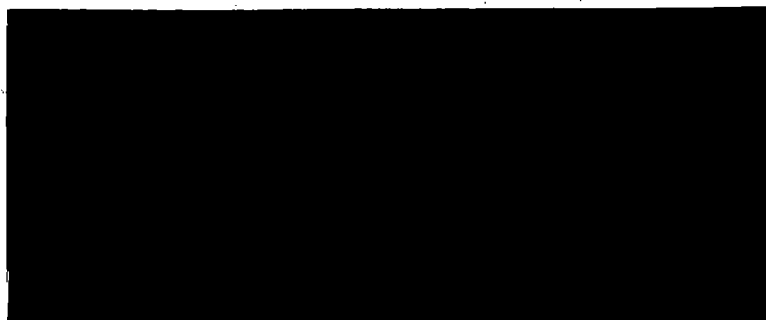




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ECKENFELDER INC.

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**OPERATION AND MAINTENANCE
MANUAL FOR THE ISVS AND GWTS

LORD SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA**

Prepared for:

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August 1996

9809

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- Attachment I - ISVS System Equipment, Operation and Maintenance Information, and Manufacturer's Information
- Attachment II - GWTS Equipment, Operation and Maintenance Information, and Manufacturer's Information
- Attachment III - GWTS Equipment, Operation and Maintenance Information, and Manufacturer's Information

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this Final Operation and Maintenance (O&M) manual is to provide the operator with a description of procedures for operation and maintenance of the remedial systems installed at the Lord-Shope Landfill Site in Girard Township, Pennsylvania.

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This O&M manual has been revised to include detailed operating procedures as determined through observations made during the initial operation of the remedial systems. The Final O&M manual will be submitted to the USEPA and PADEP at the prefinal construction conference to be held at or near completion of construction activities, as outlined in OSWER Directive 9355.0-4A.

It is anticipated that active site remediation pertaining to groundwater recovery, treatment, and discharge may be operating for a period of several years, and it is probable that some aspects of the manual may be periodically revised during operation of the system. Such changes, if they occur, will be reported to USEPA and PADEP as necessary.

In the following sections, O&M activities as well as monitoring, record keeping, and reporting requirements are described for three systems to be operated as part of the remedy for the site. The systems to be operated include:

- In situ vapor stripping (ISVS) system
- Groundwater recovery (GWR) system
- Groundwater treatment system (GWTS) including the discharge system

In addition, as part of the O&M manual, a Health and Safety/Contingency Plan (HASCP) is included in Appendix A. The HASCP outlines health and safety procedures to be followed while performing O&M activities. The contingency plan included as part of the HASCP was identified as a separate item in the Consent Decree, RD Work Plan, and SOW, but has been included as part of this O&M manual.

SECTION I

1.2 STATEMENT TO THE OPERATOR

This manual is comprised of ten (10) sections (excluding Section 1.0) that provide procedures and general operating instructions. Each section and its associated relevance to operations and maintenance are discussed in further detail below.

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Section 2.0 provides a general description of the ISVS system, GWR system, GWTS, and PC control system. Section 2.0 is intended to provide an operator with a general overview of how the systems mentioned above are to be operated. This information along with pertinent design information is provided to assist the operator with understanding the basis of operation and as a reference for achieving the remedial objective for each system.

Section 3.0 presents a summary of the major equipment items installed on each system. This section can be used as a quick reference to locate equipment manufacturers and contacts as well as to reference sections included in the Attachments of this manual for manufacturer's O&M information.

Section 4.0 describes the detailed operating procedures for each system component associated with the GWR system and GWTS. The operator can also reference this section to review the control systems and associated functions for each component of the GWR system and GWTS.

Section 5.0 details the operating procedures for the ISVS system. Similar to Section 4.0, Section 5.0 also provides a description of the controls and associated functions for the ISVS system including the thermal oxidizer.

Section 6.0 describes the operating and maintenance procedures for the site facilities including the treatment building.

Section 7.0 presents a summary of the routine tasks to be performed by the operator. This section describes several functions to be performed by the operator during each site visit or other prescribed interval. Tables are included in this section to be used as a quick reference for operator functions.

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Section 8.0 provides the operator with troubleshooting guides for the major processes of the ISVS system, GWR system, and GWTS. Tables are provided for quick reference. It is anticipated that these tables will be revised to include situations and resolutions encountered during operation of these systems.

Section 9.0 outlines the procedures that will be followed for conducting the performance monitoring tasks associated with the ISVS system, GWR system, and GWTS. Performance monitoring refers to the tasks that the operator or PC control system performs that verify that the remedial systems are operating properly.

Section 10.0 describes the tasks to be performed for compliance monitoring associated with the GWR system and GWTS. Compliance monitoring refers to the tasks associated with verifying that the regulated treatment standards associated with groundwater recovery, treatment and discharge are being achieved. Additional information for compliance monitoring including frequencies, quality assurance/quality control procedures, sample collection procedures, laboratory analytical requirements, and reporting procedures are included in the Long-Term Monitoring Plan in Appendix K.

Section 11.0 provides detailed procedures for starting the ISVS system, GWR system, and GWTS. The operator shall reference the procedures described in this section whenever startup of these systems is required.

In addition to the sections described above, appendices have been provided and are referenced where appropriate throughout this manual. Appendices include:

Appendix A	Health and Safety/Contingency Plan
Appendix B	GWTS Process Flow Diagram
Appendix C	GWTS Piping and Instrumentation Diagram
Appendix D	GWTS Hand Valve Position Schedule
Appendix E	GWTS Process Control Tables
	Table E-1 Flow Rate Adjustment Percentages
	Table E-2 Potassium Permanganate Feed Rates
	Table E-3 GWTS Alarm Schedule Summary
Appendix F	Schedule of Maintenance Activities
Appendix G	NPDES Permit

Appendix H	PC Control System Tables
Appendix I	Operator Checklists and Data Sheets
Appendix J	Long-Term Monitoring Plan
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1.3 SITE LOCATION AND DESCRIPTION

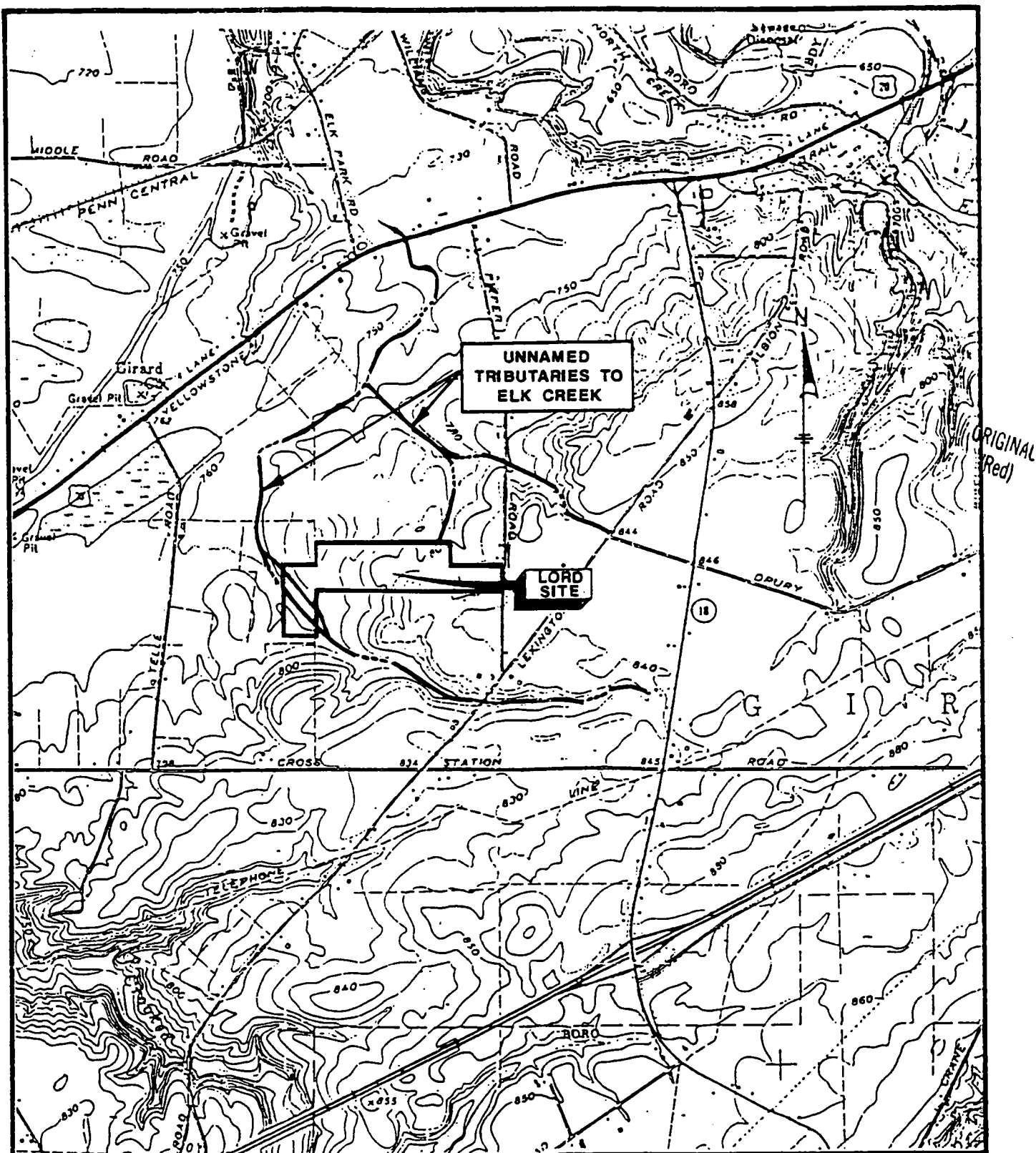
The Lord-Shope Site is located west of Pieper Road approximately 4,500 feet south of the intersection of U.S. Route 20 and Pieper Road in Girard Township, Erie County, Pennsylvania (see Figure 1-1). To the north and to the west of the site are two unnamed tributaries of Elk Creek. The site consists of an inactive, industrial waste landfill covering approximately four acres, as well as the adjacent areas of contaminated groundwater. The property containing the landfill is currently owned by the Lord Corporation of Erie, Pennsylvania.

The landfill currently appears as a grass-covered mound which rises approximately 20 feet at its highest point. The surrounding area is primarily rural agricultural with scattered residential areas bordering the roads. The property is bounded to the east by Pieper Road, by an apple orchard and vineyard to the south, by an evergreen nursery to the west, and by a field to the north. A golf course is located to the north of the landfill property, adjacent to the field. The only nearby residences are located along Pieper Road to the east and along Route 20 to the north. The nearest population center, Girard Borough, is located approximately two miles to the northeast.

1.4 SITE HISTORY

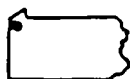
From the mid-1950s until 1979, industrial wastes, including spent adhesives; solvents; cutting oils; acids; and caustics, along with miscellaneous paper, wood, and rubber wastes, were disposed of at the site. Some wastes were disposed of in drums. The property was then owned by the late Mr. Melvin Shope, who was at that time an employee of Lord Corporation. The wastes originated at Lord Corporation's Erie (12th Street) and Saegertown plants.

