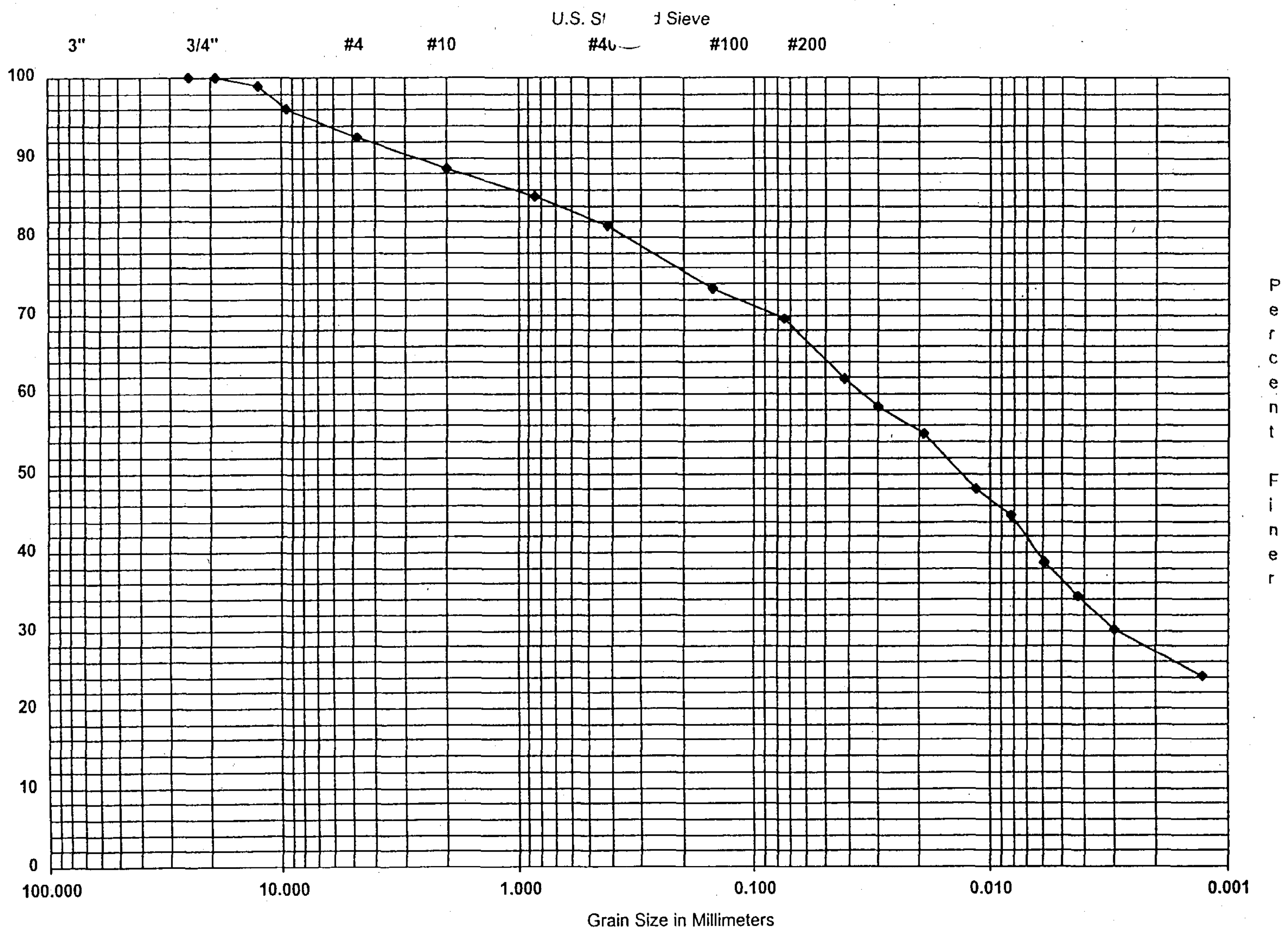
Gravel : 7 **Sand :** 23 **Silt :** 43 **Clay :** 27

Cu: 35.2 **Cc:** 0.3 **D10:** 0.001 **D30:** 0.003 **D60:** 0.035

Unified Classification: Silty CLAY, Some Sand, Trace Gravel, CL

REPORT OF GRAIN SIZE ANALYSIS

SCHLEEDE-HAMPTON ASSOCIATES, INC.



GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Boring No.: 0 Sample No.: FLGT-002 Depth: 0 LL%: 38 PL %: 18 PI %: 20

Gravel: 7 Sand: 23 Silt: 43 Clay: 27 Cu: 35.2 Cc: 0.3 Dia10: 0.001 Dia30: 0.003 Dia60: 0.035

Unified Classification: Silty CLAY, Some Sand, Trace Gravel, CL

Project Name: Clayton 15-03042.01-001 Client: Clayton Group Services, Inc. ProjectID: 72377

SCHLEEDE - HAMPTON ASSOCIATES, INC.

CONSULTING ENGINEERS

1612 LANDMEIER ROAD, SUITE C, ELK GROVE VILLAGE, ILLINOIS 60007 (847) 228-1079

HYDROMETER/COMBINED ANALYSIS

TestUniqueID: 2888 **Project Name:** Clayton 15-03042.01-001 **ProjectID:** 72377

Date: 1/9/2003 **Boring No.** 0 **Sample No.** FLGT-003 **Depth:** 0 Test No. 3

Total Sample Wt.: 321.7

	Sieve Size	Cum Wt. Ret	% Retaining	% Passing	Total Passing %	Dia (mm)
+#10 Sieve Portion.	1	0.0	0.0	100.0	100.0	25.0000
	3/4	12.4	3.9	96.1	96.1	19.0000
	1/2	16.1	5.0	95.0	95.0	12.5000
	3/8	22.6	7.0	93.0	93.0	9.5000
	No.4	32.3	10.0	90.0	90.0	4.7500
	No.10	43.0	13.4	86.6	86.6	2.0000
-#10 Sieve Portion.	No.20	2.9	5.6	94.4	81.8	0.8500
	No.40	5.5	10.7	89.3	77.3	0.4200
	No.100	12.9	25.2	74.8	64.8	0.1500
	No.200	17.1	33.5	66.5	57.6	0.0750

Wt of Sample at Start of Hydrometer : 51.0

Temperature (C): 20.2

Temp Bath Bulb Reading: 5.0

Specific Gravity: 2.70

	Elaps. Time (min)	Uncorrected	Corrected	% Passing	Total Passing %	Dia (mm)
Hydrometer Portion.	1	35.5	30.5	59.1	51.2	0.0435
	2	34.5	29.5	57.2	49.5	0.0310
	5	33.0	28.0	54.3	47.0	0.0198
	15	29.5	24.5	47.5	41.1	0.0118
	30	27.0	22.0	42.6	36.9	0.0085
	60	24.0	19.0	36.8	31.9	0.0061
	120	22.0	17.0	32.9	28.5	0.0044
	250	20.0	15.0	29.1	25.2	0.0031
	1440	17.5	12.5	24.2	21.0	0.0013

LL : 43 **PL:** 19 **PI :** 24 **Organic :** No

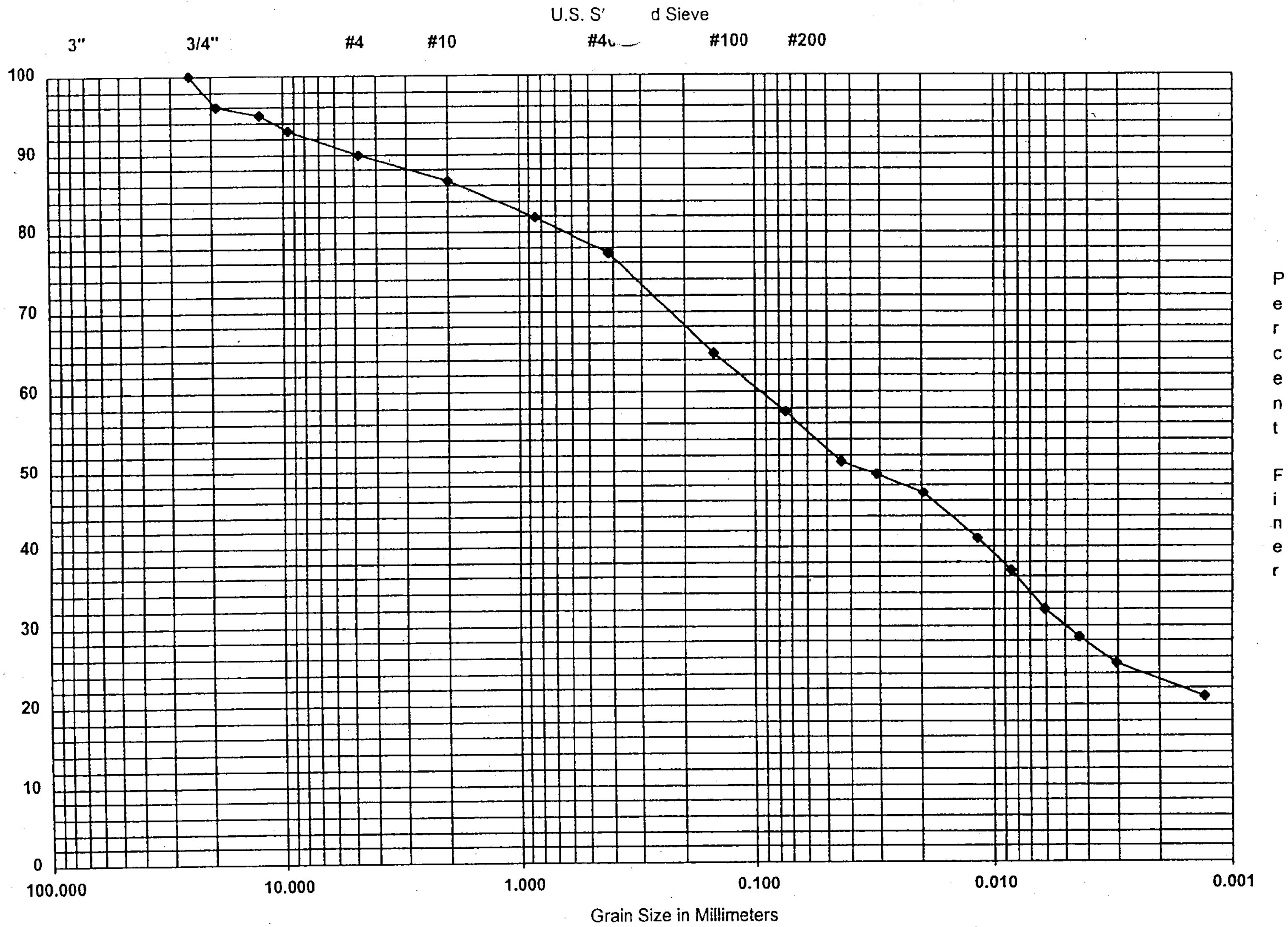
Gravel : 10 **Sand :** 32 **Silt :** 35 **Clay :** 23

Cu: 99.9 **Cc:** 0.3 **D10:** 0.001 **D30:** 0.005 **D60:** 0.1

Unified Classification: Silty CLAY, Some Sand, Little Gravel, CL

REPORT OF GRAIN SIZE ANALYSIS

SCHLEEDE-HAMPTON ASSOCIATES, INC.



GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Boring No.: 0 **Sample No.:** FLGT-003 **Depth:** 0 **LL%:** 43 **PL %:** 19 **PI %:** 24

Gravel: 10 **Sand:** 32 **Silt:** 35 **Clay:** 23 **Cu:** 99.9 **Cc:** 0.3 **Dia10:** 0.001 **Dia30:** 0.005 **Dia60:** 0.100

Unified Classification: Silty CLAY, Some Sand, Little Gravel, CL

Project Name: Clayton 15-03042.01-001 **Client:** Clayton Group Services, Inc. **ProjectID:** 72377

SCHLEEDE - HAMPTON ASSOCIATES, INC.

CONSULTING ENGINEERS

1612 LANDMEIER ROAD, SUITE C, ELK GROVE VILLAGE, ILLINOIS 60007 (847) 228-1079

HYDROMETER/COMBINED ANALYSIS

TestUniqueID: 2889 **Project Name:** Clayton 15-03042.01-001 **ProjectID:** 72377

Date: 1/9/2003 **Boring No. 0** **Sample No. FLGT-004** **Depth: 0** Test No. 4

Total Sample Wt.: 290.3

	Sieve Size	Cum Wt. Ret	% Retaining	% Passing	Total Passing %	Dia (mm)
+#10 Sieve Portion.	1	0.0	0.0	100.0	100.0	25.0000
	3/4	0.0	0.0	100.0	100.0	19.0000
	1/2	0.0	0.0	100.0	100.0	12.5000
	3/8	5.4	1.9	98.1	98.1	9.5000
	No.4	14.3	4.9	95.1	95.1	4.7500
	No.10	28.7	9.9	90.1	90.1	2.0000
-#10 Sieve Portion.	No.20	3.2	6.3	93.7	84.4	0.8500
	No.40	6.3	12.4	87.6	78.9	0.4200
	No.100	11.3	22.1	77.9	70.2	0.1500
	No.200	13.3	26.0	74.0	66.7	0.0750

Wt of Sample at Start of Hydrometer : 51.1

Temperature (C): 20.2

Temp Bath Bulb Reading: 5.0

Specific Gravity: 2.70

	Elaps. Time (min)	Uncorrected	Corrected	% Passing	Total Passing %	Dia (mm)
Hydrometer Portion.	1	39.0	34.0	65.8	59.3	0.0423
	2	37.5	32.5	62.9	56.7	0.0303
	5	36.0	31.0	60.0	54.1	0.0194
	15	32.5	27.5	53.2	48.0	0.0115
	30	29.5	24.5	47.4	42.7	0.0083
	60	26.5	21.5	41.6	37.5	0.0060
	120	24.0	19.0	36.8	33.1	0.0043
	250	21.5	16.5	31.9	28.8	0.0030
	1440	18.5	13.5	26.1	23.6	0.0013

LL : 39 **PL:** 18 **PI :** 21 **Organic :** No

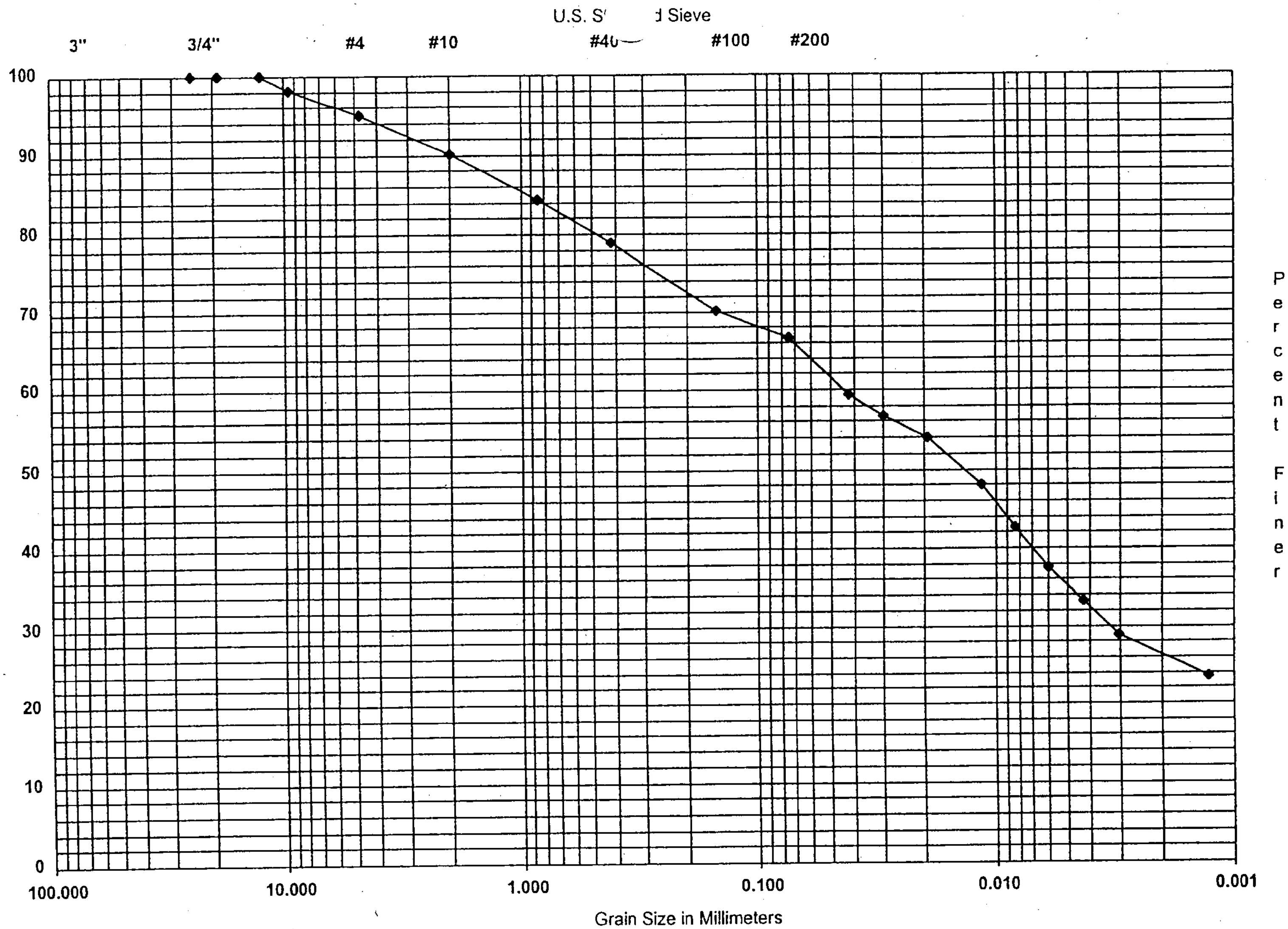
Gravel : 5 **Sand :** 28 **Silt :** 41 **Clay :** 26

Cu: 45.4 **Cc:** 0.3 **D10:** 0.001 **D30:** 0.003 **D60:** 0.045

Unified Classification: Silty CLAY, Some Sand, Trace Gravel, CL

REPORT OF GRAIN SIZE ANALYSIS

SCHLEEDE-HAMPTON ASSOCIATES, INC.



GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Boring No.: 0 **Sample No.:** FLGT-004 **Depth:** 0 **LL%:** 39 **PL %:** 18 **PI %:** 21

Gravel: 5 **Sand:** 28 **Silt:** 41 **Clay:** 26 **Cu:** 45.4 **Cc:** 0.3 **Dia10:** 0.001 **Dia30:** 0.003 **Dia60:** 0.045

Unified Classification: Silty CLAY, Some Sand, Trace Gravel, CL

Project Name: Clayton 15-03042.01-001 **Client:** Clayton Group Services, Inc. **ProjectID:** 72377

SCHLEEDE - HAMPTON ASSOCIATES, INC.

CONSULTING ENGINEERS

1612 LANDMEIER ROAD, SUITE C, ELK GROVE VILLAGE, ILLINOIS 60007 (847) 228-1079

HYDROMETER/COMBINED ANALYSIS

TestUniqueID: 2890 **Project Name:** Clayton 15-03042.01-001 **ProjectID:** 72377

Date: 1/9/2003 **Boring No. 0** **Sample No. FLGT-005** **Depth: 0** Test No. 5

Total Sample Wt.: 244.0

	Sieve Size	Cum Wt. Ret	% Retaining	% Passing	Total Passing %	Dia (mm)
+#10 Sieve Portion.	1	0.0	0.0	100.0	100.0	25.0000
	3/4	0.0	0.0	100.0	100.0	19.0000
	1/2	8.2	3.4	96.6	96.6	12.5000
	3/8	17.9	7.4	92.6	92.6	9.5000
	No.4	40.9	16.8	83.2	83.2	4.7500
	No.10	60.4	24.8	75.2	75.2	2.0000
-#10 Sieve Portion.	No.20	3.9	7.6	92.4	69.6	0.8500
	No.40	7.0	13.8	86.2	64.9	0.4200
	No.100	12.2	23.9	76.1	57.2	0.1500
	No.200	16.6	32.6	67.4	50.7	0.0750

Wt of Sample at Start of Hydrometer : 51.0

Temperature (C): 20.5

Temp Bath Bulb Reading: 5.0

Specific Gravity: 2.70

	Elaps. Time (min)	Uncorrected	Corrected	% Passing	Total Passing %	Dia (mm)
Hydrometer Portion.	1	35.5	30.5	59.1	44.5	0.0435
	2	33.5	28.5	55.2	41.6	0.0312
	5	32.5	27.5	53.3	40.1	0.0199
	15	28.5	23.5	45.5	34.3	0.0118
	30	26.5	21.5	41.7	31.4	0.0085
	60	23.5	18.5	35.9	27.0	0.0061
	120	21.5	16.5	32.0	24.1	0.0044
	250	19.0	14.0	27.1	20.4	0.0031
	1440	16.0	11.0	21.3	16.0	0.0013

LL : 47 **PL:** 25 **PI :** 22 **Organic :** No

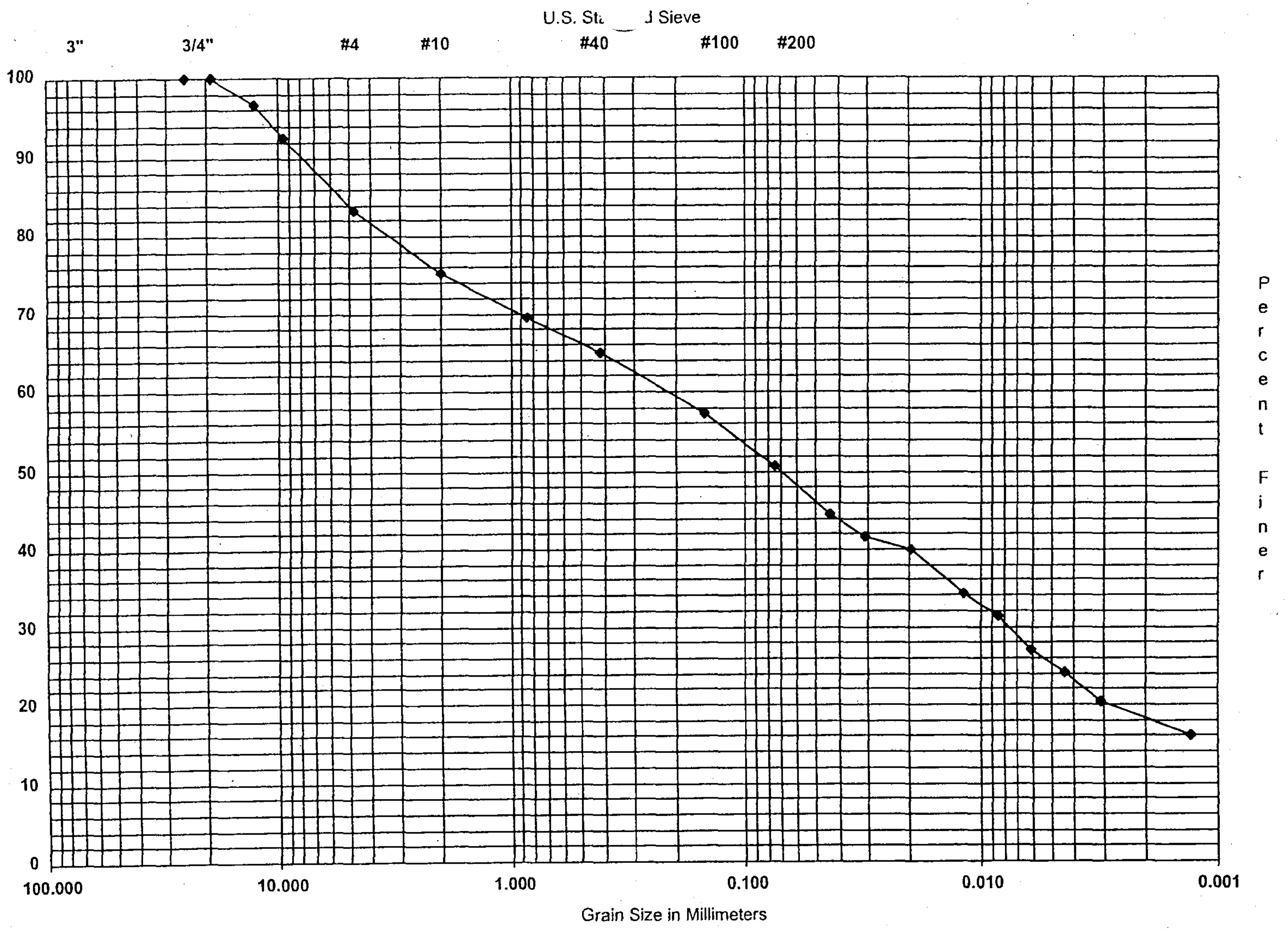
Gravel : 17 **Sand :** 29 **Silt :** 36 **Clay :** 18

Cu: 247.6 **Cc:** 0.2 **D10:** 0.001 **D30:** 0.008 **D60:** 0.248

Unified Classification: Silty CLAY, Some Sand, Little Gravel, CL

REPORT OF GRAIN SIZE ANALYSIS

SCHLEEDE-HAMPTON ASSOCIATES, INC.



GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Boring No.: 0 **Sample No.:** FLGT-005 **Depth:** 0 **LL%:** 47 **PL %:** 25 **PI %:** 22

Gravel: 17 **Sand:** 29 **Silt:** 36 **Clay:** 18 **Cu:** 247.6 **Cc:** 0.2 **Dia10:** 0.001 **Dia30:** 0.008 **Dia60:** 0.248

Unified Classification: Silty CLAY, Some Sand, Little Gravel, CL

Project Name: Clayton 15-03042.01-001 **Client:** Clayton Group Services, Inc. **ProjectID:** 72377

APPENDIX H

HELP MODEL RESULTS

Clayton
GROUP SERVICES

EXISTING CONDITIONS

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**          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                 **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:      C:\HELPMO~2\CAP.D4
TEMPERATURE DATA FILE:        C:\HELPMO~2\CAP.D7
SOLAR RADIATION DATA FILE:    C:\HELPMO~2\CAP.D13
EVAPOTRANSPIRATION DATA:      C:\HELPMO~2\CAP.D11
SOIL AND DESIGN DATA FILE:    C:\HELPMO~2\EXIST10.D10
OUTPUT DATA FILE:             C:\HELPMO~2\forexst.OUT


TIME:  15:54      DATE:   2/ 6/2003


******************************************************************************

     TITLE:  Forrestalexist

******************************************************************************


     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 27

THICKNESS	=	36.00	INCHES
POROSITY	=	0.4000	VOL/VOL
FIELD CAPACITY	=	0.3660	VOL/VOL
WILTING POINT	=	0.2880	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3919	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.779999993000E-06	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.63 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #27 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 1.% AND A SLOPE LENGTH OF 400. FEET.

SCS RUNOFF CURVE NUMBER	=	86.40	
FRACTION OF AREA ALLOWING RUNOFF	=	85.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	3.200	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	9.560	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.600	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	6.912	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	14.110	INCHES
TOTAL INITIAL WATER	=	14.110	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	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	117	
END OF GROWING SEASON (JULIAN DATE)	=	290	
EVAPORATIVE ZONE DEPTH	=	24.0	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

****

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.45	353707.312	100.00
RUNOFF	3.459	40178.504	11.36
EVAPOTRANSPIRATION	23.971	278447.594	78.72
PERC./LEAKAGE THROUGH LAYER 1	3.019182	35070.820	9.92

CHANGE IN WATER STORAGE	0.001	10.269	0.00
SOIL WATER AT START OF YEAR	14.110	163900.453	
SOIL WATER AT END OF YEAR	14.111	163910.719	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.116	0.00

****

****

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.90	417014.469	100.00
RUNOFF	7.656	88928.195	21.32
EVAPOTRANSPIRATION	22.893	265924.344	63.77
PERC./LEAKAGE THROUGH LAYER 1	3.785316	43970.234	10.54
CHANGE IN WATER STORAGE	1.566	18191.729	4.36
SOIL WATER AT START OF YEAR	14.111	163910.719	
SOIL WATER AT END OF YEAR	12.545	145718.344	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	3.132	36384.102	8.72

ANNUAL WATER BUDGET BALANCE 0.0000 -0.028
0.00

****
****

****
****

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.40	515750.250	100.00
RUNOFF	13.202	153358.797	29.74
EVAPOTRANSPIRATION	30.517	354480.875	68.73
PERC./LEAKAGE THROUGH LAYER 1	3.077439	35747.531	6.93
CHANGE IN WATER STORAGE	-2.396	-27836.754	-5.40
SOIL WATER AT START OF YEAR	12.545	145718.344	
SOIL WATER AT END OF YEAR	13.026	151312.906	
SNOW WATER AT START OF YEAR	3.132	36384.102	7.05
SNOW WATER AT END OF YEAR	0.254	2952.796	0.57
ANNUAL WATER BUDGET BALANCE	0.0000	-0.227	0.00

****
****

****
****

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.12	349873.937	100.00
RUNOFF	7.004	81363.492	23.26
EVAPOTRANSPIRATION	23.277	270386.469	77.28
PERC./LEAKAGE THROUGH LAYER 1	0.279661	3248.544	0.93
CHANGE IN WATER STORAGE	-0.441	-5124.582	-1.46
SOIL WATER AT START OF YEAR	13.026	151312.906	
SOIL WATER AT END OF YEAR	12.839	149141.109	
SNOW WATER AT START OF YEAR	0.254	2952.796	0.84
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.015	0.00

****

****

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.29	375080.656	100.00
RUNOFF	5.376	62450.723	16.65

EVAPOTRANSPIRATION	24.661	286461.750	76.37
PERC./LEAKAGE THROUGH LAYER 1	1.242937	14437.952	3.85
CHANGE IN WATER STORAGE	1.010	11730.202	3.13
SOIL WATER AT START OF YEAR	12.839	149141.109	
SOIL WATER AT END OF YEAR	13.849	160871.312	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.028	0.00

****

****

ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	34.58	401681.406	100.00
RUNOFF	4.639	53890.914	13.42
EVAPOTRANSPIRATION	26.926	312771.875	77.87
PERC./LEAKAGE THROUGH LAYER 1	3.275435	38047.449	9.47
CHANGE IN WATER STORAGE	-0.261	-3028.854	-0.75
SOIL WATER AT START OF YEAR	13.849	160871.312	
SOIL WATER AT END OF YEAR	13.555	157454.359	
SNOW WATER AT START OF YEAR	0.000	0.000	

0.00

SNOW WATER AT END OF YEAR 0.033 388.107
0.10

ANNUAL WATER BUDGET BALANCE 0.0000 0.008
0.00

****
****

****
****

ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.24	409347.875	100.00
RUNOFF	6.240	72481.070	17.71
EVAPOTRANSPIRATION	25.379	294797.531	72.02
PERC./LEAKAGE THROUGH LAYER 1	3.658193	42493.570	10.38
CHANGE IN WATER STORAGE	-0.037	-424.299	-0.10
SOIL WATER AT START OF YEAR	13.555	157454.359	
SOIL WATER AT END OF YEAR	13.552	157418.156	
SNOW WATER AT START OF YEAR	0.033	388.107	0.09
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.025	0.00

****
****

****

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
	--------	----------	-------
PRECIPITATION	35.13	408070.187	100.00
RUNOFF	7.306	84868.375	20.80
EVAPOTRANSPIRATION	23.245	270011.375	66.17
PERC./LEAKAGE THROUGH LAYER 1	3.358335	39010.422	9.56
CHANGE IN WATER STORAGE	1.221	14179.917	3.47
SOIL WATER AT START OF YEAR	13.552	157418.156	
SOIL WATER AT END OF YEAR	13.228	153658.859	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.544	17939.219	4.40
ANNUAL WATER BUDGET BALANCE	0.0000	0.108	0.00

****

****

ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
	--------	----------	-------
PRECIPITATION	38.61	448493.781	

100.00

RUNOFF 28.49	11.000	127776.289
EVAPOTRANSPIRATION 66.13	25.532	296576.312
PERC./LEAKAGE THROUGH LAYER 1 7.76	2.996388	34806.043
CHANGE IN WATER STORAGE -2.38	-0.918	-10664.851
SOIL WATER AT START OF YEAR	13.228	153658.859
SOIL WATER AT END OF YEAR	13.854	160933.234
SNOW WATER AT START OF YEAR 4.00	1.544	17939.219
SNOW WATER AT END OF YEAR 0.00	0.000	0.000
ANNUAL WATER BUDGET BALANCE 0.00	0.0000	-0.030

****

****

ANNUAL TOTALS FOR YEAR 10

PERCENT	INCHES	CU. FEET
PRECIPITATION 100.00	30.75	357192.062
RUNOFF 17.83	5.484	63704.211
EVAPOTRANSPIRATION 73.02	22.455	260835.000
PERC./LEAKAGE THROUGH LAYER 1 9.60	2.953466	34307.461
CHANGE IN WATER STORAGE -0.46	-0.142	-1654.751

SOIL WATER AT START OF YEAR	13.854	160933.234	
SOIL WATER AT END OF YEAR	13.269	154131.406	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.443	5147.079	1.44
ANNUAL WATER BUDGET BALANCE	0.0000	0.147	0.00

****

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.51	1.60	2.69	3.26	4.17	4.46
	4.10	3.31	4.00	1.92	1.71	2.01
STD. DEVIATIONS	0.75	0.64	1.50	2.13	2.13	2.62
	1.41	1.35	1.41	1.28	0.79	0.98
RUNOFF						
TOTALS	0.712	1.287	2.218	0.617	0.326	0.336
	0.264	0.235	0.435	0.106	0.211	0.389
STD. DEVIATIONS	0.735	1.209	2.096	0.662	0.429	0.674
	0.357	0.316	0.508	0.253	0.339	0.552
EVAPOTRANSPIRATION						

TOTALS	0.493	0.477	0.819	2.482	3.622	4.747
	3.787	3.067	2.705	1.252	0.900	0.536
STD. DEVIATIONS	0.112	0.071	0.385	0.930	1.012	1.172
	1.700	1.294	0.641	0.280	0.192	0.091

PERCOLATION/LEAKAGE THROUGH LAYER 1

TOTALS	0.0864	0.0045	0.0421	0.6949	0.4546	0.2359
	0.1398	0.0146	0.1041	0.1984	0.4651	0.3244
STD. DEVIATIONS	0.0636	0.0065	0.0736	0.5441	0.4479	0.3126
	0.3618	0.0384	0.2000	0.2977	0.6415	0.4056

****

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES		CU. FEET	PERCENT
PRECIPITATION	34.75	(4.368)	403621.2	100.00
RUNOFF	7.137	(2.9520)	82900.05	20.539
EVAPOTRANSPIRATION	24.885	(2.4170)	289069.31	71.619
PERCOLATION/LEAKAGE THROUGH LAYER 1	2.76464	(1.11536)	32114.004	7.95647
CHANGE IN WATER STORAGE	-0.040	(1.1458)	-462.20	-0.115

****

```
***************************************************************************
******

                    PEAK DAILY VALUES FOR YEARS    1 THROUGH   10

---------------------------------------------------------------------------
                                                (INCHES)       (CU. FT.)
                                               ----------
-------------
          PRECIPITATION                            4.09          47509.441

          RUNOFF                                   1.707
19823.3301

          PERCOLATION/LEAKAGE THROUGH LAYER  1     0.563228
6542.45605

          SNOW WATER                               3.81
44253.8789


          MAXIMUM VEG. SOIL WATER (VOL/VOL)              0.4000

          MINIMUM VEG. SOIL WATER (VOL/VOL)              0.2880

***************************************************************************
******
```

```
*************************************************************************
******

               FINAL WATER STORAGE AT END OF YEAR   10

----------------------------------------------------------------------
                 LAYER        (INCHES)        (VOL/VOL)
                 -----        --------        ---------
                   1           13.2689          0.3686

               SNOW WATER       0.443

*************************************************************************
******

*************************************************************************
******
```

Clayton
GROUP SERVICES

IMPROVED CAP

```
************************************************************************
******

************************************************************************
******
 **
**
 **
**
 **              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
**
 **
**
 **
**

************************************************************************
******

************************************************************************
******


 PRECIPITATION DATA FILE:     C:\HELPMO~2\CAP.D4
 TEMPERATURE DATA FILE:       C:\HELPMO~2\CAP.D7
 SOLAR RADIATION DATA FILE:   C:\HELPMO~2\CAP.D13
 EVAPOTRANSPIRATION DATA:     C:\HELPMO~2\CAP.D11
 SOIL AND DESIGN DATA FILE:   C:\HELPMO~2\FORCAP.D10
 OUTPUT DATA FILE:            C:\HELPMO~2\forstlC.OUT


 TIME:  15:48     DATE:   2/ 6/2003


************************************************************************
******

     TITLE:  forstlCP

************************************************************************
******


     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 29

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4510	VOL/VOL
FIELD CAPACITY	=	0.4190	VOL/VOL
WILTING POINT	=	0.3320	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4457	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.680000028000E-06	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.63 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 27

THICKNESS	=	36.00	INCHES
POROSITY	=	0.4000	VOL/VOL
FIELD CAPACITY	=	0.3660	VOL/VOL
WILTING POINT	=	0.2880	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.779999993000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #29 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 400. FEET.

SCS RUNOFF CURVE NUMBER	=	86.70	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	3.200	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	5.348	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.412	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.984	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	19.748	INCHES
TOTAL INITIAL WATER	=	19.748	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	=	3.50
START OF GROWING SEASON (JULIAN DATE)	=	117
END OF GROWING SEASON (JULIAN DATE)	=	290
EVAPORATIVE ZONE DEPTH	=	12.0 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

****

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.45	353707.312	100.00
RUNOFF	5.391	62622.578	17.70
EVAPOTRANSPIRATION	22.905	266064.844	75.22
PERC./LEAKAGE THROUGH LAYER 2	2.153919	25019.926	7.07
AVG. HEAD ON TOP OF LAYER 2	1.0465		
CHANGE IN WATER STORAGE	0.000	0.000	0.00
SOIL WATER AT START OF YEAR	19.748	229391.859	
SOIL WATER AT END OF YEAR	19.748	229391.859	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.050	0.00

****

****

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.90	417014.469	100.00
RUNOFF	10.343	120147.305	28.81
EVAPOTRANSPIRATION	21.509	249847.906	59.91

PERC./LEAKAGE THROUGH LAYER 2	1.787074	20758.656	4.98
AVG. HEAD ON TOP OF LAYER 2	0.7187		
CHANGE IN WATER STORAGE	2.261	26260.531	6.30
SOIL WATER AT START OF YEAR	19.748	229391.859	
SOIL WATER AT END OF YEAR	18.913	219697.469	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	3.095	35954.918	8.62
ANNUAL WATER BUDGET BALANCE	0.0000	0.058	0.00

****

****

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.40	515750.250	100.00
RUNOFF	17.427	202429.500	39.25
EVAPOTRANSPIRATION	27.331	317480.469	61.56
PERC./LEAKAGE THROUGH LAYER 2	1.728633	20079.797	3.89
AVG. HEAD ON TOP OF LAYER 2	0.5615		
CHANGE IN WATER STORAGE	-2.087	-24239.408	-4.70
SOIL WATER AT START OF YEAR	18.913	219697.469	
SOIL WATER AT END OF YEAR	19.668	228460.187	

SNOW WATER AT START OF YEAR	3.095	35954.918	6.97
SNOW WATER AT END OF YEAR	0.254	2952.796	0.57
ANNUAL WATER BUDGET BALANCE	0.0000	-0.133	0.00

****

****

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.12	349873.937	100.00
RUNOFF	8.442	98058.547	28.03
EVAPOTRANSPIRATION	21.747	252608.547	72.20
PERC./LEAKAGE THROUGH LAYER 2	0.697914	8106.968	2.32
AVG. HEAD ON TOP OF LAYER 2	0.2362		
CHANGE IN WATER STORAGE	-0.766	-8900.112	-2.54
SOIL WATER AT START OF YEAR	19.668	228460.187	
SOIL WATER AT END OF YEAR	19.156	222512.859	
SNOW WATER AT START OF YEAR	0.254	2952.796	0.84
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.010	0.00

****

```
*******

*************************************************************************
*******

                         ANNUAL TOTALS FOR YEAR    5

-------------------------------------------------------------------------
-------
                                              INCHES         CU. FEET
PERCENT
                                             --------       ----------
-------
   PRECIPITATION                              32.29         375080.656
100.00

