

CRA SHELTON LANDFILL

LANDFILL GAS SYSTEMS OPERATIONS

and

GAS MIGRATION MONITORING PLAN

SHELTON, CONNECTICUT

Prepared for:

CONNECTICUT RESOURCES RECOVERY AUTHORITY
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February 28, 2002
File No. 1399017.02

Mr. Peter Egan

Connecticut Resources Recovery Authority

100 Constitution Plaza

17th Floor

Hartford, Connecticut 06103

Subject:

Revised Plan

Landfill Gas Systems Operations and Gas Migration Monitoring Plan

Shelton Landfill

Dear Peter:

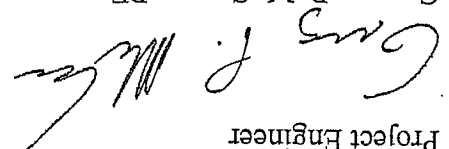
Enclosed are four (4) copies of the subject plan. This plan was revised to incorporate the conditions stated in the DEP Permit to Construct, dated October 18, 2001 and your comments on a draft revision.

Please call with any questions regarding this plan.

Very truly yours,

Lisa K. Wilkinson, PE

Project Engineer



Gregory P. McCarron, PE

Project Manager

SCS ENGINEERS, PC

Attachment



**CRA SHELTON LANDFILL
and
GAS MIGRATION MONITORING PLAN**

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Bar Punch Monitoring Form
Permit to Construct, October 18, 2001

US EPA and Connecticut require owners or operators of municipal solid waste landfills to implement a routine methane monitoring program to ensure that the concentration of methane is below regulatory levels at the facility boundary and in on-site structures, excluding gas control or recovery system components. Regulatory levels at the facility boundary and in on- and off-site structures are listed here in Table I. Regulatory concentrations are specified as a percentage of the lower explosive limit (LEL) for methane. LEL is defined as the lowest percent by volume of

REGULATORY REQUIREMENTS

- Provide for a written contingency and notification plan to rapidly identify any migration, notify the proper authorities and remediate the migration as rapidly as possible.
- Monitor for the presence of landfill gas (methane) in on-site and off-site structures and at the property line to protect public health and safety, and
- Extract LFG at a sufficient quality to enable combustion in the enclosed gas flare without the use of excessive quantities of supplemental fuel.
- Extract LFG at a sufficient rate to prevent odors and excessive surface emissions of LFG.
- Extract LFG at a sufficient rate to prevent migration off-site.

The goals of the LFG control and monitoring systems are as follows:

OPERATIONAL GOALS

- To document the goals of the LFG control and monitoring systems.
- To describe the LFG control and monitoring systems.
- To specify operational and monitoring requirements.
- To specify record keeping and reporting requirements.
- To describe contingency plans.

This Landfill Gas Systems Operations and Gas Migration Monitoring Plan has been developed for the Connecticut Resources Recovery Authority's (CRRRA) Shelton Landfill in accordance with the requirements of applicable state and federal regulations. The purpose of the monitoring plan is:

INTRODUCTION

SECTION I

a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure. The LEL for methane is 5 percent by volume in air.

Federal

On October 9, 1991, the EPA promulgated standards for new and existing municipal solid waste landfills (MSWLFs) under the Resource Conservation and Recovery Act (RCRA) Subtitle D (40 CFR 258). The rule established minimum national criteria for the location, design, cleanup and closure of MSWLFs. With EPA authorization, states were permitted to develop their own standards and exercise some flexibility in implementing the new criteria.

40 CFR 258.23 requires owners or operators of regulated MSWLFs to implement a routine methane monitoring program to ensure that the concentration of methane is below regulatory levels at the facility boundary and in on-site structures, excluding gas control or recovery system components. Regulatory levels at the facility boundary and in on-site structures are established in 40 CFR 258.23(a) and are listed here in Table 1.

The type and frequency of monitoring must be determined based on site-specific conditions as outlined in 40 CFR 258.23(b), including:

- Soil conditions.
- Hydrogeologic conditions surrounding the facility.
- Hydraulic conditions surrounding the facility.
- Location of facility structures and property boundaries.

The minimum required frequency of monitoring per regulation is quarterly.

Owner/operators must take the following actions if methane levels exceed the regulatory limits:

- Immediately take all necessary steps to protect human health and notify the State Director (i.e., CTDEP).
- Within seven days, place in the operating record the methane levels detected and a description of the steps taken to protect human health.
- Within 60 days of detection, implement a remediation plan, place a copy in the operating record, and inform the State Director that the plan has been implemented. The plan shall describe the nature and extent of the problem, and the proposed remedy.

The State Director may establish alternative schedules for demonstrating compliance with the last two items above.

Connecticut's solid waste management program was fully approved by the EPA on December 15, 1993. Regulated MSWLFs in Connecticut must comply with state standards in addition to the federal Subtitle D requirements.

Connecticut Solid Waste Management Regulations under Section 22a-209-7(n)(2) require that:

"The concentration of methane gases generated by the solid waste disposal area shall not exceed: (A) Twenty five percent (25%) of the lower explosive limit for methane in on-site or off-site structures including buildings, sheds and utility drainage lines, but excluding gas control or recovery system components; or (B) The lower explosive limit for methane in the ground at the property boundary of the solid waste disposal area."

Connecticut regulations define the same limits as Subtitle D for methane concentrations in the subsurface at the property boundary and in on-site structures. In addition, the State also established a maximum methane concentration in off-site structures (shown in Table I).

Table 1
Maximum Allowable
Methane Concentrations

Location	Maximum Concentration Allowed (% LEL)	Equivalent Methane Concentration in Air (% Volume)
On-site Structures (excluding gas control or recovery system components)	25	1.25
Off-site Structures (excluding gas control or recovery system components)	25	1.25
Facility Property Boundary	100	5.0

SECTION 2

SITE INFORMATION

LOCATION

The Shelton Landfill is located on a 110 acre parcel of land at 866 River Road (Route 110) in Shelton, Connecticut. It is bounded to the south by the Far Mill River and United Technologies Sikorsky Aircraft manufacturing plant; to the east by the Housatonic River; to the north by the Family Golf Center, also known as the Former Crump Property; and to the west by River Road (Route 110). Several commercial and light industrial properties line the western side of Route 110. A residential area is located to the west of the commercial properties. Figure 1 and Drawing 1 (in pocket at end of report) present a site location map and a site plan, respectively.

SITE HISTORY

The landfill site was formally used for sand and gravel excavation and was subsequently filled with municipal solid waste (MSW) by the City of Shelton through 1982. CRA assumed ownership in 1983, and continued landfilling MSW until 1987. Thereafter, the landfill received ash residue from the Bridgeport Resco Resource Recovery Facility until 1998.

MSW disposal took place in a 42 acre unlined area in the central portion of the site. Incinerator ash from the Bridgeport Facility was subsequently placed over the MSW. Disposal of ash in the central site ceased in August 1994.

Incinerator ash disposal continued in lined monofill areas known as the Southeast and Northeast Ash Areas. The Southeast Ash Area operated from August 1994 until June 1996. The Northeast Ash Area operated from June 1996 until February 1998. Both areas were capped with a synthetic liner in the fall of 1999.

The site also contains a 1.7-acre area, which accepted metal hydroxide sludge, a hazardous waste, from 1980 to 1983. This cell was certified closed in October 1989 in accordance with applicable regulatory criteria at the time.

GEOLOGIC SETTING

Information on the site geologic setting is based on a report prepared by Malcolm Pirnie entitled "Landfill Gas Monitoring Plan", September 1996.

Two types of water-deposited sediments overlie bedrock at the Shelton Landfill. Sediments in the northern portion of the site consist of ice-contact stratified drift. The southern portion consists of post-glacial swamp deposits.

The ice-contact stratified drift is the result of stream and local ephemeral lake deposits associated with the melting of glacial ice. This material is generally unconsolidated, poorly sorted sand, gravel, silt, and clay with abrupt changes in grain size. Variability in the sediments, both

laterally and vertically, indicates changes in the depositional environments. These deposits vary in thickness, from zero feet in areas of bedrock outcrops to 70 feet in the southeastern portion of the landfill. The stratified sediments generally grade from coarser sands and gravel to finer sands and gravel with increased depth.

Swamp deposit sediments exist in the vicinity of the tidal wetlands areas along the Far Mill River in the southern portion of the site. These sediments consist silt, sand, clay, and organic matter. The deposits occur at approximately six feet below grade and extend approximately eight feet in thickness.

Bedrock beneath the Shelton Landfill consists primarily of metamorphic schist at depths ranging from 0 to 70 feet below the surface. The bedrock, characterized by the Wepawaug Schist, is interlayered medium light-gray to dark-gray phyllitic schist and medium to dark gray quartz rich paragneiss. Bedrock outcrops are located adjacent to the Family Golf Center, at the northwest corner of the property, and beneath the Southeast Ash Area. A bedrock valley is located just southeast of the landfill.

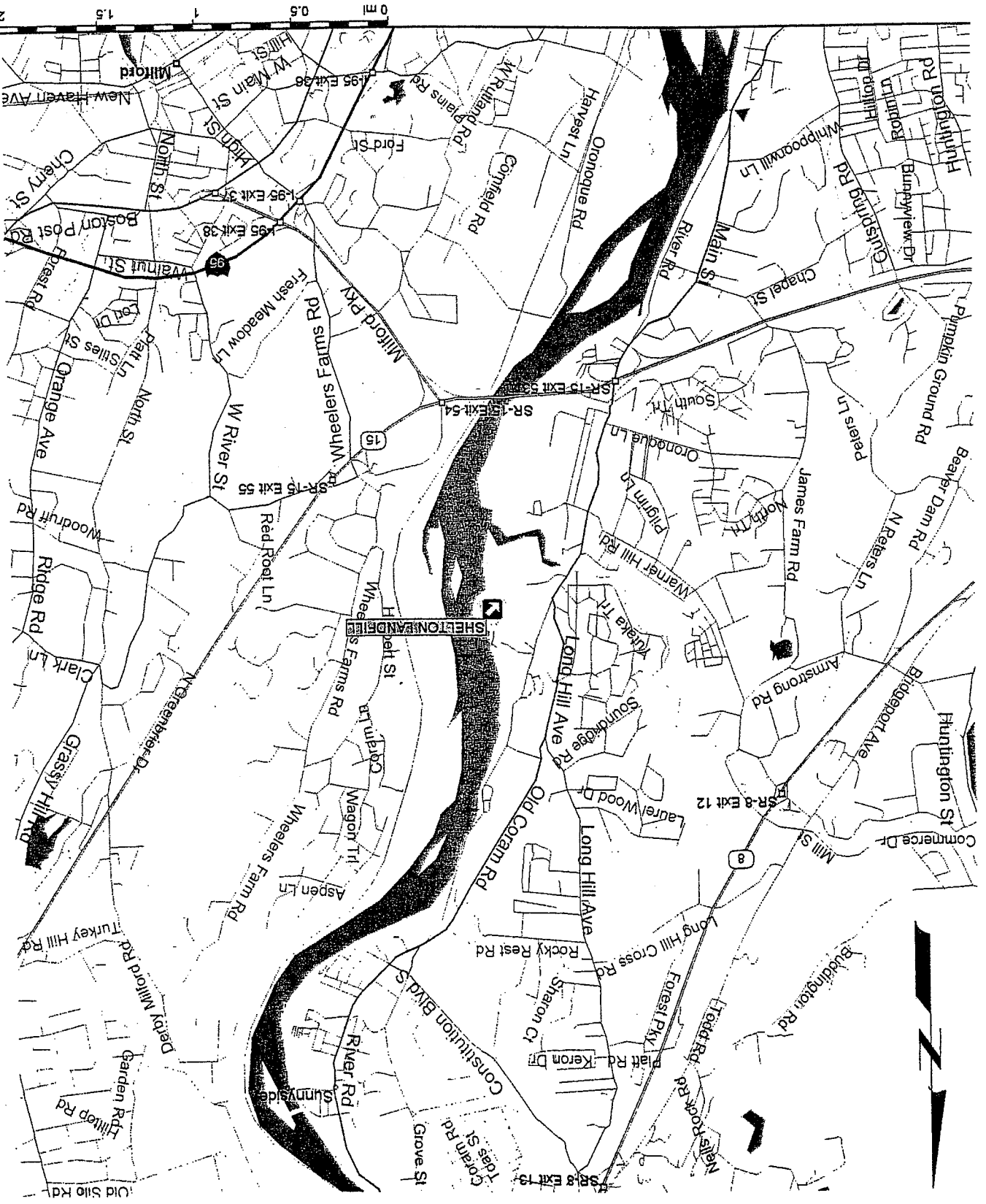
A site plan and geologic cross-sections of the landfill are presented in Appendix A.

Groundwater in the overburden unconsolidated deposits generally flows to the southeast. The Housatonic River tidally influences groundwater flow. Groundwater elevations in the unconsolidated deposits during low (June 1988) and high (August 1988) tide are shown graphically in Appendix A. Historical water level survey results from previous investigation reports are presented in Appendix A. Based on the available groundwater monitoring data, the seasonal fluctuations in groundwater elevations, including tidal influences, can be on the order of approximately 6 feet.

Observed hydraulic conductivities at the site range from 44.94 gallons per square foot (gpd/ft²) to 280.40 gpd/ft². The porosity of sediments at the site ranges from 0.20 to 0.41.

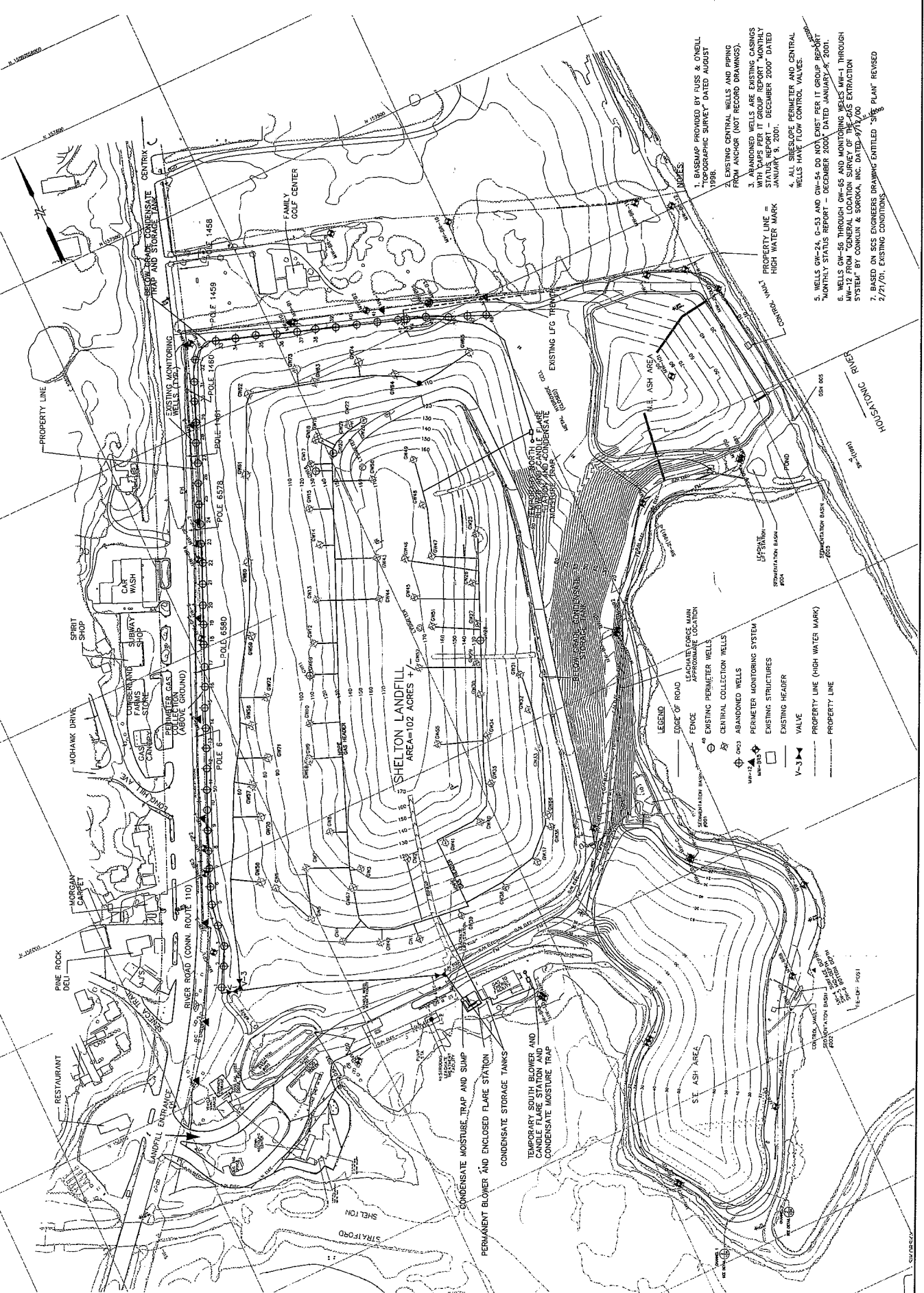
The MSW disposal area located in the central portion of the site governs site topography. Surface drainage generally flows east into the Housatonic River Lagoon and the Housatonic River, or south towards the Far Mill River.

FIGURE 1 - SITE LOCATION MAP SHELTON LANDFILL



REV	DATE	DESCRIPTION
1	04/21/01	ISSUED FOR PERMIT
2	07/16/2000	REVISED PER IT GROUP REPORT

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SECTION 3

LFG SYSTEMS DESCRIPTION

The existing LFG systems for the MSW landfill include a control system and a monitoring system. The control system includes the following components:

- A perimeter LFG collection system including vertical extraction wells and two extraction trenches in native soil, and an above grade header.
- A central LFG collection system including vertical extraction wells in the waste mass and a below grade header.
- A permanent blower/flare station inside a fenced compound at the south end of the landfill.
- Two temporary utility flares and blower skids, one at the north end and one at the south end of the landfill.
- A non-operating landfill gas-to-energy facility, consisting of 2 Waukesha internal combustion engines and related equipment and formerly operated by RTC.

The monitoring system includes the following components:

- A perimeter monitoring well system including 12 monitoring ports equipped with continuous methane detectors and 7 monitoring ports without detectors.
- Continuous methane detectors located in certain off-site structures.
- Continuous methane detectors located in certain on-site structures.

CONTROL SYSTEM

The perimeter gas collection system was installed in 1989. The perimeter system originally consisted of 42 wells, approximately 50 feet apart along the north and west property boundaries. In 1999, two gravel-filled trenches (labeled 43 and 44) were added to the perimeter system, east of Well 42. In October 2001 four new perimeter wells (45, 46, 47 & 48) were added to the perimeter collection system at the northern end of the landfill. The total number of perimeter wells and trenches is now 48. The wells and trenches are connected by an above grade header that is connected to both temporary flares and the permanent blower/flare station.

The original central collection system, installed in 1989 or 1990, included 10 wells on the western side of the landfill, and 8 wells on the eastern side. The central system was upgraded in 1995 during which time the original 18 wells were abandoned. Resource Technology Corporation (RTC), CRRA's LFG developer, reportedly installed a total of 55 extraction wells

The western and northern perimeter of the landfill is also equipped with several permanently installed gas monitoring ports that are not equipped with continuous gas monitoring equipment. These ports consist of 4 ports (GP-1 through GP-4) along the western property line and 3 ports (MW-B1, B2, B3) along the western property line.

The perimeter gas monitoring port system includes 12 vertical gas ports drilled to the groundwater table and fitted with continuous methane monitoring sensors (see Appendix B for drilling logs). The sensors are wired to a central alarm panel and automatic dialer. The system is designed to provide 24 hour monitoring of LFG migration and alert personnel to the presence of methane at the perimeter of the landfill.

MONITORING SYSTEM

Drawing 1 illustrates the layout of the perimeter and central collection systems, including the Summer 2000 and October 2001 additions to the central and perimeter systems.

An upgrade of the existing permanent blower/flare station is currently under construction and is expected to be complete by the end of March 2002. The blower/flare station upgrade includes a new enclosed flare and two blowers that are each capable of extracting 100 percent of the estimated LFG necessary to control migration. The new flare will handle all of the LFG collected by the perimeter and central collection systems, and allow removal of the two temporary flares. The new flare system includes an emergency bypass vent to allow venting of LFG during emergency conditions and during maintenance and inspection of the flare unit (when such conditions require a flare outage in excess of 4 hours and when mobilization of a temporary flare to the site is not warranted).

In response to this methane migration event, all on-site gas controls, including the existing flare and gas-to-energy facilities were inspected. The existing flare and gas-to-energy facilities were found to be inoperable. Therefore, the two temporary flare systems were delivered to the site. Repairs were made to both the perimeter and central collection systems. Two shallow, extraction trenches were installed on the north side of the site, to the east of the existing perimeter extraction wells. The perimeter and central collection systems are now connected to both temporary flares.

In August 1999, as a result of reduced operation of the central and perimeter collection systems, methane was detected on both sides of River Road (Rte 110) and on adjacent commercial and residential properties. Methane concentrations at levels in excess of the regulatory limits were detected in the ground at various off-site locations.

In August 1999, as a result of reduced operation of the central and perimeter collection systems, methane was detected on both sides of River Road (Rte 110) and on adjacent commercial and residential properties. Methane concentrations at levels in excess of the regulatory limits were detected in the ground at various off-site locations.

Currently, the central well system has 67 wells online. The central system is connected to both temporary flares and the permanent blower/flare station for the combustion of LFG. The RTC gas-to-energy facility ceased operations in August of 1999. There are no immediate plans to restore this system to operation.

Most of the on-site structures at the Shelton Landfill are equipped with permanently installed, continuous gas monitoring sensors. The sensors are designed to provide 24-hour monitoring of each structure and alert personnel to the presence of methane in the building. Table 2 lists an inventory of on-site structures at Shelton Landfill, the general use of the structure, the gas detection device installed, and the proposed monitoring schedule. Drawing No. 1 shows the locations of the on-site structures.

Nine off-site structures bordering the landfill are equipped with continuous methane monitoring sensors. Each sensor is designed to provide 24-hour monitoring of each business and alert personnel to the presence of methane in the building. Table 3 lists an inventory of the off-site structures with monitoring sensors, the general use of the structure, the gas detection device installed, and the monitoring requirements. Drawing No. 1 shows the locations of most off-site structures.

In addition, several residences to the west of the Landfill are also fitted with permanent gas monitoring devices. These devices are installed in residences and maintained by CRA, when requested by the resident.

SECTION 4

CONTROL SYSTEM REQUIREMENTS

CRRA will perform routine operation, monitoring, and maintenance tasks on the following control sub-systems:

- Central Collection System
- Perimeter Collection System
- Blower/Flare Station

CRRA may utilize its own staff or may direct other qualified personnel or consultants to perform this work. All personnel operating the flare will be trained in the proper operation of the flare per the manufacturer's operating procedures and trouble shooting techniques. Operators of the gas collection system shall also be properly trained in its operation.