A partial remediation of the site was performed from 1982 to 1983. This remediation included regrading of the waste, installation of an upgradient cut-off



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SOURCE: ALBION, (1959, REV. 1969)
PA. 7.5' QUADRANGLE



MAP LOCATION

2000 0 2000
scale feet

FIGURE 1-1
LORD - SHOPE LANDFILL SITE
LORD CORP.
GIRARD TWP., ERIE COUNTY, PA

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Nashville, Tennessee
Mahwah, New Jersey

wall, installation of a composite cap, and improvements in stormwater management.

The site was placed on the National Priorities List (NPL) in September 1983. In the intervening years, the environmental conditions of the site have been extensively investigated. The study area has included the landfill and the area immediately surrounding the landfill, a plume area located downgradient (north) of the landfill, the two tributaries and drainage patterns that make up the surface hydrology, and the groundwater system below each of these areas.

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The remedy for the site, which is described in more detail in the Engineering Report (Volume 1, Appendix A) prepared as part of the RD, is comprised of three components:

1. A groundwater recovery and treatment component;
2. The innovative technology of in situ vapor stripping within the landfill and surrounding soils; and
3. The additional protection provided by institutional controls including the installation of security fencing.

Implementation of the site remedy began in the fall of 1994 and continued through the fall of 1995. The ISVS system began operation in November of 1995 and the GWTS became operational in December 1995. A pump test was conducted in December 1995 to determine the yield for each of the GWR wells tested as well as the zone of capture for the site. Based on the results of the pump test, the final design for the GWR system was completed in January 1996 and the system installed in May 1996. The GWR system became operational in June 1996 and the GWTS has been treating groundwater since that time.

SECTION 2

2.0 GENERAL SYSTEM DESCRIPTION

This section presents a general description of the ISVS system, the GWR system, the GWTS, and PC control system. The information presented includes a general description, theory of operation, and design basis for each. Additional operating and control descriptions for the GWTS and the ISVS system are included in Section 4.0 and Section 5.0 respectively.

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2.1 ISVS SYSTEM

2.1.1 System Description

The landfill area and two adjacent areas known as the "toe area" and the "crest area" will be remediated by in-situ vapor stripping (ISVS). The ISVS system consists of a vapor extraction system, vapor collection header system, vapor treatment system (thermal oxidizer), monitoring components, and controls. The ISVS treatment system equipment is located outside and adjacent to the groundwater treatment building. The vapor extraction/treatment system includes a thermal oxidizer, blower(s), demister, condensate removal tank (secondary), condensate water pump, and controls.

Blower(s) are used to pull a vacuum on the four-inch diameter PVC header pipe that is connected to three vapor extraction wells (EX-1, EX-2, and EX-3) located in the landfill area, six vapor extraction wells (EX-4 through EX-9) located in the crest area, and a horizontal extraction pipe located in the toe area. The extracted vapor is sent through a condensate removal tank and a demister to remove moisture prior to entering the blower(s) and thermal oxidizer.

Vapor recovery performance and operation is monitored and can be adjusted using a system of temperature probes, vacuum gauges, flow meters, and valves. Each extraction well and horizontal extraction pipe has a vacuum gauge and valve for monitoring and balancing the system. Temperature probes are located at each extraction well and in the header pipe to monitor extracted vapor temperature. Temperature probes are also located in twelve temperature wells (T-1 through T-12) installed in the landfill area to monitor the temperature within the landfill. The twelve temperature wells are also equipped with vacuum gauges to monitor the

performance of the extraction wells and with a connection for nitrogen injection to be used in the event of a landfill fire.

The thermal oxidizer consists of a skid mounted system that has been designed to treat volatile organic constituents (VOCs) through combustion. The VOC laden vapor enters the thermal oxidizer via the vacuum blower(s). The vapor is then mixed with make-up air and heated to operating temperature. The vapor is then retained within the combustion chamber at the operating temperature for a predetermined time, resulting in the required VOC destruction efficiency. As necessary, the combustion chamber temperature is maintained by use of a supplemental fuel source consisting of natural gas. The treated vapors are then discharged through a 35 foot high stack. The thermal oxidizer is equipped with an automatic monitoring and adjustment system to simplify operation and initiate alarm and shutdown conditions.

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2.1.2 Theory of Operation

ISVS is a process in which air is withdrawn through vapor extraction wells. As the air passes through the media, the volatile organics in the soil interstices and absorbed onto the soil or other materials are partitioned into the air stream ("off gas") and removed as the air is extracted. This air stream is then collected and treated for contaminant removal by an appropriate process (e.g., thermal oxidation) prior to emission to the atmosphere.

The site-specific considerations that control the operation of ISVS system include the presence of methane and vinyl chloride. Methane concentrations observed during the treatability study reached a maximum of 70 percent (by volume). The presence of biodegradable materials as evidenced by methane concentrations at these levels, in combination with the use of the ISVS technology (i.e., introducing oxygen into the landfill) increase the potential for a landfill fire. The operation of the ISVS system includes a three-pronged approach to address the potential for a landfill fire as follows:

- Operating Controls - if elevated levels of methane exist within the landfill, and if conditions require, the landfill portion ISVS system will be periodically "pulsed", turned off, allowed to reequilibrate, then turned back

on. The length of each pulse will be based on the number of pore volume exchanges and observation of monitored parameters. The oxygen levels present within the landfill will rise due to the introduction of ambient air resulting from the application of vacuum during each pulse. The introduction of oxygen will then be stopped at the end of the pulse. This approach should inhibit aerobic decomposition if initiated by the introduction of oxygen and provide the opportunity for a reversion to an anaerobic condition prior to initiation of the subsequent pulse (i.e., deplete oxygen that is introduced). If aerobic conditions do not develop or are very limited, the length of each pulse can be increased. This approach should control conditions which may lead to aerobic decomposition developing to an extent that ignition temperatures could be reached. The criteria for the frequency and length of each pulse (if required) is further described in Section 5.0 of this manual.

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- Monitoring - during the operation of the system, temperature, oxygen, carbon monoxide levels (CO), percent of the lower explosive limit (LEL), and total hydrocarbons will be monitored. As described in Section 2.1.1, temperatures will be monitored within the header pipes and at twelve locations within the landfill. Temperature probes and extracted vapor temperature at the inlet to the thermal oxidizer are monitored on the PC control system. The PC control system enables direct reading of the monitoring equipment associated with the ISVS system at the computer located in the treatment building as well as at Lord's offices in Erie, PA. A significant rise in temperature as monitored by the temperature probes or the presence of carbon monoxide may indicate the possibility of a landfill fire. If elevated levels of CO are detected by the CO monitor, the ISVS system will be shut down (automatically). Oxygen levels will also be monitored as a means of evaluating the internal landfill conditions that may be conducive to combustion (i.e., landfill fire). All of the parameters listed above are monitored at the main header pipe at the inlet to the thermal oxidizer. Action levels have been developed during the initial start-up of the ISVS system and are described in Section 5.0 of this manual.

- Contingency - If a landfill fire is suspected based on the above monitoring efforts, a series of action items (measures) will be conducted. These items include immediate shut down of the ISVS system, injection of a fire suppressant into the landfill, and smothering the fire with the use of soils. These measures are described in detail in Section 5.0 of this manual.

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The emissions from the ISVS process will be treated to conform to the substantive requirements of the Pennsylvania Air Pollution Control Act as set forth in 25 PA Code Section 127.1. Performance Monitoring requirements developed to operate the thermal oxidizer so that emission levels conform to these requirements are outlined in Section 9.0.

Specific ISVS system operating and maintenance procedures are presented in Section 5.0 of this manual

2.1.3 Design Basis

The design basis for the ISVS system was described in Section 4.2 of the engineering report prepared as part of the remedial design (RD). In general, the design was based on data collected during the remedial investigation and results of the pilot-scale treatability study.

Table 2-1 presents a summary of the ISVS extraction points required for the landfill, crest, and toe areas as determined during the RD. A summary of the design extracted vapor flow rates from each area is presented in Table 2-2. In general, when all three areas are operating, vapor extraction will consist of 37 to 90 scfm of gas extracted from the landfill and up to 70 scfm (principally consisting of air) from the toe and crest area extraction systems, resulting in a total maximum feed rate of 160 scfm of ISVS gas. These flow rates may differ if certain areas are not operated or if weather conditions (i.e., extreme cold) require alternate extraction flow rates.

The conveyance system (header pipe) design was based on requirements specific to each of the three areas. In general, the header system consists of a 4-inch diameter schedule 40 PVC pipe, installed above grade, insulated, and equipped with expansion joints to compensate for thermal expansion effects. Additional design

TABLE 2-1

SUMMARY OF ISVS EXTRACTION POINTS
LORD-SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA

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Area	Extraction Point Identification
Landfill Area	EX-1, EX-2, and EX-3
Crest Area	EX-4 through EX-9
Toe Area	NA ^a

^aToe area is a continuous horizontal collection system located along the east limit of the landfill.

TABLE 2-2

**ISVS DESIGN EXTRACTION RATES
LORD-SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA**

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System Components	Minimum Flow (scfm)	Typical Flow ^a (scfm)
Landfill Extraction Wells (evenly distributed among three wells)	36	90
Crest Area Extraction Wells (evenly distributed among six wells)	30	60
Toe Area Extraction System	5	10
Total Flow	71	160

^aActual flows may be modified based on observation during actual operation, weather conditions, or adjustment to the number of extraction areas.

information is included in Section 4.2.2 of the engineering report prepared during the RD.

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As part of the RD, an evaluation of emission control technologies was performed. This evaluation was based on concentration ranges of methane and VOCs other than methane observed during the pilot-scale treatability study. Table 2-3 is a summary of the concentration ranges detected during the ISVS treatability study.

Based on results of the treatability study and the evaluation performed during the RD, the following equipment was determined to be required to meet treatment requirements for the extracted vapor:

- Condensate Tank
- Air Extraction Blowers
- Thermal oxidizer
- Flow sensors and gauges
- Demister
- VOC monitor (flame ionizing detector)
- Vacuum gauge
- Temperature gauge
- Pressure gauge
- Opacity alarm/meter^a, CO-meter, and oxygen meter.

^aOpacity was determined during initial operation of the ISVS system to be an unacceptable monitoring parameter due to the water vapor content of the extracted vapor stream. A design change was implemented to incorporate the CO monitor as one of the initial indicators of a potential landfill fire.

Design feed rates for the constituents in the ISVS gas are presented in Table 2-4.