   RUNOFF                                      7.389         85832.383
22.88

   EVAPOTRANSPIRATION                         23.117        268525.687
71.59

   PERC./LEAKAGE THROUGH LAYER  2              1.239777      14401.249
3.84

   AVG. HEAD ON TOP OF LAYER  2                0.6031

   CHANGE IN WATER STORAGE                     0.544          6321.416
1.69

   SOIL WATER AT START OF YEAR                19.156        222512.859

   SOIL WATER AT END OF YEAR                  19.700        228834.281

   SNOW WATER AT START OF YEAR                 0.000             0.000
0.00

   SNOW WATER AT END OF YEAR                   0.000             0.000
0.00

   ANNUAL WATER BUDGET BALANCE                 0.0000           -0.076
0.00

*************************************************************************
*******


*************************************************************************
*******

                         ANNUAL TOTALS FOR YEAR    6

-------------------------------------------------------------------------
```

	INCHES	CU. FEET	PERCENT
	--------	----------	-------
PRECIPITATION	34.58	401681.406	100.00
RUNOFF	6.951	80738.742	20.10
EVAPOTRANSPIRATION	25.562	296927.281	73.92
PERC./LEAKAGE THROUGH LAYER 2	2.339198	27172.129	6.76
AVG. HEAD ON TOP OF LAYER 2	0.8774		
CHANGE IN WATER STORAGE	-0.272	-3156.837	-0.79
SOIL WATER AT START OF YEAR	19.700	228834.281	
SOIL WATER AT END OF YEAR	19.395	225289.344	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.033	388.107	0.10
ANNUAL WATER BUDGET BALANCE	0.0000	0.069	0.00

****

****

ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
	--------	----------	-------
PRECIPITATION	35.24	409347.875	100.00
RUNOFF	9.646	112048.930	27.37
EVAPOTRANSPIRATION	23.706	275374.219	

67.27

PERC./LEAKAGE THROUGH LAYER 2	1.885944	21907.123	5.35
AVG. HEAD ON TOP OF LAYER 2	0.8055		
CHANGE IN WATER STORAGE	0.002	17.565	0.00
SOIL WATER AT START OF YEAR	19.395	225289.344	
SOIL WATER AT END OF YEAR	19.430	225695.016	
SNOW WATER AT START OF YEAR	0.033	388.107	0.09
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.011	0.00

****

****

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.13	408070.187	100.00
RUNOFF	10.810	125570.164	30.77
EVAPOTRANSPIRATION	21.178	246002.953	60.28
PERC./LEAKAGE THROUGH LAYER 2	1.794544	20845.424	5.11
AVG. HEAD ON TOP OF LAYER 2	0.7069		
CHANGE IN WATER STORAGE	1.347	15651.548	3.84
SOIL WATER AT START OF YEAR	19.430	225695.016	

SOIL WATER AT END OF YEAR	19.233	223407.344	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.544	17939.219	4.40
ANNUAL WATER BUDGET BALANCE	0.0000	0.093	0.00

****

****

ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	38.61	448493.781	100.00
RUNOFF	14.456	167919.906	37.44
EVAPOTRANSPIRATION	23.534	273368.875	60.95
PERC./LEAKAGE THROUGH LAYER 2	1.718847	19966.129	4.45
AVG. HEAD ON TOP OF LAYER 2	0.5836		
CHANGE IN WATER STORAGE	-1.099	-12761.284	-2.85
SOIL WATER AT START OF YEAR	19.233	223407.344	
SOIL WATER AT END OF YEAR	19.678	228585.266	
SNOW WATER AT START OF YEAR	1.544	17939.219	4.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.120	0.00

****

****

ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.75	357192.062	100.00
RUNOFF	7.921	92013.719	25.76
EVAPOTRANSPIRATION	21.257	246916.953	69.13
PERC./LEAKAGE THROUGH LAYER 2	1.532672	17803.523	4.98
AVG. HEAD ON TOP OF LAYER 2	0.5457		
CHANGE IN WATER STORAGE	0.039	457.746	0.13
SOIL WATER AT START OF YEAR	19.678	228585.266	
SOIL WATER AT END OF YEAR	19.275	223895.937	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.443	5147.079	1.44
ANNUAL WATER BUDGET BALANCE	0.0000	0.130	0.00

****

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.51	1.60	2.69	3.26	4.17	4.46
	4.10	3.31	4.00	1.92	1.71	2.01
STD. DEVIATIONS	0.75	0.64	1.50	2.13	2.13	2.62
	1.41	1.35	1.41	1.28	0.79	0.98
RUNOFF						
TOTALS	0.762	1.360	2.377	0.964	0.569	0.681
	0.549	0.485	0.841	0.290	0.481	0.519
STD. DEVIATIONS	0.689	1.235	2.126	0.878	0.796	1.246
	0.663	0.637	0.969	0.635	0.696	0.619
EVAPOTRANSPIRATION						
TOTALS	0.486	0.440	0.782	2.517	3.489	3.702
	3.484	2.848	2.550	1.352	0.972	0.562
STD. DEVIATIONS	0.116	0.081	0.416	0.964	0.987	1.157
	1.430	1.116	0.576	0.339	0.230	0.110
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.0000	0.0041	0.1034	0.3013	0.2091	0.0662
	0.0681	0.0714	0.2245	0.2080	0.2678	0.1640
STD. DEVIATIONS	0.0000	0.0078	0.0855	0.2644	0.2218	0.0951
	0.1267	0.1035	0.1473	0.2555	0.2380	0.2186

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

AVERAGES	0.0000	0.0006	0.4257	1.3252	0.7723	0.3279
	0.2943	0.2696	1.2437	0.9199	1.5730	0.8698
STD. DEVIATIONS	0.0000	0.0011	0.4444	1.2891	1.0342	0.5633
	0.5623	0.4558	1.1127	1.4301	1.6612	1.7912

****

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES		CU. FEET	PERCENT
PRECIPITATION	34.75	(4.368)	403621.2	100.00
RUNOFF	9.878	(3.6495)	114738.19	28.427
EVAPOTRANSPIRATION	23.185	(1.9984)	269311.81	66.724
PERCOLATION/LEAKAGE THROUGH LAYER 2	1.68785	(0.46060)	19606.092	4.85755
AVERAGE HEAD ON TOP OF LAYER 2	0.669	(0.220)		
CHANGE IN WATER STORAGE	-0.003	(1.2223)	-34.88	-0.009

****

****
******

PEAK DAILY VALUES FOR YEARS 1 THROUGH 10

	(INCHES)	(CU. FT.)
PRECIPITATION	4.09	47509.441
RUNOFF	2.795	32468.8027
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.035376	410.92593
AVERAGE HEAD ON TOP OF LAYER 2	12.000	
SNOW WATER	3.79	44066.2461
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4510
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.3320

****
******

****
******

FINAL WATER STORAGE AT END OF YEAR 10

LAYER	(INCHES)	(VOL/VOL)
1	4.8749	0.4062
2	14.4000	0.4000
SNOW WATER	0.443	

****
******

****
******

APPENDIX I

PERMITS

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
NOTICE OF INTENT (NOI)
GENERAL PERMIT TO DISCHARGE STORM WATER CONSTRUCTION SITE ACTIVITIES

OWNER INFORMATION

NAME:	LAST FIRST MIDDLE INITIAL United States Navy			OWNER TYPE: (SELECT ONE) ☐ PRIVATE ☐ COUNTY ☐ CITY ☐ SPECIAL DISTRICT ☒ FEDERAL ☐ STATE	
MAILING ADDRESS:	Environmental Dept. 201 Decatur Ave.				
CITY:	Great Lakes	STATE:	I L	ZIP:	60088-5600
CONTACT PERSON:	Mr. J. Blayne Kirsch, P.E.	TELEPHONE NUMBER:	AREA CODE 847	NUMBER 688-5999 X145	

CONTRACTOR INFORMATION

NAME:				TELEPHONE NUMBER:	AREA CODE	NUMBER	
MAILING ADDRESS:		CITY:		STATE:		ZIP:	

CONSTRUCTION SITE INFORMATION

SELECT ONE:	☒ EXISTING SITE ☐ NEW SITE ☐ CHANGE OF INFORMATION						GENERAL NPDES PERMIT NUMBER:		ILR10 ___ ___ ___ ___			
FACILITY NAME:	Forrestal Landfill		OTHER NPDES PERMIT NUMBERS:									
FACILITY LOCATION:	(Not necessarily the mailing address) Same as Above				TELEPHONE NUMBER:		AREA CODE		NUMBER			
CITY:		STATE:	IL	ZIP:		LATITUDE:	DEG. 42	MIN. 17	SEC. 55	LONGITUDE:	DEG. 87 MIN. 52	SEC. 11
COUNTY:	Lake	SECTION:	7	TOWNSHIP:	44 N	RANGE:	12 E					
CONSTRUCTION START DATE:		CONSTRUCTION END DATE:		TOTAL SIZE OF CONSTRUCTION SITE IN ACRES:	3.2							

TYPE OF CONSTRUCTION (SELECT ALL THAT APPLY)

☐ RESIDENTIAL ☐ COMMERCIAL ☐ INDUSTRIAL ☒ RECONSTRUCTION ☐ TRANSPORTATION ☐ OTHER

HISTORIC PRESERVATION AND ENDANGERED SPECIES COMPLIANCE

HAS THIS PROJECT SATISFIED APPLICABLE REQUIREMENTS FOR COMPLIANCE WITH ILLINOIS LAW ON:

HISTORIC PRESERVATION ☐ YES ☐ NO
ENDANGERED SPECIES ☐ YES ☐ NO