INSTRUMENTATION

Parameters monitored under this plan will be measured with the following instruments, or equivalent:

- **Methane Gas Concentration**—Landtec GEM-500 Infrared Landfill Gas Analyzer, Gastech Model 1939 Landfill Monitor, or an equivalent instrument. The instrument used will be capable of displaying the gas concentration as a percent of LEL and as a percent by volume (dual range). The meter will be maintained, calibrated, and operated according to the manufacturer's recommendations. The gas standard used for calibration will be a known gas mixture of 2.5 percent methane (50 percent LEL), balance air.
- **Pressure**—Landtec GEM-500 Infrared Landfill Gas Analyzer, Dwyer analog Magnehelic gauge, Dwyer Series 475 Mark II electronic manometer, or an equivalent instrument. The instrument will be capable of measuring pressure in the range of -5.0" w.c. to +5.0" w.c. The meter used will be maintained, calibrated, and operated according to the manufacturer's recommendations.
- **Barometric Pressure**—Oakton temperature compensated aneroid barometer or equivalent instrument. The barometer used will be maintained, calibrated, and operated according to the manufacturer's recommendations.
- **Ambient Temperature**—Landtec GEM-500 equipped with a thermocouple probe, a handheld thermometer, or equivalent instrument.
- **Gas Flow**—Fluid Components International mass flow meter, or an equivalent instrument will be used to continuously measure and monitor the volumetric flow of waste gas into the flare. The instrument will be capable of measuring flows from 0 SCFM

to 1100 SCFM. The measurement environment pressure will range from 0 psig to 1 psig and the temperature from 100°F to 160°F. The device will be maintained and routinely calibrated according to the manufacturer's recommendations. The flow measurements will be continuously recorded on a Honeywell chart recorder.

CENTRAL COLLECTION SYSTEM

Monitoring

The central collection system includes header piping, lateral piping, and LFG extraction wells drilled in refuse and designed to collect LFG from the interior portions of the landfill. This system will be monitored and adjusted weekly to insure that the wells are operating properly to control migration or emission of LFG while minimizing air infiltration into the landfill to maintain LFG quality for flare operation.

The central collection system will be monitored and adjusted once each week. Monitoring will be performed using a properly calibrated and maintained Landtec GEM-500 Infrared Landfill Gas Analyzer or equivalent instrument. The gas analyzer will be calibrated with a known gas mixture of 50% by volume methane, 35% by volume carbon dioxide, balance nitrogen. The oxygen sensor will be calibrated with a known gas mixture of 4% by volume oxygen, balance nitrogen.

Weekly monitoring and maintenance of the central collection system will include the following tasks:

1. Observe the condition of all above ground piping, including header lines, laterals, wellheads, and flexible connections. Note any needed repairs, such as loose fitting, cracked, worn, or damaged piping.
2. Observe the condition of the wellhead components, including monitoring ports, valves, dust caps, and thermometers. Note any needed repairs.
3. Immediately repair damaged piping or wellhead components which are needed to collect monitoring information from the extraction well. These repairs could include such items as replacement of monitoring ports or thermometers, or repair of damaged piping. Record any repairs made.
4. Observe the condition of the area surrounding the wellhead. Note the occurrence of any settlement, ponding of water, cracking or erosion of the surface cover, or distressed vegetation.

5. Collect the following information from each extraction well:

- Valve position
- Gas quality, including methane, carbon dioxide, oxygen and balance gas (nitrogen)
- Wellhead static pressure (inches of water column)
- Velocity pressure (inches of water column) and/or gas flowrate (SCFM)

The perimeter collection system will be monitored and adjusted once each week or as needed to respond to migration alarms indicated by the Perimeter Gas Monitoring Port System. Monitoring will be performed using a properly calibrated and maintained Landtec GEM-500 Infrared

The perimeter collection system includes header piping, lateral piping, and extraction wells drilled in soil. The system is designed to prevent LFG from migrating beyond the perimeter of the landfill. This system must be monitored and adjusted weekly to insure that the wells are operating properly to control migration or emission of LFG.

Monitoring

PERIMETER COLLECTION SYSTEM

Parameter	Acceptable Range	Target Range
Temperature	< 131°F	<= 125°F
Static Pressure	<= 0" w.c.	< 0" w.c.
Methane	> 35% vol.	>= 50% vol.
Oxygen	< 5% vol.	> 2.5% vol.
Balance Gas (Nitrogen)	> 20% vol.	<= 10% vol.

Table 4
Adjustment Parameters for Central LFG Extraction Wells

Central LFG wells will be adjusted to the maximum flowrate possible while maintaining the gas quality, temperature, and static pressure within the specified target ranges listed in Table 4. Wells with parameters that cannot be maintained within the acceptable ranges, despite repeated adjustment, shall be considered for possible replacement.

Adjustments to the central collection system extraction wells are necessary to extract the maximum amount of LFG while maintaining good gas quality and minimizing air infiltration. Due to the complex nature of LFG generation, ongoing adjustments will be needed to maximize the collection system's effectiveness.

Increasing the vacuum at a LFG well typically causes the methane concentration to decrease and the oxygen and balance gas (nitrogen) concentrations to increase. Decreasing the vacuum generally results in the opposite effect.

Extraction Well Adjustments

6. Make adjustments to the extraction wells as detailed in the following section. Record all data, observations, and adjustments on the *Central Collection System Monitoring Form* (see Appendix C for all monitoring forms).

- Gas temperature
- System pressure (inches of water column)

Landfill Gas Analyzer or equivalent instrument. The gas analyzer will be calibrated using a known gas standard or 2.5% methane by volume, balance air.

Week monitoring and maintenance of the perimeter collection system will include the following tasks:

1. Observe the condition of all aboveground piping, including header lines, laterals, wellheads, and flexible connections. Note any needed repairs, such as loose fitting, cracked, worn, or damaged piping.

2. Observe the condition of the wellhead components, including monitoring ports, valves, dust caps, and thermometers. Note any needed repairs.

3. Immediately repair damaged piping or wellhead components which are needed to collect monitoring information from the extraction well. These repairs could include such items as replacement of monitoring ports or thermometers, or repair of damaged piping. Record any repairs made.

4. Observe the condition of the area surrounding the wellhead. Note the occurrence of any settlement, ponding of water, cracking or erosion of the surface cover, or distressed vegetation.

5. Collect the following information from each extraction well:

- Valve position
- Gas quality, including methane, carbon dioxide, oxygen and balance gas
- Wellhead static pressure (inches of water column)
- Velocity pressure (inches of water column) and/or gas flowrate (SCFM)
- Gas temperature
- System pressure (inches of water column)

6. Make adjustments to the perimeter collection wells as detailed in the following section. Record all data, observations, and adjustments on the *Perimeter Collection System Monitoring Form* (see Appendix C for all monitoring forms).

Well Adjustments

In general, the perimeter collection wells will be operated at all times. System vacuum will be made available to the perimeter collection system wells at all times and each well must be operating at all times. The valve position, amount of vacuum and the rate of gas extraction at each well will be adjusted based on the presence of gas in the vicinity of each well, and as required based on the presence of LFG detected by the Perimeter Monitoring Well alarm system or other on-site and off-site migration monitoring, and the presence of methane in the collection well.

Due to the complex nature of LFG generation and migration, ongoing adjustments will be needed to maximize the collection system's effectiveness. Adjustments to the perimeter

collection system wells are necessary to insure that any LFG present at the perimeter of the landfill is collected, and to minimize the amount of air being drawn into the collection system. In order to minimize the amount of air drawn into the gas system, the perimeter collection system wellheads should be adjusted to the minimum flowrate required to maintain the methane content below 5% by volume (100% LEL) at the property line.

BLOWER/FLARE STATION

Monitoring

The blower/flare station includes the equipment needed to provide vacuum to the collection systems that conveys LFG from the wellfield to the flare for destruction. This equipment must be monitored and maintained in proper operating condition.

The blower/flare station will be monitored once each week. The monitoring will include visual inspection of all piping and station components. Any repairs required will be noted. CRA will also record the time, length, and reason for any downtime.

The following parameters will be observed and recorded on the *Blower/Flare Monitoring Form* (see Appendix C for all monitoring forms). The information will be gathered at the individual components, or at the station control panel:

- General:
- Date and Time
 - Weather conditions and barometric pressure
 - Monitoring personnel

Header line inlet:

- Inlet vacuum
- Gas quality (methane, carbon dioxide, oxygen, and balance gas)
- Sight glass level on the condensate knockout
- Demister pressure differential

Blowers:

- Blower status and amperage
- Total operating hours
- Blower inlet vacuum
- Blower outlet pressure
- Blower bearing temperatures
- Inlet and outlet gas temperatures
- Inlet and outlet valve positions

Flare:

- Flare and pilot status
- Stack temperature

1. Portable generators available from local equipment rental facilities and local electrical contractors that can be immediately delivered to the site in the event of a long-term power outage or other problem which affects electrical service to the blowers and flare.
 2. Portable and temporary flare systems will be available through landfill gas vendors. In the event that the flare is out of service for an extended length of time, CRA would mobilize a temporary flare to the site.
 3. Portable and temporary blower units, vacuum trucks and other equipment suitable for extracting gas and maintaining vacuum on the gas systems will be made available through local contractors and equipment rental sources to supplement on-site equipment if needed.
 4. Other major equipment and supplies will be available through local contractors, equipment rental facilities and local supply houses when needed.
- CRA will, either on its own, or through its subcontracted system operator, or by other means, provide a system of standby and redundant equipment that can be rapidly placed into service in the event of operational problems with the flare or landfill gas collection system, or in the event of another system malfunction. Standby mechanisms to be maintained by CRA will include:
- CRA will maintain an inventory of spare parts and supplies for use during routine maintenance as well as emergency repair of the blower/flare station and wellfield components. The inventory will include items and quantities as recommended by the component manufacturers.
 - The blower/flare station is equipped with two blowers, each providing 100 percent system capacity. One blower will be operated (lead) and one will remain on standby. The standby blower will be operated should the lead blower be shut down due to failure or maintenance requirements. The blowers' duty status (lead or lag) will be cycled monthly.

REDUNDANCY, SPARE PARTS, AND STANDBY EQUIPMENT

Trained personnel will operate the blower/flare station according to the manufacturer's operating procedures and trouble shooting techniques.

Operation

The components of the blower/flare station will be maintained according to the manufacturers' recommendations. The *Blower/Flare Station Routine Maintenance Schedule* is included in Appendix C.

Maintenance

- Gas flow rate, quality and temperature
- Pressure differential across flame arrestor
- Propane supply tank pressure or level

Table 2 lists an inventory of on-site structures at Shelton Landfill, the general use of the structure, the gas detection device installed, and the proposed monitoring schedule. Drawing No. 1 shows the locations of the on-site structures. Most of the on-site structures at the Shelton Landfill are equipped with permanently installed, continuous gas monitoring and detection

ON-SITE STRUCTURE MONITORING

- **Surface Emissions Monitoring** – Foxboro TVA-1000B flame ionization detector or an equivalent instrument. The instrument will be maintained, calibrated and operated in accordance with manufacturer's recommendations.
- **Ambient Temperature** – Landtec GEM-500 equipped with a thermocouple probe, a handheld thermometer, or equivalent instrument.
- **Barometric Pressure** – Oaktown temperature compensated aneroid barometer or equivalent instrument. The barometer used will be maintained, calibrated, and operated according to the manufacturer's recommendations.
- **Pressure** – Landtec GEM-500 Infrared Landfill Gas Analyzer, Dwyer analog Magnehelic gauge, Dwyer Series 475 Mark II electronic manometer, or an equivalent instrument. The instrument will be capable of measuring pressure in the range of -5.0" w.c. to +5.0" w.c. The meter used will be maintained, calibrated, and operated according to the manufacturer's recommendations.
- **Methane Gas Concentration** – Landtec GEM-500 Infrared Landfill Gas Analyzer, Gastech Model 1939 Landfill Monitor, or an equivalent instrument. The instrument used will be capable of displaying the gas concentration as a percent of LEL and as a percent by volume (dual range). The meter will be maintained, calibrated, and operated according to the manufacturer's recommendations. The gas standard used for calibration will be a known gas mixture of 2.5 percent methane (50 percent LEL), balance air.

Parameters monitored under this plan will be measured with the following instruments, or equivalent:

INSTRUMENTATION

CRAA will perform routine methane gas monitoring at the Shelton Landfill, including in on-site structures and off-site structures, and in the ground at the property boundary. Additionally, surface emissions monitoring will be performed quarterly to ensure methane concentrations do not exceed 500 ppmv above background at any location on the landfill surface. CRAA may utilize its own staff or may direct other qualified personnel or consultants to perform this work.

MONITORING SYSTEM REQUIREMENTS

SECTION 5

At a minimum, on a quarterly basis, all on-site structures will be monitored for methane gas using a properly calibrated and maintained hand-held instrument, regardless of the presence of a continuous gas monitoring device. The portable instrument will be calibrated using a known gas standard (2.5 percent methane by volume, balance air). The technician will monitor the atmosphere of each on-site structure, both at the floor level and the ceiling level. The technician will also test areas where the entrance and/or accumulation of explosive gases would be likely. These areas will include such places as utility conduit and plumbing entrances, foundation cracks and seams, sumps, pits, drains, corners, and other poorly ventilated areas.

The continuous methane sensor and monitoring equipment at each structure will be inspected once each quarter by a technician. The technician will observe the condition of the sensor, wiring, and appurtenant equipment and report any problems, malfunctions, etc. to CRA. Maintenance of the equipment as recommended by the manufacturer will also be performed. All on-site permanent gas detection equipment will be tested and calibrated semi-annually. Each sensor will be tested according to the manufacturer's recommendations by exposing the sensor to a known gas mixture of 2.5 percent methane by volume, balance air. Monitoring systems that fail to respond to the test will be repaired or replaced as soon as possible.

Results of the monthly monitoring, testing, and observation will be recorded on the *On-Site Structures Monitoring Form* (see Appendix C for all forms).

OFF-SITE STRUCTURE MONITORING

Nine off-site businesses immediately bordering the landfill are equipped with continuous methane monitoring sensors located in an area of each building where accumulation of migrating LFG would likely occur. Each sensor is designed to provide 24-hour monitoring of each business and alert these businesses' personnel to the presence of methane in the building. Table 3 lists an inventory of those businesses with monitoring sensors, the general nature of the business, the gas detection device installed, and the monitoring requirements. Drawing No. 1 shows the locations of the off-site businesses.

The methane sensor and monitoring equipment at each business will be inspected once each month by a technician. The technician will observe the condition of the sensor, wiring, and appurtenant equipment. Maintenance of the equipment as recommended by the manufacturer will also be performed. Once each quarter, each business monitoring system will be tested according to the manufacturer's recommendations by exposing the sensor to a known gas mixture of 2.5 percent methane by volume, balance air. Monitoring systems that fail to respond to the test will be repaired or replaced as soon as possible.

During the monthly inspection, each business will be monitored for the presence of methane using a properly calibrated and maintained hand-held instrument. The portable instrument will be calibrated using a known gas standard (2.5 percent methane by volume, balance air). The technician will monitor the atmosphere of each structure, both at the floor level and the ceiling level. The technician will also test areas where the entrance and/or accumulation of explosive gases would be likely. These areas will include such places as utility conduit and plumbing entrances, foundation cracks and seams, sumps, pits, drains, corners, and other poorly ventilated areas.

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Results of the monthly monitoring, testing, and observation will be recorded on the *On-Site Structures Monitoring Form* (see Appendix C for all forms).

The results of weekly inspection and testing, and monthly sensor testing will be recorded on the *Continuously-monitored Well Monitoring Form* (see Appendix C for all forms).

Once each month, the infrared sensors will be tested for proper operation according to the manufacturer's recommendation. This will be done by exposing the sensor to a known methane gas mixture (2.5 percent methane by volume, balance air) to assure that the sensor responds to the test gas, the integrity of the wiring between the sensor and the central alarm panel will be confirmed. If the sensor still fails to respond after the integrity of the wiring and equipment is confirmed, it will be replaced immediately.

The perimeter monitoring port system will be inspected weekly, including visual inspection of each wellhead and for any damage to the port and sensor wiring. Damage will be repaired as soon as possible. As a check, each monitoring port will be tested for methane using a properly calibrated and maintained instrument. The instrument will be calibrated using a known gas standard (2.5 percent methane by volume, balance air).

Twelve (12) perimeter monitoring ports are fitted with Bacharach Gas Sentinel continuous methane monitoring sensors. The ports are located along the western (9 ports) and northern (3 ports) property lines at approximately 200-foot intervals, between the perimeter collection system and the property line. Each sensor is hard-wired to a central alarm panel and automatic phone dialer located in the scalehouse. The system is designed to provide continuous monitoring for methane and alert personnel to the presence of methane at the perimeter of the landfill. The locations of the perimeter monitoring ports are shown on Drawing No. 1 (MW-1 through MW-12).

Continuously-monitored Gas Ports

Property boundary monitoring will be accomplished using a combination of monitoring wells, some with and some without continuous sensors, and shallow bar probing.

PROPERTY BOUNDARY MONITORING

In addition, the CRAA will install permanent gas monitoring devices in several private residences in the areas surrounding the landfill, when requested by the resident. These devices are monitored and maintained by CRAA pursuant to a separate agreement with each resident.

Results of the monthly monitoring, testing, and observation will be recorded on the *Off-site Structure Monitoring Form* (See Appendix C for all forms).

The technician will also test areas where the entrance and/or accumulation of explosive gases would be likely. These areas will include such places as utility conduit and plumbing entrances, foundation cracks and seams, sumps, pits, drains, corners, and other poorly ventilated areas.

Other Monitoring Gas Ports

The western and northern perimeter of the landfill is also equipped with several permanently installed gas monitoring ports that are not equipped with continuous gas monitoring equipment. These ports consist of 4 ports (GP-1 through GP-4) along the western property line and 3 ports (MW-B1, B2, B3) along the western property line. Each monitoring port will be tested weekly for methane (percent LEL) using a properly calibrated and maintained instrument. The gas analyzer will be calibrated using a known gas standard (2.5 percent methane by volume, balance air).

Results of the weekly inspection and testing will be recorded on the *Other Well Monitoring Form* (See Appendix C for all forms).

Bar Punch Survey

Once each month, the areas adjacent to the northern and western boundaries of the landfill will be surveyed for the presence of methane in the soil. Using a bar punch, or similar tool, the technician will install temporary probes every 300 feet along the western and northern boundaries, outside the property line. On the western boundary, bar punch probes will be installed and tested every 300 feet along both sides of River Road (Route 110).

To monitor soil gas, the bar punch will be driven to a depth of at least 36 inches. Soil gas will be tested in each probe using a properly calibrated and maintained instrument. The gas analyzer will be calibrated using a known gas standard (2.5 percent methane by volume, balance air). Each probe will be tested for a minimum of two minutes, or until the gas reading stabilizes.

All soil gas readings will be recorded on the *Bar Punch Monitoring Form* (see Appendix C for all forms).

LANDFILL SURFACE MAINTENANCE AND MONITORING

The landfill surface (e.g., grass, cover material) will be maintained as required to assure effective LFG collection to reduce odors and to minimize the venting of LFG at the landfill surface.

Monitoring of the landfill surface methane concentrations will be performed to demonstrate that methane concentrations do not exceed 500 ppmv above background concentrations. The surface emissions monitoring will be performed in accordance with the provisions of 40 CFR Part 60.755(c). If there are no monitored exceedances for 3 consecutive monitoring periods, the quarterly monitoring can be changed to an annual schedule. If there is an exceedance during an annual monitoring event, the location of the exceedance shall be remediated and monitored in accordance with 40 CFR Part 60.755(c)(4).

RECORD KEEPING AND REPORTING

SECTION 6

CRRA will provide any and all monitoring data to the CTDEP upon request. CRRA will notify the CTDEP and the City of Shelton immediately, if any monitoring results exceed the regulatory limits.

A central logbook will be maintained on-site. All monitoring data and maintenance records will be inserted into the logbook on an on-going basis. Included in the logbook will be a record of all monthly criteria pollutant emissions calculations. The logbook will be available for review by CTDEP and City of Shelton personnel at all times and will include historical data for up to 5 years.

CRRA will also maintain a computerized database of all monitoring and maintenance records. The database will facilitate record keeping, documentation of maintenance, and tracking of long term trends in performance. Copies of the database in an electronic format will be available to the CTDEP on request.

A report will be submitted to the City of Shelton, on a quarterly basis, at a minimum, providing a brief summary of the status of the operations of the landfill gas system, any operational problems encountered during the period, any system modifications made, together with a brief summary of the results of on- and off-site perimeter gas monitoring conducted during the period. The first report is due 13 months after the Permit to Operate issuance date. Thereafter, an annual report will be submitted to the CTDEP Compliance Assurance and Coordination Unit of the Bureau of Air Management. The annual report will document all exceedances of operational conditions required to be monitored by Part I, Item C of the permit (see Appendix D). The report will also include details of any remedial action taken as a result of the exceedances.

SECTION 7

CONTINGENCY PLANS

Contingency measures will be implemented if methane is detected above regulatory limits within on- or off-site structures, or in the ground at the property boundary. Contingency measures will be implemented for other reasons as well, as noted below.

ON- AND OFF-SITE STRUCTURES

If a continuous monitoring device is triggered due to the presence of methane in excess of 25 percent LEL and an alarm sounds, the occupant of the structure must notify both CRA and the City emergency personnel (CRA will instruct occupants to do this). If, during a routine check as described in Section 5, CRA's technician detects methane above the regulatory limit with a hand-held instrument, the technician will notify City emergency personnel and CRA. CRA has provided hand-held meters and ventilation equipment to the City so that the City can confirm the alarm and ventilate the structure, if necessary. The City will notify CRA in the event that City personnel respond to any reported gas detection event.

City emergency personnel will direct evacuation of the structure, if necessary. Re-entry into the affected structure will not be permitted, except by emergency response personnel, until safe conditions are restored, as determined by City emergency personnel.

CRA will mobilize personnel and equipment to evaluate and monitor the situation. Based on monitoring results and evaluation of potential sources and causes for the gas detection, CRA will consider mitigative measures including, but not limited to, the following:

- Increased LFG extraction from the perimeter and central collection systems.
- Subsurface soil ventilation.
- Installation of cut-off trenches.
- Installation of extraction wells.

PROPERTY BOUNDARY

Twelve (12) of the perimeter gas monitoring ports are equipped with a continuous methane sensor, connected to an automatic dialer system. The dialer system will be activated upon detection of the presence of methane in the gas port above 2.5 percent methane (50 percent LEL). Upon notification of an alarm condition at the perimeter, CRA will respond by dispatching a technician to the landfill within 2 hours.

The technician will confirm the presence of LFG in the monitoring port utilizing portable gas monitoring equipment (GM-500 or equivalent). Upon confirmation of the presence of methane in the gas port, gas ports on either side of the affected gas port(s) will also be monitored for the

- Increased LFG extraction from the perimeter and central collection systems.
- Subsurface soil ventilation.
- Installation of cut-off trenches.
- Installation of extraction wells.