The thermal oxidizer will achieve a destruction removal efficiency (DRE) of at least 99.9 percent for the constituents and quantities identified in Table 2-4. The DRE was based on a combustion zone residence time of 1.0 second and a combustion zone temperature of 2,200°F. During the submittal process, the thermal oxidizer manufacturer submitted an alternate design using a residence time of 1.5 seconds

TABLE 2-3
CONCENTRATION RANGES OF VOCS
DETECTED IN ISVS PILOT TESTS
LORD-SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA

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Type of Test	Methane (ppm)	Non Methane VOCs (ppm) ^a	Vinyl Chloride (ppm) ^a	1,2-Dichloroethene (ppm) ^a
75 hr ISVS test	70,000 to 470,000	4,970 to 12,500	2,900 to 7,700	1,700 to 4,300
Passive vent test	40,000	6,900 to 7,500	2,300 to 3,300	3,000 to 3,500
Slug test	3,000 to 20,000	1,000 to 5,200	170 to 2,000	490 to 2,500
<i>Overall design range</i>	3,000 to 470,000	1,000 to 12,500	170 to 7,700	490 to 4,300

^avolume/volume (v/v) basis

TABLE 2-4

**THERMAL OXIDIZER DESIGN LOADING CONCENTRATIONS
LORD-SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA**

Constituent	Influent Concentration Range		Discharge Emission Range	
	low (ppm)	high (ppm)	low ^a (ppm)	high ^b (ppm)
Vinyl Chloride	170	7,700	3.83	71.74
Acetone	ND	5.4	0.00	0.05
2-Propanol	ND	2.3	0.00	0.02
1,2-Dichloroethene (total)	490	4,300	17.14	68.14
1,1-Dichloroethane	0.3	6.7	0.01	0.10
2-Butanone	4.7	13	0.12	0.14
2-Butanol	ND	5.9	0.00	0.07
Chloroform	ND	0.95	0.00	0.02
Tetrahydrofuran	ND	77	0.00	0.83
Benzene	0.7	7.4	0.02	0.09
Trichloroethene	14	420	0.66	8.23
4-Methyl-2-pentanone	20	630	0.72	9.41
Toluene	85	240	2.83	3.30
Tetrachloroethene	0.85	17	0.05	0.42
1,3-Dimethylbenzene	ND	42	0.00	0.66
1,2-Dimethylbenzene	3.9	41	0.15	0.65
<i>Total non-methane</i>	789.45	13,508.6	25.54	157.84
Methane	70,000	470,000	405.18	1,123.77
<i>Total VOCs</i>	70,789	483,509	430.72	1,281.61

^aBased upon low end of concentration range and 90 scfm flow rate.

^bBased upon high end of concentration range and 37 scfm flow rate.

ORIGINAL
(Red)

and a combustion zone temperature of 1,700°F. Based on the calculations provided with the manufacturer's submittal, the alternate design was approved.

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2.2 GROUNDWATER RECOVERY, TREATMENT, AND DISCHARGE SYSTEM

The design objective of the groundwater recovery (GWR) system is to create a zone of groundwater capture that encompasses the delineated groundwater plume (presented in Section 2.0 of the engineering report prepared as part of the remedial design) and to convey the extracted groundwater to the groundwater treatment system (GWTS).

The objective of the groundwater treatment and discharge system is to provide metals removal (primarily iron) through solids separation and volatile organics (primarily vinyl chloride) removal by air stripping. The general process flow diagram for the GWTS included in Appendix B depicts the major treatment processes and their interrelationships. An overview of the GWR and GWTS process is further described below.

2.2.1 System Description

The GWR system includes two groundwater recovery wells, an underground forcemain, controls, and electrical equipment. The two wells are identified as IPE-1 and IPE-2 and are located along the northern boundary of the existing landfill. Each GWR well includes a submersible pump, level controls, throttling valves, and a flow indicator/totalizer. The wellhead connection for each well is located aboveground to provide easy access to the throttling valves and flow indicator/totalizer. Aboveground piping is constructed of steel and is heat traced and insulated to protect against freezing during winter months. Both GWR wells are connected to the below ground header system that conveys recovered groundwater to the GWTS located in the treatment building.

Groundwater from the recovery wells is pumped through the GWR well header system to the equalization tank (T-1) located in the treatment building. Oxidation of dissolved iron is the first step in the metals removal process. Oxidation of dissolved iron in the groundwater is accomplished in T-1 by the addition of

potassium permanganate solution via a chemical metering pump (P-3 or P-4). The specific operation of the chemical feed system including dose rates is described in Section 4.9.

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Groundwater is conveyed by the filter feed pumps (P-1 or P-2) from T-1 through the granular media pressure filters (F-1 or F-2) to the air stripper (AS-1). The granular media filters remove suspended solids from the groundwater stream thus accomplishing the initial objective of metals removal.

Following the granular media pressure filters, water is conveyed, under pressure, to the low profile air stripper where removal of VOCs in the groundwater is accomplished. Groundwater is introduced to the top of the stripper unit and flows downward across three aeration trays counter-current to the air introduced at the bottom of the air stripper. The centrifugal blower located at the bottom of the unit operates using an outdoor air inlet source. Treated groundwater is pumped from the air stripper sump located at the bottom of the unit to the effluent holding/backwash tank (T-3) using the transfer pump P-5 or P-6.

Tank T-3 serves as a reservoir for the backwash water supply and as a monitoring vessel for compliance monitoring of the treated effluent. Effluent monitoring is performed by collecting samples from T-3 in accordance with the discharge permit. Specific monitoring information is further described in Section 10.0.

Treated effluent not stored for backwash purposes is pumped from T-3 to the effluent discharge point located in the southwest portion of the site using pump P-7 or P-8. The treated effluent is discharged to a tributary of Elk Creek.

The granular media pressure filters will be backwashed periodically. Typically, backwash events will be initiated automatically, however, manual initiation through the PC control system can also be performed. Backwash operations are further described in Section 4.3. As described above, backwash water for the pressure filters is supplied from T-3 which is sized to store 1,500 gallons of water dedicated for one backwash cycle. The backwash water is pumped upward through the filters to the solids holding tank (T-4) using pump P-9 or P-10.

Tank T-4 is designed to remove suspended solids in the backwash water by allowing them to settle. Tank T-4 is sized to hold the volume of water for one backwash cycle plus settled sludge for approximately seven days. Supernatant is decanted automatically through a draw-off line located on the side of T-4 and directed to the filtrate tank (T-5). The draw-off line is equipped with an electrically actuated valve opened and closed by a timer (PC control system function) so that decant occurs before another backwash cycle but allows solids settling time prior to decant. Operation of the decant valve is further described in Section 4.7. The draw-off line is also equipped with a by-pass line to manually decant the tank if required.

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Dewatering of the sludge is performed using a 5 cubic foot plate and frame filter press. Sludge from T-4 is pumped to the filter press via an air diaphragm pump (P-11). Filtrate generated during the dewatering process is directed to T-5. Section 4.7 describes the filter press and dewatering operation in detail. The dewatered sludge generated from the filter press will be collected in a self-dumping hopper beneath the press for disposal off site as a non-hazardous solid waste.

Filtrate collected in T-5 is pumped automatically to T-1 using pump P-11 or P-12 and recirculated through the treatment system.

Tanks in the process are covered and provided with air/vacuum release vents piped to a common header. The header vent is routed to the air stripper stack. Tanks are equipped with dedicated drain lines for manual connection to pumps and are equipped with manways for access in the event that maintenance is required.

2.2.2 Theory of Operation

The GWR system is designed to generally be an automated system, and therefore, manual intervention by the operator should be minimal once the system is balanced. Initially, operation will require adjustments to the throttling valves and/or level controls located at each recovery well. Adjustments to the groundwater extraction system are further described in Section 4.1 and are based on observations made during the pump tests and full-scale operation of the system.

In general, well flow rates will require adjustments related to modifying the groundwater zone of capture as determined through the hydraulic performance monitoring described in Section 10.0.

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NOTE: Adjustments to the flow rate from each well in the groundwater extraction system shall be made as necessary, however, total system flow shall not exceed 47.4 gpm.

Once the flow rate and maximum groundwater zone of capture have been established, the GWTS can be balanced to treat the influent flow rate from the GWR system.

The GWTS is designed to operate in both a constant volume basis and variable volume basis. Operating on a constant volume basis means that the flow rate through the GWTS is balanced with the flow rate being conveyed from the GWR system. Fluctuations in the influent flow rate from the GWR system may occur and as a result the volume in tank T-1 may vary. However, the GWTS system can be configured to generally operate (within a reasonable margin) at the flow rate being pumped by the GWR system.

The system can also operate in a variable volume mode and this operating mode should be considered whenever the influent flow rate from the GWR system is less than 25 gpm. A variable volume operating mode is consistent with a batch type process where the equalization tank (T-1) is completely filled before the groundwater treatment process is initiated. If the total groundwater recovery flow rate falls below optimum operating conditions, the variable volume mode of operation will maximize the performance and life span of the GWTS equipment. When a variable volume operating mode is required, the flow rate for the GWTS will be adjusted to optimize equipment operating cycles. Operating cycles will be adjusted based on influent flow rates from the GWR system. Adjustments to specific unit components of the GWTS may be required when operating in the alternate mode and these adjustments are further described in Section 4.0.

Based on the influent flow rates observed during the pump test and initial operation of the GWR system, normal operation of the GWTS shall be on a variable volume basis since influent flow is less than 25 gpm.

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2.2.3 Design Basis

The groundwater influent characterization process is described in detail in Section 4.4.1 of the engineering report prepared during the remedial design (RD). In general, historical site data along with data collected during the 1992 treatability study was used to characterize the constituent concentrations for the groundwater influent to be treated by the GWTS. A summary of the groundwater influent concentration ranges and permit limits used for the RD is presented in Table 2-5.

The design basis for the GWTS was described in Section 4.4.2 of the engineering report prepared as part of the RD. As stated in the RD report, the GWTS design is based on a maximum flow rate of 47.4 gpm with an operating range of 14 gpm to 47.4 gpm. The design raw wasteload range for metals and organic compounds is based on the data presented in Table 2-5. The selection of unit processes during design was based on the design wasteload ranges and the treatability study results and conclusions.

The results of the pilot scale groundwater treatability study indicate that a minimal degree of metals removal is necessary to achieve the proposed discharge standards. Therefore, acceptable effluent quality may be attainable with the following unit processes:

- Equalization Tank
- Potassium Permanganate Feed System
- Granular Media Filters
- Air Stripper
- Effluent/Backwash Holding Tank
- Solids Holding Tank
- Filter Press System
- Filtrate Tank

TABLE 2-5

**GROUNDWATER INFLUENT CONCENTRATION RANGES AND PERMIT LIMITS
LORD-SHOPE REMEDIAL DESIGN
GIRARD TOWNSHIP, PENNSYLVANIA**

ORIGINAL
(Red)

Constituent	Maximum Influent Concentration ^a (µg/L)	Minimum Influent Concentration ^b (µg/L)	NPDES Permit Limit ^c (µg/L)
Metals			
Aluminum	59,570	ND ^d	460
Barium	6,328	878	1,700
Cadmium	15.6	ND	1.6
Copper	2	BMDL	9.0
Iron	32,480	874	1,600
Lead	108	ND	5
Mercury	BMDL ^e	BMDL	ND ^d
Zinc	6,765	13	60
VOCs and SVOCs			
Acetone	2,265	ND	6,700
Benzene	11	ND	5.8
Trans-1,2-DCE	125	ND	590
MEK	252	ND	3,400
MIBK	2,673	ND	3,400
TCE	25	ND	18
Vinyl Chloride	2,100	ND	ND
Conventional Parameters			
pH (s.u.)	7.69	7.43	6-9
Oil and Grease (mg/L)	3.81	1.20	15

^aThe highest concentrations based on seven scenarios considering current and historical maximum data. These are believed to be conservative concentrations and actual influent concentrations may be lower.