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this 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. In addition, I certify that the provisions of the permit, including the development and implementation of a storm water pollution prevention plan and a monitoring program plan, will be complied with.

OWNER SIGNATURE: ______________________ DATE: ______________________

MAIL COMPLETED FORM TO:

(DO NOT SUBMIT ADDITIONAL DOCUMENTATION UNLESS REQUESTED)

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
ATTN: PERMIT SECTION
POST OFFICE BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276

FOR OFFICE USE ONLY

LOG:
PERMIT NO. ILR10 ___ ___ ___ ___
DATE:

Information required by this form must be provided to comply with 415 ILCS 5/39 (1996). Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

IL 532 2104
WPC 623 Rev. 5/99

APPENDIX J

GEOTECHNICAL EVALUATION OF PROPOSED COVER MATERIAL

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.

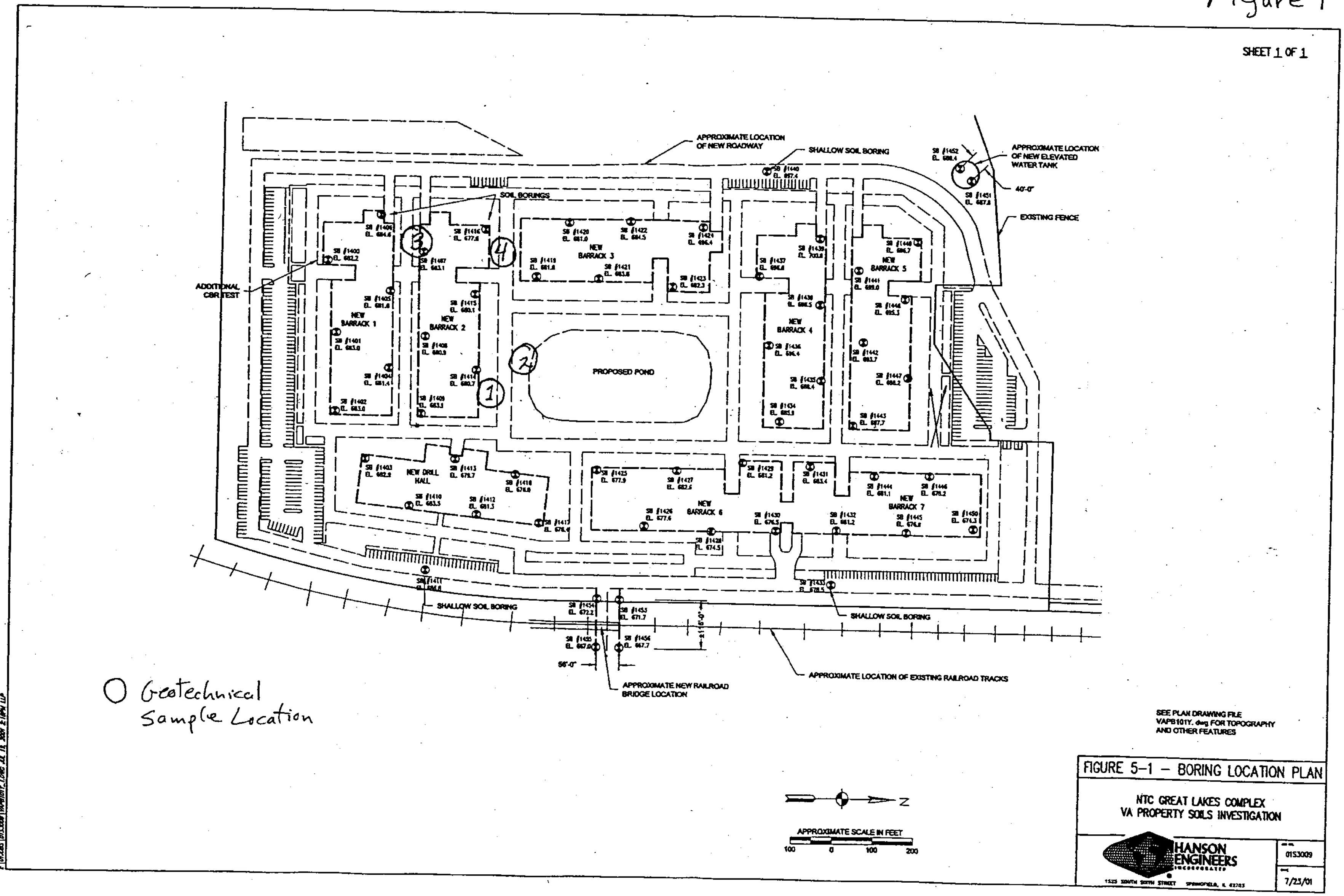
CONCLUSIONS AND RECOMMENDATIONS

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.

Figure 1



SHEET 1 OF 1
APPROXIMATE LOCATION OF NEW ROADWAY
SHALLOW SOIL BORING
APPROXIMATE LOCATION OF NEW ELEVATED WATER TANK
40'-0"
EXISTING FENCE
SOIL BORINGS
ADDITIONAL CBR TEST
NEW BARRACK 1
NEW BARRACK 2
NEW BARRACK 3
NEW BARRACK 4
NEW BARRACK 5
NEW BARRACK 6
NEW BARRACK 7
NEW DRILL HALL
PROPOSED POND
SHALLOW SOIL BORING
SHALLOW SOIL BORING
APPROXIMATE NEW RAILROAD BRIDGE LOCATION
APPROXIMATE LOCATION OF EXISTING RAILROAD TRACKS
56'-0"
1
2
3
4
O Geotechnical Sample Location
SEE PLAN DRAWING FILE VAPB101Y.dwg FOR TOPOGRAPHY AND OTHER FEATURES
APPROXIMATE SCALE IN FEET
100 0 100 200
FIGURE 5-1 – BORING LOCATION PLAN
NTC GREAT LAKES COMPLEX
VA PROPERTY SOILS INVESTIGATION
HANSON ENGINEERS
01S3009
7/23/01

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

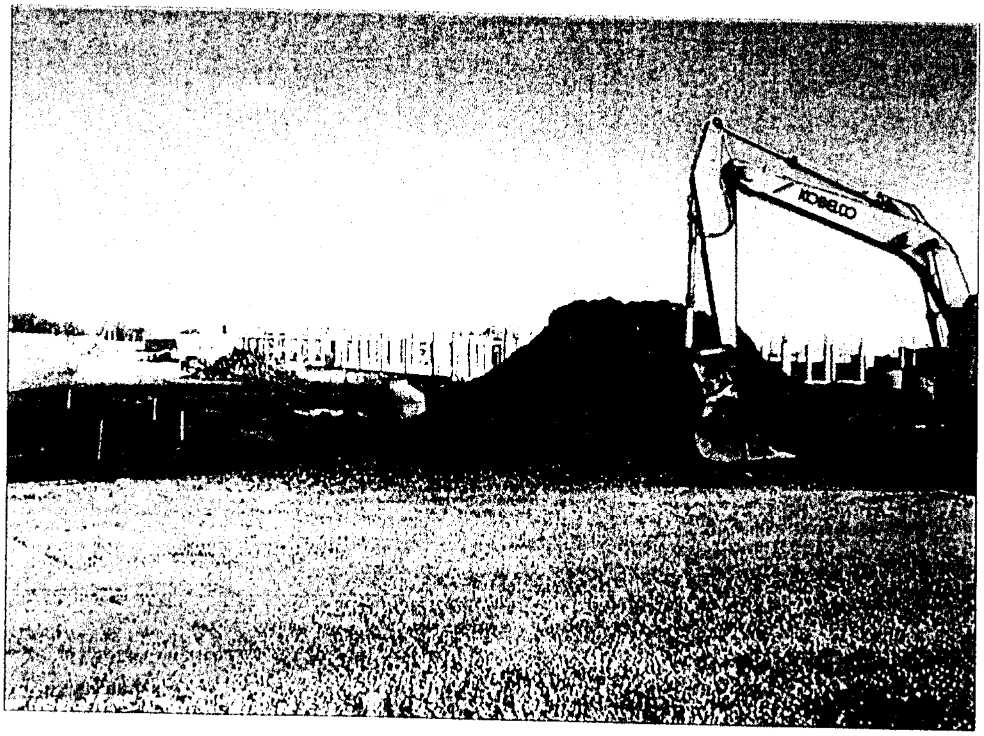


Fig. 1   Ongoing construction at the Site

Fig. 2   Ongoing construction at the Site

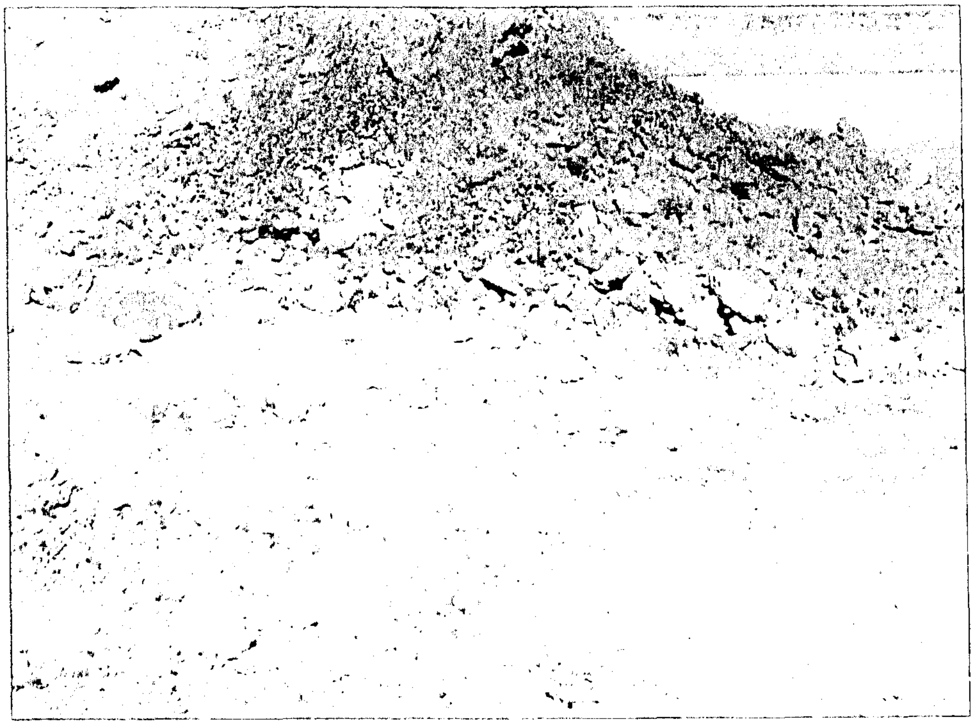


Fig. 3 Soil stockpiled at Location 1

Fig. 4 Soil stockpiled at Location 2

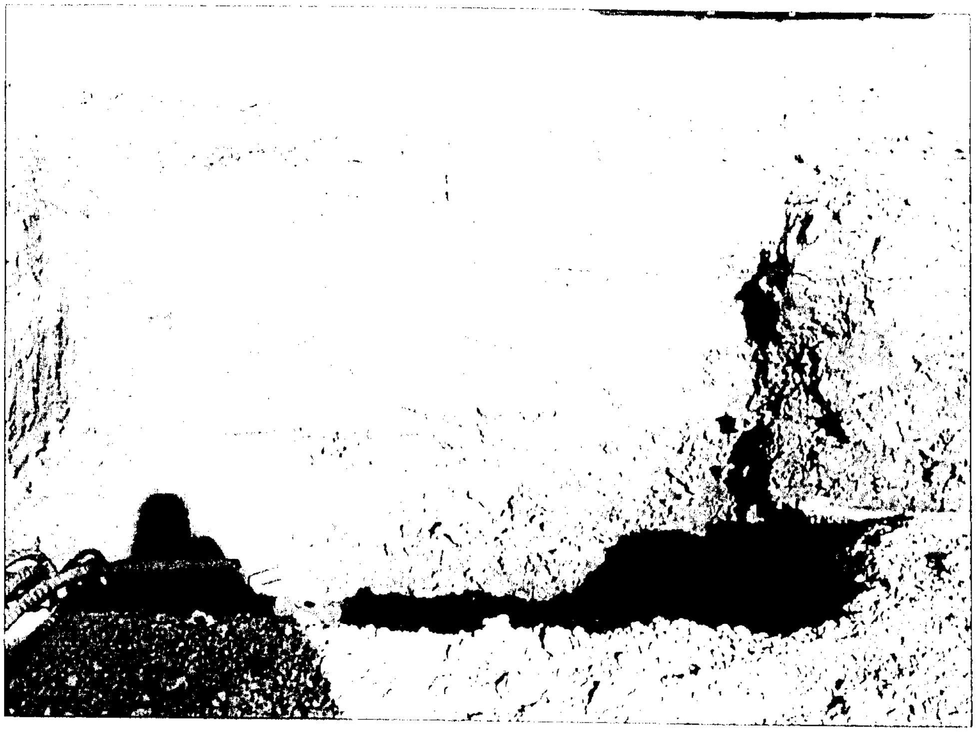


Fig. 5   Mixed soils at location 3 (test pit)

Fig. 6   Soil at Location 4 (test pit)

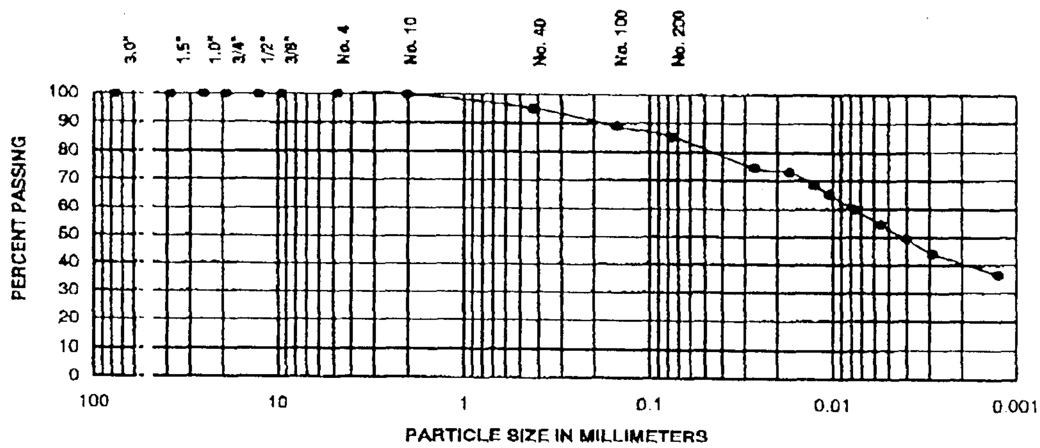
APPENDIX B

Gr at Lakes Soil & Environmental Consultants, Inc.
333 B ore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

GRAIN SIZE ANALYSIS (ASTM D422)

Project	Supply S ide Landfill						
Client	Versar, nc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	25 5	**Sample #**	Loc-1	**Date Tested**	2/14/2003	**Tested by**	NP
						Qc by	SB

Date Sample Rec ived:	2/7/2003
Sample Lo ation	#1
Sample Desc ption	Brown silty clay



% + 3"	% Gravel	% Sand	Fines: % Silt	Fines: % 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

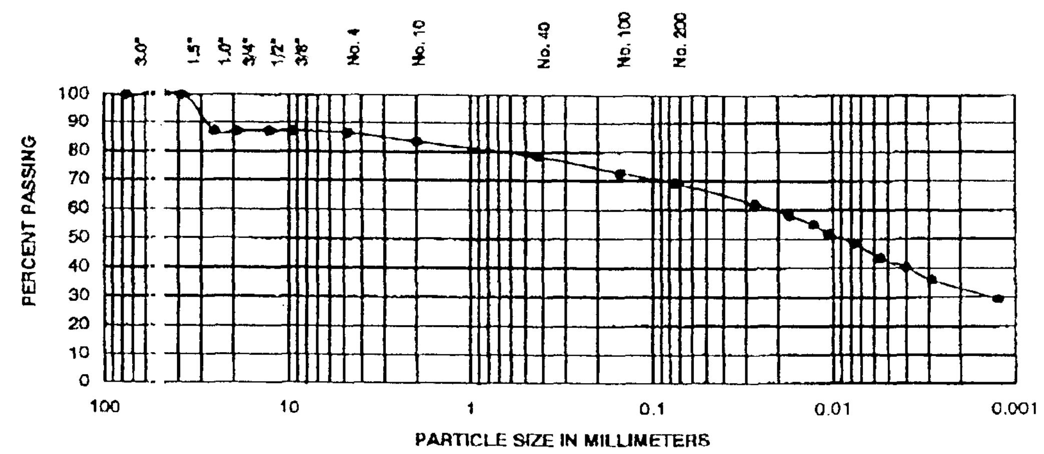
Remarks:

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.	25[illegible]5	**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



% + 3"	% Gravel	% Sand	Fines: % Silt	Fines: % 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:

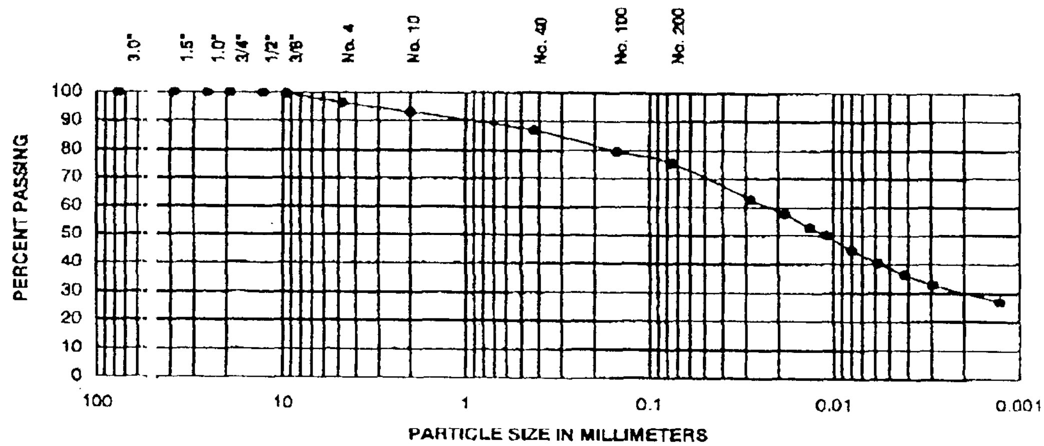
Quantity of Sample was not of required size.

Gr eat Lakes Soil & Environmental Consultants, Inc.
333 S ore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0948

GRAIN SIZE ANALYSIS (ASTM D422)

Project	Supply S ide Landfill						
Client	Versar, nc. 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File No.	25 5	**Sample #**	Loc-3	**Date Tested**	2/14/2003	**Tested by**	NP
						Qc by	SB

Date Sample Rec ived:	2/7/2003
Sample Lo ation	#3
Sample Desc ption	Brown & Gray silty clay with traces of Gravel



% + 3"	% Gravel	% Sand	Fines: % Silt	Fines: % 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

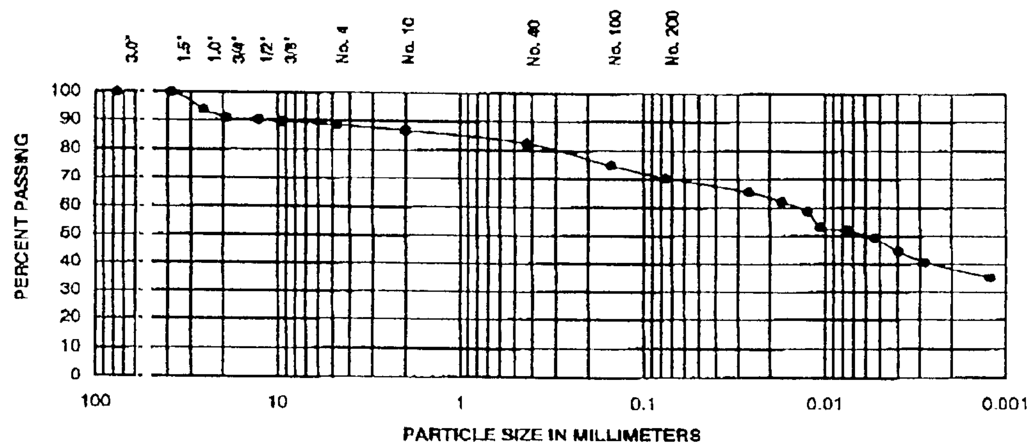
Remarks:

Great Lakes Soil & Environmental Consultants, Inc.
333 B ore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0946

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.	25[illegible]5	**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



% + 3"	% Gravel	% Sand	Fines: % Silt	Fines: % 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:

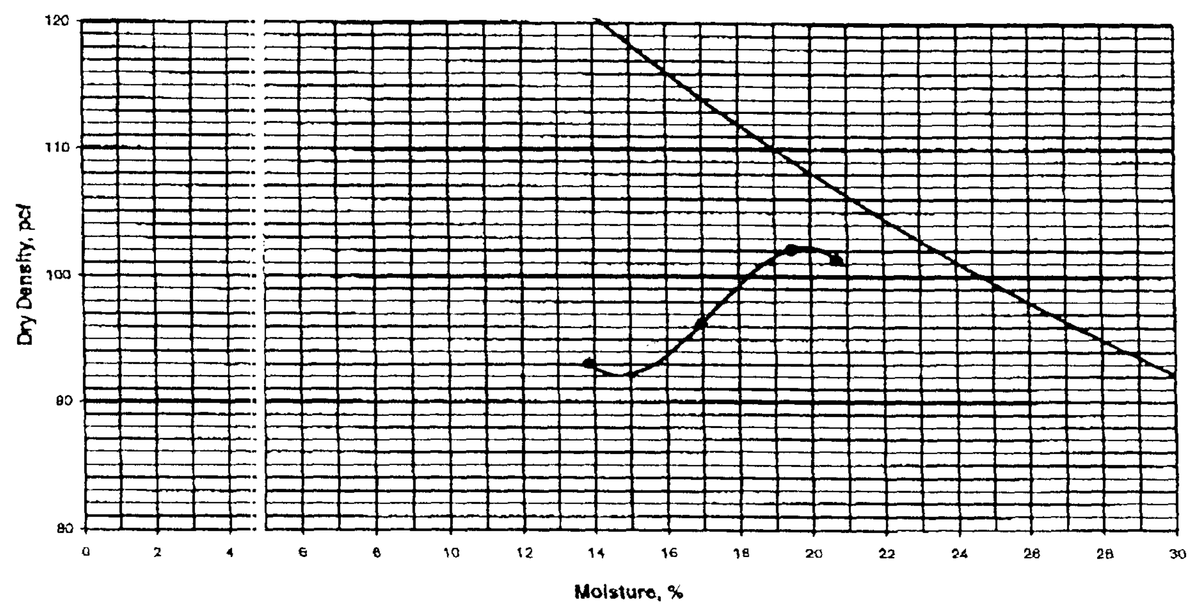
Great L: kes Soil & Environmental Consultants Inc.
333 Shore Dr /e, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

MOISTURE - DENSITY RELATIONSHIP CURVE

ASTM D698-91

Project	Supply Side Lar ifill						
Client	Versar, Inc. 200 Vest 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 si ty clay								
Type of Proctor	Standar(	**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	10: 3	**Optimum Moisture Content, %**	19.9	**Natural Moisture Content, %**	15.7
Corrected Max. Dry Density, pcf		**Corrected Optimum Moisture Content, %**			

Remarks

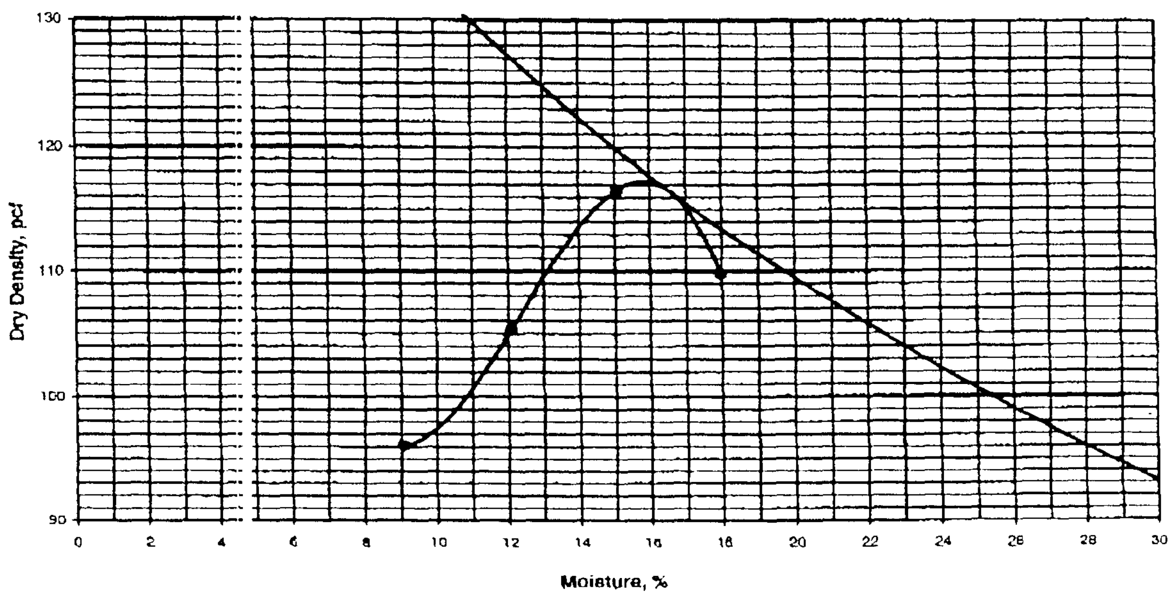
Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

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 silt / 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

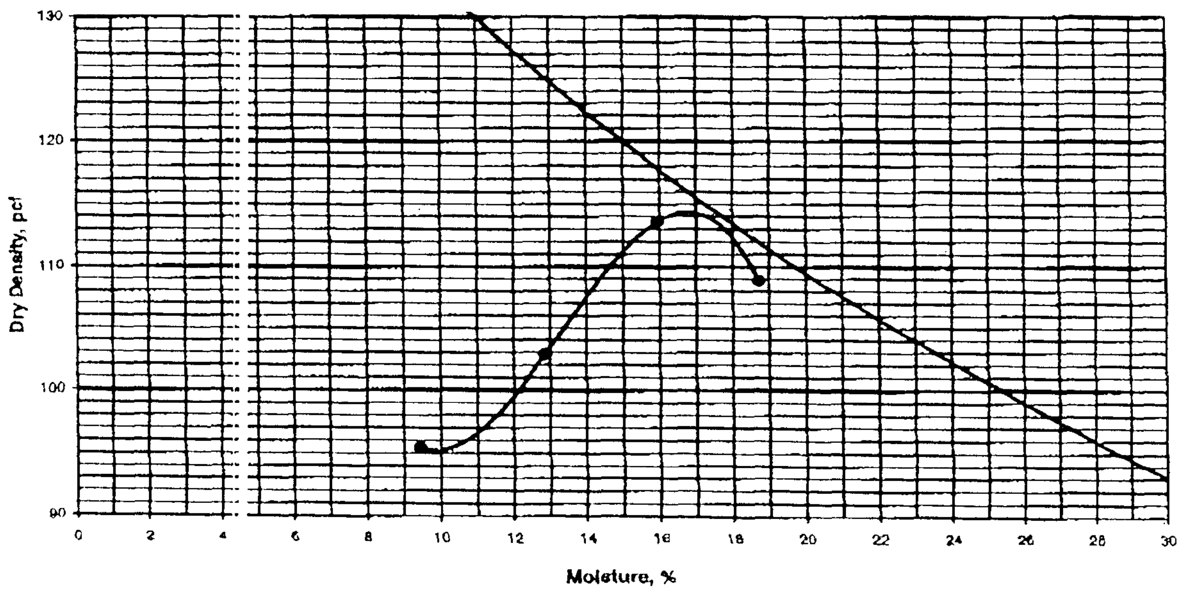
Maximum Dry Density, pcf	117.3	**Optimum Moisture Content, %**	16.0	**Natural Moisture Content, %**	4.7
Corrected Max. Dry Density, pcf		**Corrected Optimum Moisture Content, %**			

Remarks

Great Lakes Soil & Environmental Consultants Inc.	MOISTURE - DENSITY RELATIONSHIP CURVE
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	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	11[illegible].5	**Optimum Moisture Content, %**	16.7	**Natural Moisture Content, %**	15.8
Corrected Max. Dry Density, pcf		**Corrected Optimum Moisture Content, %**			

Remarks

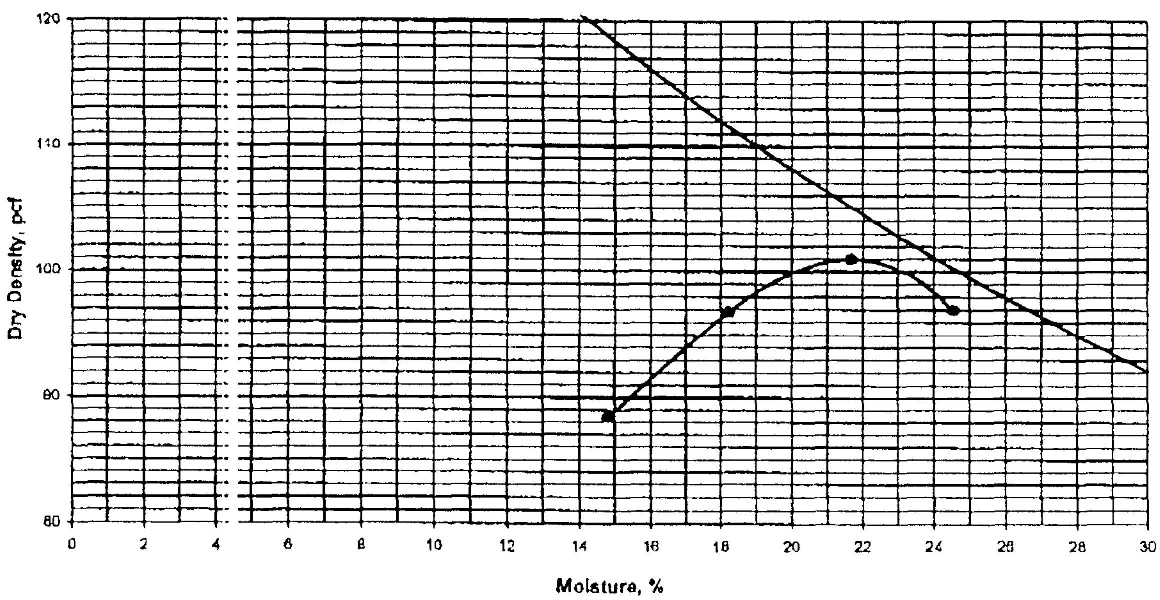
Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

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	10[illegible].0	**Optimum Moisture Content, %**	21.7	**Natural Moisture Content, %**	18.5
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

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 #	25 55	**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	111.6	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:	798.60	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:

Quality, Service & Commitment

Great L:kes Soil & Environmental Consultants, Inc
333 Shore Dr ve, 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 #	25 55	**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 L. kes Soil & Environmental Consultants, Inc
333 Shore D ve, Burr Ridge, IL 60521 Ph: (630) 321-0844 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Supply Sid · Landfill						
Client	Versar, Inc 200 West 22nd Street, Ste. 250, Lombard, IL 60148 Attn.: Mr. John Angstmann						
File #	2! 55	**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 & G ay 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 Sam ple:	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 Sam ple:	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 Pressu e	77.2 psi
Gradient:	29.5

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	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:

Appendix A. Pictures Taken at the Recruit Barracks Construction Site

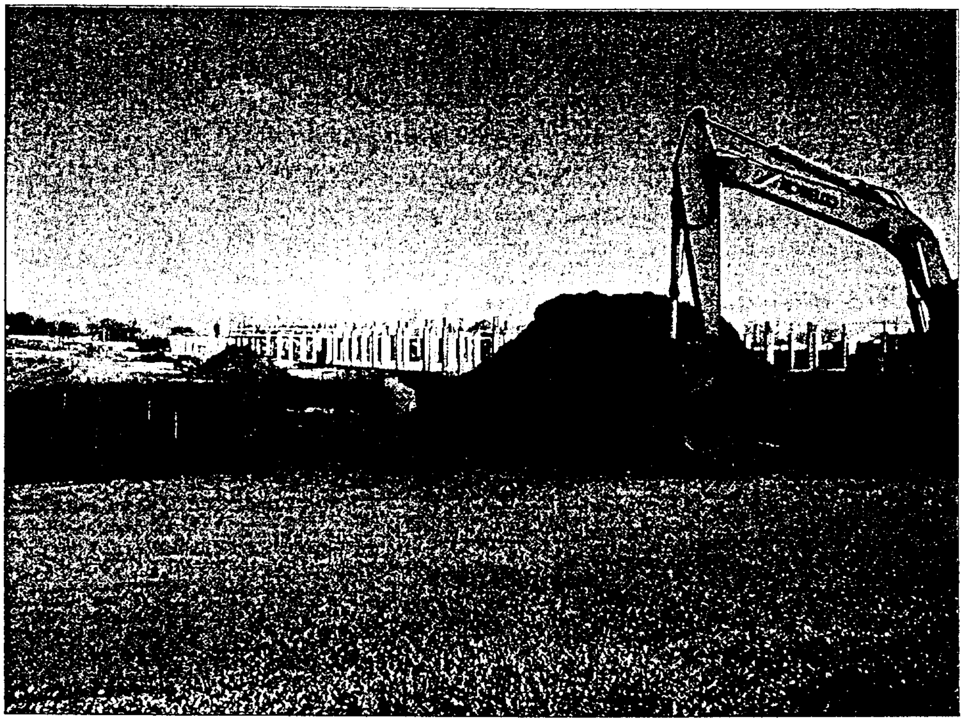


Fig. 1 Ongoing construction at the Site

Fig. 2 Ongoing construction at the Site

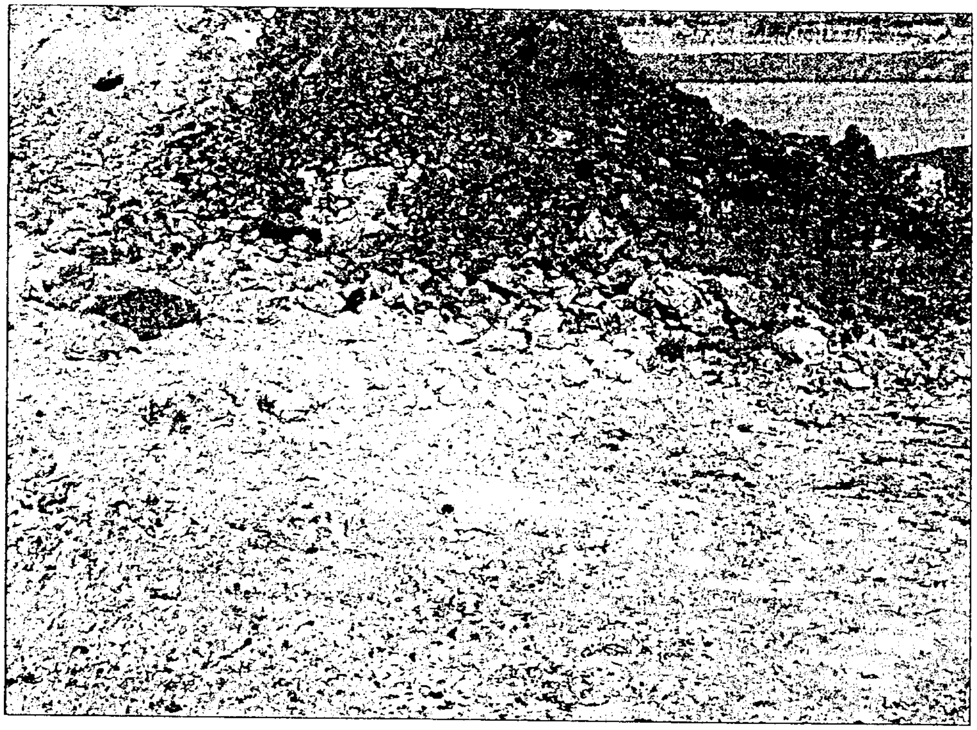


Fig. 3 Soil stockpiled at Location 1

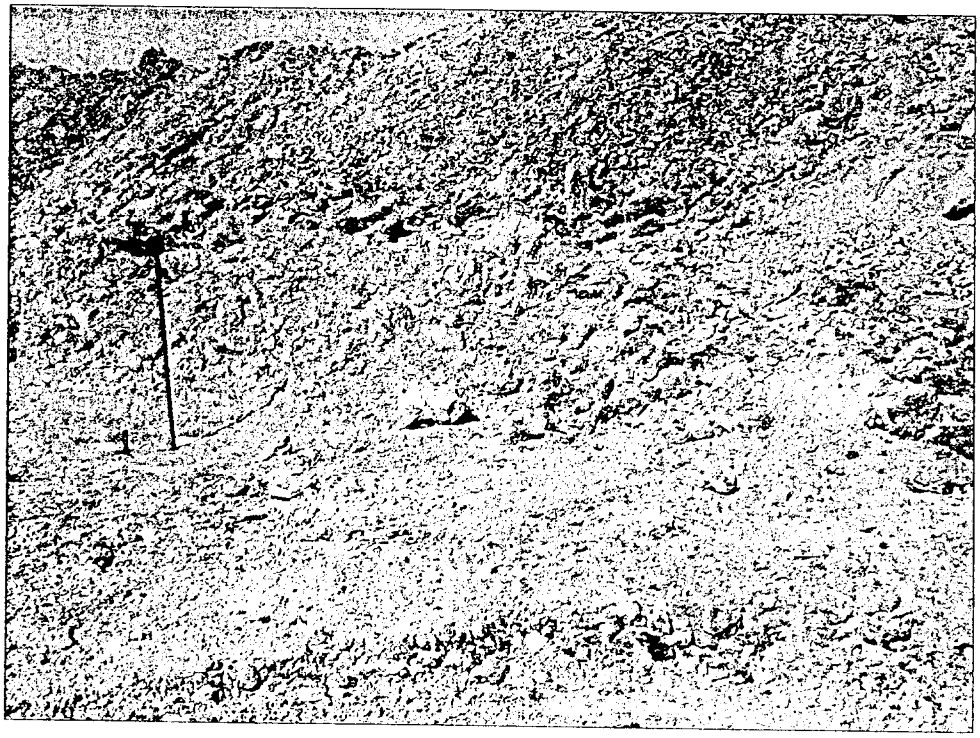


Fig. 4 Soil stockpiled at Location 2

Fig. 5 Mixed soils at location 3 (test pit)