If methane is detected in any monitoring port or bar punch above 100 percent LEL, CRA will immediately notify the CTDEP and City emergency personnel. The four perimeter collection wells nearest the indicating bar punch probe(s) will be monitored and adjusted to increase the vacuum and gas extraction flow rate to control the LFG migration. CRA will also mobilize additional personnel and equipment to monitor the situation. Based on monitoring results and consultation with the City, CRA will consider additional mitigative measures including, but not limited to, the following:

In instances where methane is detected in perimeter gas monitoring ports at elevated levels (above 50% LEL) and/or gas levels in soil (bar-hole) testing exceed 50% LEL, CRA will take immediate action to mitigate the migration and return the levels to below 2.5%. City of Shelton personnel and CTDEP will be informed, in writing, of the event and the actions taken by CRA. In the event that the presence of methane exceeds the regulatory limit of 5% (100% LEL) in any gas port or bar-hole test, City emergency personnel will be immediately notified and additional testing will be conducted to define the limits of the gas migration.

Similarly, if methane is detected in the soil, in any other monitoring port, or any bar punch probe above 50 percent LEL, additional bar punch probes will be installed and tested as needed to determine the extent of the LFG migration. The four perimeter extraction wells nearest the indicating bar punch probe(s) will be monitored and adjusted to increase the vacuum and gas extraction flow rate to control the LFG migration. The indicating bar punch probes and the perimeter collection wells will be monitored daily until the LFG migration is controlled. Control of migration is defined as detection of methane below 2.5% in the perimeter monitoring ports for a period of at least 72 hours.

The perimeter gas monitoring port and the collection wells adjusted as a result of the detection of LFG migration will be monitored daily until the migration is controlled. Control of migration is defined as detection of methane below 2.5% (50% LEL) in the perimeter gas monitoring ports for a period of at least 72 hours.

Based on the results of this monitoring, additional gas monitoring will be conducted through the use of a bar punch to obtain soil gas readings in the vicinity of the affected ports. The four nearest perimeter extraction wells will be monitored and adjusted to increase the vacuum and gas extraction flow rate to control the LFG migration.

BLOWER/FLARE STATION

The Blower/Flare station is equipped with a system failure alarm and an automatic dialer system. In the event that the flare station experiences an outage due to a power failure, a blower failure, interrupted gas flow, or a flare outage, the auto dialer will automatically dial CRA and the system operator to notify of the outage. Upon notification of an operating problem at the blower/flare station, CRA will respond by dispatching qualified operating personnel to the landfill within 2 hours. CRA will make repairs to the blower/flare station and/or gas collection system to return the station to operation as soon as possible. If the needed repairs necessitate the blower/flare station to be non-operational for an extended period of time, CRA will mobilize standby equipment as needed to assure continued operation of the perimeter system and to provide gas collection and destruction. City of Shelton personnel will be immediately notified in the event that the flare station is to be non-operational for an extended period of time due to equipment problems.

If the failure involves a flare outage that cannot be corrected within 4 hours, the emergency vent will be utilized. In this scenario, the blower will operate and push LFG through the emergency vent. A valve will be closed to isolate the flare from the rest of the system and to allow repairs to be made. City of Shelton personnel will be notified in the event that the bypass vent is utilized for periods in the excess of 4 hours.

DAMAGE TO OFF-SITE VENTS

Methane gas vents were installed at two locations along Route 110 and along Long Hill Avenue during the gas migration event in August 1999. Under current, normal operating conditions, methane is not typically found in these vents. If methane is discovered during routine monitoring, it may signify gas migration along the utility corridor. This condition, if it occurs, will be immediately reported to CRA, the City of Shelton and CTDEP. CRA will take immediate steps to remediate the condition, including increasing the rate of extraction from the perimeter system, and connection of vacuum directly to the gas vents to remove methane from the utility trench.

If a vent is damaged via vehicular accident, vandalism, or other means, the City should notify CRA and its operator immediately. As an immediate response, the City should "cap" the damaged vent with duct tape or other means.

VEHICULAR OR OTHER DAMAGE TO THE WEST PERIMETER HEADER

The west perimeter header will operate under vacuum at all times. If the header is damaged, air will be drawn into the system initially. Depending on the location and severity of the damage, this air may cause the flare flame to go out. If flame is lost, the blower will shut down, which may cause positive pressure to build in the header.

City emergency personnel should notify CRA and its operator immediately if the header is damaged due to vehicular accident or otherwise. As an immediate response, the City should

“cap” the damaged header section with duct tape or other means. Methane monitoring devices should be used to assess levels of methane in the ambient air in the immediate vicinity of the damage.

ON-SITE FIRE

The locations of the on-site control systems, including flare systems, are shown on the site plan along with locations of on-site and off-site hydrants. System valve locations are shown as well. In case of fire at one of the flare systems, City emergency personnel should notify CRA and its operator immediately. System valves should be closed to the extent possible, depending on the location and severity of the fire.

REMEDIATION PLAN

In accordance with regulatory requirements, a remediation plan will be developed within 60 days of detection of methane gas exceeding regulatory levels. The plan will provide an evaluation of the nature and extent of the LFG migration, and describe proposed remedies. The plan will be submitted to the CTDEP and the City of Shelton.

**Table 2
INVENTORY OF ON-SITE STRUCTURES**

Building/Structure	General Use	Monitoring Device Installed	Monitoring Requirement
Bldg. 866 – Office Bldg.	Office	Bacharach Gas Sentinel	Continuous plus quarterly confirmation with hand-held meter.
Maintenance Garage	Vehicle Maintenance	none	Quarterly check with hand-held meter.
Scalehouse Trailer	Office	Bacharach Gas Sentinel	Continuous plus quarterly confirmation with hand-held meter.
Scale pit	Landfill Scale (below grade)	Bacharach Gas Sentinel	Continuous plus quarterly confirmation with hand-held meter.
Town Recycling Center	Recycling Transfer Station	Bacharach Gas Sentinel	Continuous plus quarterly confirmation with hand-held meter.
Vehicle Wheel Wash Facility	Vehicle Wheel Washing	Bacharach Gas Sentinel	Continuous plus quarterly confirmation with hand-held meter.
Leachate Treatment Facility	Leachate Treatment	Bacharach Gas Sentinel	Continuous plus quarterly confirmation with hand-held meter.
Gas-to-Energy Facility	Equipment Housing	none	Quarterly check with hand-held meter.

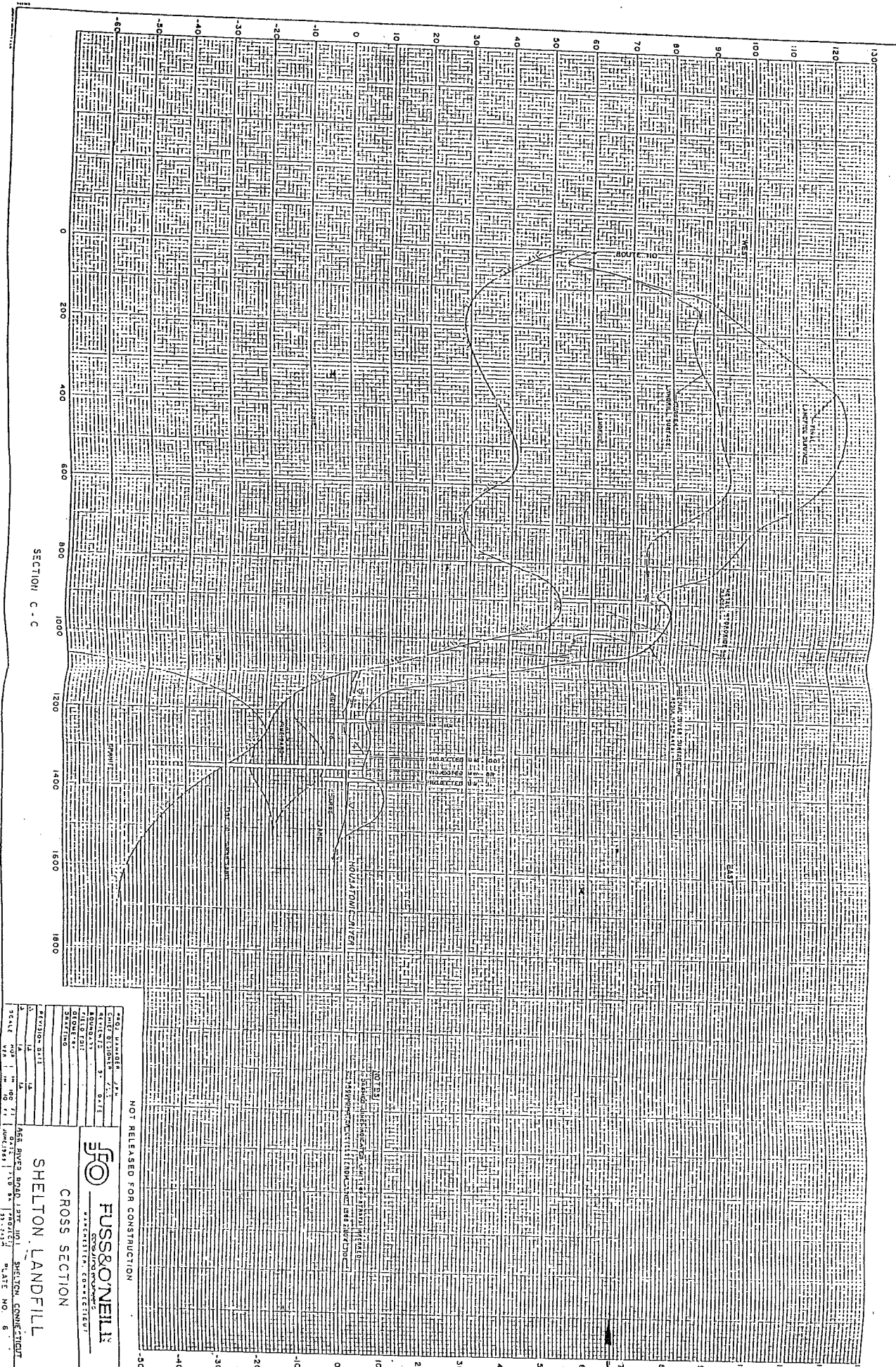
**Table 2 (continued)
INVENTORY OF ON-SITE STRUCTURES**

Building/Structure	General Use	Monitoring Device Installed	Monitoring Requirement
Leachate Concrete Vault (SE Expansion Area)	Leachate Control Housing	Bacharach Gas Sentinel	Continuous plus quarterly confirmation with hand-held meter.
Leachate Concrete Vault (NE Expansion Area)	Leachate Control Housing	Bacharach Gas Sentinel	Continuous plus quarterly confirmation with hand-held meter.
Leachate Lift Station (NE Expansion Area)	Leachate Pumping Manhole	none	Quarterly confirmation with hand-held meter.
Pump Station (west side of leachate treatment facility)	Leachate Pumping Station	none	Quarterly confirmation with hand-held meter.
Leachate Lift Station (NE Side of Leachate Treatment Facility)	Leachate Lift Station	none	Quarterly confirmation with hand-held meter.

**Table 3
INVENTORY OF OFF-SITE STRUCTURES**

Building/Structure	General Use	Monitoring Device Installed	Monitoring Requirement
Master Restaurant 861 River Road	Restaurant	Bacharach Gas Sentinel	Continuous plus monthly confirmation with hand-held meter.
Pine Rock Deli 851 River Road	Deli	Bacharach Gas Sentinel (2 sensors)	Continuous plus monthly confirmation with hand-held meter.
AJ's Service Center 851 River Road	Vehicle Service	Bacharach Gas Sentinel	Continuous plus monthly confirmation with hand-held meter.
Cumberland Farms 825 River Road	Gas Station/Convenience Store	Bacharach Gas Sentinel	Continuous plus monthly confirmation with hand-held meter.
On The Rocks Spirits Shop 813-821 River Road	Liquor Store	Bacharach Gas Sentinel (1 sensor)	Continuous plus monthly confirmation with hand-held meter.
Subway 813-821 River Road	Restaurant	Bacharach Gas Sentinel	Continuous plus monthly confirmation with hand-held meter.
Pro-Lube Auto Service/Car Wash 811 River Road	Vehicle Service/Car Wash	Bacharach Gas Sentinel (2 sensors)	Continuous plus monthly confirmation with hand-held meter.
Family Golf Center 784 River Road	Driving Range/Retail	Bacharach Gas Sentinel	Continuous plus monthly confirmation with hand-held meter.
Centrix, Inc. 770 River Road	Manufacturing	Bacharach Gas Sentinel	Continuous plus monthly confirmation with hand-held meter.

APPENDIX A
BACKGROUND GEOLOGIC AND
HYDROGEOLOGIC DATA



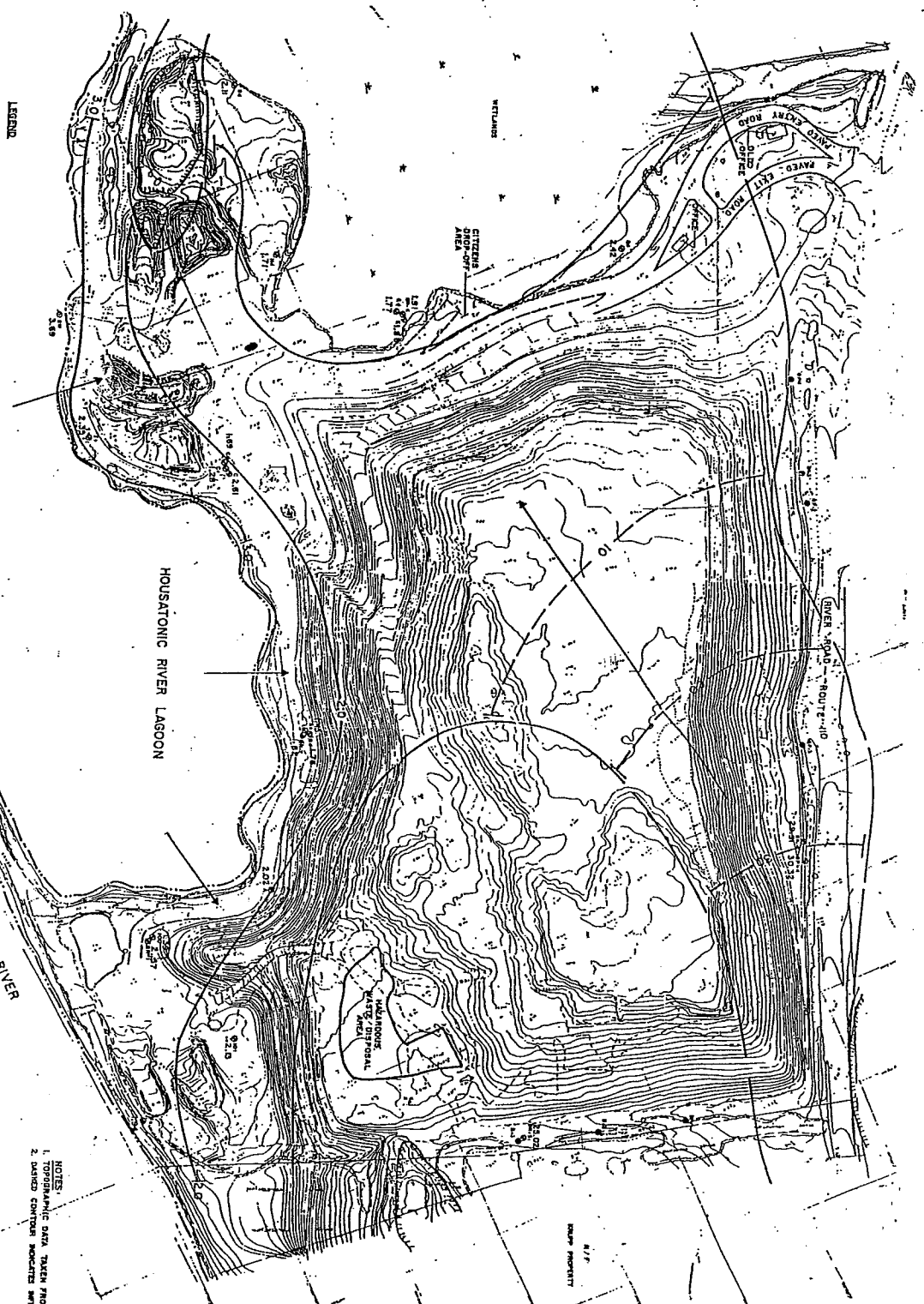
SECTION C - C

NOT RELEASED FOR CONSTRUCTION

DATE	1/18/71	BY	J.M.
REVISED DATE	1/18/71	BY	J.M.
REVISION	REVISED TO SHOW THE PROPOSED CONSTRUCTION OF THE LANDFILL AREA.		
DESIGNED BY	J.M.		
CHECKED BY	J.M.		
APPROVED BY	J.M.		
SCALE	1" = 100'		
PROJECT	SHELTON LANDFILL		
LOCATION	SHELTON, CONNECTICUT		
PLATE NO.	6		

FUSS & O'NEILL
CONSULTING ENGINEERS
ARCHITECTS-CORPORATION

CROSS SECTION
SHELTON LANDFILL



LEGEND

- LIMIT OF SURFACE WATER
- - - - - ADJACENT PROPERTY LINE
- MOVEMENT MONITOR WELL
- BAI POINT
- SURFACE WATER ELEVATION REFERENCE POINT
- MONUMENTARY ELEVATION CONTROL, N.E.L.
- LIMIT OF UNCONSOLIDATED MOVEMENTS FLOW
- RECORD OUTPOST
- DIRECTION OF UNCONSOLIDATED FLOW

NOTES

1. TOPOGRAPHIC DATA TAKEN FROM AERIAL PHOTOGRAPHY PLUM, AUGUST 1, 1982.
2. DANGER ZONE MONITORING WELLS WERE BOUNDARY CONTROL.

NOT RELEASED FOR CONSTRUCTION

PROJ. MANAGER:	J.H.
CHIEF ENGINEER:	V.L.C.
ENGINEER:	B.T.
FIELD ENGINEER:	
DRAWING:	
REVISION DATE:	
SCALE:	1" = 100' FT.
DATE:	APR 1983

FUSS & RONNELL
 ARCHITECTS, ENGINEERS
 100 N. MAIN ST. SUITE 100
 SHELTON, CONNECTICUT 06484

UNCONSOLIDATED GROUNDWATER FLOW
 AUGUST 1988 - HIGH TIDE
 SHELTON LANDFILL

888 RIVER ROAD (ROUTE 10)
 SHELTON, CONNECTICUT

PLATE NO. 10

SOILTESTING, INC.

140 OXFORD RD.
OXFORD, CT 06478
CT (203) 888-4531
NY (914) 946-4850

JREMAN - DRILLER
J/C's

INSPECTOR

GROUND WATER OBSERVATIONS

AT none FT AFTER 0 HOURS
AT FT AFTER HOURS

SAMPLE

CLIENT: Organic Waste Technologies

PROJECT NO. E105-5736-99

PROJECT NAME Perimeter LFG Monitoring

LOCATION Shelton Landfill-Route 110 - Shelton, CT

CASING SAMPLER CORE BAR HSA SS
DATE START 1-4-00
DATE FINISH 1-4-00

SIZE I.D. 4 1/4" 1 3/8"
HAMMER WT. 140#
HAMMER FALL 30"

FIELD IDENTIFICATION OF SOIL REMARKS
INCL. COLOR, LOSS OF WASH WATER,
SEAMS IN ROCK, ETC.

DEPTH	CASING BLOWS PER FOOT	NO	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE)	CORING TIME PER FT (MIN)	DENSITY OR CONSIST	MOIST	STRATA CHANGE DEPTH	ELEV	SAMPLE		
													DEPTH	ELEV	
0															
5															
10															
15															
20															
23'0"															
24'0"															
25															
30															
35															
0															

Brn F-C SAND & F-C GRAVEL,lt
cobbles

Lt-bm F-C SAND & F-C GRAVEL,sm
cobbles

SAME

Lt-bm VF-F SAND,sm M-C sand,F-C
gravel

23'0" SAME

24'0" POSSIBLE BEDROCK
AUGER REFUSAL

E.O.B.

E.O.B. 24'0"

GROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. HOLE NO. MW-5

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST
WOH = WEIGHT OF HAMMER & RODS
SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER
C = COARSE M = MEDIUM F = FINE

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

Phone (203) - 888-4531

Telefax (203) - 888-6247



SOILTESTING, INC.

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

MONITOR WELL INSTALLATION DETAIL

WHITE PLAINS, N.Y. (914) - 946-4850

GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling

Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99

MONITOR WELL # MW-5

VENTED LOCKING STEEL CAP: YES NO

PROTECTIVE STEEL CASING: YES NO

MOUNDED BACKFILL: YES NO

CONCRETE COLLAR: YES NO

BACKFILL MATERIAL: #2 Silica Sand

TYPE OF CASING & SCREEN: 2" SCH 40 PVC

JOINT TYPE: LD. 2.067" O.D. 2.375" UN'D F.T.

IMPERMEABLE BACKFILL: Bentonite Chips

BACKFILL MATERIAL: #2 Silica Sand

SCREEN PACKINGS: #2 Silica Sand

SCREEN SLOT SIZE: #20

SUMP LENGTH: N/A

BACKFILL MATERIAL: N/A

REFUSAL: YES NO

LOCKING EXP PLUG: YES NO

Lock

Locking Exp Plug

S/U - (1)

D/O

Bentonite Chips 1 bag

Bentonite Pellets

Concrete Mix 1 bag

Portland

Powdered Bentonite

Silica Sand 900#

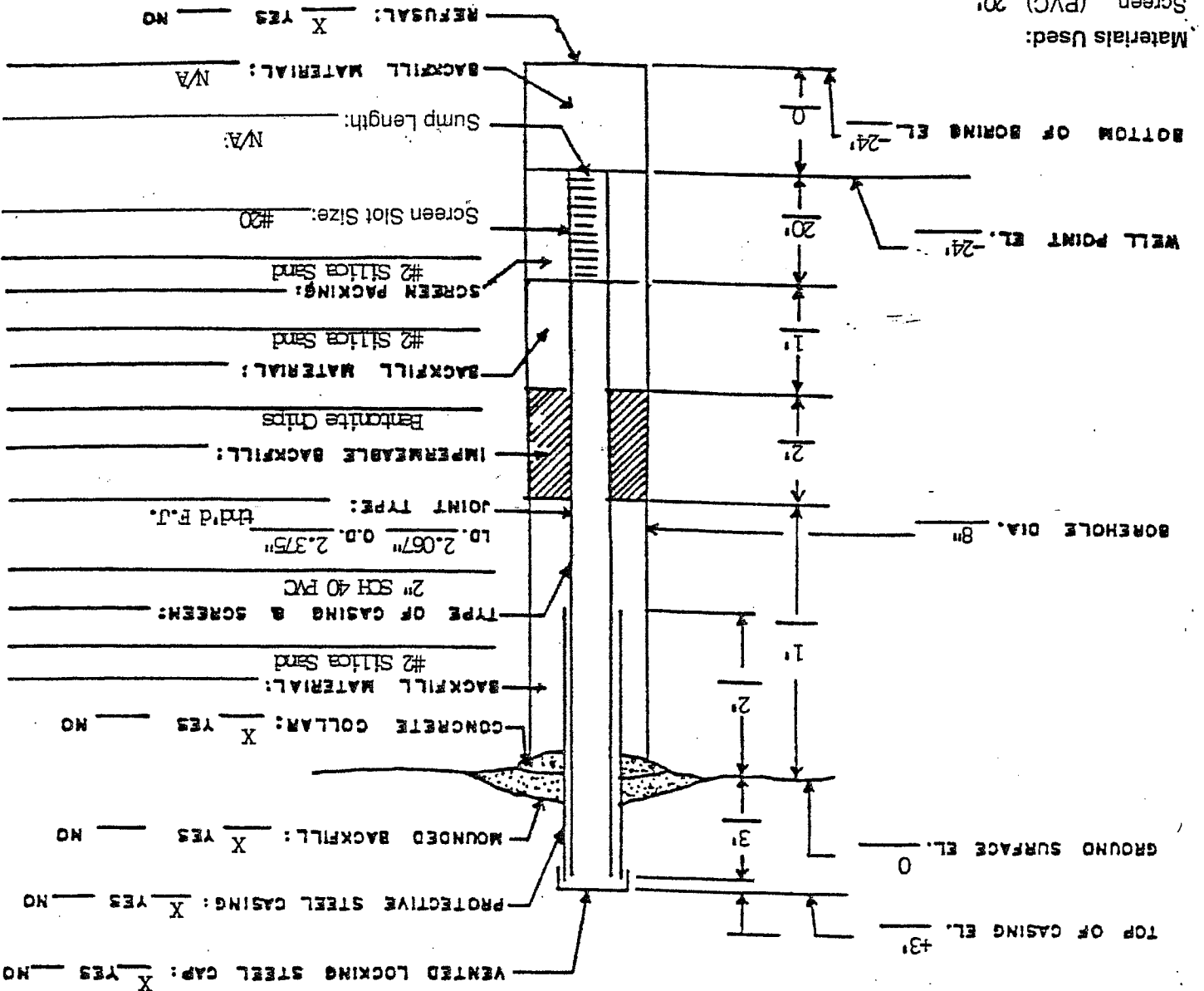
Slippcap (PVC)

Plug (PVC) (1)

Riser (PVC) 10'

Screen (PVC) 20'

Materials Used:



BOTTOM OF BORING EL. -24'

WELL POINT EL. -24'

BOREHOLE DIA. 8"

GROUND SURFACE EL. 0

TOP OF CASING EL. +3'

SOILTESTING, INC.