^bThe highest concentration based on seven scenarios considering current and historical minimum data. These are believed to represent a lower bound and actual influent concentrations of some constituents may be higher.

^cMonthly average limit established in proposed discharge permit issued by USEPA in August 1992.

^dND = Nondetectable.

^eBMDL = Below Method Detection Limits

The process design basis for each of these components is summarized in Table 2-6. Each of the system components listed above is further described in Section 2.2.1 and 4.0 of this manual. The process flow diagram, piping and instrumentation diagram, and manufacturer's information present additional details for unit components installed as part of the GWTS. Calculations for sizing and specifying piping, pumps, tanks, and other system components are included in Appendix F of the remedial design engineering report.

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2.3 PROCESS CONTROL SYSTEM

2.3.1 System Description

The ISVS system and GWTS are monitored and controlled using a personal computer (PC) based operating system. The control system is operated through a PC located at the site. Remote monitoring and alarm annunciation for portions of the ISVS system and GWTS can also be performed from the Lord Corporation offices located in Erie, PA via an integrated modem and autodialing system.

The PC control system can be activated by turning on the computer located at the site. When activated, the system is configured to automatically come on-line and assume control of the ISVS system and GWTS.

CAUTION: The ISVS system and GWTS shall not be operated without the PC control system. If in the event the C:\> prompt appears on the PC monitor, the operator shall type SHOPE and press the enter key to reactivate the PC control system. If a failure of the PC control system occurs, discontinue operation of the ISVS system and GWTS.

The PC control system utilizes EIGHT primary screens to monitor and control system operations. Screen displays include GW-WELL, PROCESS, BACKWASH pH-COND, EX-WELL, TEMPWELL OX-TEMP, and ISVS. Access to each screen display is described in Volume 1 of the Water Treatment Systems operations manual prepared by Dynalitic Systems, Inc. Input and output information for each screen display is described in Section 4.0 and Section 5.0 of this manual.

TABLE 2-6

PROCESS DESIGN
GROUNDWATER TREATMENT SYSTEM
LORD-SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA

ORIGINAL
(Red)

Component/Parameter	Value
Equalization Tank	
- Operating Mode	Variable Volume
- HRT, hrs @ 47 gpm	2
- Nominal Liquid Volume, gal	6,000
- Mixing, HP	1.0
Granular Media Filters	
- Type	Pressure, Downflow
- Number in Parallel	2
- Media	
-- Silica Sand	
Effective size, mm	1.5
Uniformity Coefficient	1.6
-- Anthracite	
Effective size, mm	1.0
Uniformity Coefficient	1.7
- Filter Diameter, ft	4
- Hydraulic Loading, gpm/sq ft @ 47 gpm	4
- Bed Depth, ft	3
- Backwash Rate, gpm	150
Air Stripping Tower^a	
Effluent Holding/Backwash Tank	
- Operating Mode	Variable Volume
- Backwash Working Volume, gal	1,500
- Nominal Liquid Volume, gal	1,900
Sludge Holding Tank	
- Operating Mode	Variable Volume
- Backwash Storage Volume, gal	1,500
- Sludge Storage Volume, gal	1,000
Filter Press^b	
- Volume, cu.ft.	5
- Cycle Frequency, number/wk	1
- Cycle Duration, hr	3
Filtrate Tank	
- Nominal Liquid Volume, gal	1,500

TABLE 2-6 (Continued)

PROCESS DESIGN
GROUNDWATER TREATMENT SYSTEM
LORD-SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA

ORIGINAL
(Red)

Component/Parameter	Value
Potassium Permanganate Feed System	
<u>Feed Tank</u>	
- Liquid Volume, gal	150
- Solution Concentration, percent (w/w)	1.5 percent
- Dose (mg/L)	4
<u>Metering Pumps (P3, P4)</u>	
- Type	Positive Displacement
- Number	2
- Operating Range, gph	0 to 2.5
Filter Feed Pumps (P1, P2)	
- Type	Centrifugal
- Number	2
- Capacity, gpm	47
Effluent Tank Feed Pumps (P5, P6)	
- Type	Centrifugal
- Number	2
- Capacity	47 gpm
Effluent Discharge Pumps (P7, P8)	
- Type	Centrifugal
- Number	2
- Capacity	47 gpm
Backwash Pumps (P9, P10)	
- Type	Centrifugal
- Number	2
- Capacity, gpm	150
Sludge Pump (P11)	
- Type	Positive Displacement
- Number	1
- Maximum Pressure, psi	100
Filtrate Pump (P12, P13)	
- Type	Centrifugal
- Number	2
- Capacity, gpm	25

TABLE 2-6 (Continued)

PROCESS DESIGN
GROUNDWATER TREATMENT SYSTEM
LORD-SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA

ORIGINAL
(Red)

Component/Parameter	Value
Blowers	
- Type	Centrifugal-Variable Frequency
- Number	2
- Air-to-Water Ratio, Average @ 47 gpm	50:1
- Air-to-Water Ratio, Range @ 47 gpm	25:1 to 100:1

^aAir Stripper design basis corresponded to a packed tower type system. A low profile air stripper was installed as an approved equal. The design basis for the low profile air stripper is provided in Section 006 of the manufacturer's information (Attachment II).

^bThe pilot plant utilized sand drying beds for sludge dewatering. As such, the dewatering characteristics of the sludge were only monitored to the extent that the sludge readily dried on the sand bed surface. Filtrate volume was insufficient to properly evaluate solids capture on the bed. The process design specifies mechanical sludge dewatering by a plate and frame filter press. Although pressure filtration tests were not conducted during the pilot study, this method is believed to be appropriate for this application. Settling characteristics of backwash are not well-defined. It may be found during full-scale operation that some form of settling enhancement is required. Effective dewatering with a filter press may require the use of a dewatering (bulking) aid such as lime, sawdust, or fly ash. Such analysis and evaluation will be required during full-scale treatment plant operations.

The PC control system is also provided with a level of operation for supervisory personnel. Entry to this level of the system is password protected and should only be accessed when necessary. The supervisory level of the PC control system is primarily used to download or copy historical performance monitoring data files for the ISVS system and GWTS. Additional information regarding features for the supervisory level of the PC control system is provided in Volume 1 of the Water Treatment Systems operations manual.

ORIGINAL
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2.3.2 Theory of Operation

As discussed in Section 2.3.1, the PC control system shall operate whenever the ISVS system or GWTS is operating. Remote monitoring shall be performed daily to verify that the PC control system, the ISVS system, and the GWTS are operating properly. Remote monitoring procedures for the ISVS system and the GWTS are described in Section 9.0.

NOTE: If remote monitoring identifies an alarm event or other condition with the ISVS system or GWTS outside of normal operating conditions, the operator shall make a site visit immediately to further investigate the situation.

The operator is required to perform routine tasks during each scheduled site visit. Checking the operating status of the PC control system, ISVS system, and GWTS is included in the list of operator tasks. The operator shall check these systems using the screen displays described in Section 2.3.1 in addition to a physical inspection of the system. Operator functions are further described in Section 7.0.

2.3.3 Design Basis

The PC control system design was based on requirements developed during the process design for the ISVS system and GWTS. The control system was also designed to meet the requirements of unmanned operation and remote monitoring.

The PC control system for the ISVS system was designed to meet the requirements for operating the packaged thermal oxidizer along with addressing the safety concerns associated with the potential for a landfill fire. The PC control system is

configured to monitor specific operating parameters associated with the ISVS system including but not limited to the extracted vapor flows, extracted vapor temperatures, opacity, carbon monoxide, lower explosive limit (LEL), total hydrocarbons, and oxygen. Opacity however, was determined during initial startup to be parameter to monitor due to the high amount of water vapor present in the extracted vapor. In addition, to the parameters listed above, subsurface landfill temperature is also monitored at twelve monitoring points in the landfill.

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The PC control system was also designed to monitor and control the various systems associated with the GWTS. The PC control system is configured to achieve both the requirements for operating the process as well as the operator's need to monitor and control the system with minimal on site intervention. Control of the GWTS is based on the control logic as described in Section 4.0 and shown on the P&ID (Appendix C).

SECTION 3

3.0 MAJOR EQUIPMENT LIST

ORIGINAL
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3.1 DISCUSSION

The ISVS system, GWR system, and GWTS at the site consist of numerous unit processes which, when operated together, provide effective recovery, treatment, and discharge of extracted groundwater generated from recovery wells at the site. The process flow diagram in Appendix B presents the process flow and the unit processes of the GWTS with accompanying process number designations. A piping and instrument diagram for the GWTS is provided in Appendix C.

The ISVS system consists of the extraction wells, valves, treatment equipment, and associated piping. Equipment items and relevant data for the ISVS system are summarized in Table 3-1. Equipment items and relevant data for the GWR system and GWTS are presented in Table 3-2. Design drawings and/or vendor manuals may be referenced for additional detail regarding equipment listed on Tables 3-1 and 3-2.

TABLE 3-1

SUMMARY OF MAJOR EQUIPMENT FOR THE ISVS SYSTEM^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Item	Location	Manufacturer	Contact	Model No.	Reference Information
ISVS System:					
Vacuum gauge	Wells	Dwyer	--b	Series 2000 Magnehelic	Attachment I, Section 004
Temperature gauge	Wells	Trend Instruments	--	No. 32040	Attachment I, Section 009
Ball valve	Wells	Chemtrol	(800) 343-5455 (502) 775-6431	29601805A-A	
Flow sensor	Wells	Dwyer	--	Series DS-300	Attachment I, Section 003
Sensor gauge	Wells	Dwyer	--	Series 2000 Magnehelic	Attachment I, Section 004
Vacuum gauge	Toe header	Dwyer	--	Series 2000 Magnehelic	Attachment I, Section 004
Ball valves	Toe header	Chemtrol	Same as above	True Union	
Expansion joints	Recovery piping	Plastics Engineered Products	--	4" Flanged	Attachment I, Section 008
Temperature sensors	Temperature probes	Delmar Controls	--	385 Alpha, 100 Ohm, Platnum	
RTD cable	Temperature probe	Cooper	--	Belden 8791	

ORIGINAL
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TABLE 3-1 (Continued)

**SUMMARY OF MAJOR EQUIPMENT FOR THE ISVS SYSTEM^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Location	Manufacturer	Contact	Model No.	Reference Information
Condensate tank	ISVS	Fliteway Air Products	Mr. Bill Dehl Fliteway Air Products 7233 N. 51 Blvd. Milwaukee, WI 53223 (800) 236-3580	N/A	
Level switches	Condensate Tank	W. E. Anderson	--	Flotect Model L-6	Attachment I, Section 012
Condensate pump	ISVS	Gould	Mr. Harvey Willard J. H. Process Equipment 2 Davis Avenue Frazer, PA 19335 (610) 695-0900	NPE 1ST2C4A	Attachment I, Section 010
Vapor extraction/ treatment unit	ISVS	ThermTech, Inc.	Mr. Brian Smith ThermTech, Inc. 8080 Russell Palmer Road Kingwood, TX 77339 (800) 659-8271	VAC 25CL	Attachment I, Section 001

^aEquipment list information provided by Dames & Moore

^bContact for this piece of equipment was not provided by Dames & Moore.