Fig. 6 Soil at Location 4 (test pit)

APPENDIX K

CONSTRUCTION MATERIALS AND COST ESTIMATES

Construction Cost Estimate

Forrestal Landfill / Great Lakes, Illinois

ACTIVITY	QUANTITY	UNIT	UNIT COST	TOTAL
Site Preparation				
Silt fence	1,500	l.F.	$0.92	$1,380
Straw bales	480	l.F.	3.00	1,440
Temporary fence	800		21.00	16,800
Gate	1	each	515.00	515
Strip vegetation	3	acre	539.00	1,617
Haul for disposal	850	c.y.	7.95	6,758
Disposal	570	ton	25.00	14,250
			Subtotal	***$42,760***
Gas Management System				
Pea gravel	123	c.y.	$22.00	$2,706
Trenching	16	hours	93.00	1,488
6-inch diameter HDPE pipe	1,010	l.f.	2.66	2,687
Fittings	10	each	15.00	150
Sand	15	c.y.	6.56	98
Passive vent	1	each	3,000.00	3,000
			Subtotal	***$10,129***
Soil Cap				
Clay: placed and compacted	4,800	c.y.	$14.99	$71,952
Topsoil	1,900	c.y.	24.82	47,158
Moisture condition clay	4,800	c.y.	2.00	9,600
			Subtotal	***$128,710***
Drainage Structures	440	l.f.	$15.60	***$6,864***
Landscaping				
Seed and fertilizer	140	1,000 s.f.	$45.00	$6,300
Mulch	140	1,000 s.f.	9.95	1,393
Shrubs	100	each	22.00	2,200
Trees	15	each	500.00	7,500
Watering	6	each	192.00	1,152
			Subtotal	***$18,545***
TOTAL CONSTRUCTION				**$207,008**
Overhead (3.5%)				7,245
Profit (10%)				20,701
GRAND TOTAL				**$234,954**

Construction Cost Estimate

Forrestal Landfill / Great Lakes, Illinois

ACTIVITY	QUANTITY	UNIT	UNIT COST	TOTAL
Site Preparation				
Silt fence	1,500	l.F.		
Straw bales	480	l.F.		
Temporary fence	800			
Gate	1	each		
Strip vegetation	3	acre		
Haul for disposal	850	c.y.		
Disposal	570	ton		
			Subtotal	***$0***
Gas Management System				
Pea gravel	123	c.y.		
Trenching	16	hours		
6-inch diameter HDPE pipe	1,010	l.f.		
Fittings	10	each		
Sand	15	c.y.		
Passive vent	1	each		
			Subtotal	***$0***
Soil Cap				
Clay: placed and compacted	4,800	c.y.		
Topsoil	1,900	c.y.		
Moisture condition clay	4,800	c.y.		
			Subtotal	***$0***
Drainage Structures	440	l.f.		***$0***
Landscaping				
Seed and fertilizer	140	1,000 s.f.		
Mulch	140	1,000 s.f.		
Shrubs	100	each		
Trees	15	each		
Watering	6	each		
			Subtotal	***$0***
TOTAL CONSTRUCTION				**$0**
Overhead (3.5%)				0
Profit (10%)				0
GRAND TOTAL				**$0**

Construction Schedule

Total Project Duration - 13 Weeks

Forrestal Landfill / Great Lakes, Illinois

ACTIVITY	WEEK												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Navy authorizes project; Project Kick-Off Meeting													
Order materials													
Erect erosion protection, fence, and construction entrance													
Strip vegetation and grade													
Construct gas system													
Haul, spread, and grade clay													
Place topsoil; build drainage ditches													
Landscaping													
Demobilization													

Clayton
GROUP SERVICES

APPENDIX L

HDPE PIPE SPECIFICATIONS

Product Notes

Product Note 3.120
Re: Specification for Single Wall Corrugated Polyethylene Pipe
Date: February 2000

This specification applies to high density corrugated polyethylene pipe, Type C. Nominal sizes for which this specification is acceptable are 75 – 600 mm (3 – 24 inch) diameters. Requirements for test methods, dimensions and markings are found in AASHTO designation M-252 and M-294.

Pipe and fittings shall be made of virgin PE compounds that conform with the requirements of cell classification 335420C as defined and described in ASTM D-3350. Compounds that have higher cell classifications in one or more properties are acceptable provided product requirements are met.

The minimum parallel plate stiffness values when tested in accordance with D-2412 shall be as follows:

Diameter (nominal)	Pipe Stiffness (minimum)	Diameter (nominal)	Pipe Stiffness (minimum)
75 mm (3")	240 kN/m^2 (35 pii)	250 mm (10")	240 kN/m^2 (35 pii)
100 mm (4")	240 kN/m^2 (35 pii)	300 mm (12")	345 kN/m^2 (50 pii)
125 mm (5")	240 kN/m^2 (35 pii)	375 mm (15")	290 kN/m^2 (42 pii)
150 mm (6")	240 kN/m^2 (35 pii)	450 mm (18")	275 kN/m^2 (40 pii)
200 mm (8")	240 kN/m^2 (35 pii)	600 mm (24")	235 kN/m^2 (34 pii)

The pipe and fittings shall be free of foreign inclusions and visible defects. For pipe sizes 300 mm (12 inch) diameter and greater, designed drainage perforations shall be permitted in corrugation valleys only. All holes of any kind in the corrugation crests or sidewalls shall be considered unacceptable. Standard perforations for 75 - 250 mm (3 - 10 inch) shall be AASHTO M-252 Class 2 and for 300 - 600 mm (12 - 24 inch) shall be AASHTO M-294 Class 2. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.

The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings may be either molded or fabricated by the manufacturer. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without approval of the Project Engineer.

Joints for 75 – 150 mm (3 – 6 inch) shall be made with snap couplings. Joints for 200 – 600 mm (8 – 24 inch) shall be made with split couplings to engage the pipe corrugations.

Installation shall be in accordance with ASTM Recommended Practice D-2321 or as specified by the Project Engineer or local approval agency.

A manufacturer's certification that the product was manufactured, tested and supplied in accordance with this specification shall be furnished to the Project Engineer upon request.

ADS SINGLE WALL PRODUCT INFORMATION SHEET

Nominal Diameter	Inside Diameter, Average	Outside Diameter, Average	Minimum Pipe Stiffness @ 5% Deflection	Weight kg./6m (lbs./20 ft.)	Area mm^2/mm	"I" cm^4/cm	"C" mm
75 mm	79 mm	93 mm	240 kN/m^2	1.97 kg	1.88	0.0066	2.97
(3")	(3.12")	(3.66")	35 psi	(4.40 lbs)	(0.074 in^2/in)	(0.0004 in^4/in)	(0.117 in)
100 mm	102 mm	120 mm	240 kN/m^2	2.81 kg	2.06	0.0169	4.29
(4")	(4.03")	(4.71")	35 psi	(6.30 lbs)	(0.081 in^2/in)	(0.001 in^4/in)	(0.169 in)
125 mm	127 mm	148 mm	240 kN/m^2	4.43 kg	2.34	0.0229	4.78
(5")	(4.99")	(5.81")	35 psi	(9.90 lbs)	(0.092 in^2/in)	(0.0014 in^4/in)	(0.188 in)
150 mm	151 mm	176 mm	240 kN/m^2	6.39 kg	3.15	0.0459	6.22
(6")	(5.95")	(6.92")	35 psi	(14.30 lbs)	(0.124 in^2/in)	(0.0028 in^4/in)	(0.245 in)
200 mm	207 mm	240 mm	240 kN/m^2	11.02 kg	3.25	0.1082	8.08
(8")	(8.14")	(9.45")	35 psi	(24.60 lbs)	(0.128 in^2/in)	(0.0066 in^4/in)	(0.318 in)
250 mm	255 mm	300 mm	240 kN/m^2	16.23 kg	3.48	0.1966	11.20
(10")	(10.05")	(11.83")	35 psi	(36.30 lbs)	(0.137 in^2/in)	(0.0120 in^4/in)	(0.441 in)
300 mm	306 mm	366 mm	345 kN/m^2	26.56 kg	5.23	0.5211	15.88
(12")	(12.04")	(14.41")	50 psi	(59.40 lbs)	(0.206 in^2/in)	(0.0318 in^4/in)	(0.625 in)
375 mm	378 mm	444 mm	290 kN/m^2	36.39 kg	4.67	0.5440	14.86
(15")	(14.87")	(17.49")	42 psi	(81.40 lbs)	(0.184 in^2/in)	(0.0332 in^4/in)	(0.585 in)
450 mm	454 mm	534 mm	275 kN/m^2	53.51 kg	6.22	1.062	20.02
(18")	(17.86")	(21.04")	40 psi	(119.70 lbs)	(0.245 in^2/in)	(0.0648 in^4/in)	(0.788 in)
600 mm	600 mm	699 mm	235 kN/m^2	100.33 kg	8.99	2.161	25.38
(24")	(23.61")	(27.50")	34 psi	224.40 lbs	(0.354 in^2/in)	(0.1318 in^4/in)	(0.999 in)

Date: June 2000

Product Notes

Product Note 3.106
Re: Standard Pipe Perforations (4"-60" N-12 Pipe)
Date: November 2001

Introduction