140 OXFORD RD.
OXFORD, CT 06478
CT (203) 888-4531
NY (914) 946-4850

REMAN - DRILLER
Jc/Is

INSPECTOR

GROUND WATER OBSERVATIONS
AT 33' FT AFTER 0 HOURS
AT 1' FT AFTER 1 HOURS

CLIENT: Organic Waste Technologies

PROJECT NO. E105-5736-99

PROJECT NAME
Perimeter LFG Monitoring

LOCATION
Shelton Landfill-Route 110 - Shelton, CT

CASING SAMPLER CORE BAR
HSA SS

TYPE
HSA SS

SIZE I.D. 4 1/4" 1 3/8"

HAMMER WT. 140#

HAMMER FALL 30"

SHEET 1 OF 1

HOLE NO. MW-6

BORING LOCATIONS
as directed

DATE START 14-00

DATE FINISH 14-00

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH PER CASING BLOWS	NO	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 6 - 12 12 - 18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST	STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.	SAMPLE	
											MOIST	ELEV

Bm F-C SAND & F-C GRAVEL, lit cobbles

moist

SAME

moist

moist

moist

moist

moist

moist

moist

wet

wet

35'0"

35'0"

E.O.B. 35'0"

E.O.B.

HOLE NO. MW-6

GROUND SURFACE TO FT. USED CASING THEN CASING TO FT.

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

F = FINE M = MEDIUM C = COARSE

Phone
(203) - 888-4531

Telephone
(03) - 888-6247

SOILTESTING, INC.

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

MONITOR WELL INSTALLATION DETAIL

WHITE PLAINS, N.Y.
(914) - 946-4850

GEOCHEMICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling

Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99

MONITOR WELL # MW-6

VENTED LOCKING STEEL CAP: YES NO

PROTECTIVE STEEL CASING: YES NO

ROUNDED BACKFILL: YES NO

CONCRETE COLLAR: YES NO

BACKFILL MATERIAL: #2 Silica Sand

TYPE OF CASING & SCREEN: 2" SCH 40 PVC

JOINT TYPE: Std F.J.
I.D. 2.067" O.D. 2.375"

IMPERMEABLE BACKFILL: Bentonite Chips

BACKFILL MATERIAL: #2 Silica Sand

SCREEN PACKING: #2 Silica Sand

SCREEN SLOT SIZE: #20

SUMP LENGTH: N/A

BACKFILL MATERIAL: N/A

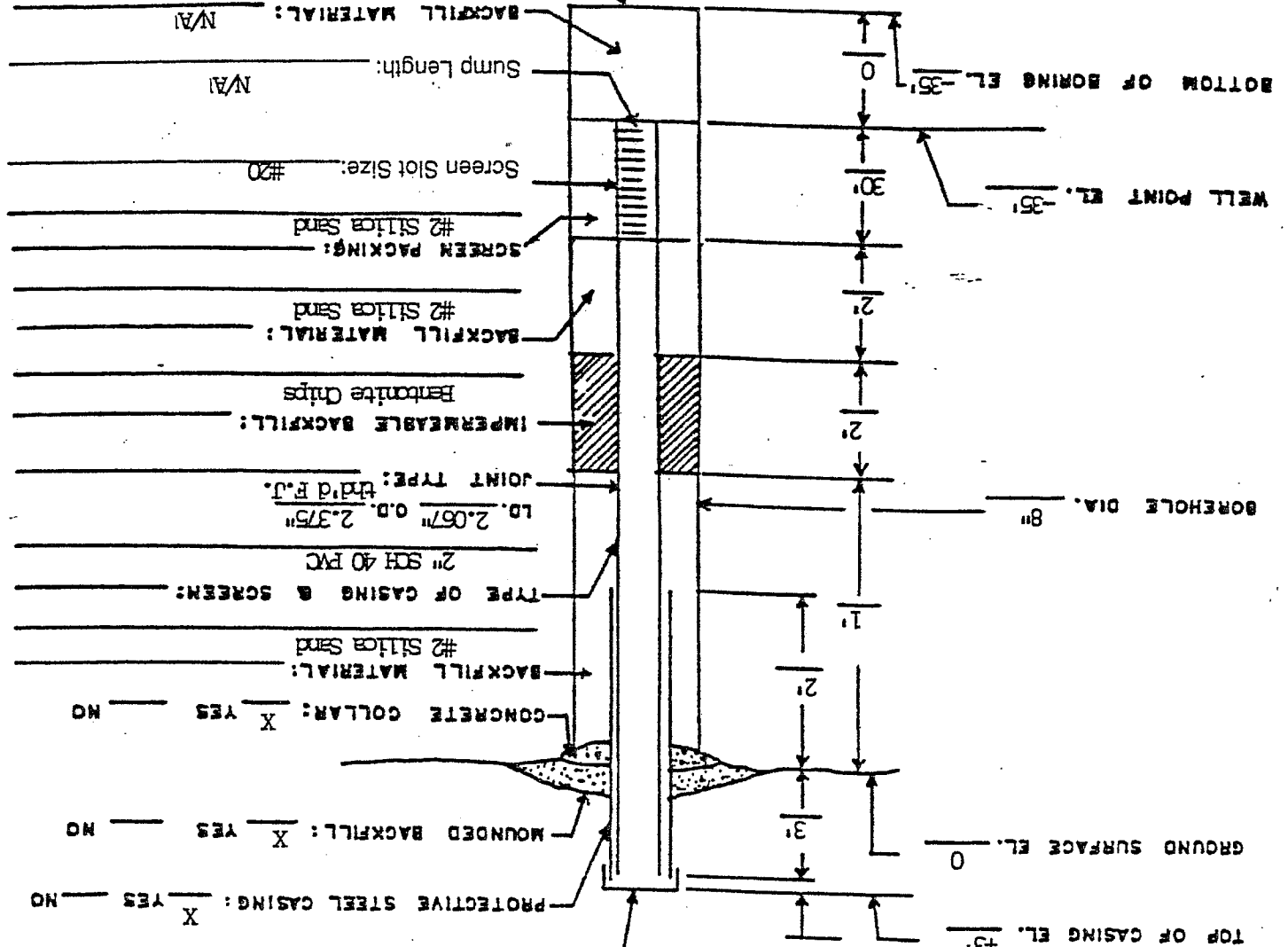
REFUSAL: YES NO

LOCKING EXP PLUG

LOCK

D/O

S/U - (1)



Materials Used:

Screen (PVC) 30'

Riser (PVC) 10'

Plug (PVC) (1)

Slipcap (PVC)

Silica Sand 1250#

Powdered Bentonite

Bentonite Pellets

Bentonite Chips 1 bag

Concrete Mix 1 bag

Portland

SOILTESTING, INC.

140 OXFORD RD.
OXFORD, CT 06478
CT (203) 888-4531
NY (914) 946-4850

REMAN - DRILLER

JC/ls

INSPECTOR

GROUND WATER OBSERVATIONS
AT none FT AFTER 0 HOURS
AT FT AFTER HOURS

SHEET 1 OF 1

CLIENT: Organic Waste Technologies

HOLE NO. MW-7,7A,7B

PROJECT NO. E105-5736-99

PROJECT NAME Perimeter LFG Monitoring

LOCATION Shelton Landfill-Route 110 - Shelton, CT

DATE START 1-5-00

DATE FINISH 1-5-00

SURFACE ELEV. _____

GROUND WATER ELEV. _____

TYPE HSA SS

SIZE I.D. 4 1/4" 1 3/8"

HAMMER WT. _____

HAMMER FALL _____

BIT 140# 30"

OFFSET _____

CASING SAMPLER CORE BAR _____

FIELD IDENTIFICATION OF SOIL REMARKS
INCL. COLOR, LOSS OF WASH WATER,
SEAMS IN ROCK, ETC.

STRATA CHANGE DEPTH

DENSITY OR CONSIST

MOIST

ELEV

M-7

Bm F-C SAND & F-C GRAVEL, sm

cobbles, boulders

AUGER REFUSAL

4'0"

moist

MW-7A

Bm F-C SAND & F-C GRAVEL, sm

cobbles, boulders

AUGER REFUSAL

3'6"

moist

MW-7B

Bm F-C SAND & F-C GRAVEL, sm

cobbles, boulders

AUGER REFUSAL

3'6"

E.O.B.

GROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. HOLE NO. MW-7,7A,7B

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST
 WOH = WEIGHT OF HAMMER & RODS
 WOR = WEIGHT OF RODS
 SS = SPLIT TUBE SAMPLER
 H.S.A. = HOLLOW STEM AUGER
 C = COARSE
 M = MEDIUM
 F = FINE

PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

SOILTESTING, INC.

WHITE PLAINS, N.Y.
(914) - 946-4850

Phone 203) - 888-4531
 03) - 888-6247
 Telefax



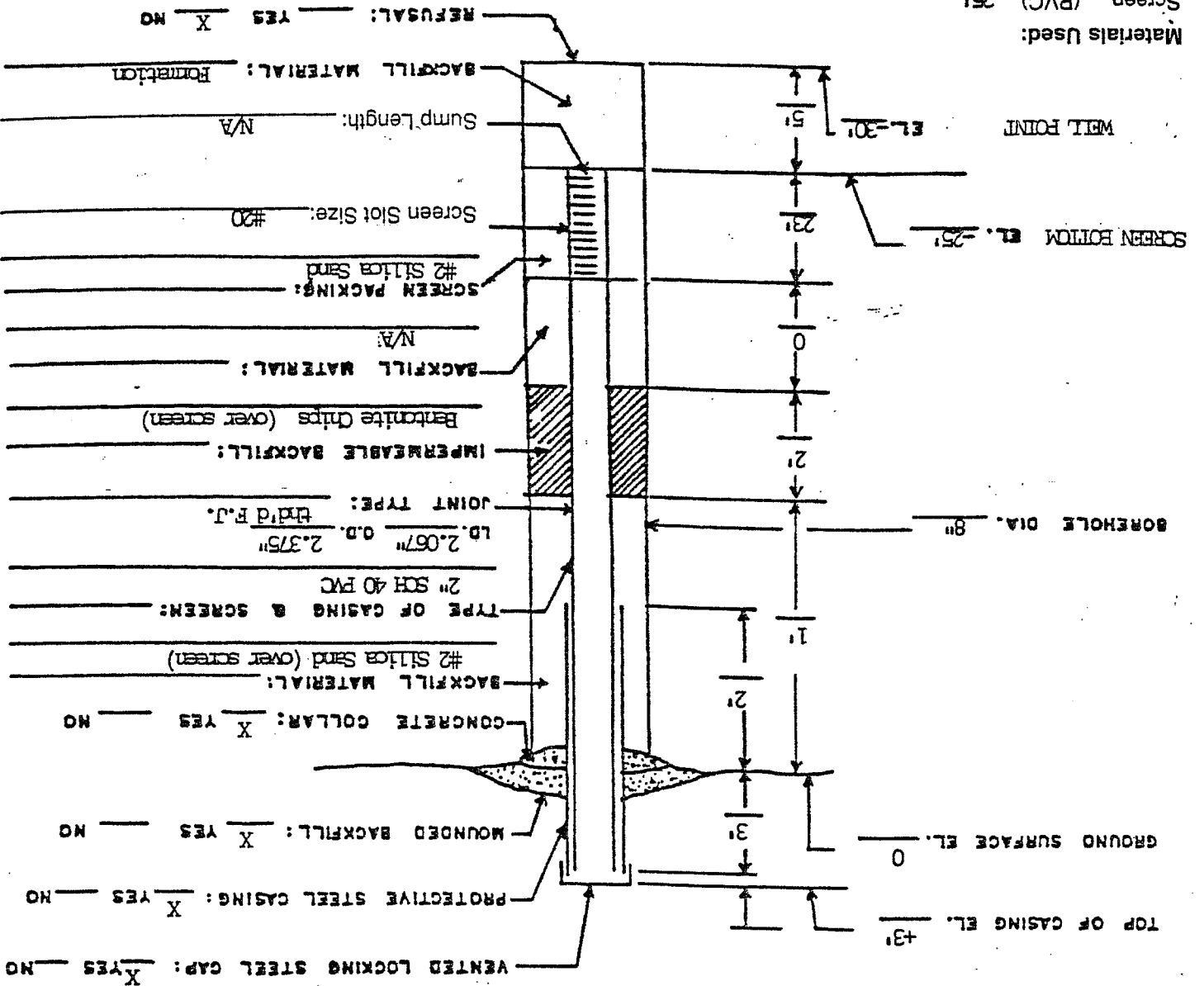
MONITOR WELL INSTALLATION DETAIL

GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling
 Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99

MONITOR WELL # MW-7C



REFUSAL: YES NO
 Locking Exp Plug
 Lock
 D/O
 S/U - (1)

Materials Used:
 Screen (PVC) 25'
 Riser (PVC) 10'
 Plug (PVC) (1)
 Slipcap (PVC)
 Silica Sand 1000#
 Powdered Bentonite
 Bentonite Pellets
 Bentonite Chips
 Concrete Mix
 Portland

SOILTESTING, INC.

140 OXFORD RD.

OXFORD, CT 06478

CT (203) 888-4531

NY (914) 946-4850

EMAN - DRILLER

JC/S

INSPECTOR

GROUND WATER OBSERVATIONS

AT 28' FT AFTER 0 HOURS

AT FT AFTER HOURS

SAMPLE

CASING BLOWS PER FOOT
NO TYPE PEN REC
DEPTH @ BOT
BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0-6 6-12 12-18
CORING TIME PER FT (MIN)

CLIENT: Organic Waste Technologies

PROJECT NO. E105-5736-99

PROJECT NAME: Perimeter LFG Monitoring

LOCATION: Shelton Landfill-Route 110 - Shelton, CT

DATE START 1-5-00

DATE FINISH 1-5-00

SURFACE ELEV. _____

GROUND WATER ELEV. _____

TYPE HSA

SIZE I.D. 4 1/4"

HAMMER WT. _____

HAMMER FALL _____

DATE START 1-5-00

DATE FINISH 1-5-00

SURFACE ELEV. _____

GROUND WATER ELEV. _____

DEPTH	CASING BLOWS PER FOOT	NO	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE)	CORING TIME PER FT (MIN)	DENSITY OR CONSIST	MOIST	STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
0												
5									moist			Dk-bm F-C SAND & F-C GRAVEL
10									moist			Bm F-C SAND & F-C GRAVEL, sm cobbles
15									moist			SAME
20									moist			Bm F-C SAND, lit F-M gravel, tr cobbles
25									moist			SAME
30									wet			SAME
35												SAME

ROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. HOLE NO. MW-8

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

S = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

F = FINE M = MEDIUM C = COARSE

E.O.B. 30'0"

E.O.B.

Dk-bm F-C SAND & F-C GRAVEL

Bm F-C SAND & F-C GRAVEL, sm cobbles

Bm F-C SAND, lit F-M gravel, tr cobbles

SAME

SAME

SAME

E.O.B. 30'0"

Phone (203) - 888-4531
 Telefax (03) - 888-6247



SOLTESTING, INC.

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling

Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

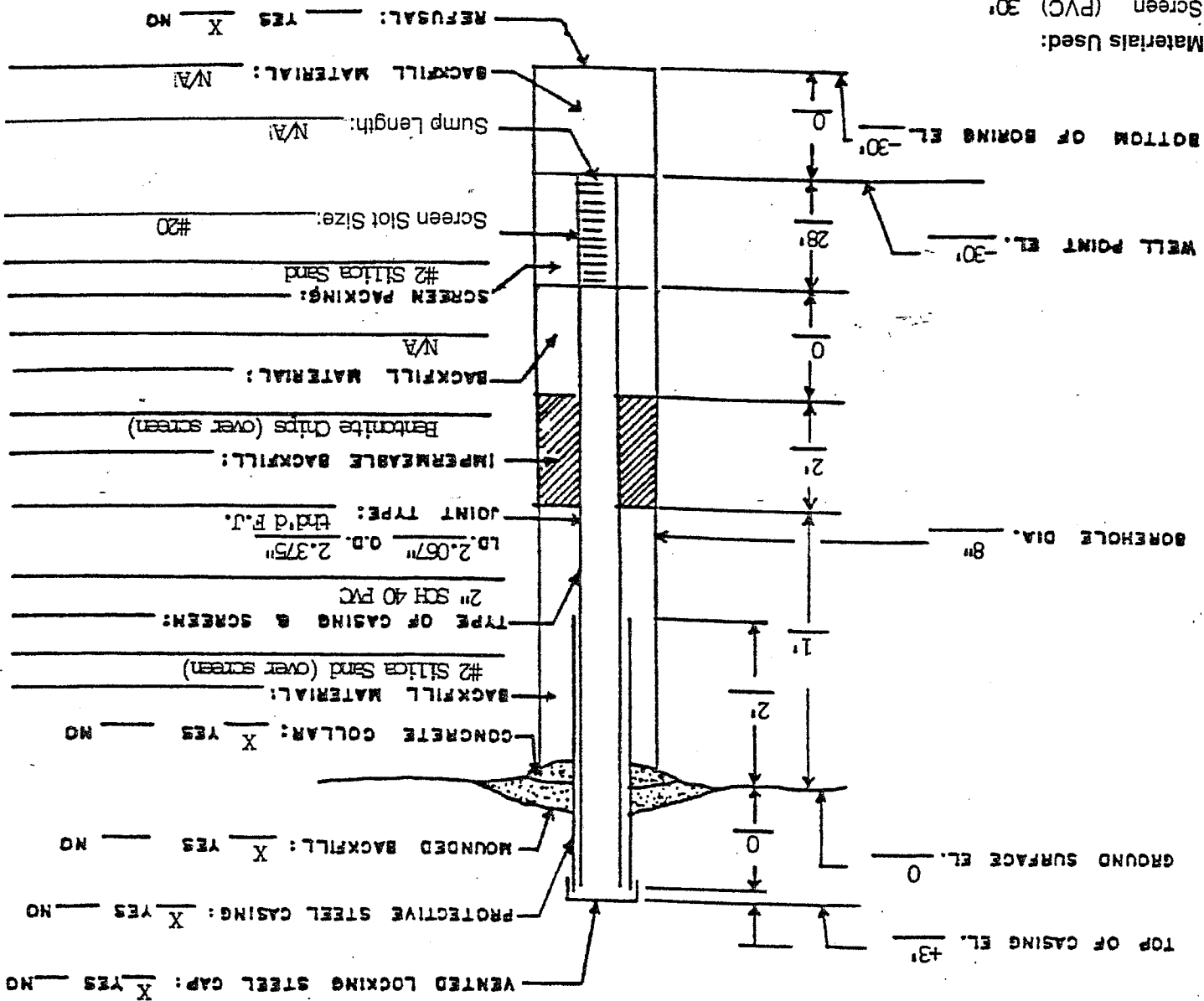
Client: Organic Waste Technologies

Job #: E105-5736-99

MONITOR WELL # M-8

MONITOR WELL INSTALLATION DETAIL

WHITE PLAINS, N.Y. (914) - 946-4850



SOILTESTING, INC.

140 OXFORD RD.
 OXFORD, CT 06478
 CT (203) 888-4531
 NY (914) 946-4850

EMAN - DRILLER
 PDVc

INSPECTOR

AT none FT AFTER 0 HOURS
 AT FT AFTER HOURS

GROUND WATER OBSERVATIONS

PROJECT NO. E105-5736-99

PROJECT NAME
 Perimeter LFG Monitoring

LOCATION
 Shelton Landfill-Route 110 - Shelton, CT

DATE START 12-27-99
 DATE FINISH 12-27-99
 SURFACE ELEV.
 GROUND WATER ELEV.

TYPE HSA
 SIZE I.D. 4 1/4"
 HAMMER WT. 140#
 HAMMER FALL 30"

CLIENT: Organic Waste Technologies

SHEET 1 OF 1

HOLE NO. MW-9

PROJECT NO. E105-5736-99

PROJECT NAME
 Perimeter LFG Monitoring

LOCATION
 Shelton Landfill-Route 110 - Shelton, CT

DATE START 12-27-99
 DATE FINISH 12-27-99
 SURFACE ELEV.
 GROUND WATER ELEV.

TYPE HSA
 SIZE I.D. 4 1/4"
 HAMMER WT. 140#
 HAMMER FALL 30"

CLIENT: Organic Waste Technologies

DEPTH

DEPTH PER CASING BLOWS NO TYPE PEN REC DEPTH @ BOT

BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0-6-12 12-18 FT (MIN) CORING TIME PER

DENSITY OR CONSIST MOIST STRATA CHANGE DEPTH ELEV

FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.

TOPSOIL 6"

Bm F-M-C SAND & F-C GRAVEL, III cobbles, tr silt

Lt-bm F-M-C SAND & F-C GRAVEL, III cobbles

SAME

Bm/lt-bm F-M-C SAND & F-C GRAVEL, III cobbles

SAME; sm cobbles, tr boulders

DECOMPOSED FRACTURED ROCK AUGER REFUSAL E.O.B.

E.O.B. 27'6"

E.O.B. 27'6"

ROUND SURFACE TO FT. USED CASING THEN CASING TO FT. HOLE NO. MW-9

A = AUGER UP = UNDISTURBED PISTON T = THINWALL
 WOH = WEIGHT OF HAMMER & RODS
 H.S.A. = HOLLOW STEM AUGER
 PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

C = COARSE
 M = MEDIUM
 F = FINE

REPORTS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

WOR = WEIGHT OF RODS
 H.S.A. = HOLLOW STEM AUGER
 T = THINWALL
 V = VANE TEST

Phone (203) - 888-4531
 Telefax (03) - 888-6247



SOLTESTING, INC.