TABLE 3-2

**SUMMARY OF EQUIPMENT FOR THE GWR AND GWTS^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Location	Manufacturer	Contact	Model No.	Reference Information
GWR Well Pumps	IPE-1 & IPE-2	Grundfos Pumps Corp.	800-333-1366	10S03-6 (1/2 hp motor)	Attachment II, Section 011
Bronze Globe Valves	IPE-1, IPE-2, AS-1, & T-3	Stockham	800-786-2542	Class 150 Bronze Globe Valves	Attachment II, Section 012
Swing Check Valve	IPE-1 & IPE-2	Stockham	same as above	Class 125 Bronze Swing Check	Attachment II, Section 012
GWR Well Level Switches	IPE-1 & IPE-2	MagneTek	B/W Controls 1080 N. Crooks Road Clawson, MI 48017 (313) 435-0700	6013-W6	Attachment II, Section 013
Equalization Tank (T-1)	N/A	Viatec, Inc.	Mr. Thomas Aglira Data Design Services 561 Exton Commons Exton, PA 19341 (610) 524-6357	CVF-120-6628-S	Attachment II, Section 001
Mixer M-1	T-1	Brawn Mixer, Inc.	Mark Umile R. J. Schmidt Co. 2330 Yellow Springs Road Malvern, PA 19355 (610) 647-7935	BGM100-LP	Attachment II, Section 002
Mixer M-2	T-2	Brawn Mixer, Inc.	same as above	SD33	Attachment II, Section 002

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TABLE 3-2 (Continued)

**SUMMARY OF EQUIPMENT FOR THE GWR AND GWTS^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Location	Manufacturer	Contact	Model No.	Reference Information
Permanganate tank (T-2)	N/A	Viatec, Inc.	same as above	OVF-30-146-S	Attachment II, Section 001
Permanganate Metering pumps (P-3/P-4)	Permanganate Tank	Pulsafeeder	Ms. Evelyn Brimble RW Fox Company Newton Square, PA 19073	Series Eplus	Attachment II, Section 008
Ball valve	T-1	Chemtrol	(800) 343-5455 (502) 775-6431	True Union	Attachment III, Section 006
Flow element • Flow sensor • Flow transmitter	Influent line	Signet	Allen Delmar Controls 700 Cornell Drive, Suite 18 Wilmington, DE 19801 (302) 651-9533	515/3-8510 8510	Attachment III, Section 009
Level switches (2)	T-1	Magnetrol	--b	B15-1E2A-BEB	Attachment II, Section 003
Level switch	T-2	Magnetrol	--	B15-1E2A-BEB	Attachment II, Section 003
Filter pumps (P-1/P-2)	T-1 effluent	Ingersoll- Dresser	Mr. Jim Quinn Glauber Equipment 3940 Broadway Buffalo, NY 14227 (800) 879-4320	D-814 2x1x10	Attachment II, Section 007

TABLE 3-2 (Continued)

**SUMMARY OF EQUIPMENT FOR THE GWR AND GWTS^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Location	Manufacturer	Contact	Model No.	Reference Information
Pressure filters (F-1/F-2)	N/A	Anderson Water Systems	Mr. Peter Midgley Anderson Water Systems 44 Head Street St. Dundas, Ont. Canada L9H 3H3 (905) 627-9233	None	Attachment II, Section 005
Filter controls		Anderson Water Systems	same as above	SB-144TA-48	Attachment II, Section 005
Flow element • Flow sensor • Flow transmitter	F-1/F-2 discharge	Signet	same as above	515/3-8510 8510	Attachment III, Section 009
Flow control valve	F-1/F-2 discharge	Jordan Valve	Mr. Gil Welsford F. S. Welsford Company Valley Creek Industrial Park 310 Commerce Drive Exton, PA 19341 (610) 524-9600	331/332 I & M	Attachment III, Section 003
Pressure indicators	P-1/P-2 influent/discharge	Ametek/US Guage	--	5333	Attachment III, Section 008
Ball valve	T-1 effluent	Chemtrol	same as above	True Union	Attachment III, Section 006
Ball check valve	P-1/P-2 discharge	Chemtrol	same as above	True Union	

TABLE 3-2 (Continued)

**SUMMARY OF EQUIPMENT FOR THE GWR AND GWTS^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Location	Manufacturer	Contact	Model No.	Reference Information
Air Stripper Package (AS-1)	N/A	Northeast Environmental	Ms. Christine Greene Northeast Environmental 17 Technology Drive West Labanon, NH 03784 (603) 298-7061	Shallow Tray 2631	Attachment II, Section 006
Effluent tank feed pumps (P-5/P-6)	Air stripper discharge	Ingersoll-Dresser	same as above	D-814, 2x1x10	Attachment II, Section 007
Effluent/backwash holding tank (T-3)	N/A	Viatec, Inc.	same as above	CVF-72-2026-S	Attachment II, Section 001
Effluent pumps (P-7/P-8)	T-3 discharge	Ingersoll-Dresser	same as above	D-814, 2x1x10	Attachment II, Section 007
Auto sampler (S-1)	T-3	ISCO, Inc.	ISCO 531 Westgate Blvd. Lincoln, NE 68528 (800) 228-4373	3700	Attachment III, Section 002
Backwash pumps (P-9/P-10)		Ingersoll-Dresser	same as above	D-814, 3x2x8	Attachment II, Section 007
Ball valves		Chemtrol	same as above	True Union	Attachment III, Section 006
Ball check valve	P-5/P-6, P-7/P-8, P-9/P-10 discharge	Chemtrol	same as above	True Union	Attachment III, Section 006

TABLE 3-2 (Continued)

**SUMMARY OF EQUIPMENT FOR THE GWR AND GWTS^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Location	Manufacturer	Contact	Model No.	Reference Information
Pressure indicators	P-5/P-6, P-7/P-8, P-9/P-10 influent and effluent	Ametek/US Gauge	--	5333	Attachment III, Section 008
pH probe transmitter	T-3	Signet	same as above	8710	Attachment III, Section 010
pH electrode	T-3	Signet	same as above	3-2716	Attachment III, Section 010
pH pre-amplifier	T-3	Signet	same as above	2720	Attachment III, Section 010
Conductivity transmitter	T-3	Great Lakes Instruments	Great Lakes Instruments 9020 W Dean Road Milwaukee, WI 53224 (414) 355-3601	672E3F1CON	Attachment III, Section 012
Conductivity Sensor	T-3	Great Lakes Instruments	same as above	3625E2T	Attachment III, Section 012
Level switches	T-3	Magnetrol	--	C15-1E2A-OEB A15-1E2A-BDQ	Attachment II, Section 003
Flow element • Flow sensor • Flow transmitter	Discharge	Signet	same as above	515/3-8510 8510	Attachment III, Section 009
Sludge holding tank (T-4)	N/A	Viatec, Inc.	same as above	CV9C-96-2914-S	Attachment II, Section 001

TABLE 3-2 (Continued)

**SUMMARY OF EQUIPMENT FOR THE GWR AND GWTS^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Location	Manufacturer	Contact	Model No.	Reference Information
Filter Press Package (FP-1)	N/A	D. R. Sperry & Co.	Ms. Elizabeth Clark D. R. Sperry & Co. 112 N. Grant St. North Aurora, IL 60542 (708) 892-4361	Filter - HCP III Air Compressor - Dayton 4B250 Pump - Wilden M-8	Attachment III, Section 001
Filtrate Tank (T-5)	N/A	Viatec, Inc.	same as above	CVF-96-1843-S	Attachment II, Section 001
Equalization tank return pumps (P-12/P-13)	T-5 discharge	Ingersol-Dresser	same as above	D-814, 2x1x6	Attachment II, Section 007
Ball valve		Chemtrol	same as above	True Union	Attachment III, Section 006
Ball check valve	P-11, P-12/P-13 discharge	Chemtrol	same as above	True Union	
Pressure indicators	P-5/P-6 influent and discharge	Ametek/US Guage	--	5333	Attachment III, Section 008
Sludge level indicator	T-4	EIT	--	5570	Attachment II, Section 010
Level switches	T-4	Magnetrol	--	B15-1E2A-BEB	Attachment II, Section 003
Solenoid valve (timed)	T-4	Asco, Inc.	--	8210/8211	Attachment III, Section 004
Level switches	T-5	Magnetrol	--	C15-1E2A-OEB	Attachment II, Section 003
Pressure indicators	P-12/P-13 influent and effluent	Ametek/US Guage	--	5333	Attachment III, Section 008

TABLE 3-2 (Continued)

SUMMARY OF EQUIPMENT FOR THE GWR AND GWTS^a
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Item	Location	Manufacturer	Contact	Model No.	Reference Information
Sump pumps (SP-1/SP-2)	Floor sump	ABS, Inc.	McMaster-Carr 473 Ridge Road Dayton, NJ 08810 (908) 329-3200	SJS-10WA2	Attachment II, Section 009
Tank vents	T-1, T-3, T-4, T-5	Protectoseal	--	18540	Attachment II, Section 004

^aEquipment list information provided by Dames & Moore

^bContact for this piece of equipment was not provided by Dames & Moore.

4.0 GWTS OPERATING AND MAINTENANCE PROCEDURES

General descriptions for the GWR system and GWTS are presented in Section 2.2 of this manual. This section describes the process operation and control for the unit processes described in Section 2.2. Alternate process operating procedures for the GWTS are also described in this section. The operating and control logic for the GWTS described herein is depicted graphically on the piping and instrumentation diagram (P&ID) included in Appendix C.

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4.1 GROUNDWATER RECOVERY SYSTEM