Perforated pipe plays an integral role in many applications of ADS HDPE pipe. Generally, perforated pipe is used to accelerate the removal of subsurface water in soils or to allow storm water to percolate into the soil. Currently, two classifications of perforations are specified in the AASHTO material specifications for HDPE pipe; Class I, and Class II. Class I perforations are commonly used in combination storm/underdrain systems while Class II incorporates leach fields and detention/retention systems. Both classes are explained in more detail in the AASHTO materials specifications (M294, M252 and MP7). AASHTO M252 covers pipe size 3 - 10 inch (75 - 250 mm) while M294 covers 12 – 48 inch (300 - 1200 mm). Currently a provisional specification, MP7 covers 54 - 60 inch (1350 - 1500 mm) pipe. ADS manufactures pipe to meet the perforations specified for the project using the patterns indicated as follows.

ADS STANDARD PERFORATION PATTERN (AASHTO Class II Perforation)
The following terminology for perforations is derived from the applicable AASHTO specification. Differences between the specifications are covered in Table I. The perforations shall be circular and/or slotted. The perforations shall be located in the outside valleys of the corrugations. The water inlet area shall be no less than 0.94 in^2/ft (20 cm^2/m) for pipe sizes 4 - 10 inch (100 - 250mm), 1.42 in^2/ft (30 cm^2/m) for pipe sizes 12 - 18 inch (300 - 450 mm) and 1.89 in^2/ft (40 cm^2/m) for pipe sizes larger than 24 inches (450 mm). Table I and the figure A below represent ADS standard perforation patterns for AASHTO Class II. Patterns indicated with an asterisk are a made to order product and should allow for additional lead-time when ordering.

Table I

Nominal I.D.		Perforation Type	Slot Length or Diameter		Slot Width		Perforation Config	Nominal Inlet Area	
In	mm		in	mm	in	mm		in^2/ft	cm^2/m
*4	100	Slot	0.875	22.2	0.125	3.18	CD	5.97	126.28
*6	150	Slot	0.875	22.2	0.125	3.18	CD	5.11	108.24
*8	200	Slot	1.25	31.8	0.125	3.18	CD	5.86	124.03
*10	250	Slot	1.25	31.8	0.125	3.18	CD	4.46	94.50
12	300	Circular	0.375	9.52	-	-	E	4.14	87.62
15	375	Circular	0.375	9.52	-	-	E	3.07	64.96
18	450	Circular	0.375	9.52	-	-	E	2.97	62.78
24	600	Circular	0.375	9.52	-	-	F	3.36	71.21
30	750	Circular	0.375	9.52	-	-	H	5.14	108.89
36	900	Circular	0.375	9.52	-	-	H	4.12	87.28
*42 Type S	1050	Circular	0.375	9.52	-	-	H	4.04	88.45
*42 Type D	1050	Circular	0.375	9.52	-	-	**F	2.12	44.86
*48 Type S	1200	Circular	0.375	9.52	-	-	H	4.04	85.45
*48 Type D	1200	Circular	0.375	9.52	-	-	**F	2.12	44.86
*60 Type S	1500	Circular	0.375	9.52	-	-	H	3.43	72.60
*60 Type D	1500	Circular	0.375	9.52	-	-	**F	1.93	40.78

* Denotes perforation pattern made to order
** Spaced at 5" longitudinally for 42" and 48" and 5.5" longitudinally for 60" diameter

AASHTO Class I Perforation

The following terminology is derived from the applicable AASHTO specification. ADS manufactures 12 - 24 inch (300 – 600 mm) Class I perforation as a standard product (ADS designation 'C' perforation), however, other sizes may be ordered as a made to order with sufficient lead time. The perforations shall be approximately circular and arranged in rows parallel to the axis of the pipe. The locations of the perforations shall be in the valley of the outside corrugation and also in each corrugation. The perforations shall be arranged in two equal groups placed symmetrically on either side of the lower half of the pipe. Please note that certain perforation patterns are not available in various parts of the United States. **Please contact your local ADS representative for availability and ordering of class I perforations.**

TABLE II

Nominal I.D.		Min. No. of Rows of Perforations	Perforation Hole Diameter		"H" Maximum		"L" Minimum		Nominal Inlet Area	
in	mm		in	mm	in	mm	in	mm	in^2/ft	cm^2/m
*4	100	2	0.375	9.5	1.8	45	2.6	65	4.01	84.97
*6	150	4	0.375	9.5	2.8	70	3.8	95	6.88	145.66
*8	200	4	0.375	9.5	3.8	94	5.2	130	5.52	116.83
*10	250	4	0.375	9.5	4.8	120	6.4	160	4.21	89.01
12	300	6	0.375	9.5	5.5	138	8.7	218	4.14	87.62
15	375	6	0.375	9.5	6.9	173	10.6	265	3.07	64.96
18	450	6	0.375	9.5	8.3	208	12.5	313	2.97	62.78
24	600	6	0.375	9.5	11.0	276	15.4	384	2.52	53.41
*30	750	8	0.375	9.5	13.8	345	19.2	480	2.57	54.45
*36	900	8	0.375	9.5	16.6	414	23.0	576	2.06	43.64
*42 Type S	1050	8	0.375	9.5	19.3	483	26.9	672	2.02	42.73
*42 Type D	1050	**8	0.375	9.5	19.3	483	26.9	672	2.12	44.86
*48 Type S	1200	8	0.375	9.5	22.1	552	30.7	768	2.02	42.73
*48 Type D	1200	**8	0.375	9.5	22.1	552	30.7	768	2.12	44.86
*60 Type S	1500	8	0.375	9.5	27.6	690	38.4	960	1.72	36.41
*60 Type D	1500	**8	0.375	9.5	27.6	690	38.4	960	1.93	40.78

* Denotes perforation pattern made to order

** Spaced at 5" longitudinally for 42" and 48" and 5.5" longitudinally for 60" diameter

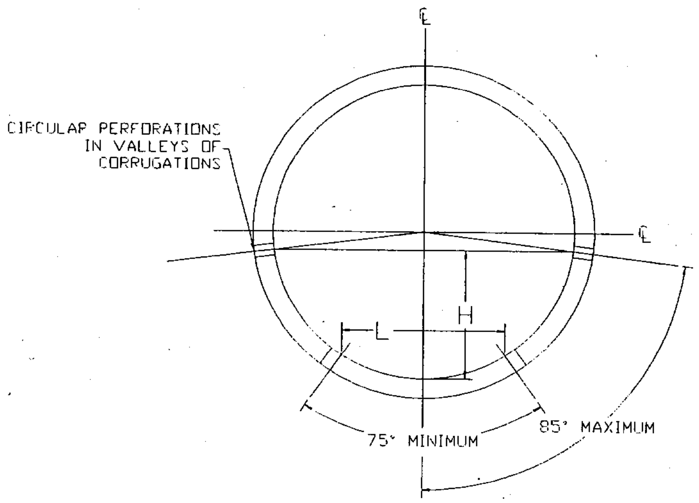
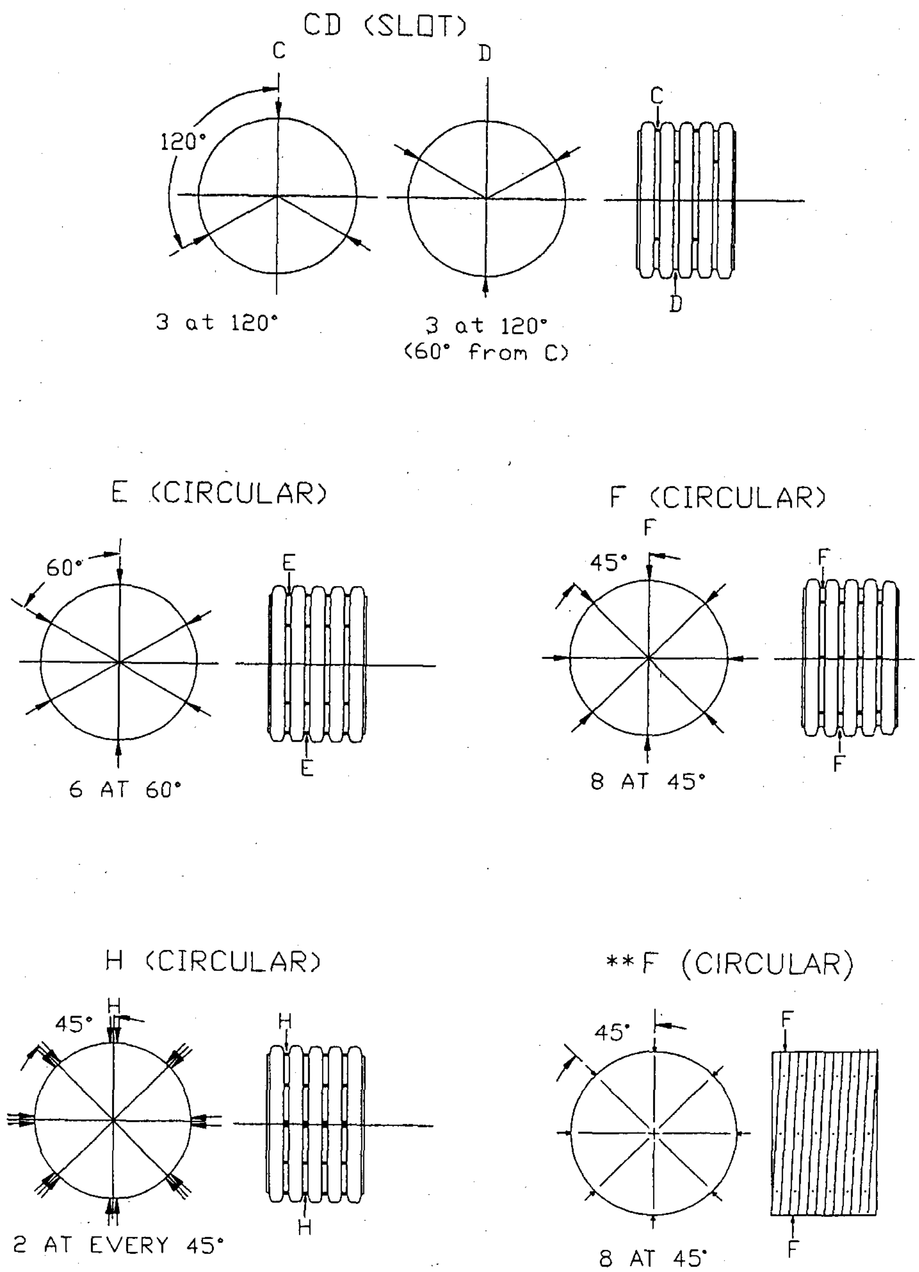


Figure B – Class I Requirements for Perforations

Figure A — Class II Perforation Configurations

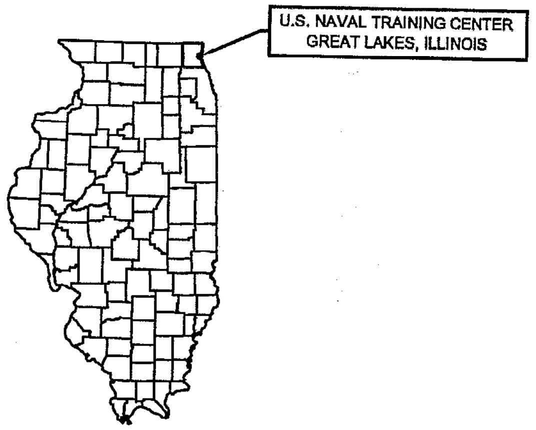


APPENDIX B

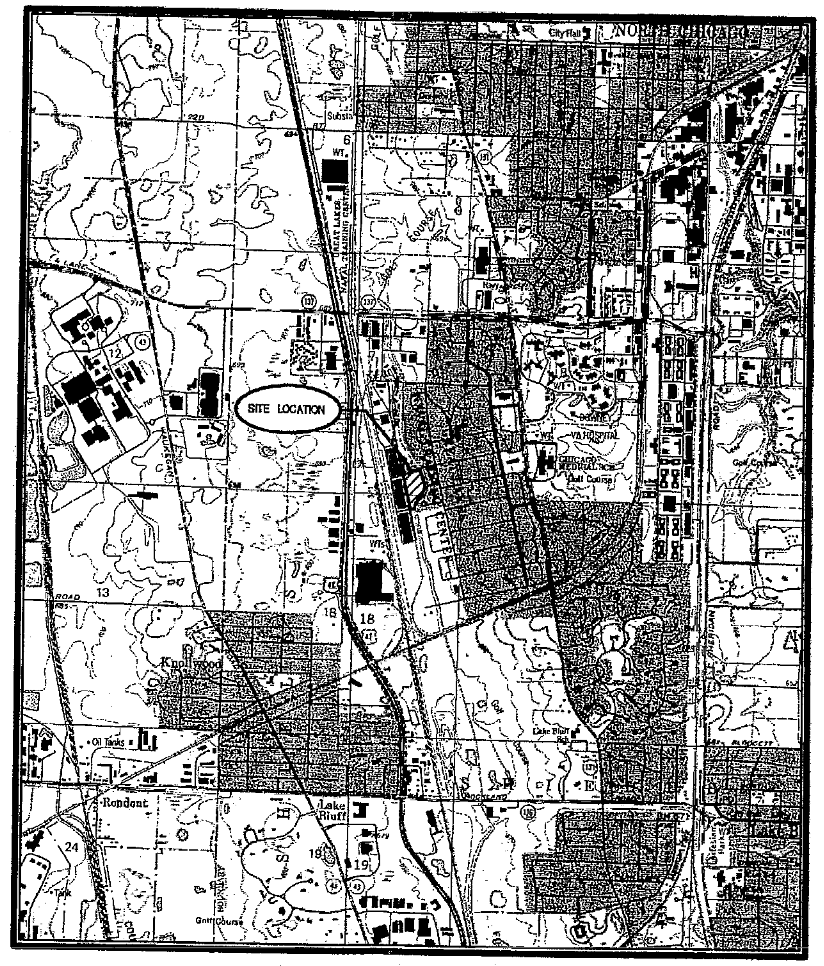
PROJECT DRAWINGS

DESIGN PLAN FOR
FINAL LANDFILL CAP IMPROVEMENTS

UNITED STATES NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS



SITE LOCATION MAP



SCHEDULE OF DRAWINGS:

1. COVER SHEET
2. EXISTING TOPOGRAPHY AND EROSION CONTROL PLAN
3. SOIL INVESTIGATION
4. LANDFILL CAP DESIGN - FINISH GRADING AND SURFACE DRAINAGE PLAN
5. LANDFILL CROSS SECTIONS - EAST TO WEST
6. LANDFILL CROSS SECTIONS - NORTH TO SOUTH
7. GAS MANAGEMENT SYSTEM PLAN
8. END USE AND VEGETATION PLAN
9. CAP CROSS SECTION AND CONSTRUCTION DETAILS

Order No. N68950-02-M-5172

Clayton℠ GROUP SERVICES
3140 Finley Road • Downers Grove, Illinois 60515 • 630 795 3240

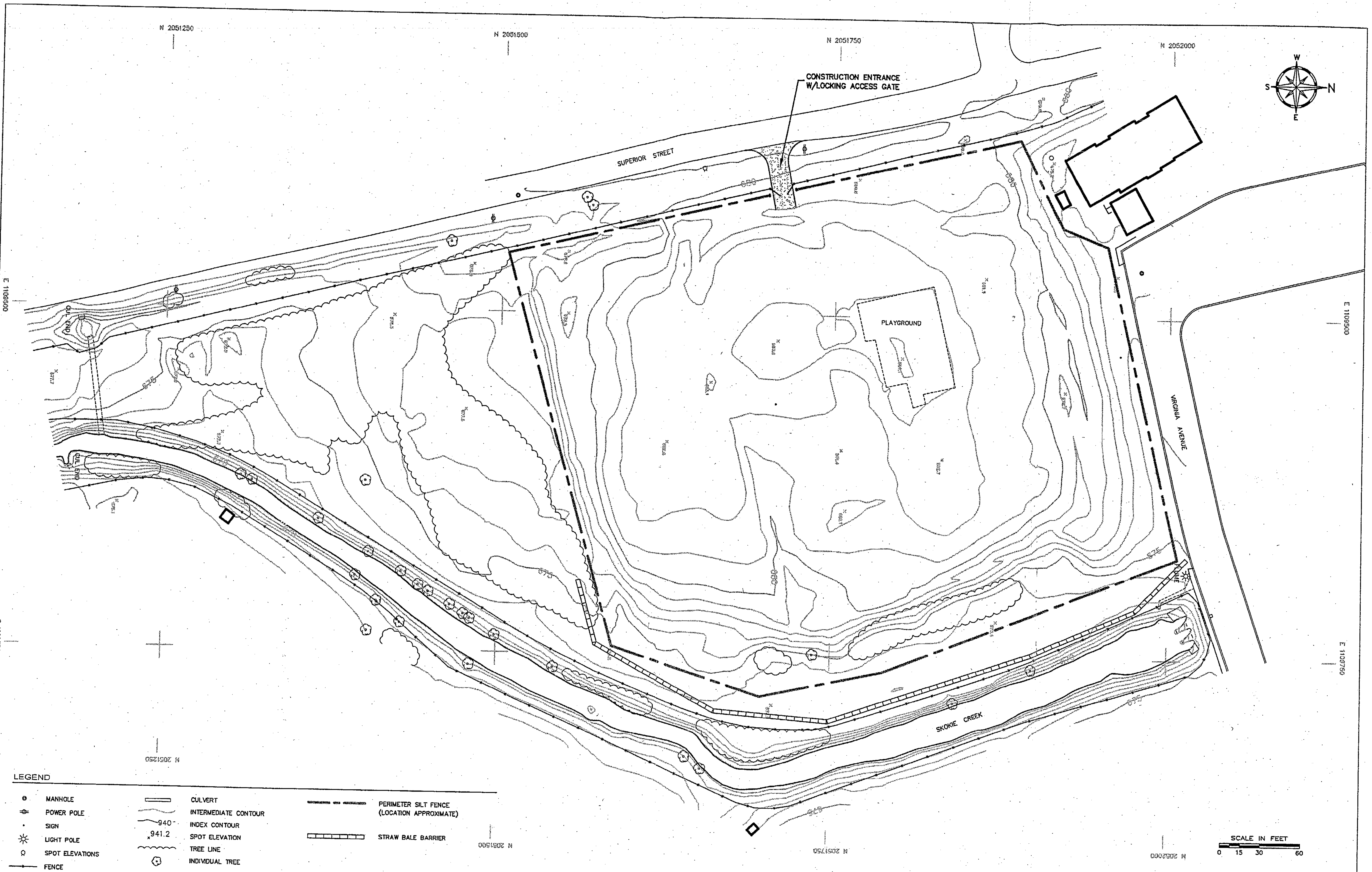
United States Department of the Navy
Naval Facilities Engineering Command
Naval Training Center
Great Lakes, Illinois

ENGINEERS' SEAL

COVER SHEET
FORRESTAL LANDFILL CAP IMPROVEMENTS
LAKE COUNTY
GREAT LAKES, ILLINOIS

PLATE
C-1

SHEET
1 of 9



LEGEND

	MANHOLE		CULVERT		PERIMETER SILT FENCE (LOCATION APPROXIMATE)
	POWER POLE		INTERMEDIATE CONTOUR		
	SIGN	940	INDEX CONTOUR		STRAW BALE BARRIER
	LIGHT POLE	941.2	SPOT ELEVATION		
	SPOT ELEVATIONS		TREE LINE		
	FENCE		INDIVIDUAL TREE		
		W.E. 935.4	WATER/STREAM		

NOTES:

1. EXISTING TOPOGRAPHY BY MARTINEZ CORP. FROM AERIAL PHOTOGRAPH DATED DECEMBER, 2002.

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

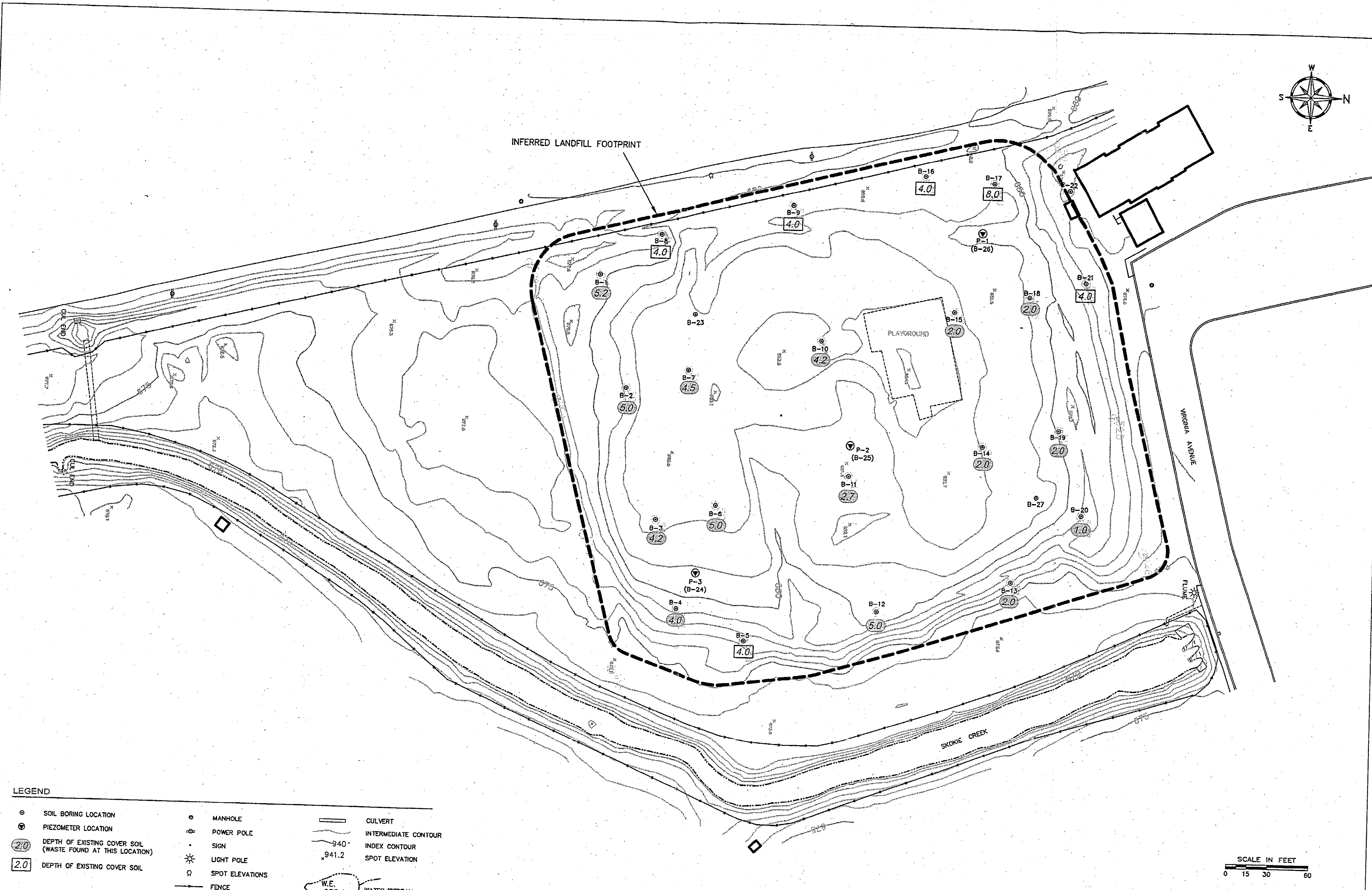
DESIGN BY:	JJR
CHECKED BY:	JJR
DRAWN BY:	BCP
DATE:	1-15-03
SCALE:	AS SHOWN
CAD NO.:	03042002B-rev2
PROJECT NO.:	15-03042

Clayton GROUP SERVICES

EXISTING TOPOGRAPHY
AND EROSION PLAN

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE
C-2
SHEET
2 of 9



NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY: JJR
CHECKED BY: JJR
DRAWN BY: BCP
DATE: 1-15-03
SCALE: AS SHOWN
CAD NO.: 03042002C-rev2
PROJECT NO.: 15-03042

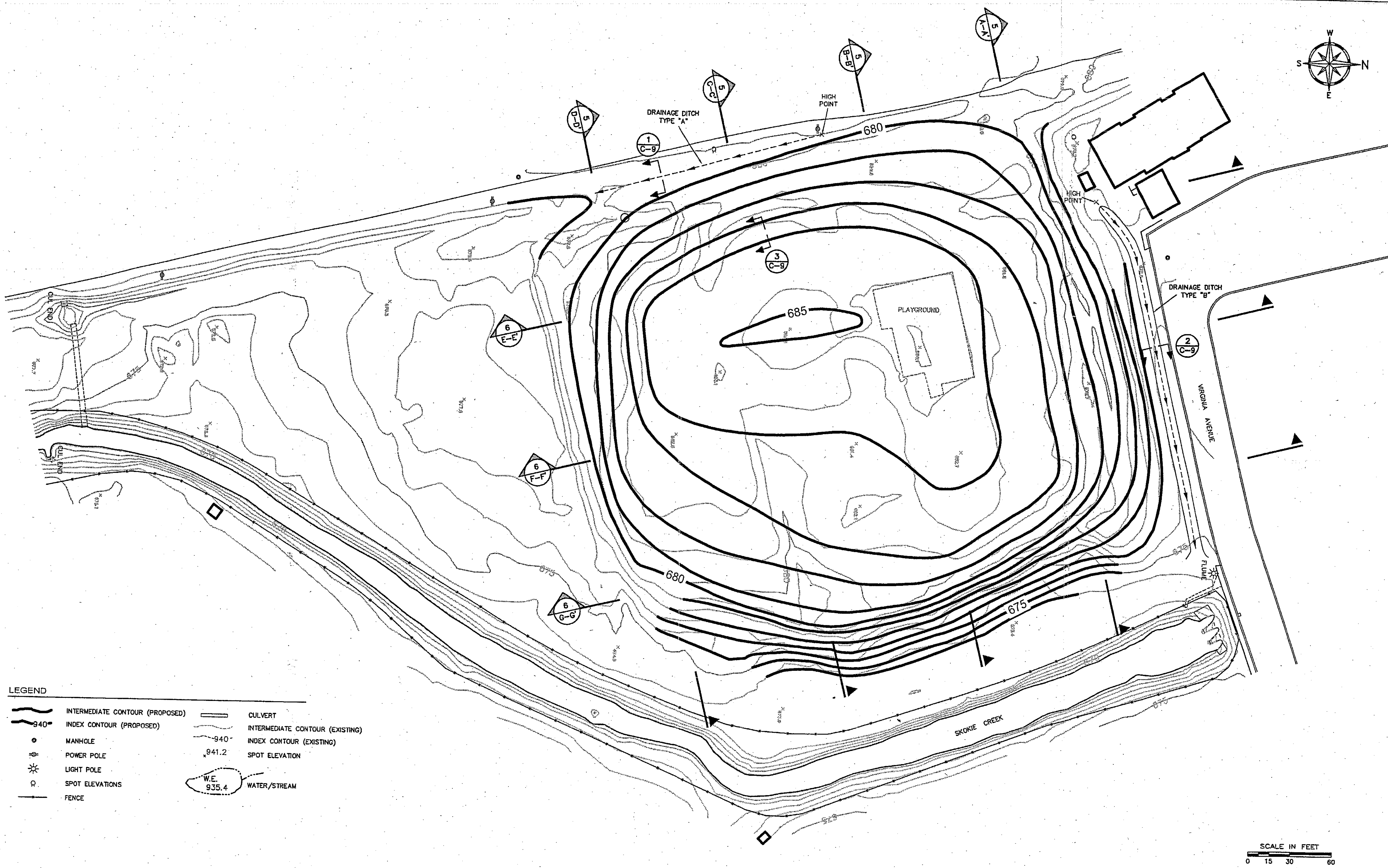
Clayton GROUP SERVICES

SOIL INVESTIGATION MAP

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE C-3

SHEET 3 of 9



LEGEND

	INTERMEDIATE CONTOUR (PROPOSED)		CULVERT
940	INDEX CONTOUR (PROPOSED)		INTERMEDIATE CONTOUR (EXISTING)
	MANHOLE	940	INDEX CONTOUR (EXISTING)
	POWER POLE	x941.2	SPOT ELEVATION
	LIGHT POLE	W.E. 935.4	WATER/STREAM
	SPOT ELEVATIONS		
	FENCE		

NOTES:

1. EXISTING PLAYGROUND TO BE DISMANTLED AND REMOVED.
2. RECREATION FACILITIES AND FOOTPATH BY OTHERS.

NO.	DATE	BY	REVISIONS
2	2-20-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

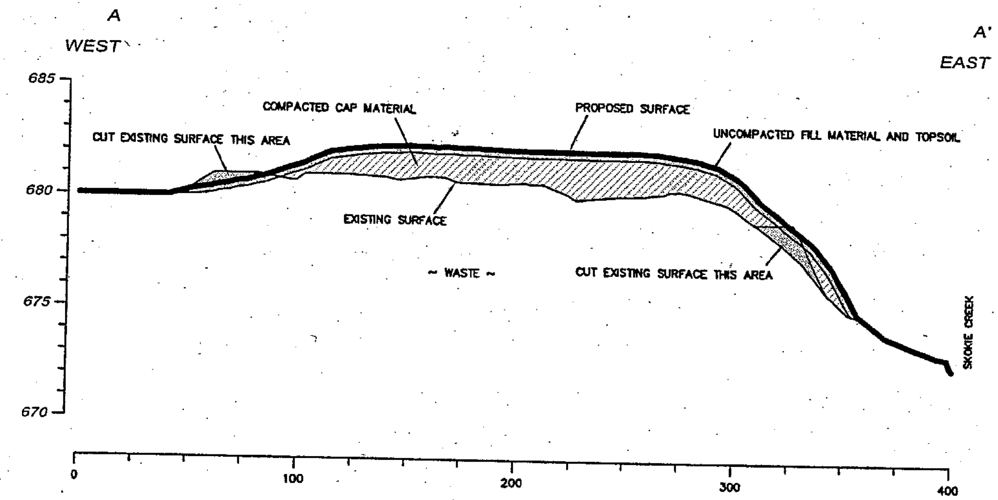
DESIGN BY: JJR
CHECKED BY: JJR
DRAWN BY: BCP
DATE: 1-15-03
SCALE: AS SHOWN
CAD NO.: 03042002D-rev2