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

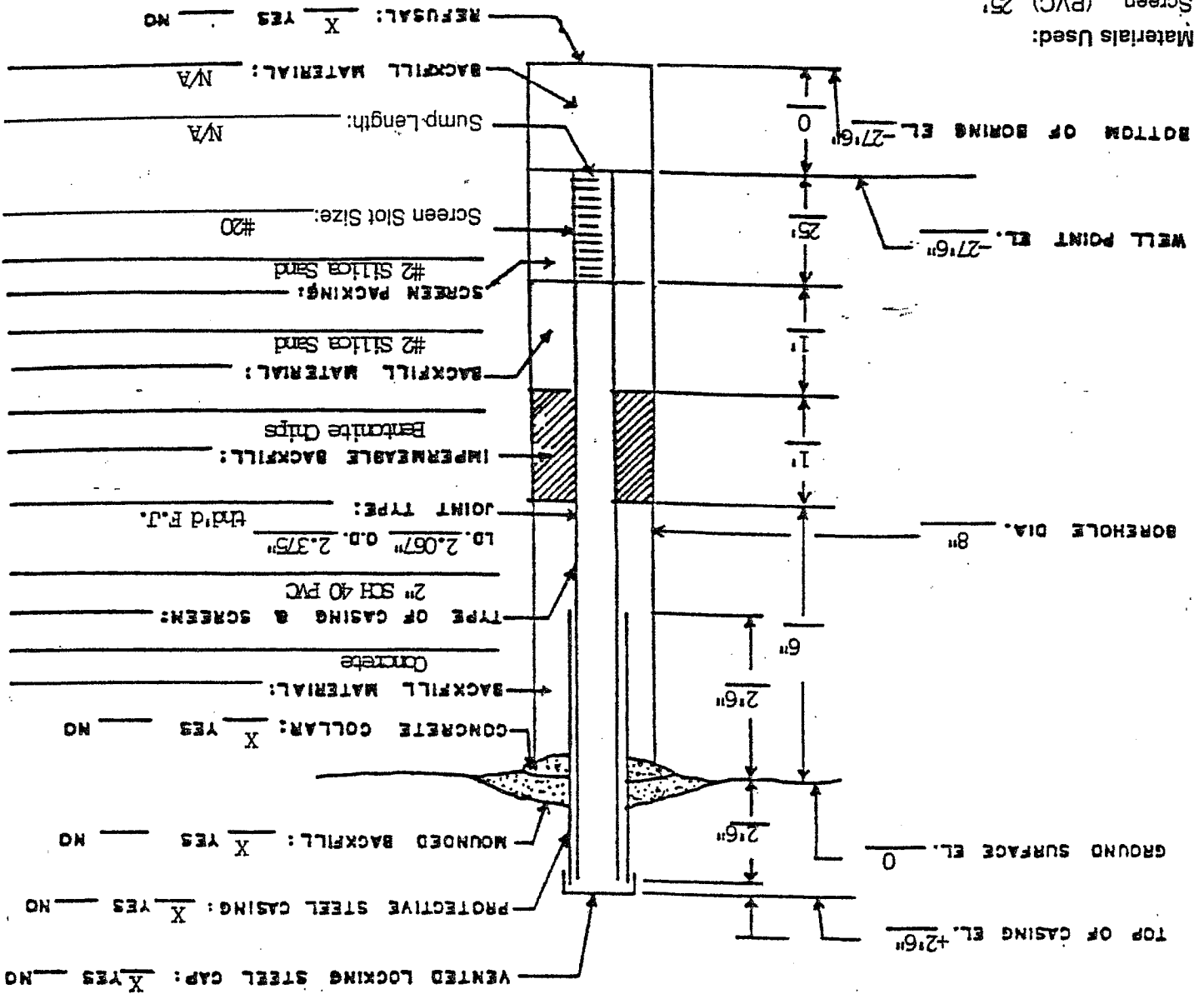
GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling

Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99

MONITOR WELL # MW-9



- Materials Used:
- Screen (PVC) 25'
 - Riser (PVC) 5'
 - Plug (PVC) (1)
 - Slipcap (PVC)
 - Silica Sand 950#
 - Powdered Bentonite

- Bentonite Pellets
- Bentonite Chips 1/2 bag
- Concrete Mix 1 bag
- Portland

- Locking Exp Plug
- Lock
- D/O
- S/U - (1)

MONITOR WELL INSTALLATION DETAIL

WHITE PLAINS, N.Y. (914) - 946-4850

SOIL TESTING, INC.

140 OXFORD RD.
OXFORD, CT 06478
CT (203) 888-4531
NY (914) 946-4850

REMAN - DRILLER
P/D/vc

INSPECTOR

GROUND WATER OBSERVATIONS
AT 30' FT AFTER 0 HOURS
AT FT AFTER HOURS

CLIENT:

Organic Waste Technologies

PROJECT NO. E105-5736-99

PROJECT NAME

Perimeter LFG Monitoring

LOCATION

Shelton Landfill-Route 110 - Shelton, CT

CASING SAMPLER CORE BAR

DATE START 12-27-99

DATE FINISH 12-27-99

SURFACE ELEV.

GROUND WATER ELEV.

TYPE

HSA

SS

SIZE I.D.

4 1/4"

1 3/8"

HAMMER WT.

140#

BIT

HAMMER FALL

30"

SAMPLE

DEPTH
PER
FOOT

CASING
BLOWS
NO

DEPTH
@ BOT

BLOWS PER 6 IN
ON SAMPLER
(FORCE ON TUBE)

CORING
TIME PER
FT (MIN)

DENSITY
OR
CONSIST

MOIST
ELEV

FIELD IDENTIFICATION OF SOIL REMARKS
INCL. COLOR, LOSS OF WASH WATER,
SEAMS IN ROCK, ETC.

DEPTH PER FOOT	CASING BLOWS NO	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE)	CORING TIME PER FT (MIN)	DENSITY OR CONSIST	MOIST ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5					moist		gravel, cobbles, tr silt
10					moist		SAME
15					moist		Bm/lt-bm F-M-C SAND & F-C GRAVEL
20					moist		SAME; sm cobbles
25					moist		Bm/lt-bm F-M-C SAND, sm F-C gravel, tr cobbles
30					wet	30.0"	SAME
35							E.O.B. 30.0"

HOLE NO. MW-10

GROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. V = VANE TEST
 A = AUGER UP = UNDISTURBED PISTON T = THINWALL
 WOR = WEIGHT OF RODS
 WOH = WEIGHT OF HAMMER & RODS
 SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER
 M = MEDIUM F = FINE
 C = COARSE
 PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

WHITE PLAINS, N.Y. (914) - 946-4850

MONITOR WELL INSTALLATION DETAIL

SOILTESTING, INC.



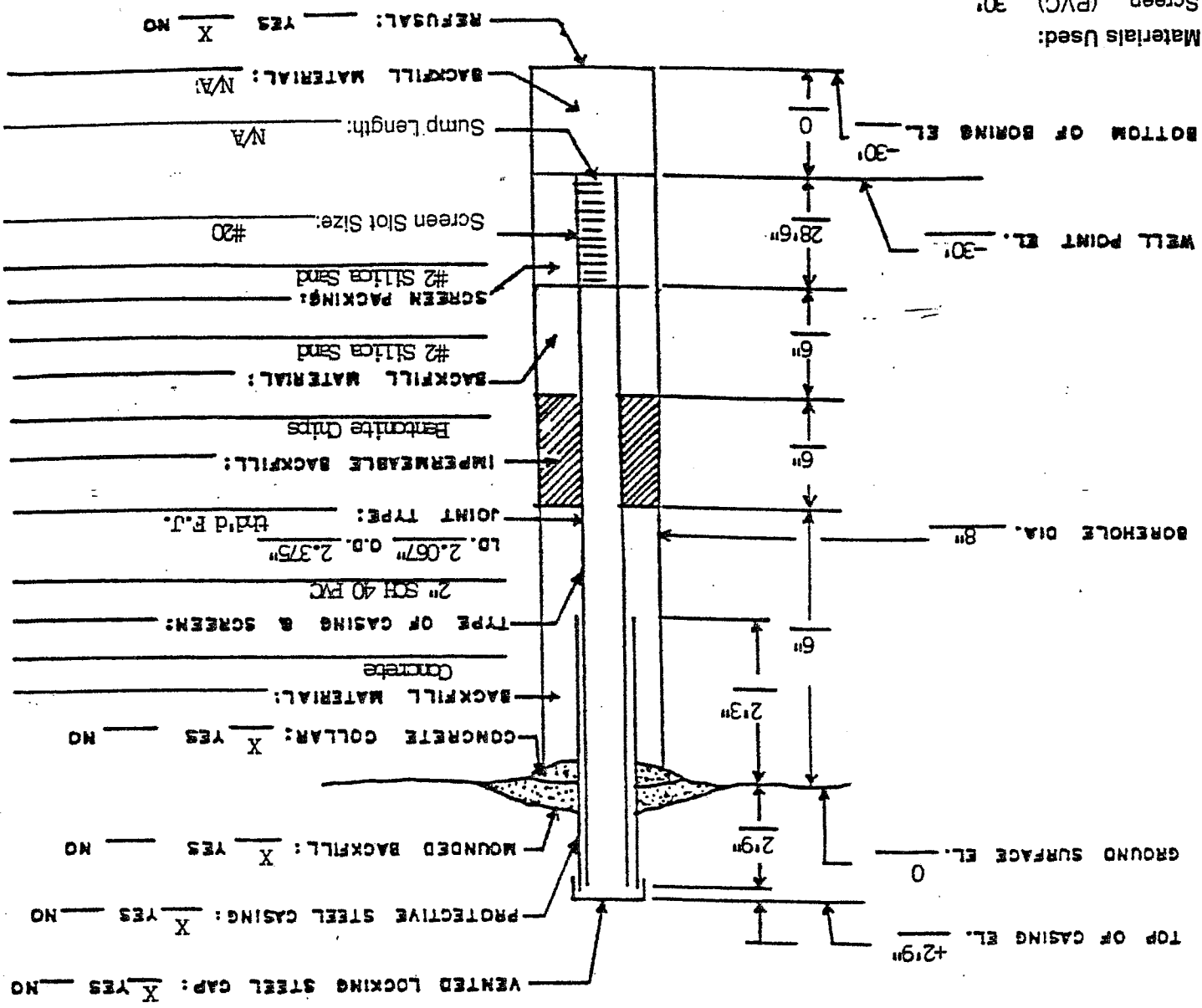
Phone (203) - 888-4531
 Telefax (203) - 888-6247

GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling
 Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99

MONITOR WELL # MW-10



Materials Used:

- Screen (PVC) 30'
- Riser (PVC) 5'
- Plug (PVC) (1)
- Silicap (PVC)
- Silica Sand 1050#
- Powdered Bentonite

- Bentonite Pellets
- Bentonite Chips 1/2 bag
- Concrete Mix 1 bag
- Portland

- Locking Exp Plug
- Lock
- D/O
- S/U - (1)

REFUSAL: YES NO

BACKFILL MATERIAL: NA

Sump Length: NA

Screen Slot Size: #20

SCREEN PACKINGS: #2 Silica Sand

BACKFILL MATERIAL: #2 Silica Sand

IMPERMEABLE BACKFILL: Bentonite Chips

JOINT TYPE: Hard F.J.

TYPE OF CASING & SCREEN: 2" SCH 40 FWC

BACKFILL MATERIAL: Concrete

CONCRETE COLLAR: YES NO

MOUNDED BACKFILL: YES NO

PROTECTIVE STEEL CASING: YES NO

VENTED LOCKING STEEL CAP: YES NO

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

SOILTESTING, INC.

Phone (203) - 888-4531
 Telefax (203) - 888-6247



MONITOR WELL INSTALLATION DETAIL

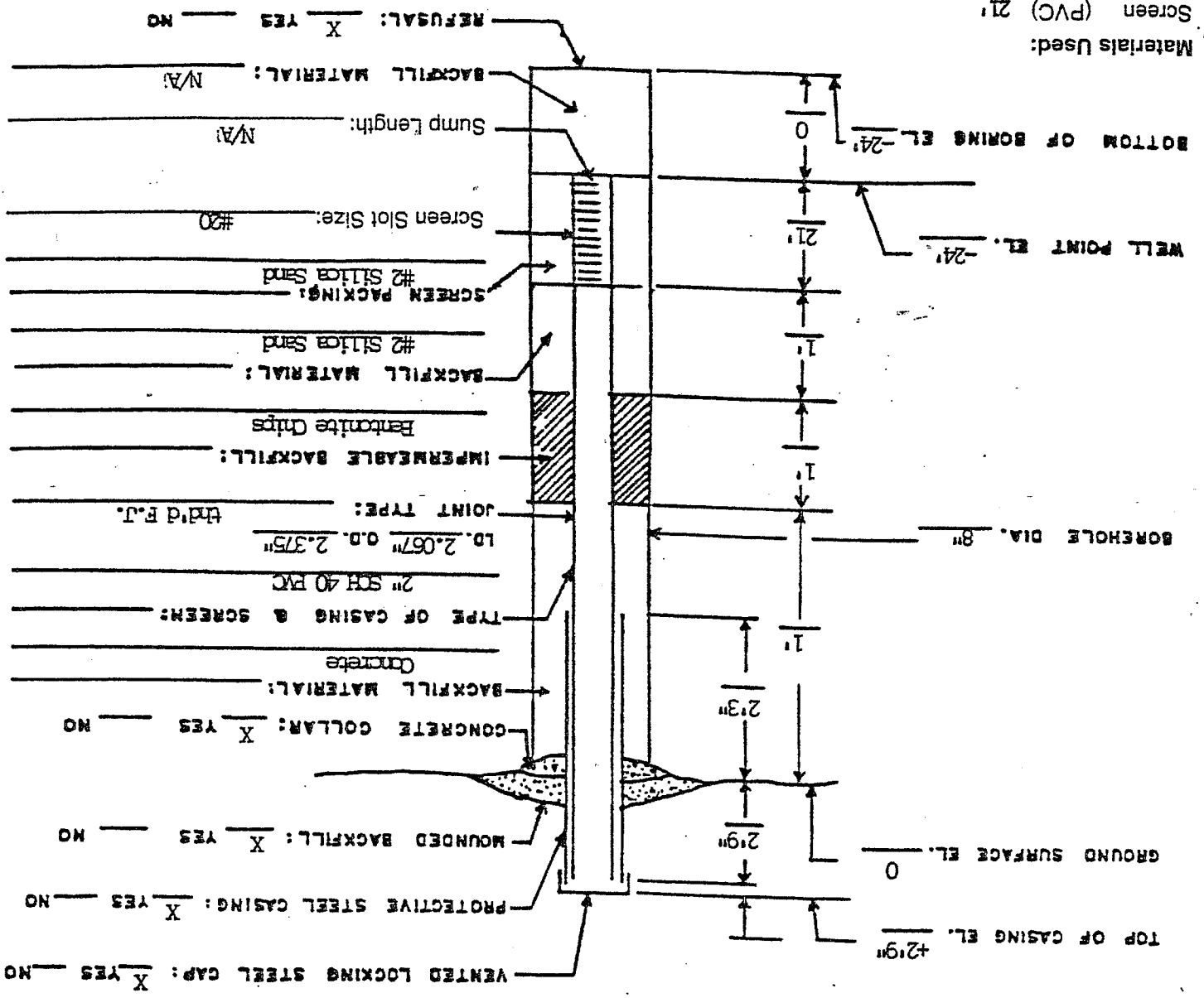
WHITE PLAINS, N.Y. (914) - 946-4850

GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling
 Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

MONITOR WELL # M-11

Job #: E105-5736-99



- Materials Used:
- Screen (PVC) 21'
 - Riser (PVC) 5'
 - Plug (PVC) (1)
 - Slipcap (PVC)
 - Silica Sand 750#
 - Powdered Bentonite

- Bentonite Pellets
- Bentonite Chips 1/2 bag
- Concrete Mix 1 bag
- Portland

- Locking Exp Plug
- Lock
- D/O
- S/U - (1)

SOIL TESTING, INC.

140 OXFORD RD.
OXFORD, CT 06478
CT (203) 888-4531
NY (914) 946-4850

MAN - DRILLER

PD/Vc

INSPECTOR

ROUND WATER OBSERVATIONS

AT NONE FT AFTER 0 HOURS

AT FT AFTER HOURS

CASING BLOWS PER FOOT

DEPTH @ BOT

BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE)

0-6 6-12 12-18 FT (MIN)

DENSITY OR CONSIST

MOIST

FIELD IDENTIFICATION OF SOIL REMARKS

INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.

BRN/GRY SILT, sm F-M sand, F-C gravel, lit

COBBLES, tr rubbish

BRN/LT-GRY F-M SAND & F-C GRAVEL, lit

COBBLES

LT-BRN/GRY F-M-C SAND, sm F-C gravel, lit

SILT, COBBLES

SAME; sm cobbles, possible fractured rock

38.0"

41.0"

DECOMPOSED ROCK

AUGER REFUSAL

E.O.B.

GROUND SURFACE TO FT. USED

CASING THEN CASING TO FT. VANE TEST

HOLE NO. MW-12

CLIENT: Organic Waste Technologies

PROJECT NO. E105-5736-99

PROJECT NAME Perimeter LFG Monitoring

LOCATION Shelton Landfill-Route 110 - Shelton, CT

CASING SAMPLER CORE BAR

TYPE HSA SS

SIZE I.D. 4 1/4"

HAMMER WT. 140#

HAMMER FALL 30"

DATE START 12-27-99

DATE FINISH 12-27-99

SURFACE ELEV.

GROUND WATER ELEV.

OFFSET

BORING LOCATIONS as directed

HOLE NO. MW-12

SHEET 1 OF 1

REPORTS USED: TRACE = 0-10% LITTLE = 10-20% SOME = 20-35% AND = 35-50%
F = FINE
M = MEDIUM
C = COARSE

WOR = WEIGHT OF RODS
AUGER UP = UNDISTURBED PISTON
T = THINWALL
V = VANE TEST
WOH = WEIGHT OF HAMMER & RODS
H.S.A. = HOLLOW STEM AUGER

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SOILTESTING, INC.

WHITE PLAINS, N.Y. (914) - 946-4850

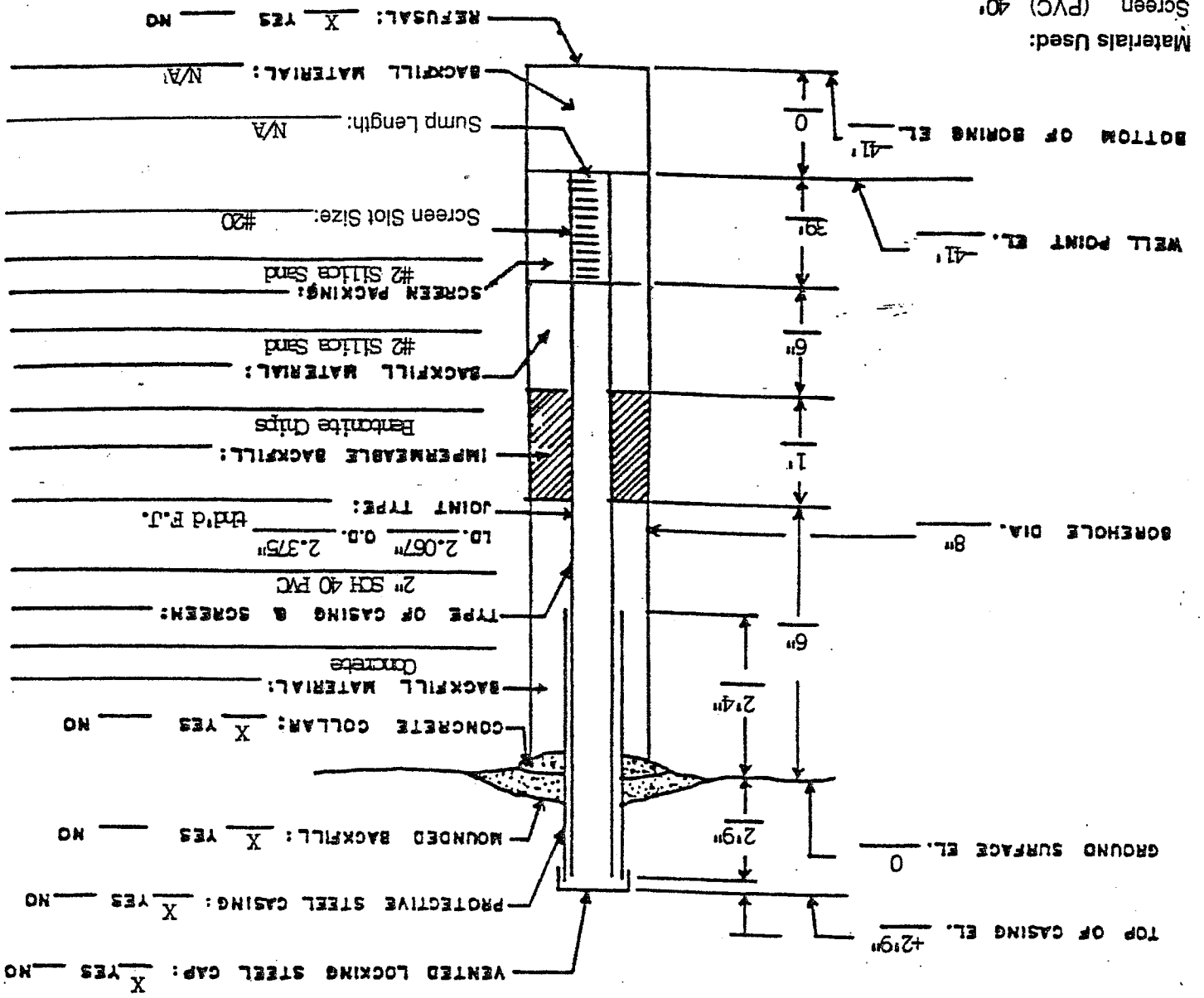
MONITOR WELL INSTALLATION DETAIL

GEO TECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling
Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99