4.1.1 Normal Operation

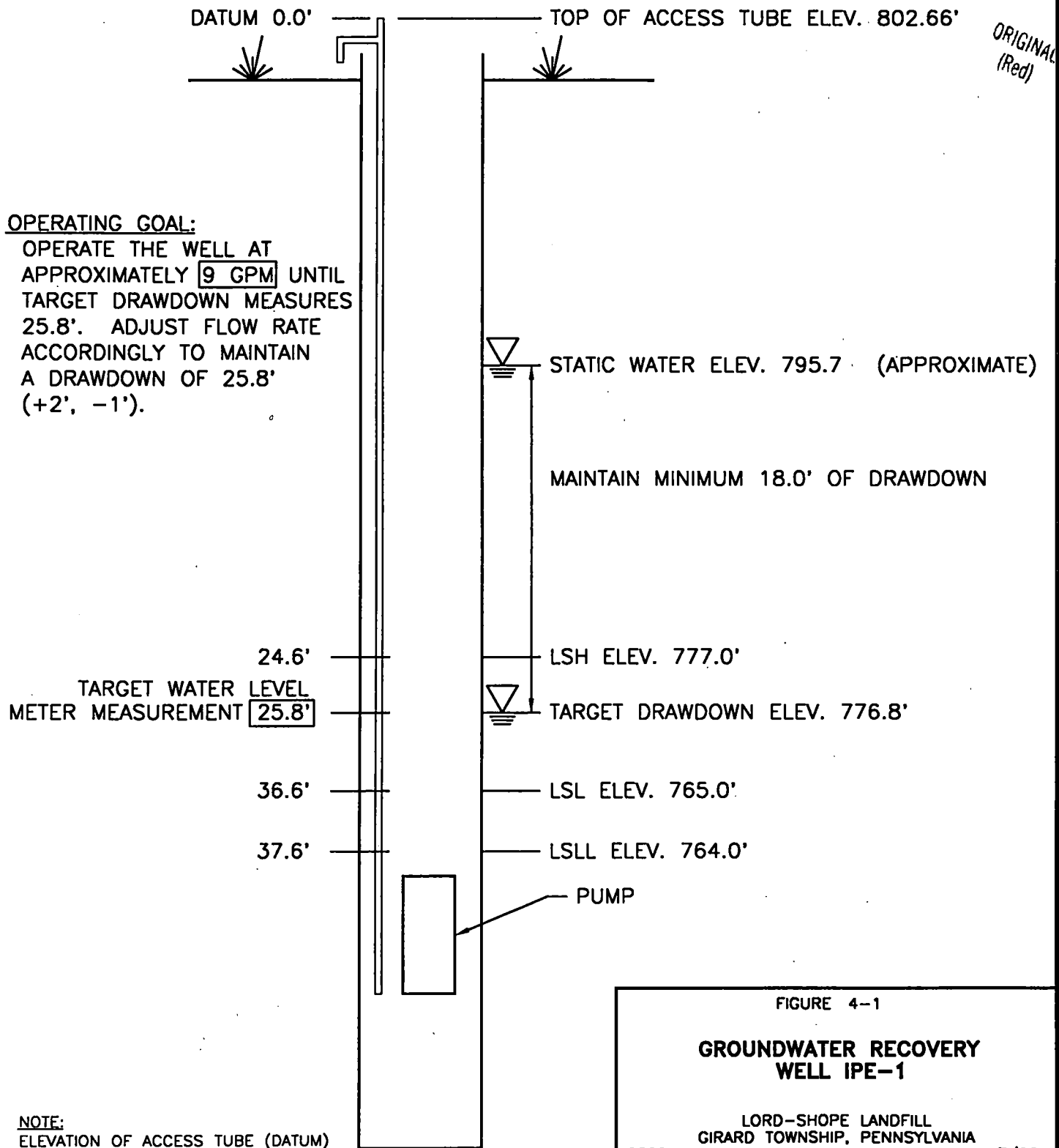
The GWR system is configured to operate automatically based on the level controls installed in each recovery well. Operation of the of the system will require periodic adjustments to the pumping rates for each well. Pumping rates for each well shall be adjusted to match the pumping capacity of the well and thus supply the GWTS with a constant volume of influent. Pumping rates will be adjusted using the throttling valves located at each well.

Figure 4-1 and Figure 4-2 graphically depict GWR wells IPE-1 and IPE-2, respectively. Included on each figure is the elevation of the GWR pump, control switches, and target draw down level. In addition, target pumping rates for IPE-1 and IPE-2 are also included on these figures. This information was based on observations collected during the initial pump test of these wells.

As part of the operator's weekly responsibilities, total gallons pumped, flow rate, water level, and discharge pressure for IPE-1 and IPE-2 shall be recorded on the Weekly Inspection Checklist. This information will be necessary to assess the performance of the GWR system as well as determine if adjustments are required.

Total gallons pumped can be read from the flow meter/totalizer located on the aboveground portion of the GWR forcemain. Discharge pressure can be recorded from the pressure indicator located near the wellhead connection. Water levels and flow rates can be determined as described below.

GROUNDWATER RECOVERY WELL IPE-1



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FIGURE 4-1

GROUNDWATER RECOVERY WELL IPE-1

LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

9809

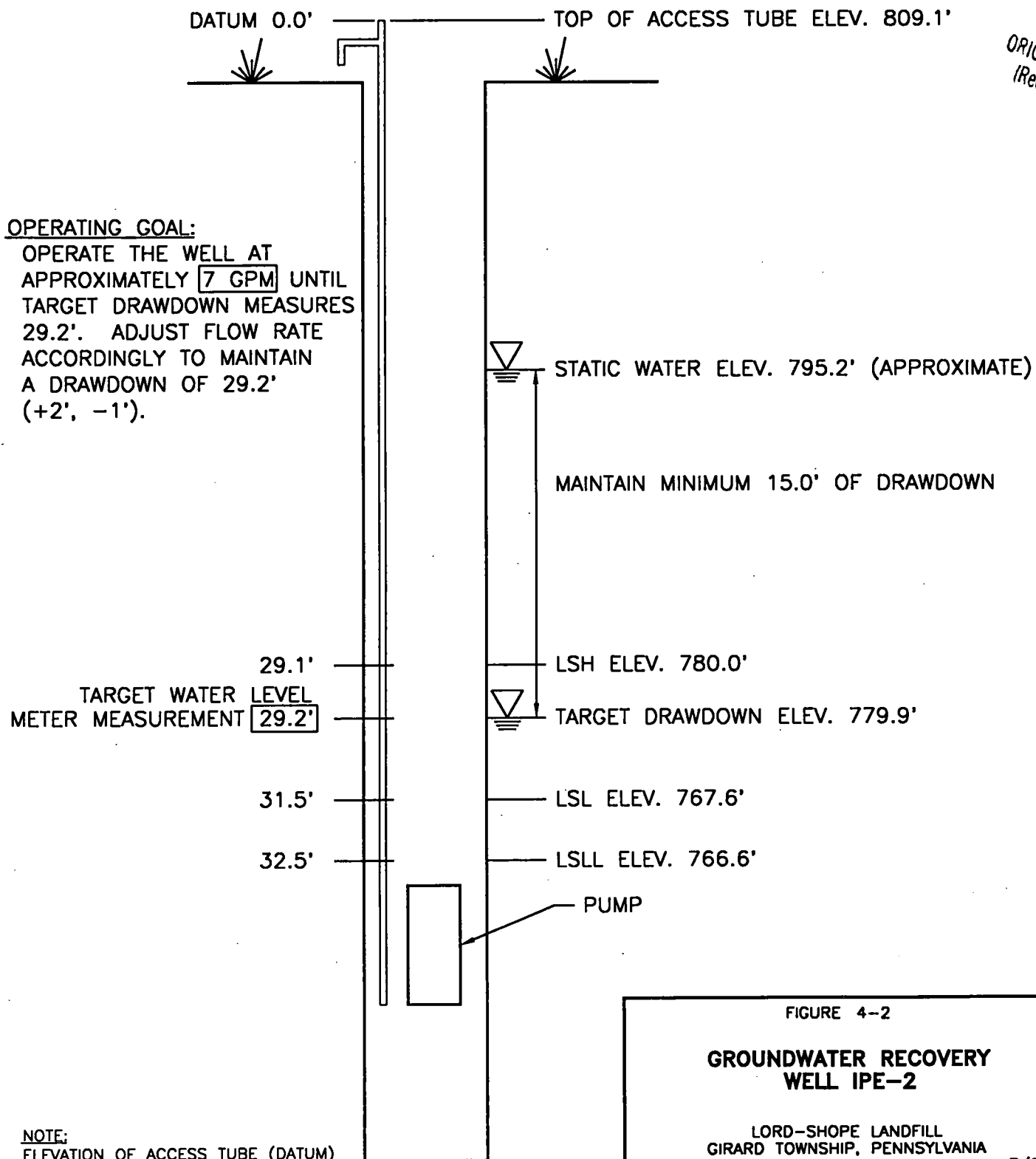
7/96

NOTE:
ELEVATION OF ACCESS TUBE (DATUM)
IS APPROXIMATE. ELEVATION TO BE
CORRECTED WHEN ACCESS TUBE IS
RESURVEYED.



Nashville, Tennessee
Mahwah, New Jersey
Greenville, South Carolina

GROUNDWATER RECOVERY WELL IPE-2



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FIGURE 4-2

GROUNDWATER RECOVERY WELL IPE-2

LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

9809

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NOTE:
ELEVATION OF ACCESS TUBE (DATUM)
IS APPROXIMATE. ELEVATION TO BE
CORRECTED WHEN ACCESS TUBE IS
RESURVEYED.



Nashville, Tennessee
Mahwah, New Jersey
Greenville, South Carolina

Follow the instructions outlined below for checking the water level in the GWR wells.

1. Open the well access tube located at the top of the well casing. This tube is a 3/4 inch PVC pipe with a threaded metal cap.
2. Carefully insert the water level meter probe into the access tube and slowly lower the probe into the well.
3. Lower the water level meter probe until the alarm on the water level meter is annunciated. Take an initial reading of the water level meter tape measure using the top of the access tube as a reference.
4. Raise the water level meter probe until the alarm deactivates and then slowly lower the probe again.
5. Repeat step 4 until the water level in the well is determined.
6. Record the water level reading in the appropriate box on the Weekly Inspection Checklist. A copy of this checklist is included in Appendix J.

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As discussed above, target water levels for each recovery well are provided on Figures 4-1 and 4-2. Weekly adjustments to the flow rate for each well may be necessary based on the water levels collected. In general, if the water level in the well is higher than expected (i.e., water level measurement less than target value), the flow rate for the GWR pump should be increased slightly. If the water level in the well is lower than expected (i.e., water level measurement greater than target level), then the flow rate for the GWR pump should be decreased. This is a general procedure to follow and it may be necessary for the operator to discuss potential operating changes to the system with the project manager prior to implementation.

If adjustments to the pumping rates are required, the operator shall implement these adjustments as follows:

1. Open the protective cover to the flow meter/totalizer located on the aboveground portion of the GWR forcemain.

2. Using a stopwatch or other time piece, count the number of gallons pumped in one minute. Note that the flow meter/totalizer is calibrated such that one full revolution of the dial equates to 10 gallons pumped. Record this initial flow rate on the Weekly Inspection Checklist.
3. Compare the flow rate determined in Step 2 with the appropriate target flow rate for that well (i.e., IPE-1 = 9 gpm; IPE-2 = 7 gpm).
4. Adjust the flow rate accordingly (i.e., increase or decrease) using the globe valves provided on the aboveground portion of the GWR forcemain. Note that these valves only need a slight adjustment to achieve significant changes in the flow rate. In addition, both valves should be adjusted such that the settings (percent open) for each valve are reasonably similar.
5. Repeat Step 2.
6. Repeat Step 3.
7. If necessary repeat Step 4 and continue to repeat steps 2, 3, and 4 until the desired flow rate is achieved.

Once the changes in flow rate have been completed, record the adjusted flow rate next to the initial flow rate on the Weekly Inspection Checklist (e.g., 9 gpm / 10 gpm).

NOTE: Once adjustments to the GWR wells have been completed, the operator should verify the total flow rate by checking the flow indicator located on the groundwater influent (GWI) line in the treatment building or on the PC control system by accessing the PROCESS or GW-WELLS screen display. The total flow rate should compare to the sum of the flow rates for IPE-1 and IPE-2.

4.1.2 Controls

A three level conductive level switch is provided in each GWR well. Level switches are configured as follows:

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- LSL activates an alarm on the PC control system to alert the operator to a low water level condition in the well. A low water level in the well may be the result of a failure in a piece of well equipment or the well running dry as a result of clogging or over pumping the aquifer.
- LSL deactivates the submersible well pump
- LSH activates the submersible well pump

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A flow meter/totalizer, two globe valves, an air release valve, and a swing check valve are installed aboveground at each GWR well location. A below grade valve box is also located at each GWR well location. The valve box contains a valve and drain line to allow the GWR header to be drained back into each well.