PROJECT NO.: 15-03042

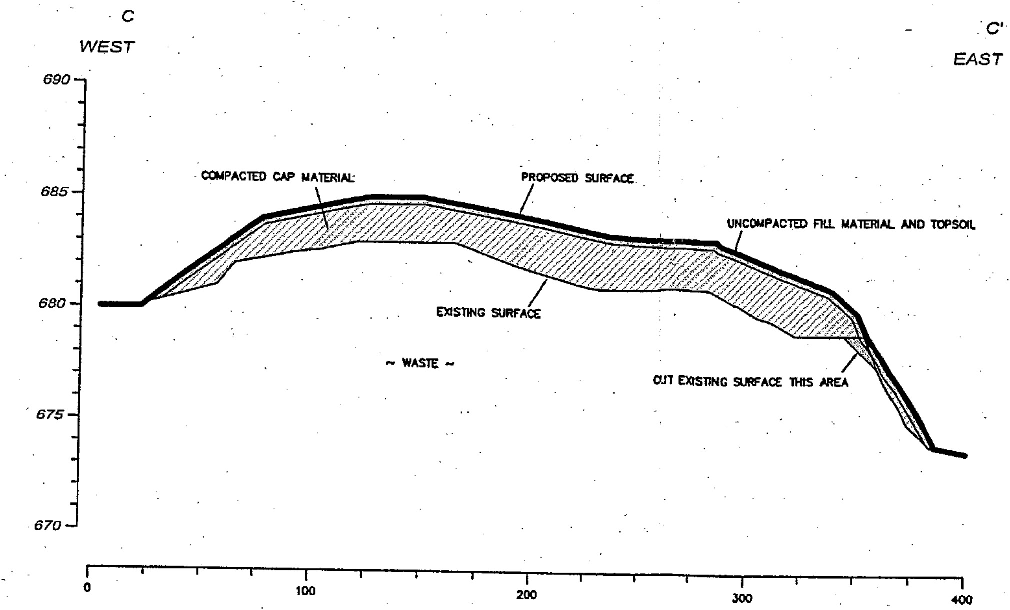
Clayton GROUP SERVICES

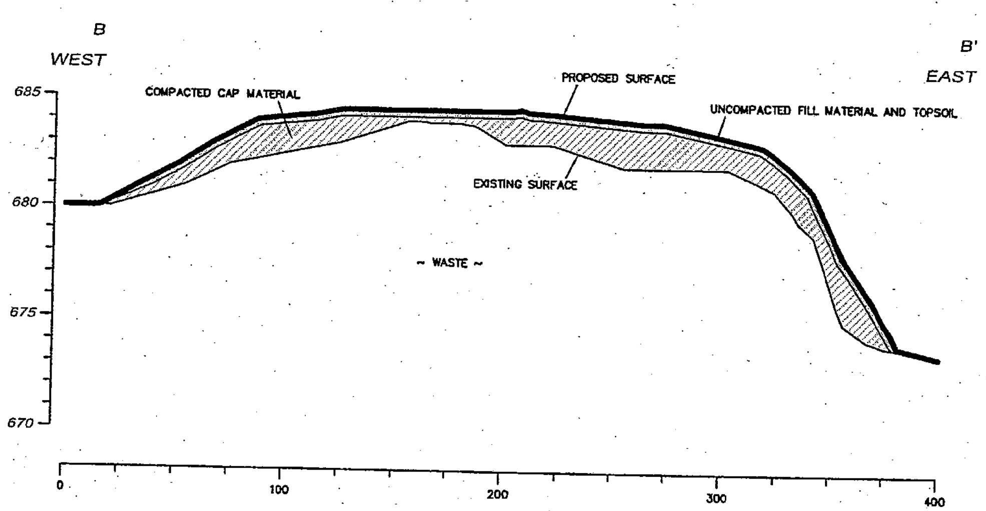
LANDFILL CAP DESIGN
FINISH GRADING
AND SURFACE DRAINAGE PLAN
U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

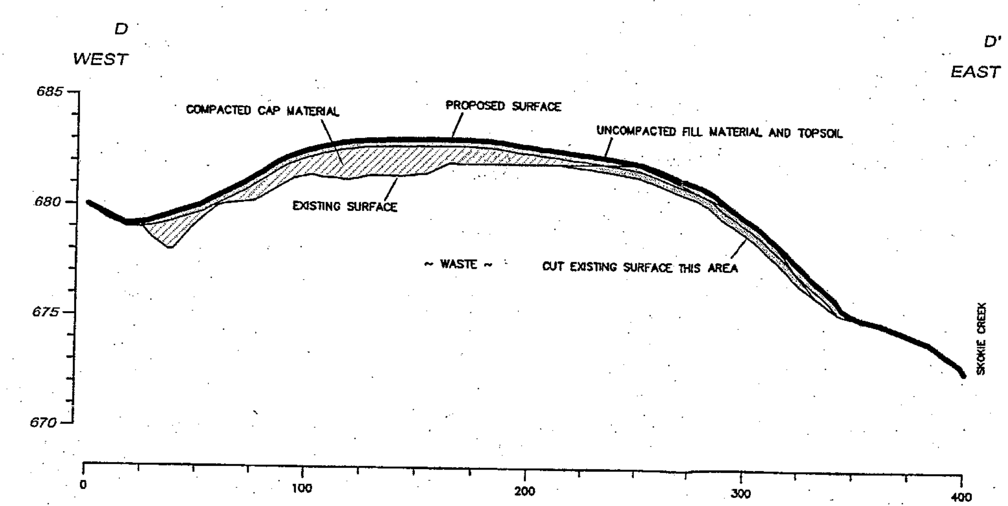
PLATE C-4

SHEET 4 of 9









SCALE IN FEET
0 20 40 80
VERTICAL EXAGGERATION: 10x

NOTE: "EXISTING SURFACE" IS NOT TOP OF WASTE. APPROXIMATE DEPTHS OF EXISTING COVER SOIL ARE SHOWN ON SHEET C-3.

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY: JJR
CHECKED BY: JJR
DRAWN BY: BCP
DATE: 2-28-03
SCALE: AS SHOWN
CAD NO.: 03042002H-rev2
PROJECT NO.: 15-03042

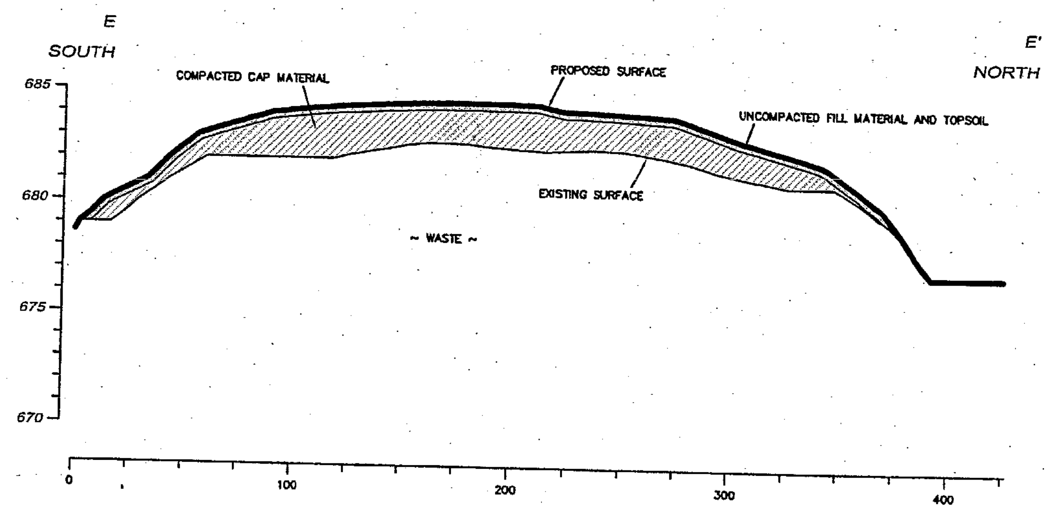
Clayton GROUP SERVICES

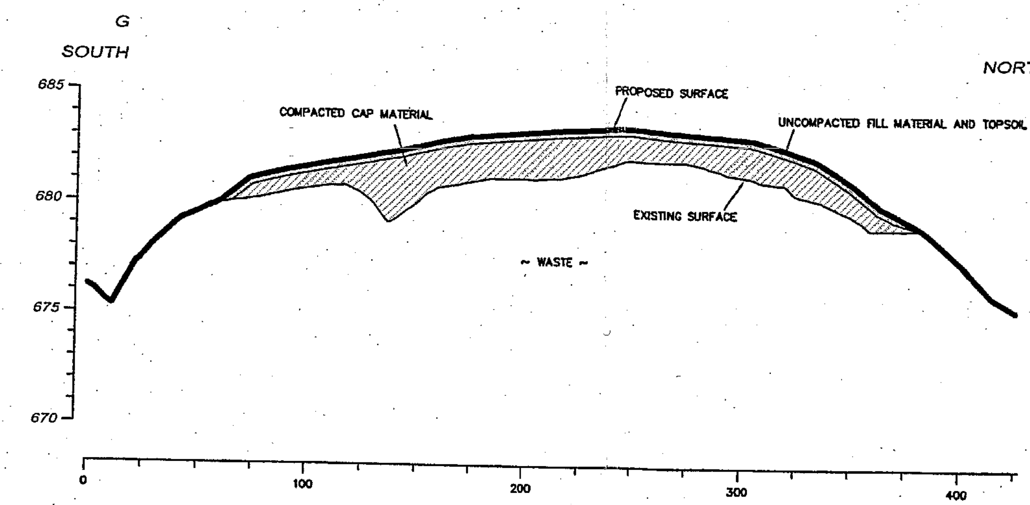
LANDFILL CROSS SECTIONS
EAST TO WEST

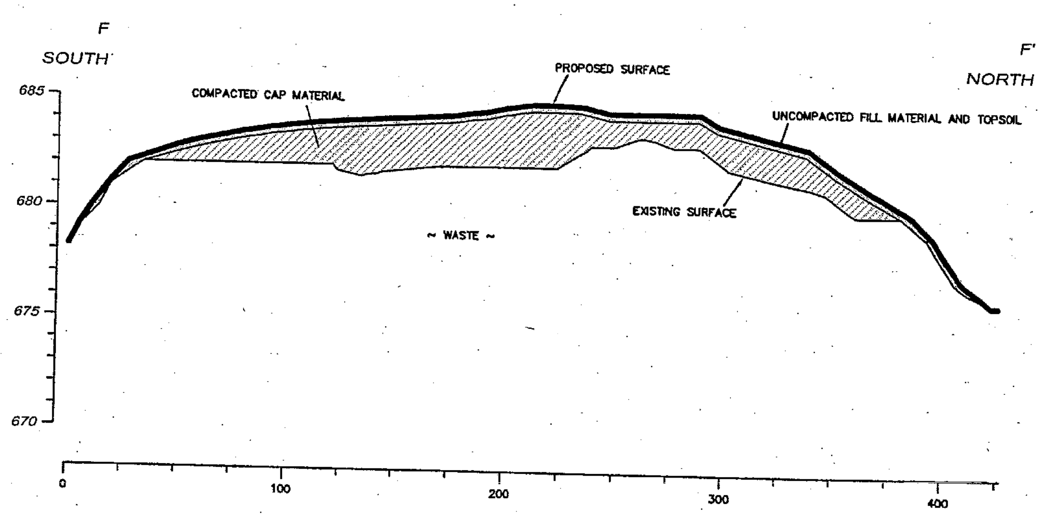
U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE
C-5

SHEET
5 of 9







NOTE: "EXISTING SURFACE" IS NOT TOP OF WASTE. APPROXIMATE DEPTHS OF EXISTING COVER SOIL ARE SHOWN ON SHEET C-3.

SCALE IN FEET
0 20 40 80
VERTICAL EXAGGERATION: 10x

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY:	JJR
CHECKED BY:	JJR
DRAWN BY:	BCP
DATE:	2-28-03
SCALE:	AS SHOWN
CAD NO.:	03042002H-rev2
PROJECT NO.:	15-03042

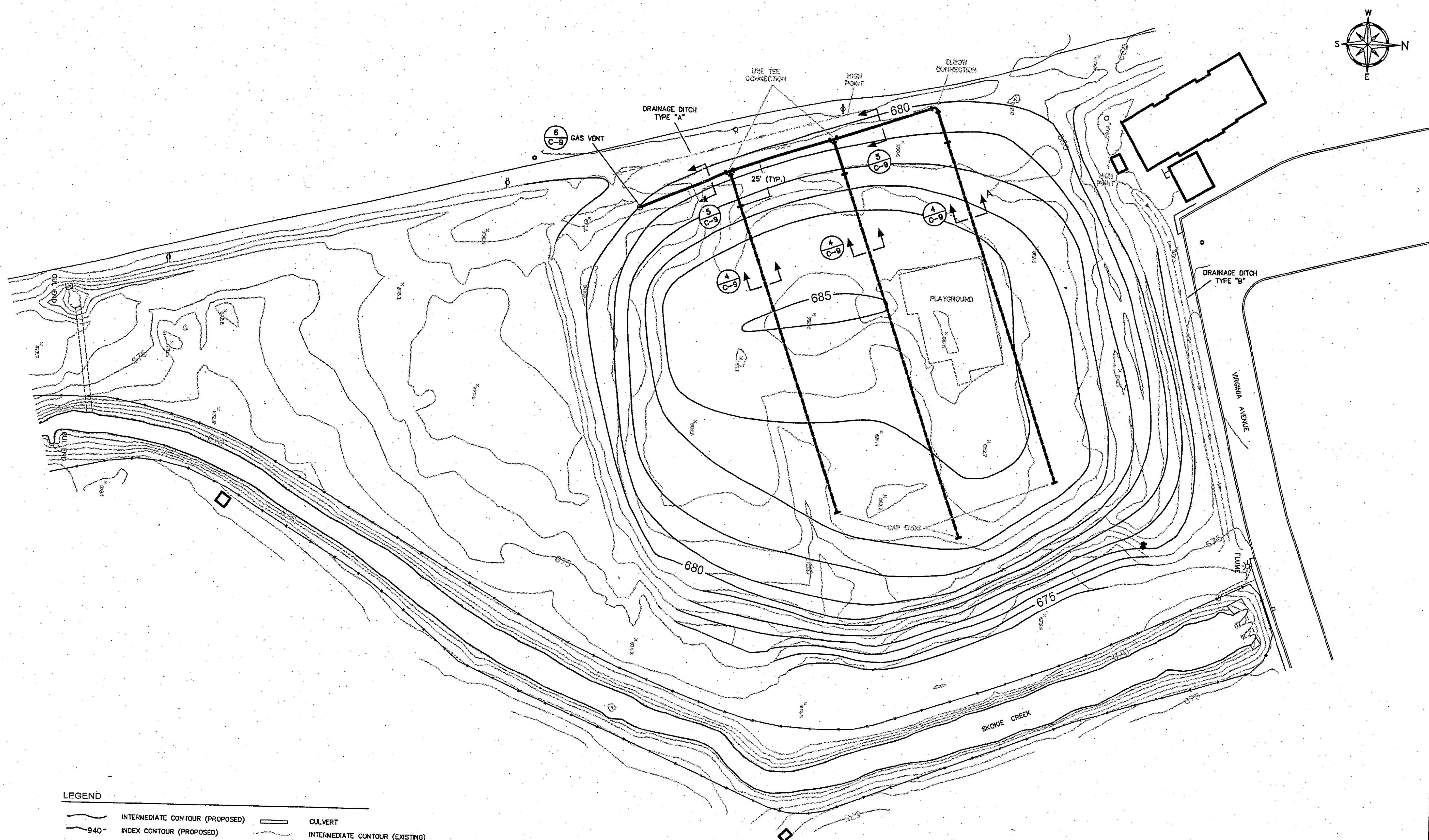
Clayton GROUP SERVICES

LANDFILL CROSS SECTIONS
NORTH TO SOUTH

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE
C-6

SHEET
6 of 9



LEGEND

	INTERMEDIATE CONTOUR (PROPOSED)		CULVERT
940	INDEX CONTOUR (PROPOSED)		INTERMEDIATE CONTOUR (EXISTING)
	MANHOLE	940	INDEX CONTOUR (EXISTING)
	POWER POLE	941.2	SPOT ELEVATION
	LIGHT POLE		TREE LINE
	SPOT ELEVATIONS	W.E. 935.4	WATER/STREAM
	FENCE		
	SOLID WALL GAS VENT HEADER (6")		
	GAS CONTROL TRENCH		

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

ENGINEERS' SEAL

DESIGN BY: JJR
CHECKED BY: JJR
DRAWN BY: BCP
DATE: 1-15-03
SCALE: AS SHOWN
CAD NO.: 03042002E-rev2
PROJECT NO.: 15-03042

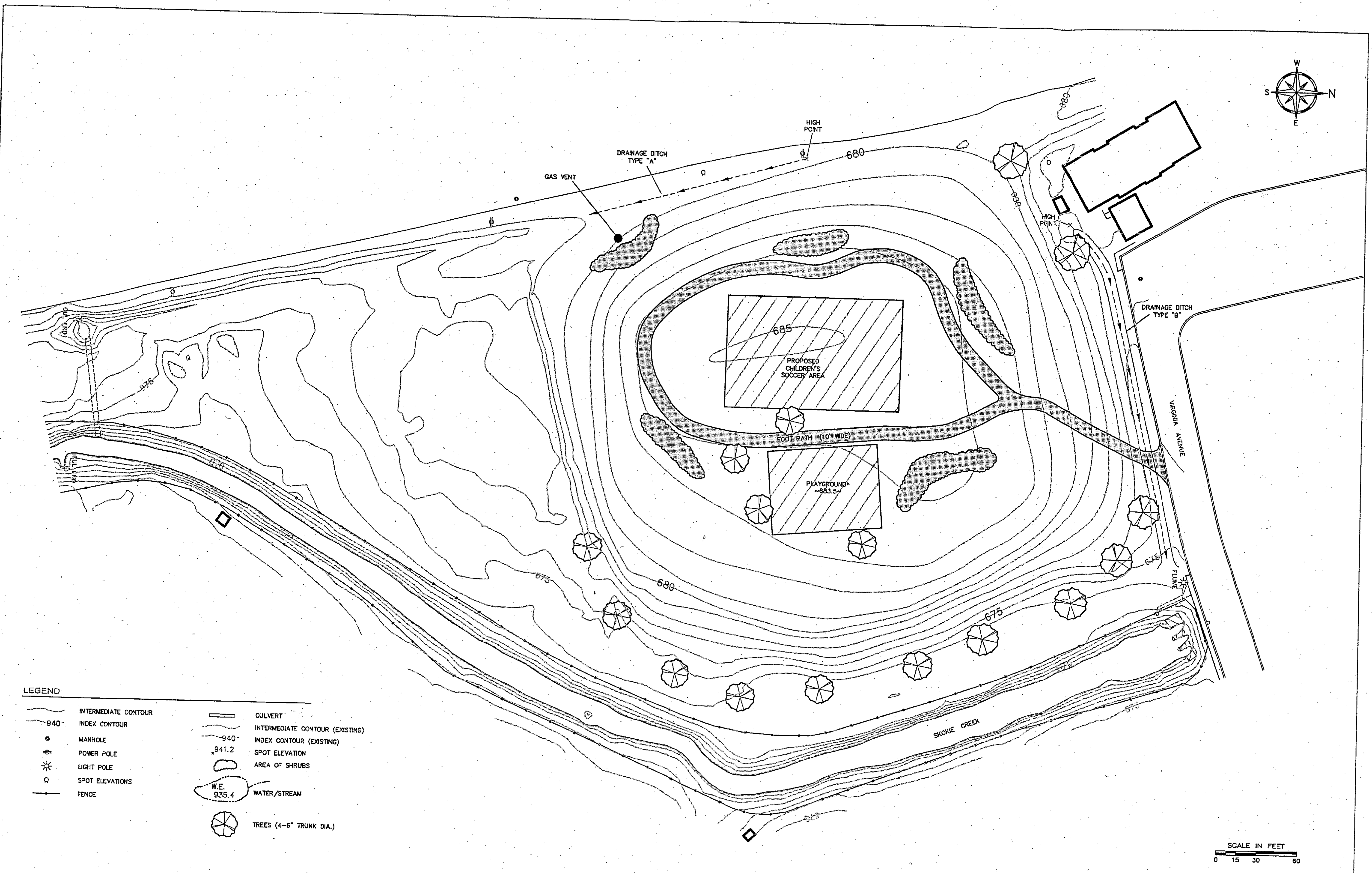
Clayton GROUP SERVICES

GAS MANAGEMENT SYSTEM PLAN

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE C-7

SHEET 7 of 9



LEGEND

- INTERMEDIATE CONTOUR
- 940 INDEX CONTOUR
- MANHOLE
- POWER POLE
- LIGHT POLE
- SPOT ELEVATIONS
- FENCE
- CULVERT
- INTERMEDIATE CONTOUR (EXISTING)
- 940 INDEX CONTOUR (EXISTING)
- 941.2 SPOT ELEVATION
- AREA OF SHRUBS
- W.E. 935.4 WATER/STREAM
- TREES (4–6" TRUNK DIA.)

NOTES:

1. EXISTING PLAYGROUND TO BE DISMANTLED AND REMOVED.
2. RECREATION FACILITIES AND FOOTPATH BY OTHERS.

ENGINEERS' SEAL

NO.	DATE	BY	REVISIONS
2	2-28-03	JJR	FINAL DESIGN
1	1-15-03	JJR	PRELIMINARY DESIGN

DESIGN BY:	JJR
CHECKED BY:	JJR
DRAWN BY:	BCP
DATE:	2-28-03
SCALE:	AS SHOWN
CAD NO.:	03042002F-rev2
PROJECT NO.:	15-03042

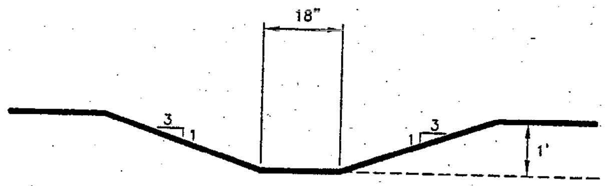
Clayton GROUP SERVICES

END USE AND VEGETATION PLAN

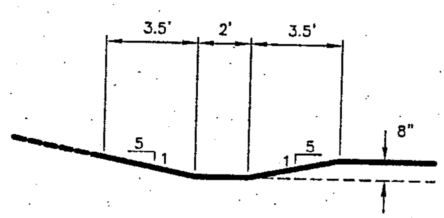
U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE C-8

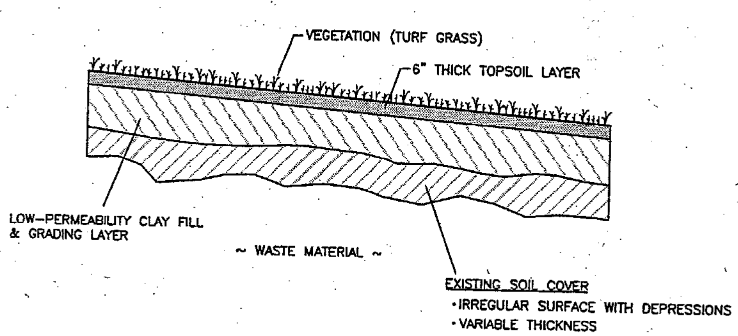
SHEET 8 of 9



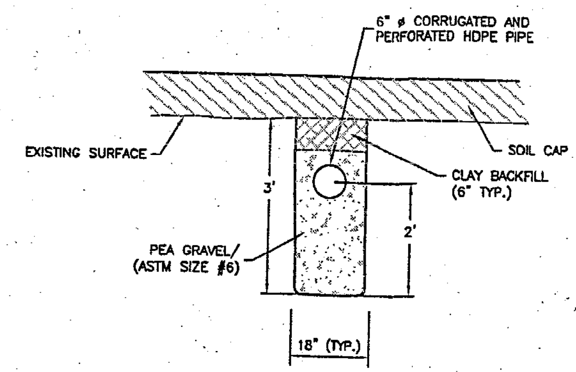
1 / C-4 DETAIL - DRAINAGE DITCH TYPE "A"



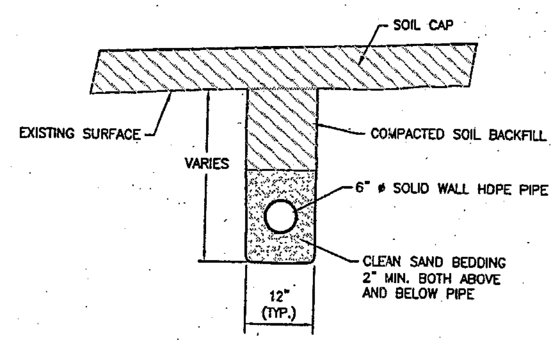
2 / C-4 DETAIL - DRAINAGE DITCH TYPE "B"



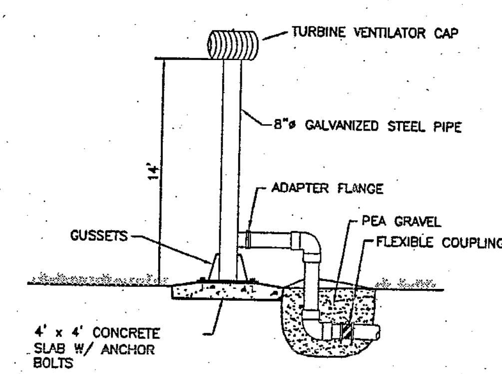
3 / C-4 CROSS SECTION - TYPICAL CAP IMPROVEMENT



4 / C-4 CROSS SECTION - GAS COLLECTION TRENCH

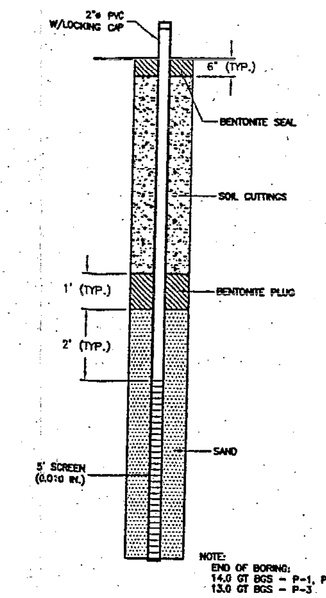


5 / C-4 CROSS SECTION - GAS HEADER TRENCH



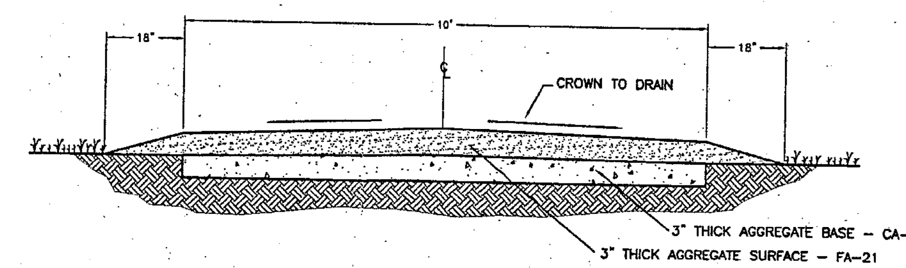
6 / C-7 DETAIL - PASSIVE GAS TRENCH

(LOCATION WHERE SHOWN ON PLAN SHEET C-7)



8 / C-3 DETAIL - TYPICAL PIEZOMETER

(P-1, P-2, P-3)



7 / C-8 CROSS SECTION - FOOT PATH

NOTE: FA-21 GRAVEL SCREENINGS SHALL BE 100% CRUSHED AGGREGATE MATERIAL. NO LIMESTONE SCREENINGS. MATERIAL SHALL BE OBTAINED FROM: MEYER MATERIAL DRYER LAKE, WISCONSIN QUARRY

OR: THELAN SAND & GRAVEL ROUTE 173, NORTH PIT ANTIOCH, ILLINOIS (PRIME BIKE PATH MIX)

NO.	DATE	BY	REVISIONS	
				DESIGN BY: JJR
				CHECKED BY: JJR
				DRAWN BY: BCP
				DATE: 2-28-03
				SCALE: AS SHOWN
				CAD NO.: 03042002G-rev2
2	2-28-03	JJR	FINAL DESIGN	PROJECT NO.: 15-03042

ENGINEERS' SEAL

Clayton GROUP SERVICES

CAP CROSS SECTION AND CONSTRUCTION DETAILS

U.S. NAVAL TRAINING CENTER
GREAT LAKES, ILLINOIS
FORRESTAL LANDFILL CAP IMPROVEMENTS

PLATE C-9

SHEET 9 of 9

APPENDIX C

PROJECT SCHEDULE

APPENDIX D

HEALTH AND SAFETY PLAN

EJOC CONTRACT NO. N68950-00-D-0200
DELIVERY ORDER NO. 0069

HEALTH AND SAFETY PLAN
FORRESTAL 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
MAY 2004

BY

TOLTEST, INC.
1000 S. Northpoint Boulevard
Waukegan, Illinois 60085
(847) 689-0697
FAX (847) 689-0698

TOLTEST PROJECT NO. 73706.01

HEALTH AND SAFETY PLAN
FORRESTAL LANDFILL
NAVAL STATION GREAT LAKES
GREAT LAKES, ILLINOIS

EJOC NO. N68950-00-D-0200
DELIVERY ORDER NO. 0069

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 — Date: 5/10/04
Jeffrey M. Tinney, Project Manager

Reviewed/Approved by: K. Mander — Date: 5/10/04
Khushwant Mander, Senior Project Manager

TABLE OF CONTENTS

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 Forrestal Cap Construction Work Plan includes the necessary tasks that will be performed to construct the new landfill cap at the Forrestal 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

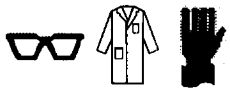
Physical State Liquid.

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 (%)

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.

 Continued on Next Page

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

 Continued on Next Page

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.

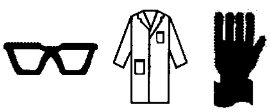
SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

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 unflitered 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

 Continued on Next Page

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

THE INFORMATION IN THIS MSDS WAS OBTAINED FROM SOURCES WHICH WE BELIEVE ARE RELIABLE. HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESSED OR IMPLIED REGARDING ITS CORRECTNESS. SOME INFORMATION PRESENTED AND CONCLUSIONS DRAWN HEREIN ARE FROM SOURCES OTHER THAN DIRECT TEST DATA ON THE SUBSTANCE ITSELF. THIS MSDS WAS PREPARED AND IS TO BE USED ONLY FOR THIS PRODUCT. IF THE PRODUCT IS USED AS A COMPONENT IN ANOTHER PRODUCT, THIS MSDS INFORMATION MAY NOT BE APPLICABLE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION OR PRODUCTS FOR THEIR PARTICULAR PURPOSE.

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 Manager, Corporate Health and Safety	David D. Alleman, CPA 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:

  - Injury/Illness
    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

  - Vehicle Incidents
    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)

  - Near Miss
    a. Incident Investigation Report (Attachment 4)

  - Property Damage/General Liability
    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

Manager, Corporate Health and Safety

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:

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: REJECTED FOR:

______________________________ ______________________________
MANAGER, CORPORATE HEALTH AND SAFETY
____

ACCEPTED: REJECTED FOR:

______________________________ ______________________________
MANAGER, HUMAN RESOURCES