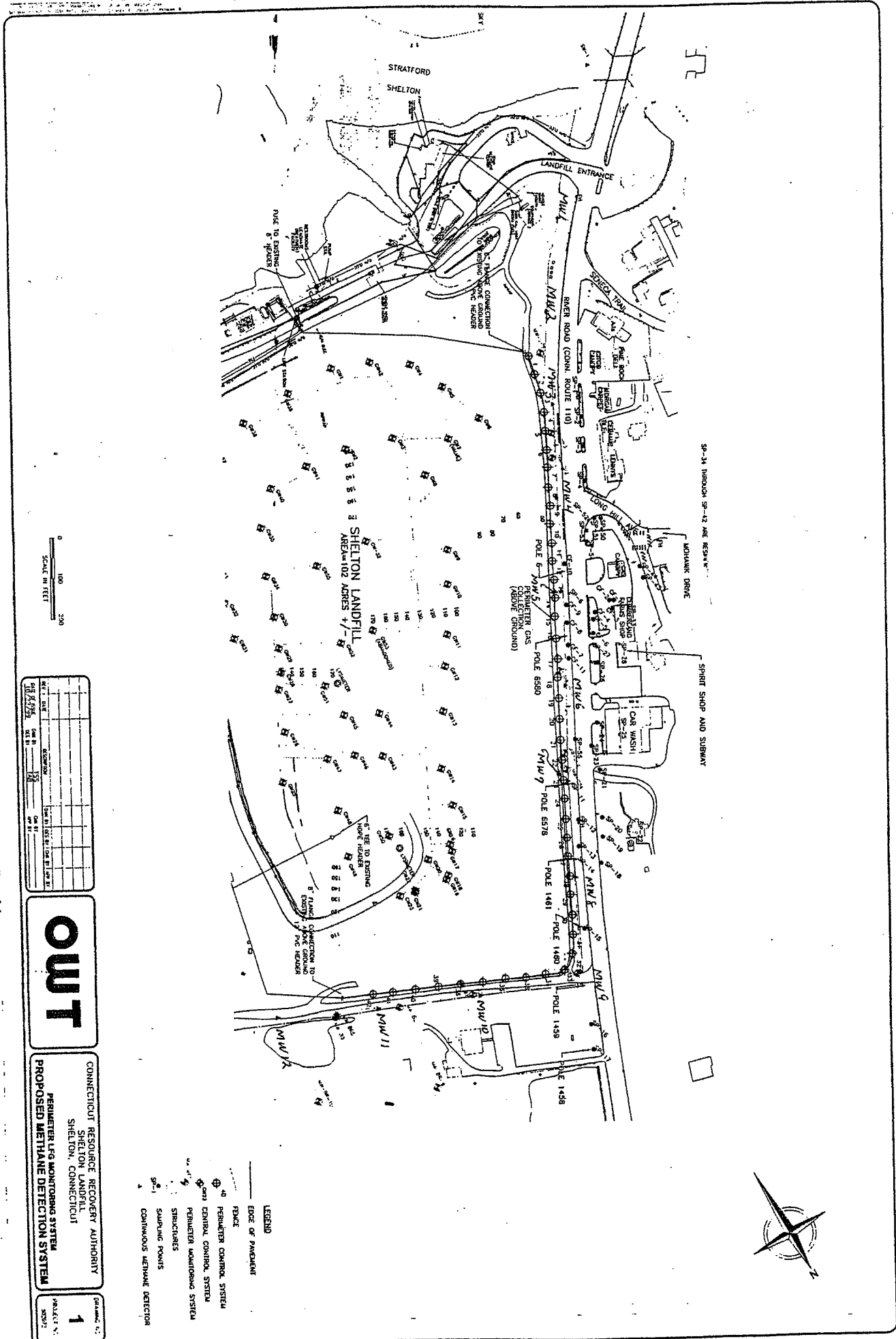
MONITOR WELL # MW-12



- Materials Used:
- Screen (PVC) 40'
 - Riser (PVC) 5'
 - Plug (PVC) 1'
 - Slipcap (PVC)
 - Silica Sand 1150#
 - Powdered Bentonite

- Bentonite Pellets
- Bentonite Chips 1 bag
- Concrete Mix 1 bag
- Portland

- Locking Exp Plug
- Lock
- D/O
- S/U - (1)



SCALE IN FEET
0 100 200

DATE	REV	BY	CHK
10/15/95	1	...	...
10/15/95	2	...	...
10/15/95	3	...	...
10/15/95	4	...	...
10/15/95	5	...	...
10/15/95	6	...	...
10/15/95	7	...	...
10/15/95	8	...	...
10/15/95	9	...	...
10/15/95	10	...	...

OWT

CONNECTICUT RESOURCE RECOVERY AUTHORITY
SHELTON LANDFILL
SHELTON, CONNECTICUT
PERIMETER LFG MONITORING SYSTEM
PROPOSED METHANE DETECTION SYSTEM

DRAWING NO. 1
PROJECT NO. 9507

MONITORING FORMS

APPENDIX C

**SHELTON LANDFILL
BLOWER/FLARE STATION
ROUTINE MAINTENANCE SCHEDULE**

Component		Frequency of Service					
As Needed	Annually	Semi-annually	Monthly	Biweekly	Weekly	Daily	
Condensate Knockout							
Check liquid level (sight glass)						^	
Drain liquid							^
Inspect internal coating and gasket							^
Clean demister pad							^
Tighten cover bolts							^
Check differential pressure							^
Header Valve System							
Check valve performance							^
LFG Blower							
Inspect foundation & correct deficiencies							^
Check condition of isolation pads							^
Check motor alignment							^
Check piping alignment							^
Check bearing temperature							^
Check vibration level							^
Lubricate bearings per manufacturer							^
Inspect flex coupling							^
Clean motor ventilation openings							^
Lubricate motor bearings							^
Check wire connections							^
Drain liquid from blower housing							^
Piping							
Check valves for proper operation							^
Tighten flange bolts							^
Check flange gaskets for leaks							^
Inspect condition of expansion joints							^
Check piping alignment							^
Methane Analyzer							
Calibrate							^
Check filters							^
ump Pump							
Check piping							^
Service pump per manufacturer							^
Check/clean electrodes							^

**SHELTON LANDFILL
CONTINUOUSLY-MONITORED
WELL MONITORING FORM**

Date: _____
 Weather: _____
 Temperature: _____
 Barometer: _____

Monitoring Equipment: _____
 Personnel: _____

Location	CH ₄ (% LEL)	Wellhead/Wiring Condition	Maintenance Performed/Repairs Needed
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

WEEKLY INSPECTION

Location	Sensor Check	Maintenance Performed/Repairs Needed
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

MONTHLY TESTING

PERMIT TO CONSTRUCT

APPENDIX D



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

OCT 18 2001

01 OCT 22 1AM 9:43

RECEIVED
CONN. RESOURCES
RECOVERY AUTHORITY



Mr. Michael Tracey
Connecticut Resources Recovery Authority
100 Constitution Plaza
17th Floor
Hartford, CT 06103
Dear Mr. Tracey:

Enclosed is a certified copy of your original permit to construct a landfill gas collection and control system including a John Zink ZTOF landfill flare at the Shelton Landfill, Route 110, Shelton, CT.

This letter does not relieve you of the responsibility to comply with the requirements of other appropriate Federal, State, and municipal agencies. The permit is not transferable from one permittee to another (without prior written notification), from one location to another (unless the subject equipment is a portable rock crusher or stripping facility), or from one piece of equipment to another. The permit must be posted for easy access at the site of operation.

Upon completion of construction, Connecticut Resources Recovery Authority shall certify to the Commissioner, in writing, that the facility has been constructed in accordance with the terms and conditions of its construction permit (Construction Certification Form enclosed). Upon the Commissioner's approval of the certification and confirmation that the facility has been constructed in accordance with its construction permit, the Commissioner shall issue a permit to operate. Connecticut Resources Recovery Authority shall not operate the landfill gas collection and control system including a John Zink ZTOF landfill flare prior to the receipt of an operating permit.

Permit renewal applications must be filed at least one hundred twenty (120) days prior to the permit expiration date, if applicable. Pursuant to Section 22a-174-3 of the Regulations of Connecticut State Agencies, Connecticut Resources Recovery Authority must apply for a permit modification in writing if it plans any physical change, change in method of operation, or addition to this source which constitutes a "modification" as defined in Section 22a-174-1. Any such changes should first be discussed with Mr. Newt Rowe of the Bureau of Air Management, by calling (860) 424-4152. Such changes shall not commence prior to the issuance of a permit modification.

Sincerely,

Gary S. Rose
Acting Director
Engineering and Technical Services
Bureau of Air Management

(Printed on Recycled Paper)
79 Elm Street • Hartford, CT 06106-5127

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1901 2001

GSR:jad
Enclosure



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127

Construction Certification Form

By signing the statement below you are certifying that you are familiar with the terms and conditions of the construction permit, that you have conducted reasonable investigation, including inquiry of those individuals responsible for conducting the construction, and that the construction has been completed in accordance with the construction permit. Signing the statement below, if false, may be punishable as a criminal offense in accordance with Connecticut General Statutes §22a-6, under §53a-157b of the Connecticut General Statutes.

"I, _____, (Name of Applicant) have personally examined _____ and am familiar with all terms and conditions of the construction permit and certify that based on reasonable investigation, including my inquiry of those individuals responsible for conducting all aspects of the construction, that the construction of the equipment described below is complete and has been constructed in accordance with all terms and conditions of the construction permit to the best of my knowledge and belief, and I understand that any false statement made in this document or its attachments may be punishable as a criminal offense."

Company Name: _____
Equipment description: _____
Construction Permit No. _____
Signature of Applicant _____
Date _____
Name of Applicant (print or type) _____
Title (if applicable) _____

ARTHUR J. ROCOBE, JR.
COMMISSIONER, DEPARTMENT OF
ENVIRONMENTAL PROTECTION
OR DESIGNATED AGENT

I CERTIFY THAT THIS IS A TRUE COPY OF THE ORIGINAL
James D. [Signature]

* The landfill is not subject to any New Source Performance Standard (NSPS). The landfill is subject to subpart GGG of 40 CFR Part 62. To the extent that requirements of subpart MWW of 40 CFR Part 60 apply, those requirements apply only because they are incorporated by reference in subpart GGG or specifically by this permit.

EPA SOURCE CLASS: New Source Major Mod Minor Mod
 TSP SOX NOX CO VOC PM-10 LEAD OTHER

TYPE OF POLLUTANT FOR WHICH THE PREMISES IS A "MAJOR SOURCE":
 Emergency use only Non-emergency use, including self generation

INTERNAL COMBUSTION ENGINES ONLY:

serious (Major source if VOC or NOX > 50 TPY)
 severe (Major source if VOC or NOX > 25 TPY)

OZONE NON-ATTAINMENT STATUS:

MACT (40 CFR Part 63) Subpart: _____
 NSHAPS (40 CFR Part 61) Subpart: _____
 NSPS (40 CFR Part 60) Subparts: _____

FEDERAL REQUIREMENTS*:

Construct Operate Modify

PERMIT TO:

- 1. Legal Firm Name: Connecticut Resources Recovery Authority
- 2. Address: 100 Constitution Plaza, 17th Floor, Hartford, CT 06106-5127
- 3. Equipment Location: Shelton Landfill, Route 110, Shelton, CT 06484
- 4. Equipment Description (Model, I.D. #): Landfill with gas collection & John Zink 18.6 MBtu ZTOF Enclosed Landfill Flare

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
AND GAS COLLECTION AND CONTROL SYSTEM
STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

Date Issued	Exp. Date	OCT 18 2001	
Town No.	Premise No.	163	119
Permit No.	Stack No.	0091	01
Permit Fee		\$2,000.00	

FIRM NAME: Connecticut Resources Recovery Authority
 EQUIPMENT LOCATION: Shelton Landfill, Route 110, Shelton, CT 06484
 EQUIPMENT DESCRIPTION (MODEL, I.D. #): Landfill with Gas Collection System and Enclosed Flare (John Zink 18.6 MMBtu ZTOF Flare Landfill Flare)
 Enclosed Flare (John Zink 18.6 MMBtu ZTOF Flare Landfill Flare)

- A. Design Specifications
1. Fuel Type(s): Landfill Gas
 2. Maximum Fuel Consumption over any consecutive Twelve (12) Month Period (MMFt³): 578
 3. Trunk Line Fuel Filter Performance Specifications:
 - a. Trunk Line Capture Efficiency (%): 100
 - b. Removal Efficiency (%) at Maximum Flow: 99.5 (> or = to 3 μm)
 - c. Overall Efficiency (%) at Maximum Flow: 99.5 (> or = to 3 μm)
 4. Maximum Fuel Firing Rate (scfm): 1,030
 5. Minimum Allowable Combustion Temperature (°F): 1,400
 6. Minimum Residence Time (seconds): 0.9 @ 1,600°F
 7. Maximum Gross Heat Input (MMBTU/hr): 18.6 (@ Estimated LFG Heat Content of 300 BTU/Ft³)
 8. Minimum Stack Height (ft): 40
 9. Maximum Exhaust Gas Flow Rate (acfm): 37,198
 10. Minimum Distance from Stack to Property Line (ft): 140
 11. Operating Hours: 24 hours/day; 8,760 hours per year
- B. The following operating conditions shall be met at all times:
1. The enclosed flare's minimum destruction efficiency for non-methane

PART I. DESIGN SPECIFICATIONS AND OPERATIONAL CONDITIONS: Gas Collection and Control System

* The landfill's gas collection and control system (GCCS) consists of the following components: 1) one hundred five (105) landfill gas (LFG) collection wells (sixty-three (63) in the central well field & forty-two (42) around the landfill perimeter), 2) lateral piping from the LFG collection wells to a main header, 3) condensate discharge piping, traps, sump, and storage tank, and 4) an enclosed flare (John Zink 18.6 MMBtu ZTOF Landfill Flare). Additions and/or replacements (with similar equipment) intended to improve capture and control of LFG, and remedial actions required by this permit, shall not trigger any permit modification requirements.

The conditions on all pages of this permit and attached appendices shall be verified at all times. Design specifications unless specifically noted elsewhere in this permit need not be verified on a continuous basis. However, demonstration of compliance shall be provided to the Commissioner upon request.

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL AND GAS COLLECTION AND CONTROL SYSTEM*
 STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT

FIRM NAME: Connecticut Resources Recovery Authority
 EQUIPMENT LOCATION: Shelton Landfill, Route 110, Shelton, CT 06484
 EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and Enclosed Flare (John Zink 18.6 MMBtu ZTOF Flare Landfill Flare)

- PART I. DESIGN SPECIFICATIONS AND OPERATIONAL CONDITIONS, CONTINUED:
2. The enclosed flare shall be designed for and operated with no visible emissions as determined by Reference Method 22, Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares, except for periods not to exceed a total of five (5) minutes during any two (2) consecutive hours.
 3. The permittee shall install, operate and maintain a flare pilot flame and associated pilot fuel supply to assure the timely, automatic restart of the landfill flare.
 4. The enclosed flare shall be operated with a flame present at all times except as required during maintenance. The presence of a flare flame shall be monitored by a UV scanner or other equivalent device.
 5. The enclosed flare shall be operated in accordance with the manufacturer's specifications and recommendations.
- C. The permittee shall ensure effective and safe operation of the LFG collection system through compliance with the following operational conditions:
1. Monthly checks of all wells to ensure wellhead vacuum and proper wellhead operation is maintained. Should the positive pressure exist at a wellhead, the permittee shall take remedial action in accordance with 40 CFR 60.755(a)(3).
 2. Monthly confirmation at each central wellhead demonstrating both N₂ levels are below 20% and O₂ levels are below 5%. Should the N₂ level equal or exceed 20% and O₂ level equal or exceed 5%, the permittee shall take remedial action by reducing or shutting off the vacuum to that well until such time as either the oxygen or nitrogen level drops below the relevant threshold.
 3. Monthly monitoring of central wellhead LFG temperature to ensure LFG temperature is maintained below 55°C (131°F). If the temperature of a well exceeds 130°F, the permittee shall shut off the vacuum to the well. If positive pressure is measured at a high temperature well, the permittee may open the valve to the well to relieve the high pressure, regardless of temperature. The permittee shall not place the well under vacuum until such time as the temperature is below 131°F.
 4. Monitoring of landfill surface methane concentrations to demonstrate that methane concentrations at any location on the landfill surface do not exceed 500 ppmv above background in accordance with the provisions of 40 CFR 60.755(c). The permittee shall conduct the first monitoring demonstration, over the entire landfill surface, no later than 30 days

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
 AND GAS COLLECTION AND CONTROL SYSTEM
 STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT

FIRM NAME: Connecticut Resources Recovery Authority
 EQUIPMENT LOCATION: Shelton Landfill, Route 110, Shelton, CT 06484
 EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and Enclosed Flare (John Zink 18.6 MMBtu ZTOF Flare Landfill Flare)

- PART I. DESIGN SPECIFICATIONS AND OPERATIONAL CONDITIONS, CONTINUED:
- STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT
- D. The permittee shall operate the collection system with negative pressure at each central well field wellhead except as provided in 40 CFR 60.753(b).
 - E. All flare operating personnel shall be trained on the operation of the flare according to the manufacturer's operating procedures and trouble shooting techniques.
 - F. The GCS shall be operated and maintained only by personnel properly trained in its operation.
5. Prompt shutdown of GCS blower whenever the enclosed flare or other in place controls are inoperable in accordance with the provisions set forth in 40 CFR 60.753(e). However, in order to prevent LFG migration, the GCS blower may be operated when the emergency by-pass is operated.
- The permittee shall not be required to conduct periodic methane landfill surface monitoring when the landfill is snow covered.
- If there are no monitored exceedances of this operational requirement for three (3) consecutive quarterly monitoring periods, thereafter the permittee shall conduct methane landfill surface monitoring annually. However, if there is an exceedance of the 500 ppm above background detected during annual monitoring, the specific location(s) exceeding 500 ppmv above background shall be monitored and remediated in accordance with the provisions of 40 CFR part 60.755(c) (4). All other locations below the 500 ppm above background threshold may stay on the annual monitoring schedule.
- All locations exceeding 500 ppmv above background in any round of monitoring shall be monitored and remediated in accordance with the provisions of 40 CFR part 60.755(c) (4). As long as the actions specified in 40 CFR part 60.755(c) (4) are taken, the exceedance is not a violation of the operational requirements of this permit.
- after the receipt of the permit to construct. Subsequent to the initial demonstration, the permittee shall conduct methane landfill surface monitoring quarterly.

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
 AND GAS COLLECTION AND CONTROL SYSTEM

FIRM NAME: Connecticut Resources Recovery Authority
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EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and Enclosed Flare (John Zink 18.6 MMBtu ZTOF Flare Landfill Flare)

$$\text{MASC (}\mu\text{g/m}^3\text{)} = \frac{0.885 \cdot (\text{HTV}) \cdot [X + 1.08 \cdot V^{0.64}]^{1.56}}{V}$$

<Equation 1>

The permittee shall not allow emissions of any Hazardous Air Pollutant listed on any Table in Section 22a-174-29 of the Regulations of Connecticut State Agencies (hereinafter referred to as RSCA) and emitted from this flare to exceed the Maximum Allowable Stack Concentration ("MASC") as determined pursuant to the provisions of Section 22a-174-29 of the RSCA and Equation 1:

Non-Criteria Pollutants

- A. Initial Compliance Demonstration Test Data
- B. Manufacturer's Emissions Data
- C. AP-42, Fifth Edition, Section 2.4
- D. SOx emissions based on 97% overall oxidation of sulfur compounds contained in the waste gas and 97% overall oxidation of reduced sulfur to oxides of sulfur

Demonstration of compliance with the above emission limits shall be met by calculating the emission rates using emission factors from the following sources:

1. The ton per year limitation for SOx is not an enforceable permit condition. However should source testing indicate the annual SOx emission is greater than five (5) tons per year the permittee shall perform a BACT analysis as required in Part VI, Item I of this permit.
2. Fugitive VOC emissions are the VOC in the landfill gas not captured by the gas collection system; this annual emission rate need not be verified by the permittee.

Criteria Pollutants	#/MMBtu	TPY
TSP (Flare)	0.02	1.4
PM-10 (Flare)	0.02	1.4
SOx (Flare)	0.06	4.9 ¹
NOx (Flare)	0.06	4.9
VOC (Flare)	0.007	0.6
VOC (Fugitive Emissions) ²	NA	3.2 ²
CO (Flare)	0.20	16.2

The permittee shall not allow emissions from this source to exceed the emission limits stated herein at any time. Final emission limits may be established upon completion of initial compliance testing required herein and the Commissioner's acceptance of the test results.

PART II. ALLOWABLE EMISSION LIMITS: (GCCS)

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL AND GAS COLLECTION AND CONTROL SYSTEM
STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

FIRM NAME: Connecticut Resources Recovery Authority
EQUIPMENT LOCATION: Shelton Landfill, Route 110, Shelton, CT 06484
EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and Enclosed Flare (John Zink 18.6 MMBtu ZTOF Flare Landfill Flare)

- A. The permittee shall install, operate and routinely calibrate a device or devices to continuously measure and monitor the volumetric flow of waste gas into this flare.
- B. The permittee shall record the quantity of waste gas burned by this flare during each calendar month. Such records shall include the date of the recording period and the quantity of waste gas, expressed in units of million cubic feet per month.
- C. The permittee shall record the quantity of pilot fuel burned (propane or natural gas) by the flare during each calendar month. Such records shall include the date of the recording period and the quantity of pilot fuel. Fuel records may be used to calculate the amount of pilot fuel burned.

PART III. MONITORING, REPORTING AND RECORD KEEPING REQUIREMENTS:

Nothing in Parts II, III, or IV of this permit shall preclude the Commissioner from requiring other means (e.g. stack testing) to demonstrate compliance with Section 22a-174-29 of the RSCA, as allowed by state or federal statute, law, or regulation.

For any operating period having a duration greater than 30 minutes but less than 8 hours, the permittee may demonstrate compliance with an adjusted MASC calculated in accordance with Section 22a-174-29(f) of the RSCA; provided that actual emissions during each and every period of eight (8) consecutive hours do not exceed the value of MASC determined using the 8-hr HLV for the Hazardous Air Pollutants emitted.

Equation 2 is derived using the maximum exhaust flow rate of 37,198 acfm ($V = 17.55 \text{ m}^3/\text{sec}$) and a minimum property line distance of 140 feet ($X = 42.67 \text{ meters}$).

$$\text{MASC (ug/m}^3\text{)} = 22.1 \times (\text{HLV})$$

<Equation 2>

HLV = Hazard Limiting Value for each specific HAP emitted from the operation of the flare ($\mu\text{g}/\text{m}^3$)

V = The exhaust gas flowrate exiting the stack (actual m^3/second)

X = The distance from the stack to the nearest property line (meters)

or simply:

PART II. ALLOWABLE EMISSION LIMITS, CONTINUED:

STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT
 PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
 AND GAS COLLECTION AND CONTROL SYSTEM

FIRM NAME: Connecticut Resources Recovery Authority
 EQUIPMENT LOCATION: Shelton Landfill, Route 110, Shelton, CT 06484
 EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and Enclosed Flare (John Zink 18.6 MMbtu ZTOF Flare Landfill Flare)

1 Flare Outlet Measurement
 2 Flare Inlet Measurement
 3 HAP measurements and MASC compliance demonstrations shall include the following HAPs common to MSW Landfills: acetone, acrylonitrile, benzene, bromodichloromethane, butane, carbon disulfide, carbon tetrachloride, carbonyl sulfide, chlorobenzene, chlorodifluoromethane, chloroethane, chloroform, chloromethane, dichlorobenzene,

None at this time TSP SOX NOX CO
 VOC^{1,2} (as NMOC) PM-10 Pb Other: (HAPS^{2,3})

PART IV. SOURCE TEST REQUIREMENTS: (Applicable if X-checked)
 Source testing shall be required for the following pollutant(s):

- J. The permittee shall submit a report annually to the CTDEF Compliance Assurance and Coordination Unit of the Bureau of Air Management detailing all exceedances of operational conditions monitored pursuant to Part I, Item C (1-5) of this permit. Such report shall include the remedial action taken by the permittee. The first of such reports shall be due 13 months after the issuance of the permit to operate.
- I. The permittee shall retain any records required under this permit for a period of no less than five (5) calendar years. All records shall be made available to the Commissioner or his agent upon request.
- H. The permittee shall maintain a complete record of all monitoring conducted pursuant to Part I. C. of this permit and all testing conducted pursuant to Part IV of this permit as well as any periodic testing required in the facility's amended Operations and Maintenance Plan.
- G. The permittee shall maintain records of all GCS maintenance and calibration operations listed in Part I. of this permit as detailed in the facility's amended Operations and Maintenance Plan.
- F. The permittee shall maintain monthly records of all criteria pollutant emissions calculations and supporting documentation to demonstrate compliance with the annual emission limitations set forth in Part II of this permit. Such records shall assure that the annual emissions of each criteria pollutant can be calculated over any rolling 12-month period.
- E. The permittee shall record the number of hours of flare operation during each calendar month. Such records shall include the date of the recording period and the number of flare operating hours during each recording period.
- D. The permittee shall install and operate a device or devices to measure and monitor the number of hours of flare operation during each calendar month.