The GWR well pumps are monitored and controlled by the PC control system. The GW-WELLS display screen provides a graphical representation of the GWR system. This screen displays the total influent flow rate from the GWR system and identifies which pumps are operating (green colored dot in the center for pump on; red colored dot for pump off). Pump operation is controlled at the motor control center located in the electrical equipment room.

4.1.3 Alternate Operation

In the event that pumping rates exceed the pumping capacity of a GWR well, cycling of GWR pump will occur. The level switches located in each well will allow the system to automatically operate in this alternate mode. Pumping rates shall be adjusted to optimize (minimize the number of cycles) the cycle time for each submersible pump. Operating the GWR system in this mode (which may result in flows of less than 25 gpm) may require adjustments to the GWTS. See applicable sections in Section 4.0 for instructions on operating the GWTS on a variable volume basis.

If the GWR system is deactivated as a result of a power loss during below freezing weather conditions, the aboveground portions of GWR system piping shall be drained immediately upon notification of the power failure. Operator intervention

will be required to manually drain the aboveground piping at each GWR well location. Drain valves are accessible through valve boxes located near each GWR well. The drain valves shall be opened and allowed to drain back to the GWR well. Drain valves shall be returned to their normal operating position once draining is complete.

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4.2 EQUALIZATION TANK (T-1) AND FILTER FEED PUMPS (P-1, AND P-2)

4.2.1 Normal Operation

Oxidation of dissolved iron in the groundwater is performed in the constant volume, baffled Equalization Tank (T-1). Potassium permanganate is fed to T-1 using chemical metering pumps (P-3 and P-4). Dose rates for the potassium permanganate solution are manually controlled based on influent flow rates and chemical composition of the groundwater. Dose rates are further discussed in Section 4.9. Tank T-1 is to be continuously mixed with the constant speed mixer (M-1) to provide dissolution of the potassium permanganate solution. The mixer will be manually deactivated should a low water condition develop in T-1.

The groundwater is pumped via line FF by the filter feed pumps (P-1 and P-2) from T-1 through one of the two granular media filters (F-1 and F-2) to the inlet of the air stripper (AS-1).

If the total influent flow rate from the GWR wells is less than 25 gpm on a continuous basis, the system shall be operated on a variable volume basis. Operating the system on a variable volume (as described in Section 2.2.2) basis requires the operator to make certain adjustments to the systems associated with T-1. The flow rate for P-1 and P-2 shall be adjusted to optimize the operating cycles for P-5 and P-6 and P-7 and P-8. The flow rate for P-1 and P-2 shall be adjusted using the flow control valve system as described in Section 4.2.2.

The feed rate for the chemical feed pumps, P-3 and P-4, may also require some adjustment based on the influent flow rate from the GWR system. Influent flow rates along with their corresponding chemical feed rates are included in Appendix E (Table E-2).

Section 4.2.3 describes procedures for operating the GWTS on a constant volume basis should the influent flow rate from the GWR wells exceed 25 gpm on a continuous basis.

Hand valves (HV) associated with this portion of the system include HV-01 through HV-06 as shown on the P&ID (Appendix C). See Table D-1 (Appendix D) for HV position schedule for normal operation of the system.

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4.2.2 Controls

The flow element (FE) provided on the groundwater influent (GWI) line to T-1 transmits the flow rate to a flow indicator (FI) and the PC control system. The flow indicator also provides a signal to the potassium permanganate feed system (P-3 and P-4). The chemical feed system operates only when an influent flow of greater than 1 gpm is detected. The PC control system records the flow rate and flow total at 5,000 gallon intervals.

Two (2), two level displacement switches are provided to control the water level in T-1. The switches are configured as follows:

- **Level Switch High High (LSHH)** activates an alarm located on both the PC control system and the CAAP to alert the operator of a high water level condition in T-1. LSHH temporarily disables the GWR well pumps, P-12 and P-13, the condensate tank pump, and the sump pumps in order to prevent liquid from being pumped to T-1 in the event of a high water level condition in T-1. LSHH also initiates a controlled shutdown of the ISVS system and activates a Group II alarm on the autodailer system. The GWTS system is capable of being reset remotely via the system modem. Once LSHH is cleared, the operator can enter the appropriate code (i.e., "1") in the circle located on the graphics portion of the PROCESS screen display to reset the influent systems to T-1. The ISVS system however, will require operator intervention to restart the thermal oxidizer (see Section 11.1 for ISVS startup procedures)..

- **Level Switch High (LSH)** activates P-1 and P-2. LSH also activates the air stripper blower.
- **Level Switch Low (LSL)** serves as an early warning system by activating an alarm on the PC control system to alert the operator that the water level in T-1 is decreasing below the target operating level in the tank. Monitoring this early warning system is only necessary when the T-1 is operating on a constant volume basis.
- **Level Switch Low Low (LSLL)** deactivates P-1 and P-2 and activates an alarm on the PC control system to alert the operator of a low water level condition in T-1. Once P-1 and P-2 are deactivated, the intrinsic controls included in the packaged air stripper system will enable the blower to operate an additional five minutes before deactivating to allow proper treatment of the groundwater remaining in the aeration trays.

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The mixer included with T-1 can be activated/deactivated by a control switch (2G) located at the motor control center. Operator intervention is required to deactivate the mixer in the event of a low water level condition in T-1. The mixer shall be manually deactivated if the GWTS is stopped.

A direct reading pressure indicator located on the discharge side of P-1 and P-2 is provided to monitor the performance of these pumps.

A flow element (FE) and flow control valve (FCV) located on the discharge side of the pressure filters is provided to regulate the flow from T-1 to the inlet of the air stripper as the pressure losses across the on-line pressure filter changes. Flow control for this system can be set through the PC control system. Under normal operation, the FCV should be set to a flow rate greater than the influent flow rate from the GWR system (47 gpm maximum) while maximizing the operating cycles of the primary process pumps. The FCV can be adjusted by accessing the PROCESS screen display on the PC control system. The flow rate adjustment input value is based on a percentage of the maximum output of P-1 or P-2 (i.e., 51 gpm). To adjust the flow rate, enter the desired input value in the box located on the PROCESS screen display. Flow rates and associated input values are provided in Table E-1 of Appendix E. Instructions for accessing screen displays and changing operating

parameters for the PC control system are included in Volume 1 of the Water Treatment Systems Operations manual.

4.2.3. Alternate Operation

Tank T-1 is also designed to operate on a constant volume basis when the influent flow rate from the GWR wells is greater than 25 gpm. The filter feed pumps (P-1 and P-2) shall be adjusted so that the effluent flow from T-1 generally corresponds with the influent flow from the GWR well header. Balancing the effluent flow rates on this portion of the GWTS shall be accomplished by programming the flow control valve located in the discharge side of F-1 and F-2 to match the influent flow rate from line GWI.

NOTE: The GWTS should never be configured to operate at a flow rate less than the influent flow rate from the GWR system. When operating on a constant volume basis, the operator should configure the GWTS to operate at a flow rate slightly greater than the influent flow rate to prevent the GWTS from flooding.

4.3 PACKAGED GRANULAR MEDIA FILTER SYSTEM (F-1 AND F-2)

4.3.1 Normal Operation

Normal operation of the granular media filter system is normally monitored and controlled by the PC control system. One filter shall operate on-line while the second filter is backwashing or in a standby mode. When a pressure differential of 10 pounds per square inch (psig) is detected by the PC control system, the on-line filter will be taken off line, the second filter will be placed into service, and the previously operating filter will be backwashed. This changeover is performed automatically using electrically actuated valves controlled by the PC control system. Filter changeover and backwash initiation can be initiated either by manual control or automatically when the differential pressure across the operating filter reaches the preset value of 10 psig. Additional information regarding the normal operation of the granular media filter system is provided in Section 005 of Attachment II.

Under normal operating conditions, a backwashing event should occur once every seven (7) days. If a full backwash cycle has not occurred in seven days, the operator shall initiate a backwash cycle manually as described in Section 4.3.2. A normal backwash cycle shall be performed using a volume of 1,500 gallons of water at a flow rate of 180 gpm (approximately 8 minutes).

NOTE: Backwash duration can be user defined and input at the PC control system station located at the site. Backwash duration shall not exceed 8 minutes. Durations longer than 8 minutes will activate the LSH in tank T-4 and deactivate the GWTS.

Hand valves (HV) associated with this portion of the system include HV-007 through HV-011 and include several internal valves. See Table D-1 for HV position schedule for normal operation of the system.

4.3.2 Controls

The packaged pressure filter system includes the necessary controls for automatic and manual monitoring of operations. The packaged filter system operating in conjunction with the PC control system is programmed to allow for backwash cycles to be initiated automatically by pressure differential or manually by operator intervention. The PC control system will automatically activate the electrically actuated valves required to switch filtering modes (i.e., on line, backwash, and standby). When a backwash cycle is initiated, the PC control system will activate P-9 and P-10 and continue operation of these pumps for a specified time interval.

Control of the granular media filter system can be accessed through the BACKWASH screen display located on the PC control system. Backwash cycle duration, manual initiation, differential pressure setting, and backwash disabling can all be accessed and adjusted on this screen display.

NOTE: Normal Operation Settings for the granular media filter system shall be as follows:

Operator B/W Pres. Set 10 dpsi
Operator B/S Time Set 8 min
Filter Select - Auto
Backwash Disable - Normal
Backwash Select - Auto

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See Volume 1 of the Water Treatment System operations manual for instructions for accessing screen displays.

4.3.3 Alternate Operation

Follow the procedures described under normal operation (Section 4.3.1) for operating the granular media filter system on a constant volume basis. The flow through the system should be set to optimize pump cycle times.

The two filters supplied with the GWTS will operate with only one filter on line at any given time. This allows backwashing and maintenance of a filter without disrupting the treatment system process flow. However, in the event of equipment failure by both filters, a bypass line (FB) is provided to allow the flow to be diverted around the filters to T-3. Bypassing the filter system should only be performed during maintenance operations when transferring water through the system is required. The valves required for this operation are HV-008, HV-009, and HV-010 are identified on the GWTS P&ID (Appendix C). Valve positions for bypassing the granular media filter system are presented in Table D-2 of Appendix D.

CAUTION: Long-term bypass of the granular media filter system is not recommended. Fouling or other damage to downstream systems including the air stripper may occur as a result of operating the filter bypass line. Discharge of untreated groundwater shall not be allowed and bypass water should be returned to T-1 for treatment prior to discharge.

Accessing the BACKWASH screen display can enable the operator to reconfigure the granular media filter system to operate in an alternate mode. The PC control system can be configured to disable the operation of one filter, if required. The

system can also be configured to manually initiate a backwash cycle or temporarily disable the backwash function. See Volume 1 of the Water Treatment System Operations manual for instructions for accessing and altering system configurations.