____

ACCEPTED: REJECTED FOR:

______________________________ ______________________________
DIVISION VICE PRESIDENT
____

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 Manager, Corporate Health and Safety	David D. Alleman, CPA 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

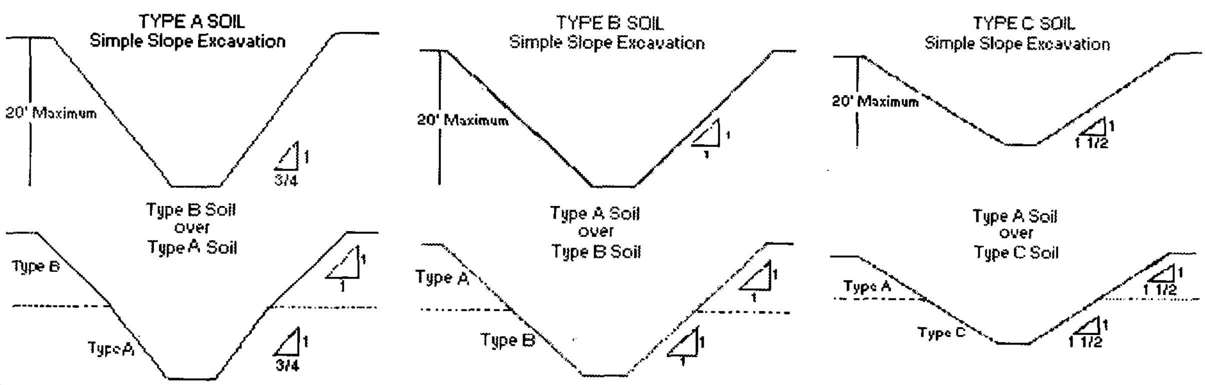
The slopes and configurations of sloping and benching systems must be determined by the competent person in accordance with the requirements of 29 CFR 1926(b)(1) through (b)(4) as well as 29 CFR 1926 Subpart P – Appendix B.

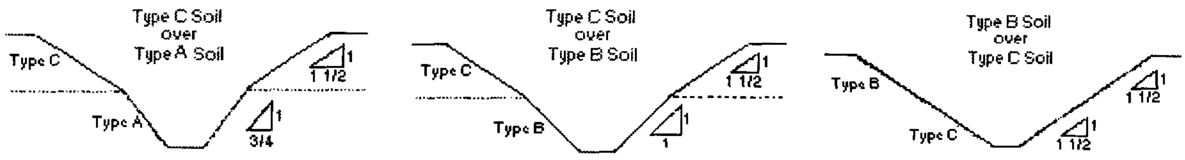
After the competent person has determined the soil type based on one visual and one manual test, he or she may design the sloping and benching systems for excavations less that 20 feet deep using the following table.

MAXIMUM ALLOWABLE SLOPES
BASED ON SOIL CLASSIFICATION

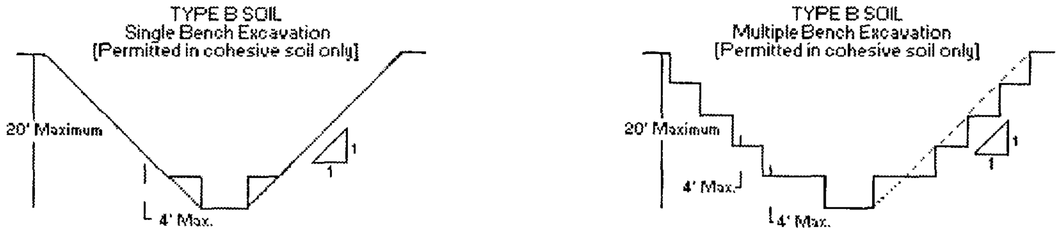
Soil Line	Maximum Allowable Slope/Bench for Excavations Less Than 20 Feet Deep
Stable Rock	Vertical Sides (90°)
Type A Soil	3/4H:1V (53°)
Type B Soil	1H:1V (45°)
Type C Soil	1 1/2H:1V (34°)
Note: If your sloped/benched soil shows any sign of distress you must increase the layback an additional 1/2H:1V.	
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.

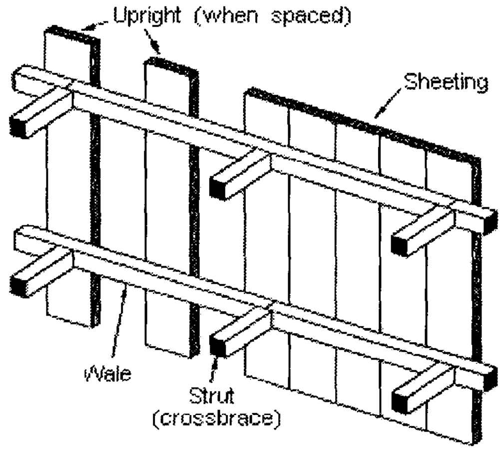
The design of the protective system must be in accordance with the requirements of 29 CFR 1926.652(c)(1) through (c)(4) and 29 CFR 1926 Subpart P – Appendices C, D, E.

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



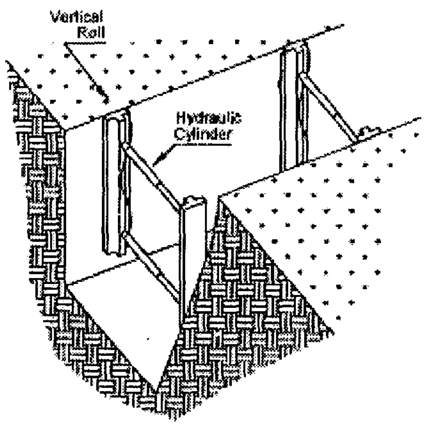
6.2.1.1 Hydraulic Shoring

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:

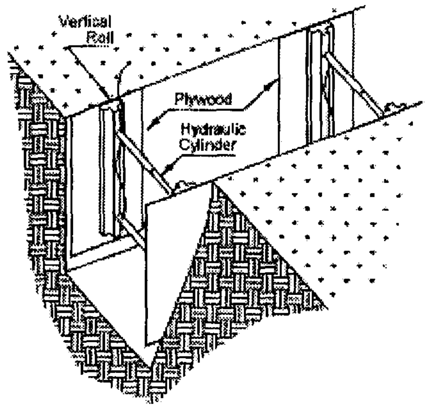
- Are light enough to be installed by one worker;
- Are gauge-regulated to ensure even distribution of pressure along the trench line;
- Can have their trench faces "preloaded" to use the soil's natural cohesion to prevent movement; and
- Can be adapted easily to various trench depths and widths.

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.

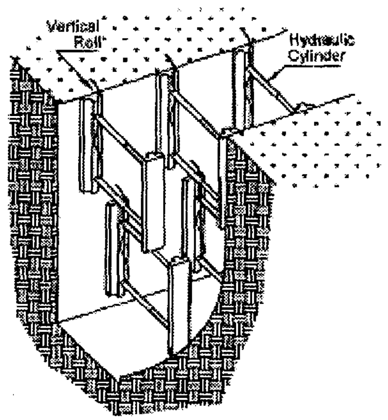
TYPICAL ALUMINUM HYDRAULIC SHORING INSTALLATIONS



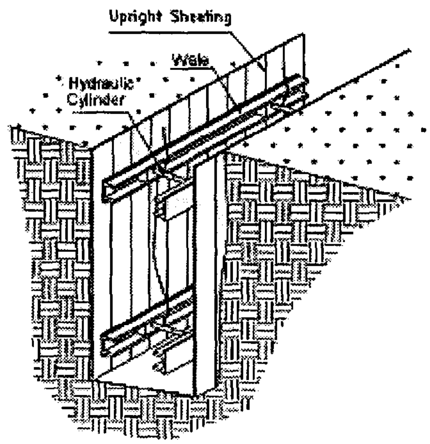
Vertical Aluminum Hydraulic Shoring
(Spot Bracing)



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.

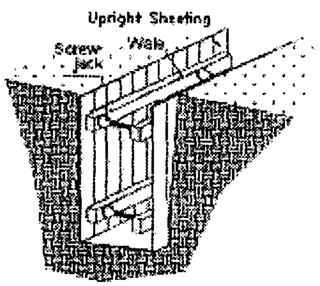
1. Screw Jacks. Screw jack systems differ from hydraulic and pneumatic systems in that the struts of a screw jack system

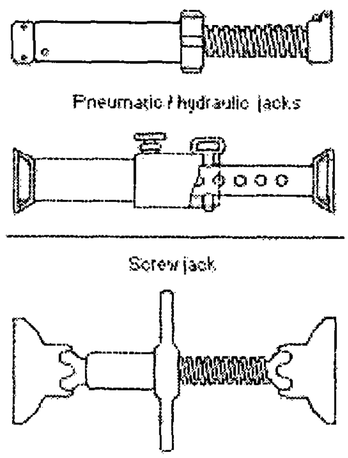
must be adjusted manually. This creates a hazard because the worker is required to be in the trench in order to adjust the strut. In addition, uniform "preloading" cannot be achieved with screw jacks, and their weight creates handling difficulties.

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



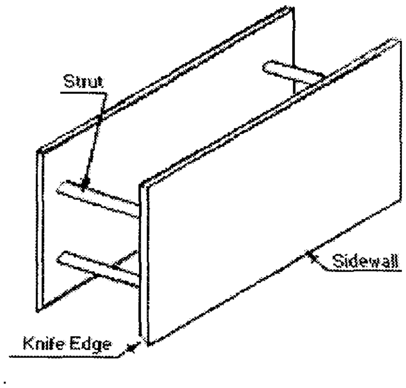


6.2.2 Shielding Types

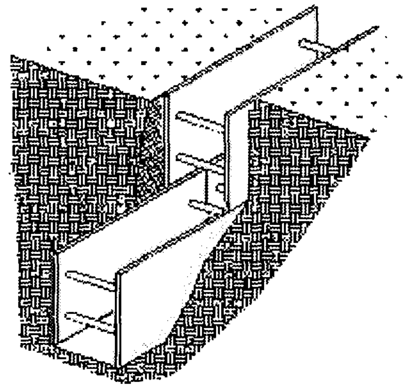
6.2.2.1 Trench Boxes

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

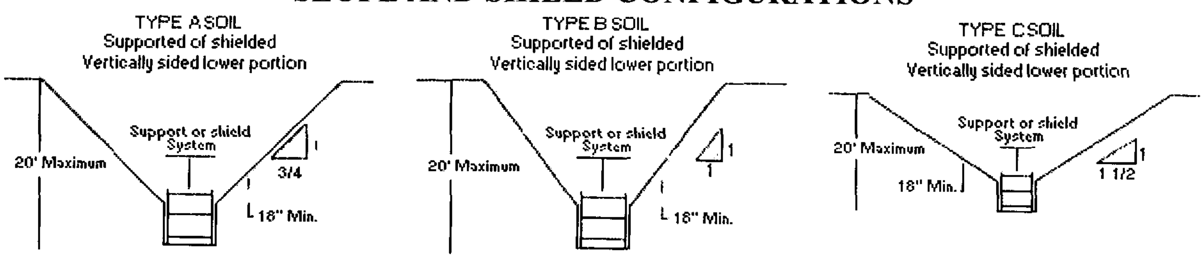


6.3 Combined Use

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 ___

2.

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 ___

3.

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)

Copy: Project File

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? If Yes, an Initial Excavation/Trenching Permit must be completed. YES _______ NO _______

2. Are additional protective systems needed which differ from those used during the previous day? If Yes, an Initial Excavation/Trenching Permit must be completed. YES _______ NO _______

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	1-800-422-4133
	Underground Service Alert South	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	1-800-342-1585
	Palouse Empire Undrgrnd Crd. Cncl.	1-800-822-1974
	Kootenai County Utility Coord. Cncl.	1-800-428-4950
	Utilities Underground Location Center	1-800-424-5555
	One Call Concepts – Idaho	1-800-626-4950
	Shoshone county One Call	1-800-398-3285
ILLINOIS	Julie, Inc.	1-800-892-0123
	Chicago: Digger	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	1-800-348-1030
	Call Before You Dig Of Wyoming	1-800-849-2476
CANADA	Alberta: Alberta One-Call Location Corp.	1-800-242-3447
	British Columbia: BC One Call	1-800-474-6886
	Ontario: Ontario One Call Ltd	1-800-400-2255 or 905-709-1717
	Quebec:Info-Excavation	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.

TOTEST 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
FORRESTAL LANDFILL
FINAL COVER CONSTRUCTION

TABLE OF CONTENTS

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 Forrestal 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 Forrestal Landfill is a 3.2-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 Forrestal 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 Forrestal 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, which will be sloped to direct runoff into the site. Also, straw bales will be placed along the east perimeter as specified in Section 6 of the Project Plans. 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/Scarification

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 3ft deep/1ft wide) through the existing soil cover and waste mass layers and backfilled with pea gravel. The three collection trenches will be approximately 250ft in length and run east to west across the center of the landfill approximately 75ft apart. The header piping will be installed in similar trench and run north to south approximately 220ft in length.

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 CONTROL MEASURES

The following is a discussion of control measures and Best Management Practices (BMPs) that may be employed during Final Cover Construction activities at Forrestal 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 tempory 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

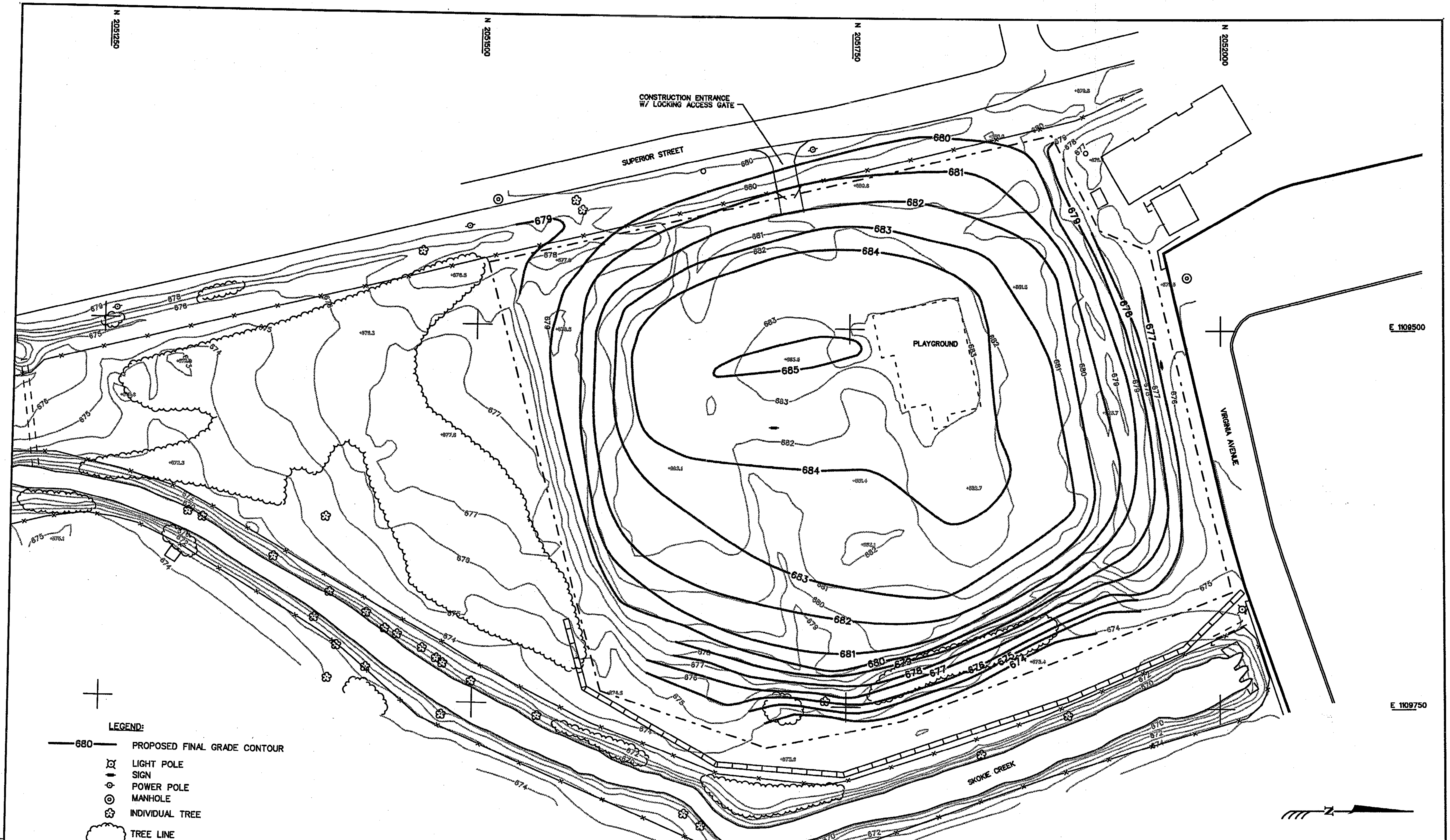
Areas of construction and their associated control measures will be inspected weekly and the results documented on the inspection form included in **Appendix E2**. Inspections will also occur within 24 hours of a storm event involving 0.5 inches or more of precipitation. The inspection sheet summarizes 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



LEGEND:

680	PROPOSED FINAL GRADE CONTOUR
	LIGHT POLE
	SIGN
	POWER POLE
	MANHOLE
	INDIVIDUAL TREE
	TREE LINE
	PERIMETER SILT FENCE (APPROXIMATE LOCATION)
675	EXISTING CONTOUR
	SPOT ELEVATION
	EXISTING FENCE
	STRAW BALE BARRIER

REV	DATE	BY	DESCRIPTION

SCALE: 0 30 60 SCALE IN FEET

DESIGNED: -
DRAWN: HHSI
CHECKED: T. Blair

CLIENT: TOLTEST
FORRESTAL LANDFILL CAP
GREAT LAKES, ILLINOIS

TITLE: FINAL GRADING PLAN

HARD HAT SERVICES, INC.
Engineering, Construction and Management Solutions

1701 Quincy Ave, Suite 29
Naperville, IL 60540
(630) 637-9470

SHEET: E-2 OF SHEETS

05/24/04 ...\FGP.dgn

APPENDIX E1

Naval Station Great Lakes
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

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
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.

FORREST 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

Signature: ______________________

Company: ______________________

Date: ______________________

Title: ______________________

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