PART III. MONITORING, REPORTING AND RECORD KEEPING REQUIREMENTS, CONTINUED:

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
 AND GAS COLLECTION AND CONTROL SYSTEM
 STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT

FIRM NAME: Connecticut Resources Recovery Authority
 EQUIPMENT LOCATION: Shelton Landfill, Route 110, Shelton, CT 06484
 EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and
 Enclosed Flare (John Zink 18.6 MMBtu ZTOF Flare Landfill Flare)

3. Should the assessment detailed in Item 1 above indicate that less than 90% of the LFG wells in the central well field are fully operational, the permittee shall submit in writing to the Commissioner for review and approval an LFG collection system remediation plan. Such plan shall set forth those steps with associated timelines to bring the central well field to a minimum level of 90% operational effectiveness. Weather permitting, the permittee shall take all reasonable action to assure such LFG collection system remediation is completed within one hundred eighty (180) days of Commissioner's approval of the LFG collection system

2. The permittee shall conduct a complete assessment of the effectiveness of the central well field within sixty (60) days of receipt of the permit to construct or completion of work under section IV.A. of this permit, whichever occurs later. Such assessment shall be submitted in writing to the Commissioner for review and approval forty-five (45) days after completion of the assessment. The assessment shall provide a determination as to whether or not a minimum of 90% of the LFG wells in the central well field are fully operational at that time. A fully operational well shall be defined as a well where negative pressure is maintained. The amount of vacuum applied to each well head shall be left to the discretion of the permittee.

- a. Replacement of Well Head Valves by August 31, 2001 (Designated as Wells GW 2, GW3, GW8, GW15, GW17, GW18, GW19, GW21, GW22, GW23, & GW42 on Drawing 1 of 2, Dated 6/29/01)
- b. Installation of new side slope wells by October 31, 2001 (Designated as wells GW 70, GW 71, GW72, GW 73, & GW 74 on Drawing 1 of 2, Dated 6/29/01)
- c. Installation of new perimeter wells by October 31, 2001 (Designated as wells 45, 46, 47, & 48 on Drawing 1 of 2, Dated 6/29/01)

1. The permittee shall complete the landfill gas collection system remediation in accordance with the following timetable:

- A. Pre-LFG Characterization and Stack Emissions Test, LFG Collection System Remediation and Assessment:
 - dichlorodifluoromethane, 1,1-dichloroethane, 1,2-dichloroethane, trans 1,2-dichloroethene, dichlorofluoromethane, dichloromethane, dimethylsulfide, ethane, ethanol, ethyl mercaptan, ethylbenzene, ethylene dibromide, fluorotrifluoromethane, hexane, hydrogen sulfide, mercury, methyl ethyl ketone, methyl iso-butyl ketone, methyl mercaptan, pentane, propane, 2-propanol, propylene dichloride, 1,1,2,2-tetrachloroethane, tetrachloroethylene, toluene, 1,1,1-trichloroethane, trichloroethylene, vinyl chloride, vinylidene chloride, and xylenes

PART IV. SOURCE TEST REQUIREMENTS, CONTINUED:

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
 AND GAS COLLECTION AND CONTROL SYSTEM
 BUREAU OF AIR MANAGEMENT
 STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION

FIRM NAME: Connecticut Resources Recovery Authority
 EQUIPMENT LOCATION: Shelton Landfill, Route 110, Shelton, CT 06484
 EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and Enclosed Flare (John Zink 18.6 MBtu ZTOF Flare Landfill Flare)

1. Permit compliance demonstration of VOC (as NMOC) destruction efficiency
 2. Permit compliance demonstrations for HAP, TSP, NO_x and CO flare emission rates and measurement of SO_x to determine the annual emission rate
- C. Stack Emissions Testing (Enclosed Flare)?
1. Characterization of LFG with respect to total reduced sulfur, NMOC, methane, oxygen, nitrogen, and hazardous air pollutants (HAPs) common to municipal solid waste (MSW) landfills listed in footnote 3 of Part IV
 2. Mass spectral tentative identification of HAPs not specifically listed above
 3. Measurements of the GCCS LFG collection rates (scfm) and estimates of the gas collection system capture efficiency and total LFG production
- B. LFG Characterization?
5. All testing shall be conducted in accordance with the general guidelines of Attachment B of this permit unless specifically amended above. The following site-specific testing shall be required:
 4. Except as provided above, the permittee shall submit, to the Stack Test Group, a source test protocol to conduct the LFG characterization and source emission testing required in Items B and C below within one hundred eighty (180) days of the receipt of the permit to construct. All testing required in Items B and C below shall be completed within sixty (60) days of system start-up or DEF approval of the test protocol, whichever occurs later. The final report of such testing shall be submitted to the Stack Test Group no later than 45 days after the completion of the stack test.
- The permittee shall notify the Commissioner in writing within one hundred fifty (150) days of the Commissioner's approval of the LFG collection system remediation plan if the permittee believes that the remediation of the LFG collection system can not be completed within the one hundred eighty (180) day period required above. Such notification shall include a revised timeline for the remediation of the LFG collection system as well as amended timelines for the submittal of a source test protocol, commencement of LFG characterization and source testing, and submittal of the LFG characterization and source test report.

PART IV. SOURCE TEST REQUIREMENTS, CONTINUED:

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
 AND GAS COLLECTION AND CONTROL SYSTEM
 STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT

FIRM NAME: Connecticut Resources Recovery Authority
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- A. The permittee shall operate and maintain the GCCS in accordance with the manufacturer's specifications and written recommendations.
- B. The permittee shall operate the landfill and GCCS at all times in a manner so as not to violate or contribute significantly to the violation of any applicable state noise control regulations, as set forth in Sections 22a-69-1 through 22a-69-7.4 of the RSCA.
- C. The permittee shall comply with state odor regulations, as set forth in Section 22a-174-23 of the Regulations.
- D. The permittee shall maintain the landfill surface (i.e. cover material) and/or replace, modify or supplement all components of the gas collection system as required to assure effective LFG collection to prevent nuisance odors, and to minimize the venting of LFG at the landfill surface.
- E. The permittee shall comply with all applicable sections of 40 CFR Part 62, subpart GGG.
- F. The amended Operations and Maintenance Plan shall be submitted to the Commissioner for review and approval within ninety (90) days of the effective date of the permit to construct.
- G. The replacement, repair, addition, or retirement of any LFG well(s) or components (provided such components, if replaced, are replaced with components of equivalent design and performance specifications), and any remedial action taken pursuant to the terms of this permit, shall not require a modification of this permit.

PART VI. SPECIAL REQUIREMENTS:

These references are not intended to be all inclusive - other sections of the Regulations may apply.
 22a-174-3(a), (b), (f); 22a-174-18; 22a-174-19; 22a-174-29(b); 22a-174-22

PART V. APPLICABLE REGULATORY REFERENCES: (The Regulations of Connecticut State Agencies)

The permittee shall verify that a minimum of 90% of LFG wells in the central well field of the GCCS network are fully operational 24 hours prior to the initiation of LFG characterization and stack emissions testing.

The permittee shall conduct a permit compliance demonstration for NOx and CO flare emission rates every five years.

D. Periodic Stack Emissions Testing (Enclosed Flare):

PART IV. SOURCE TEST REQUIREMENTS, CONTINUED:

STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT
 PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
 AND GAS COLLECTION AND CONTROL SYSTEM

FIRM NAME: Connecticut Resources Recovery Authority
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 EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and
 Enclosed Flare (John Zink 18.6 Mmbtu ZTOF Flare Landfill Flare)

- A. Upon completion of construction, the permittee shall certify to the Commissioner, in writing, that the facility has been constructed in accordance with the terms and conditions of its construction permit. Upon the Commissioner's approval of the certification and confirmation that the facility has been constructed in accordance with its construction permit, the Commissioner shall issue a permit to operate.
- B. This permit does not relieve the permittee of the responsibility to conduct, maintain and operate the regulated activity in compliance with all applicable requirements of any federal, municipal or other state agency. Nothing in this permit shall relieve the permittee of other obligations under applicable federal, state and local law.
- C. Any representative of the DEP may enter the permittee's site in accordance with constitutional limitations at all reasonable times without prior notice, for the purposes of inspecting, monitoring and enforcing the terms and conditions of this permit and applicable state law.
- D. This permit may be revoked, suspended, modified or transferred in accordance with applicable law.
- E. This permit is subject to and in no way derogates from any present or future property rights or other rights or powers of the State of Connecticut and conveys no property rights in real estate or material, nor any exclusive privileges, and is further subject to any and all public and private rights and to any federal, state or local laws or regulations pertinent to the facility or regulated activity affected thereby. This permit shall neither create nor affect any rights of persons or municipalities who are not parties to this permit.

PART VII. ADDITIONAL TERMS AND CONDITIONS:

- H. The permittee shall not inject LFG condensate and/or landfill leachate into the enclosed flare.
- I. The permittee shall submit a Top-Down BACT analysis for SO_x and/or NO_x if the initial performance test indicates that SO_x and/or NO_x emissions exceed 5 TPY or such level as may be required by the Commissioner.
- J. Except as provided in the Public Use and Recreation Plan approved by the Commissioner, the permittee shall restrict the public from uncontrolled access to any location on the premise/landfill.

PART VI. SPECIAL REQUIREMENTS, CONTINUED:

STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT
 PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
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 EQUIPMENT LOCATION: Shelton Landfill, Route 110, Shelton, CT 06484
 EQUIPMENT DESCRIPTION (MODEL, I.D.#): Landfill with Gas Collection System and
 Enclosed Flare (John Zink 18.6 MMBtu ZTOF Flare Landfill Flare)

- F. Any document, including any notice, which is required to be submitted to the Commissioner under this permit shall be signed by a duly authorized representative of the permittee and by the person who is responsible for actually preparing such document, each of whom shall certify in writing as follows: "I have personally examined and am familiar with the information submitted in the documents and all attachments and certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief, and I understand that any false statement made in this document or its attachments may be punishable as a criminal offense." Any false statement in any information submitted pursuant to this permit may be punishable as a criminal offense in accordance with Connecticut General Statutes §22a-6, under §53a-157 of the Connecticut General Statutes.
- G. Nothing in this permit shall affect the Commissioner's authority to institute any proceeding or take any other action to prevent or abate violations of law, prevent or abate pollution, recover costs and natural resource damages, and to impose penalties for violations of law, including but not limited to violations of this or any other permit issued to the permittee by the Commissioner.
- H. Within fifteen days of the date the permittee becomes aware of a change in any information submitted to the Commissioner under this permit, or that any such information was inaccurate or misleading or that any relevant information was omitted, the permittee shall submit the correct or omitted information to the Commissioner.
- I. The date of submission to the Commissioner of any document required by this permit shall be the date such document is received by the Commissioner. The date of any notice by the Commissioner under this permit, including but not limited to notice of approval or disapproval of any document or other action, shall be the date such notice is personally delivered or the date three days after it is mailed by the Commissioner, whichever is earlier. Except as otherwise specified in this permit, the word "day" means calendar day. Any document or action which is required by this permit to be submitted or performed by a date which falls on a Saturday, Sunday or legal holiday shall be submitted or performed by the next business day thereafter.
- J. Any document required to be submitted to the Commissioner under this permit shall, unless otherwise specified in writing by the Commissioner, be directed to: Office of Assistant Director, Compliance & Field Operations Division; Bureau of Air Management; Department of Environmental Protection; 79 Elm Street, 5th Floor; Hartford, Connecticut 06106-5127.

PART VII. ADDITIONAL TERMS AND CONDITIONS, CONTINUED:

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
 AND GAS COLLECTION AND CONTROL SYSTEM
 STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF AIR MANAGEMENT

ORIGINAL

Town No: 163

Premise No: 119

Permit No: 0091

Stack No: 01

- B Stack Emission Test Requirements
- C New Source Performance Standards
- E Control Equipment Specifications

Appendices attached (Applicable if -X- checked)

STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PERMIT FOR MUNICIPAL SOLID WASTE LANDFILL
AND GAS COLLECTION AND CONTROL SYSTEM

Pursuant to the Regulations of Connecticut State Agencies, the owner/operator of this facility shall submit an Intent-to-Test (ITT) package consisting of an ITT form (Form AE404) and a test protocol. The test protocol shall be consistent with the Bureau's Emission Source Test Guideline specifying the test methodology to be followed and the conditions under which the process and its control equipment will be operated. The process shall be operated at a minimum of 90% of the permitted maximum rated capacity and the control equipment shall be operated as specified in this permit.

All proposed test methods shall comply with appropriate Federal test methods or methods acceptable to the Bureau. The ITT package must demonstrate compliance with applicable requirements of the Code of Federal Regulations (CFR) Title 40 Parts 51, 60 and 61. Any proposed test methods that deviate from those specified in these regulations must be approved by the Bureau prior to stack testing. All sampling ports shall be installed and located in compliance with 40 CFR Part 60 Appendix A, Method 1. Final plans showing the location of all sampling ports shall be submitted with the ITT package to the Air Bureau's Stack Test Group for approval prior to stack testing. Please submit an original and one copy of the ITT package to: Bureau of Air Management, New Source Review Section, 79 Elm Street, 5th Floor, Hartford, Connecticut 06106-5127.

An inspection of the source may be conducted to verify that appropriate instrumentation is available, and to determine the source process parameters, indicative of compliant operation, to be monitored during stack testing. Once the ITT package is approved, the owner/operator shall be notified, in writing, by the Bureau's Stack Test Group.

The source test must be scheduled, monitored by Bureau personnel, and completed within sixty (60) days from the date of Bureau approval of the proposed ITT package. It is the source's responsibility to conduct preparatory testing for tuning or debugging purposes prior to the Bureau-monitored stack testing. An acceptable test report must be submitted to the Bureau within forty-five (45) days of the completion of emissions testing. The owner/operator shall respond to any test report deficiency within fifteen (15) days of notification by the Bureau.

Acceptable test results will be incorporated into the final permit to operate. In the event that the stack test report is unacceptable, or the tested values show that the source is not in compliance with applicable permit conditions or regulations, a final permit to operate will be not be issued until the owner/operator responds to and corrects any deficiencies. The Bureau may issue an Administrative Order if there is a likelihood that the source may demonstrate compliance through a process modification and a retest.

Appendix B: SOURCE STACK TESTING GENERAL REQUIREMENTS

The owner/operator shall conduct stack testing within sixty (60) days of achieving the maximum production rate, but not later than one hundred-eighty (180) days after initial start up, unless specified otherwise within this permit.

APPENDIX E
Control Equipment

Air Pollution Control Equipment (applicable if X-checked).
The following specifications need not be verified on a continuous basis, however, if requested by the Bureau, demonstration shall be shown.

None

Scrubber

Make and Model: _____

Reagent: _____

Reagent Flow Rate: _____

Pressure Drop (in H₂O): _____

Minimum Gas Flow Rate at Maximum Rated Capacity (acfm): _____

PH: _____

Design Outlet Grain Loading (gr/dscf): _____

Design Removal Efficiency (%): _____

A. *Enforceable Conditions* - The following shall be verified at all times.

Fabric Filter

Pressure Drop, range (in. H₂O): _____

B. *Design Specifications* - The following specifications need not be verified on a continuous basis, however, if requested by the Bureau, demonstration of compliance shall be shown.

Fabric Filter

Make and Model: _____

Number of Bags in Use: _____

Air/Cloth Ratio: _____

Bag Material: _____

Cleaning Method: _____

Minimum Gas Flow Rate at Maximum Rated Capacity (acfm): _____

Design Removal Efficiency (%): _____

Wet Dust Suppression (ultrasonic or equivalent)

Number of Nozzles: _____

Water Flow Rate: _____

Location: _____

Electrostatic Precipitator (ESP)

Make and Model: _____

Number of Fields: _____

Minimum Gas Flow Rate at Maximum Rated Capacity (acfm): _____

Design Outlet Grain Loading (gr/dscf): _____

Design Removal Efficiency (%): _____

APPENDIX E
Control Equipment

Afterburner (Enclosed Flare)	<input checked="" type="checkbox"/>
Make and Model: John Zink 18.6 MBtu ZTOF Landfill Flare	
Minimum Operating Temperature (°F): 1,400	
Minimum Residence Time (sec): 0.9 @ 1,600 °F	
Minimum VOC/HC Destruction Efficiency (%): 98	
Minimum Gas Flow Rate at Maximum Rated Capacity (acfm): 37,198	
Other - Minimum Fuel Pre-Filter Performance Specifications:	<input checked="" type="checkbox"/>
Trunk Line Capture Efficiency (%): 100	
Trunk Line Removal Efficiency (% at Maximum Flow: 99.5 (> or = to 3 micrometers (µm))	
Trunk Line Overall Efficiency (% at Maximum Flow: 99.5 (> or = to 3 micrometers (µm))	

Control Equipment Malfunction

- Equipment or methods which control "air pollutant" "emissions" from a "stationary source" in compliance with applicable "emission standards" and regulations shall be maintained in operation at all times that the "stationary source" is in operation or emitting "air pollutants". This includes instruments required by permit, order, or regulation which measure those source operating parameters which affect air pollutant emissions, air pollution control equipment, or other instruments which measure meteorological data required by permit, order or regulation.
- No "person" shall deliberately shut down any such control equipment, method or other instruments specified in subsection 22a-174-7(a) while the "source" is in operation except for such necessary maintenance as operation and its not emitting "air pollutants".
- In the event of breakdown, failure, or deliberate shut down of any control equipment, method, or other instrument specified in subsection 22a-174-7(a) during which time the "stationary source" will be in operation, all reasonable measures shall be taken to assure resumption of the control equipment as soon as possible. Due diligence shall be exercised to minimize "emissions" while the control equipment or method is inoperative. In the event such shutdown of control equipment or methods is expected or may reasonably be expected to continue for longer than 72 hours, and if the "source" is to be operated at any time during that period, the "Commissioner" shall be notified within twenty-four (24) hours or by 10 o'clock a.m. (10:00am) the following business day, whichever is later. Such notice shall include, but is not limited to, the following:
 - Identification of the specific equipment or instrument taken out, or to be taken out, of service as well as its location, and, where applicable, registration or permit number;

Town No: 163

Premise No: 119

Permit No: 0091

Stack No: 01

- 4. The "Commissioner" may attach conditions to the operation of the "source" during the period of shutdown or breakdown.
 - a. The reasons that it would be impossible or impractical to shut down the "stationary source" operation during the maintenance period;
 - b. Measures such as the use of offshift labor and equipment that will be taken to minimize the length of the shutdown period;
 - c. The nature and quantity of "emissions" of "air pollutants" likely to be emitted during the shutdown period;
 - d. The expected length of time that the "air pollution" control equipment or instrument will be out of service;

APPENDIX E
Control Equipment

TABLE NO. 11-1

SMELTON LANDFILL
GROUNDWATER ASSESSMENT

Water Level Survey Results

(all elevations reported as MSL)

Well	June 1988		July 1988		August 1988	
	Depth to Water	From Top of Casing	Depth to Water	From Top of Casing	Depth to Water	From Top of Casing
Monitor						
	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide
	June 1988	July 1988	June 1988	July 1988	August 1988	High Tide
	Elevation		Elevation		Elevation	
	Table		Table		Table	
	Water		Water		Water	
	Elevation		Elevation		Elevation	
	Table		Table		Table	
	August 1988		High Tide		High Tide	

Overburden Wells

MW-A	10.85	---	9.84	11.86	1.01	---	2.02
MW-B5	9.11	8.58	9.82	11.27	2.16	2.69	1.45
MW-B4	10.28	8.53	9.84	11.60	1.32	3.07	1.76
MW-C5	5.61	4.93	6.24	7.52	1.91	2.59	1.28
MW-C4	6.18	5.15	5.35	7.96	1.78	2.81	2.61
MW-C3	5.90	4.44	5.72	7.41	1.51	2.57	1.69
MW-D4	17.73	17.55	18.26	20.37	2.64	2.82	2.11
MW-E	7.50	7.58	8.12	10.00	2.50	2.42	1.88
MW-E3	6.74	7.03	7.28	9.05	2.31	2.02	1.77
MW-E2	11.56	11.45	12.08	14.50	2.94	3.05	2.42
MW-H4	13.99	14.05	14.58	16.29	2.30	2.24	1.71
MW-I5	7.68	4.32	6.57	8.90	1.22	4.58	2.33
MW-I5	4.95	2.78	4.13	6.07	1.12	3.29	1.94
MW-100	4.54	3.23	4.57	5.96	1.42	2.73	1.39
MW-GP-4	26.03	26.38	26.25	56.57	30.54	30.19	30.32
MW-101	5.09	2.38	3.83	5.96	0.87	3.58	2.13

Bedrock Wells

MW-BR-1	3.81	1.03	1.92	4.49	0.56	3.46	2.57
MW-BR-2	9.06	7.03	8.39	10.21	1.15	3.18	1.82
MW-BR-3	45.96	48.29	47.47	58.26	12.30	9.97	10.79
MW-BR-4	23.04	25.83	25.27	55.18	32.14	29.35	29.91
MW-BR-5	42.17	43.80	43.96	68.98	26.81	25.18	25.02
MW-BR-6	6.73	6.48	7.16	9.07	2.34	2.59	1.91
Dock	8.89	---	4.98	8.67	-0.22	---	3.69

NOTE: --- = Measuring Point Inaccessible

TABLE NO. I-1

SHELTON LANDFILL
DISCHARGE PERMIT APPLICATION
JULY 1989

Groundwater Monitor Well Network
Pertinent Elevations

(all elevations reported as MSL)

Well Identification	Surveyed Elevation	Ground Surface Elevation	Well Bottom Elevation	Top of Screen Elevation	Groundwater Elevation	Top of Bedrock Elevation
NW-A	11.80	9.40	-16.60	-6.60	-0.35	-17.20
NW-B5	11.27	9.32	-5.68	4.32	5.32	-18.38
NW-BD	11.60	9.32	-15.33	-5.33	-0.68	-18.38
NW-BR-2	10.21	8.62	-38.38	-28.38	5.12	-18.38
NW-CS	7.52	6.22	-18.78	-3.78	1.22	-64.08
NW-C	7.96	6.02	-33.98	-27.98	1.52	-64.08
NW-CD	7.41	5.92	-64.08	-54.08	0.92	-64.08
NW-DD	20.37	19.19	-19.81	-9.81	1.19	-20.81
NW-E	9.65	7.24	-17.34	-7.34	3.74	-62.46
NW-ED	9.05	7.34	-62.66	-52.66	2.34	-62.46
NW-BR-6	9.07	7.54	-76.46	-66.46	1.94	-62.46
NW-GD	14.50	12.89	-31.11	-21.11	4.39	-31.11
NW-HD	16.29	14.60	-30.40	-20.40	-0.20	-30.40
NW-IS	8.90	7.33	-7.67	2.33	2.33	-7.67
NW-JS	6.07	4.53	-20.47	-5.47	1.53	-20.47
NW-100	5.96	3.80	-12.20	-2.20	1.30	-47.43
NW-BR-1	4.49	3.57	-67.43	-57.43	0.07	-47.43
NW-101	5.96	4.3	-11.45	-1.45	0.88	<-13
NW-BR-3	58.26	56.02	-6.98	3.02	11.02	13.02
NW-GP-4	56.57	54.35	22.52	42.52	33.18	3.55
NW-BR-4	55.18	53.55	-14.45	-4.45	32.55	3.55
NW-BR-5	68.98	67.05	18.05	28.05	29.55	41.05

NOTE: * = Groundwater elevations observed during monitor well installation

TABLE 3-1
Monitoring Well Completion Details/May '95 Groundwater Elevations (where available)

Well Number	Ground Elevation (feet NVGD)	Steel Casing Elevation (feet NVGD)	Well Diameter (inch)	Well Depth (feet)	Screen Length (feet)	Screen Depth (feet)	Screen Elevation (feet NVGD)	Bedrock Elevation (feet NVGD)	Screened Unit	Groundwater Elevation 5/2/95 (feet NVGD)
M	57.7	60.96	2	35.5	15	20.5-35.5	37.2-22.2	22.2	Sand and Gravel	33
L	16.7	19.59	2	22	10	12-22	4.7-(-5.3)	-5.3	Sand and Gravel	1.11
N	10.7	13.31	2	34.5	10	24.5-34.5	-13.8-(-23.8)	-23.8	Sand and Gravel	0.94
Js(NE)	4.8	6.84	2	25	15	10-25	-5.2-(-20.2)	-20.2	Sand and Gravel	0.43
Ts	3.1	6.17	2	9	5	4-9	-0.9-(-5.9)	-5.4	Sand and Gravel	1.56 ^A
Td	3.6	6.65	2	57	5	52-57	-48.4-(-53.4)	-53.4	Sand and Gravel	1.4 ^A
Rs	14.1	17.31	2	17	10	7-17	7.1-(-2.9)	-22.2	Sand and Gravel	1.33 ^A
Rd	14.1	16.22	2	36.3	5	31.3-36.3	-17.2-(-22.2)	-22.2	Sand and Gravel	1.78 ^A
BR-1	3.7	5.16	2	71	10	61-71	-57.3-(-67.3)	-47.3	Bedrock	0.1
BR-4	53.7	56.09	2	68	10	58-68	-4.3-(-14.3)	3.7	Bedrock	30.56
BR-5	67	69.62	2	49	10	39-49	28-18	41	Bedrock	28.49
BR-9	70.8	72.38	4	48	*	*	*	67	Bedrock	47.29
BR-10	64.1	66.29	2	42	10	32-42	32.1-22.1	41.6	Bedrock	31.98
BR-11	22	23.74	2	28.6	10	18.6-28.6	3.4-(-6.6)	10	Bedrock	1.74
BR-12	14.37	16.89	2	44	10	34-44	-19.63-(-29.63)	-19.63	Bedrock	0.72
BR-13	16.0	19.06	3	43	**	**	**	-6	Bedrock	1.85 ^A

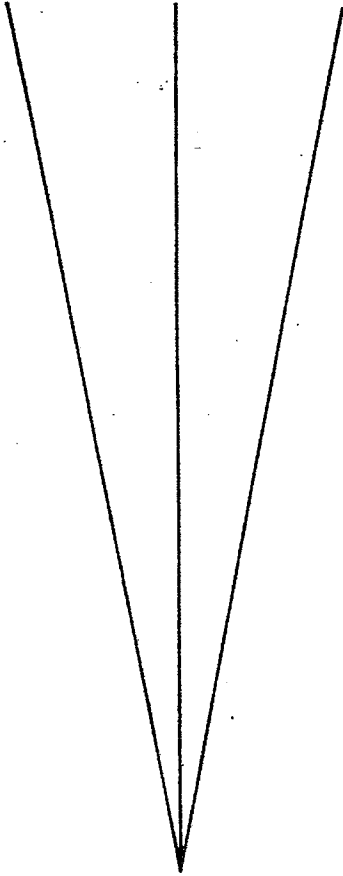
Notes:
 The above monitoring wells were installed at ERL's direction.
 "feet NVGD" = Feet above National Vertical Geodetic Datum.
 * BR-9 was an open rock hole from 3-48 feet below grade, elevation 67.8 to 22.8 feet NVGD.
 ** BR-13 was an open rock hole from 23-43 feet below grade, elevation -7 to -27 feet NVGD.
 A = Date groundwater measured was 9-13-95 (due to tidal influence, groundwater elevations are dependent upon time frame of measurement).

GAS PORT DRILLING LOGS

APPENDIX B

SOILTESTING, INC.

TO: Organic Waste Technologies Inc.
DATE: January 7, 2000
ADDRESS: 371 Route 17A - Tuxedo, New York 10987
SITE LOCATION: Perimeter LFG Monitoring - Shelton Landfill - Route 110 - Shelton, CT
REPORT SENT TO: Michael Schumack
SAMPLES SENT TO: None



140 Oxford Road
Oxford, Connecticut 06478
203-888-4531
Branch Office:
White Plains, New York 10607
914-946-4850

JOB NO. 5736

SOILTESTING, INC.

140 OXFORD RD.
OXFORD, CT 06478
CT (203) 888-4531
NY (914) 946-4850

REMAN - DRILLER

PDIvc

INSPECTOR

GROUND WATER OBSERVATIONS
AT 9 FT AFTER 0 HOURS
AT FT AFTER HOURS

CLIENT: Organic Waste Technologies

SHEET 1 OF 1

HOLE NO. MW-1

PROJECT NO. E105-5736-99

PROJECT NAME Perimeter LFG Monitoring

LOCATION Shelton Landfill-Route 110 - Shelton, CT

TYPE HSA
SIZE I.D. 4 1/4"
HAMMER WT. 140#
HAMMER FALL 30"
DATE START 12-27-99
DATE FINISH 12-27-99
SURFACE ELEV.
GROUND WATER ELEV.

DEPTH	PER BLOWS	CASING NO	TYPE	PEN REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0-6 6-12 12-18 FT (MIN)	CORING TIME PER	FT (MIN)	DENSITY OR CONSIST	MOIST	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.	STRA TA	CHANGE DEPTH	ELEV	SAMPLE		
															NO	TYPE	
10																	
5																	
0																	

Brn/drk-brn F-M SAND, sm F-C gravel, cobbles, silt (fill)
4'0"

Brn/lt-brn F-M-C SAND & F-C GRAVEL, silt cobbles
10'0"

same E.O.B.
10'0"

GROUND SURFACE TO	FT. USED	CASING THEN	THEN	CASING TO	FT.	HOLE NO
						MW-1

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST
WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS
SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER
M = MEDIUM F = FINE
C = COARSE
POTPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

SOILTESTING, INC.



Phone (203) - 888-4531
 Telefax (203) - 888-6247

MONITOR WELL INSTALLATION DETAIL

WHITE PLAINS, N.Y. (914) - 946-4850

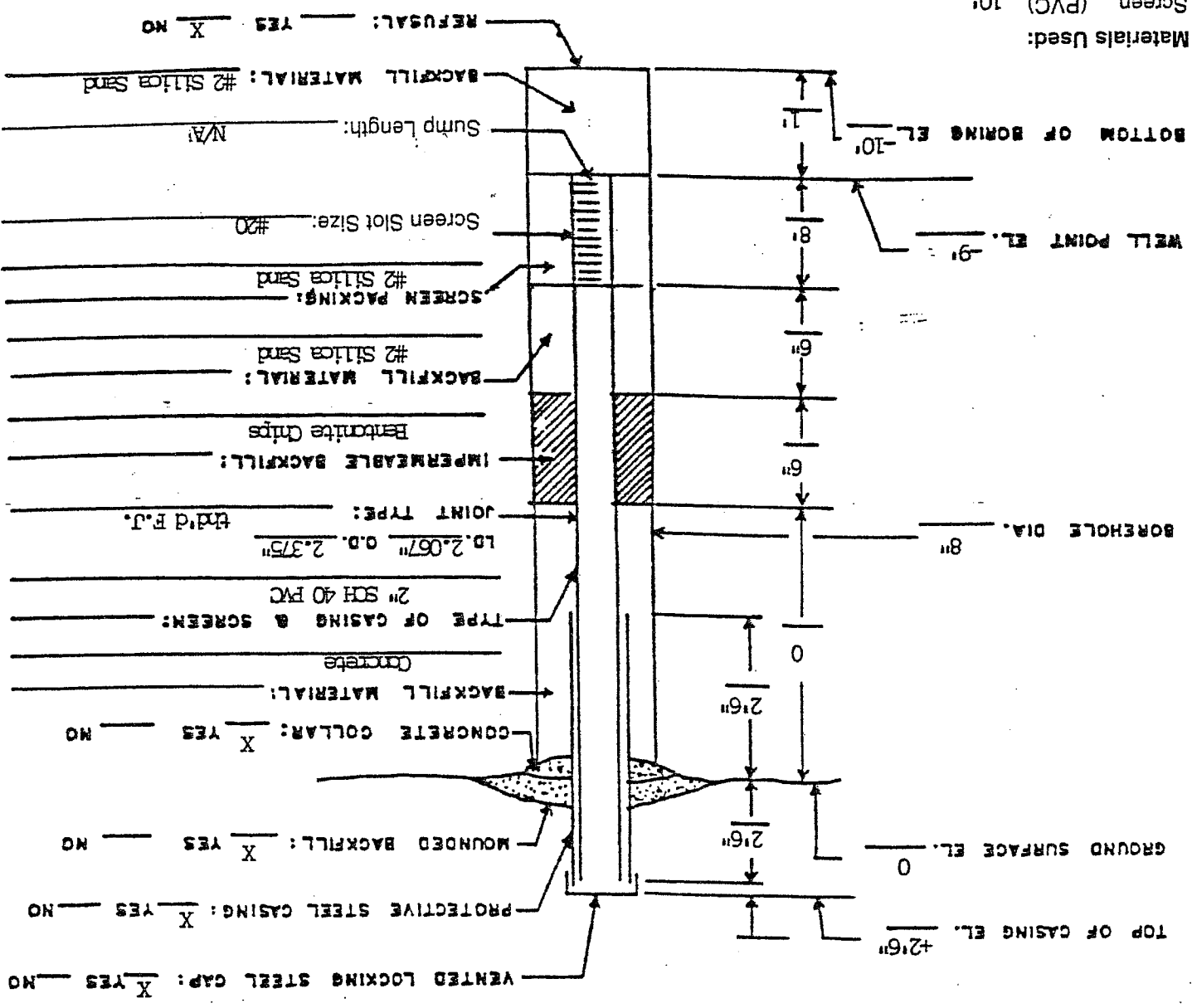
GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling

Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99

MONITOR WELL # MW-1



- Materials Used:
- Screen (PVC) 10'
 - Riser (PVC) 5'
 - Plug (PVC) (1)
 - Slipcap (PVC)
 - Silica Sand 300#
 - Powdered Bentonite

- Bentonite Pellets
- Bentonite Chips 1/2 bag
- Concrete Mix 1 bag
- Portland

- Locking Exp Plug
- Lock
- D/O
- S/U - (1)

SOILTESTING, INC.

140 OXFORD RD.
OXFORD, CT 06478
CT (203) 888-4531
NY (914) 946-4850

RYEMAN - DRILLER

PD/vc

INSPECTOR

GROUND WATER OBSERVATIONS

AT none FT AFTER 0 HOURS
AT FT AFTER HOURS

CLIENT: Organic Waste Technologies

PROJECT NO. E105-5736-99

PROJECT NAME

Perimeter LFG Monitoring

LOCATION

Shelton Landfill-Route 110 - Shelton, CT

CASING SAMPLER CORE BAR

TYPE HSA SS

SIZE I.D.

4 1/4" 1 3/8"

HAMMER WT.

140#

HAMMER FALL

30"

GROUND WATER ELEV.

DATE START 12-27-99

DATE FINISH 12-27-99

SURFACE ELEV.

GROUND WATER ELEV.

SAMPLE

DEPTH PER FOOT	CASING BLOWS PER FOOT	NO	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0-6 6-12 12-18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST	STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.	ELEV	
												MOIST	ELEV

Lt-bm F-M-C SAND & F-C GRAVEL, III
cobble

Lt-bm/gry F-M SAND, sm F-C gravel, III
cobble
SAME; sm cobbles, boulders, poss. fractured decomposed rock
AUGER REFUSAL
E.O.B.

E.O.B. 16'0"

GROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. HOLE NO. MW-2

SS = SPLIT TUBE SAMPLER
WOR = WEIGHT OF RODS
A = AUGER UP = UNDISTURBED PISTON
T = THINWALL
V = VANE TEST
WOH = WEIGHT OF HAMMER & RODS
H.S.A. = HOLLOW STEM AUGER
F = FINE
M = MEDIUM
C = COARSE
PORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

SOILTESTING, INC.

WHITE PLAINS, N.Y. (914) - 946-4850

MONITOR WELL INSTALLATION DETAIL

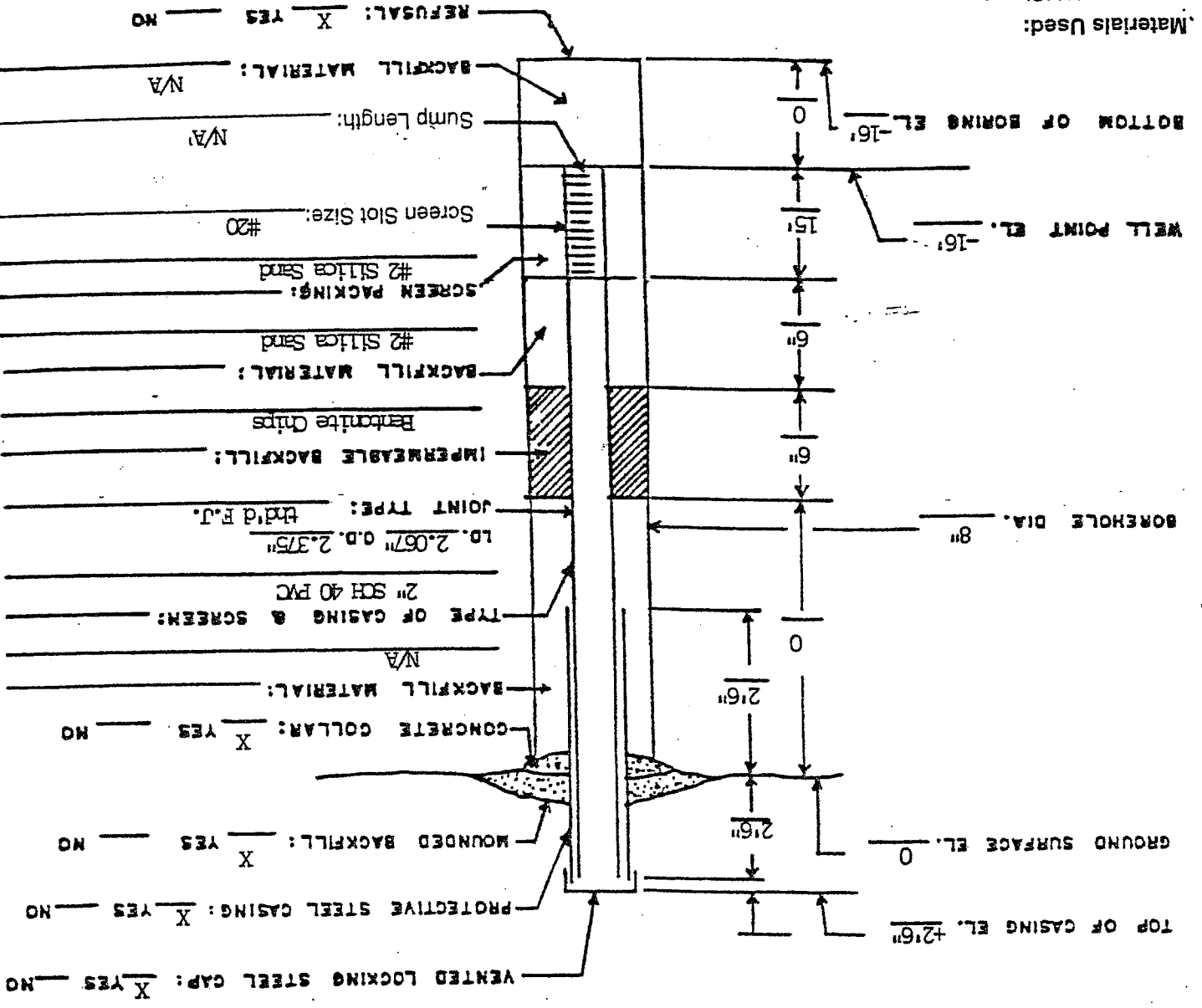
Phone (203) - 888-4531
 Telefax (203) - 888-6247

MONITOR WELL # MW-2

GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling
 Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99



Materials Used:

- Screen (PVC) 15'
- Riser (PVC) 5'
- Plug (PVC) (1)
- Slipcap (PVC)
- Silica Sand #50
- Powdered Bentonite

- Bentonite Pellets
- Bentonite Chips 1/2 bag
- Concrete Mix 1 bag
- Portland

- Locking Exp Plug
- Lock
- D/O
- S/U - (1)

REFUSAL: YES NO

BACKFILL MATERIAL: N/A

Sump Length: N/A

Screen Slot Size: #20

SCREEN PACKING: #2 Silica Sand

BACKFILL MATERIAL: #2 Silica Sand

IMPERMEABLE BACKFILL: Bentonite Chips

JOINT TYPE: Std E.J.

I.D. 2.067" O.D. 2.375"

TYPE OF CASING & SCREEN: 2" SCH 40 PVC

BACKFILL MATERIAL: N/A

CONCRETE COLLAR: YES NO

ROUNDED BACKFILL: YES NO

PROTECTIVE STEEL CASING: YES NO

VENTED LOCKING STEEL CAP: YES NO

140 OXFORD ROAD - OXFORD, CONN. 06478-1943

SOILTESTING, INC.

Telephone (203) - 888-6247

Phone (203) - 888-4531



MONITOR WELL INSTALLATION DETAIL

WHITE PLAINS, N.Y. (914) - 946-4850

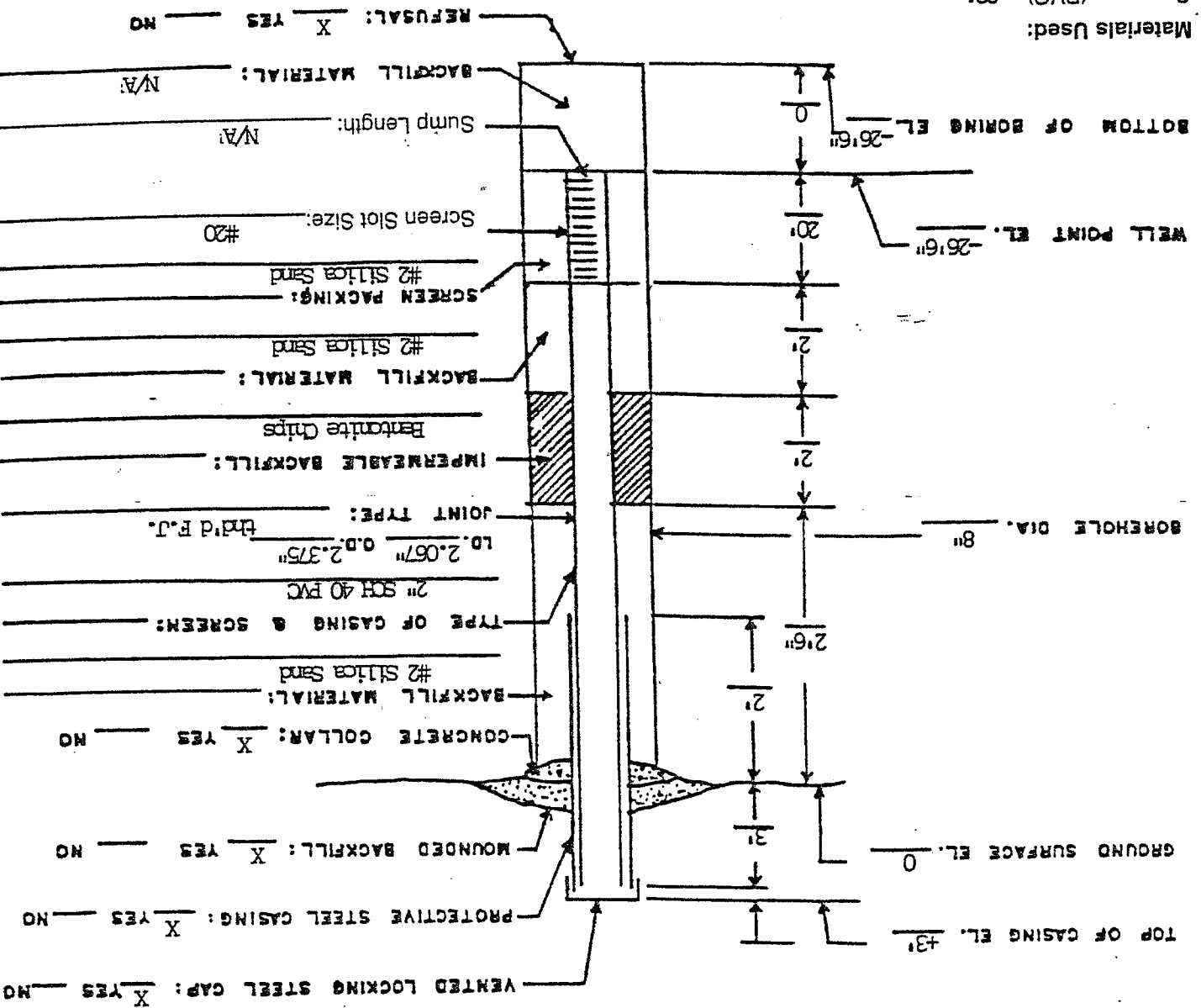
GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling

Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling

Client: Organic Waste Technologies

Job #: E105-5736-99

MONITOR WELL # MW-4



- Materials Used:
- Screen (PVC) 20'
 - Riser (PVC) 10'
 - Plug (PVC) (1)
 - Slipcap (PVC)
 - Silica Sand 800#
 - Powdered Bentonite

- Bentonite Pellets
- Bentonite Chips 1 bag
- Concrete Mix 1 bag
- Portland

Locking Exp Plug
Lock
D/O
S/U - (1)