4.4 PACKAGED AIR STRIPPER SYSTEM (AS-1)

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4.4.1 Normal Operation

As described in Section 2.2, the packaged air stripper system includes the air stripper (AS-1), two effluent transfer pumps (P-5 and P-6), and a blower (B-1). Effluent from the on-line granular media filter (F-1 or F-2) flows under pressure via line ASF to the inlet of AS-1. The untreated groundwater will flow across the three aeration trays and then collect in a reservoir at the bottom of the air stripper. Pumps P-5 and P-6 are used to transfer the treated groundwater collected in the air stripper reservoir via line ETF to the effluent/backwash holding tank (T-3). Under normal operating conditions, the globe valve (HV-20) on the discharge side of P-5 and P-6 shall be adjusted so that the cycle times meet manufacturer's recommendations and the flow rate does not exceed an average of 47 gpm. The flow rate can be adjusted by monitoring pump cycle times and the water levels in the air stripper reservoir and T-3. The flow rate for P-5 and P-6 shall be adjusted so that the high water alarms in the air stripper and T-3 are not activated. Recommended operating durations (on cycle) for P-5 and P-6 are in the range of 10 to 15 minutes.

The blower used to introduce air flow at the bottom of the air stripping tower shall be adjusted to provide a flow rate of 600 cubic feet per minute (cfm). This corresponds to a pressure reading of 11 inches water column (w.c) in the air stripping chamber and a flow reading of 0.3 inches w.c. in the air stripper stack. Reference Section 3.0 of the air stripper manufacturer's O&M manual (Attachment II, Section 006) for procedures on adjusting air flow.

Under normal operation, the air stripper blower will operate based on operation of P-1 or P-2. Controls intrinsic to the air stripper as well as the PC control system will enable the blower to activate and deactivate corresponding to the operation of P-1 and P-2. Additional information regarding operating controls for the blower are described in Section 4.4.2.

The valves associated with operating AS-1 are HV-15 through HV-20 as shown on the GWTS P&ID (Appendix C). Valve positions for normal operation of AS-1 are presented in Table D-1.

4.4.2 Controls

Three level controls are provided to control water levels in the air stripper reservoir. The functions described as LSL and LSH are accomplished by a single switch located in the air stripper reservoir. The level controls are configured as follows:

- LSL deactivates P-5 and P-6.
- LSH activates P-5 or P-6.
- LSHH activates an alarm on the PC control system and calls out the alarm on the CAAP to alert the operator of a high water level condition in the air stripper reservoir. This monitoring point, when activated, deactivates the GWTS and initiates a Group II (Groundwater Process Stoppage) alarm on the autodialer system. Operator intervention will be required to restart the GWTS if LSHH is activated (see Section 11.2 for start-up procedures for the GWTS).

The air stripper blower is configured to operate based on the operation of pump P-1 or P-2. When LSH in T-1 activates P-1 or P-2, the intrinsic control system installed with the packaged air stripper will delay engaging the low air pressure switch circuit for five seconds to enable the air stripper blower to come up to speed. Once this five second delay has passed, the low air pressure switch circuit will engage and will operate as described below. When P-1 or P-2 reach the end of their operating cycle and are deactivated, the intrinsic controls within the air stripper will continue to operate the blower for an additional five minutes before deactivating to treat the groundwater remaining in the aeration trays.

AS-1 also includes an air pressure switch that will automatically deactivate P-1 and P-2 in the event a low air pressure in the stripper is detected. Operator intervention is required to reset the air stripper interlocks and restart the system in

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the event the low pressure switch is activated (see Section 11.2 for information on restarting the GWTS).

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The direct reading pressure indicator located on the discharge side of P-5 and P-6 is provided to monitor the performance of these pumps.

A globe valve is provided on the discharge side of P-5 and P-6 to adjust the flow rate for these pumps. In general, the globe valve should be adjusted such that each pump operates no more than six times per hour.

NOTE: Discharge flow rate for P-5 and P-6 shall not exceed an average flow rate of 47 gpm.
--

4.4.3 Alternate Operation

Follow the procedures described under normal operation (Section 4.4.1) for operating the air stripping system on a constant volume basis. Flow rates for the system shall be set to optimize pump cycle times.

In the event that AS-1 has to be taken off-line for a short period of time (i.e. less than 1 hour), a bypass line (ASB) exists to allow water flow to be diverted around AS-1 back to T-1. The valves required for this operation are hand actuated and valve positions for bypassing the air stripper are presented in Table D-2. In the event that the air stripper has to be deactivated for more than one hour, the entire GWTS should be deactivated (see Section 11.2 for system shut down and restart procedures).

Hand valves (HV) associated with bypassing the air stripper system include HV-11 and HV-12 as shown on the GWTS P&ID (Appendix C). See Table D-1 for HV position schedule for normal operation of the system.

4.5 EFFLUENT/BACKWASH HOLDING TANK (T-3), FILTER BACKWASH PUMPS (P-9 AND P-10), AND EFFLUENT DISCHARGE PUMPS (P-7 AND P-8)

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4.5.1 Normal Operation

The Effluent/Backwash Holding Tank (T-3) is designed to provide capacity for effluent monitoring and storage of backwash water. Under normal operation, T-3 will generally function in a constant volume mode except when supplying backwash water. Effluent monitoring will be performed as described in Section 10.0 using the automatic sampler installed adjacent to T-3 (see Section 002 of Attachment III for instructions on operating the automatic sampler). Pumps P-7 and P-8 discharge treated effluent from T-3 to the existing subsurface force main (line WE) that discharges to the unnamed tributary of Elk Creek located west of the site. The discharge flow rate under normal operating conditions shall be adjusted to optimize the pump cycle times for P-7 and P-8.

NOTE: The maximum discharge flow rate specified in the NPDES permit is 47.4 gpm. Under no condition shall the discharge flow rate of P-7 and P-8 exceed 47.4 gpm.

Valves associated with the normal operation for discharging treated effluent from T-3 include HV-21 through HV-27 and positions for normal operation are specified in Table D-1. Locations for these valves are shown on the GWTS P&ID included in Appendix C.

Backwashing of the granular media filters is accomplished with water from T-3 using the filter backwash pumps (P-9 and P-10). The backwash flow rate for the granular medial filters shall be 180 gpm. The mechanical flow control valve (MCV) located on the discharge side of P-9 and P-10 is factory set to control the flow rate automatically.

The dirty backwash water from the granular media filters is directed via line DBW to the Solids Holding Tank (T-4) under normal operating conditions. Valves associated with backwash operations include HV-28 through HV-35 and include

several internal valves associated with the granular media filters as shown on the GWTS P&ID (Appendix C). Valve positions for normal backwash operations are identified in Table D-1.

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4.5.2 Controls

One, three (3) level displacement switch and one single level displacement switch are provided to control water level in T-3. Level switches are configured as follows:

- **LSLL** terminates the backwash cycle by deactivating P-9 and P-10 in the event the volume of water is not large enough for a full backwash cycle or the backwash cycle duration is set too long. Normally, pumps P-9 and P-10 are activated and deactivated automatically when the PC control system initiates a backwash cycle. **LSLL** also signals an alarm on the PC control system to alert the operator of an incomplete backwash cycle.

NOTE: Normal backwash cycle duration should be set so that **LSLL** is not activated during a full backwash cycle. The PC control system is designed to deactivate a backwash cycle when the set time interval expires. In the event T-3 does not contain 1,500 gallons of water at the start of the backwash cycle, the cycle will attempt to run beyond the lower limit in T-3 and activate **LSLL**. This will then signal an alarm on the PC control system to notify the operator of an incomplete backwash cycle. See Section 4.3.2 for instructions on setting backwash control parameters.

- **LSL** deactivates P-7 and P-8 and terminates the discharge of treated effluent.
- **LSH** activates P-7 or P-8.
- **LSHH** signals an alarm on the PC control system and CAAP. This monitoring point, when activated, deactivates the GWTS and initiates a Group II (Groundwater Process Stoppage) alarm on the autodialer system. Operator intervention will be required to restart the GWTS if **LSHH** is activated. See Section 11.2 for restarting procedures for the GWTS.

A vertical section of pipe (standpipe) is installed in T-3 and connected to the suction side of P-7 and P-8. The standpipe located in T-3 (suction side of P-7 and P-8) along with LSL are set at an elevation that provides an adequate volume for one backwash cycle (approximately 1,500 gallons).

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A pH sensor and conductivity sensor are installed below the low water level in T-3. These two instruments are used as monitoring devices to measure pH and conductivity levels in the treated effluent prior to discharge. This information is displayed on the pH analyzer and conductivity analyzer located on the control panel adjacent to T-3. In addition, the pH-COND screen display charts the pH and conductivity on a continuous basis. This screen display can be accessed using the PC located at the site. The PC control system also records these parameters hourly on the data acquisition system. Specific operating and programming instructions for the pH sensor/analyzer and conductivity sensor/analyzer are included in Section 010 and Section 012 respectively (Attachment III).

The flow element (FE) located on the WE line transmits a signal to a flow indicator (FI) and the PC control system. The PC control system records the flow rate and for total every 5,000 gallons.

A direct reading pressure indicator located on the discharge side of P-9 and P-10 is provided to monitor performance of these pumps. A backwash flow indicator provided with the packaged granular media filter system is provided to assist with monitoring the flow during backwash cycles. As previously stated, the mechanical flow control valve (MCV) is designed to control the flow rate at 180 gpm as the pressure in the filter being backwashed changes.

4.5.3 Alternate Operation

In the event T-3 requires maintenance, the GWTS should be deactivated until maintenance activities are completed. If T-3 needs to be drained for maintenance purposes, manual operation of P-9 and P-10 can be performed in order to transfer water from T-3 to the filtrate tank (T-5). A backwash bypass line (BWD) is included in the system to bypass the pressure filters and convey water from T-3 to T-5. Tank

T-5 is sized to store approximately 1,500 gallons. Prior to draining T-3 to T-5, the operator must pump any existing water stored in T-5 to T-1.

A bypass line is also provided to enable dirty backwash water to be directed to T-1 instead of T-4. This will enable the operator to recirculate water from T-3 back through the treatment process. This operation will be performed if solids filtered from the treatment process are not large enough to provide adequate settling in T-4. This alternate operation will be evaluated during full-scale operation of the GWTS.

Valves associated with draining T-3 include HV-28 through HV-34. Valves associated with directing dirty backwash water to T-1 include HV-28 through HV-36. Valve positions for performing alternate operations as described above are identified in Table D-2. Valve locations are shown on the GWTS P&ID included in Appendix C.

4.6 SOLIDS HOLDING TANK (T-4)

4.6.1 Normal Operation

Backwash water from the granular media filters is conveyed via line DBW to the Solids Holding Tank (T-4) under normal operations. The dirty backwash water collected in T-4 will be allowed to settle between backwashing events. Settling times will be determined during the first year of operation. Tank T-4 is sized to store a volume of backwash water from one backwash cycle (approximately 1,500 gallons) plus a volume for accumulated solids for seven days of operation. A supernatant draw-off port located on the side of T-4 is provided to automatically transfer clarified backwash water to the Filtrate Tank (T-5) by opening an electrically actuated control valve once the programmed settling time (decant time) has elapsed.

The decant time is operator defined and can be changed by accessing the PROCESS screen display. The recommended decant time interval is 120 minutes however, this value will be evaluated over the first year of operation and adjusted accordingly.

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Settled solids in T-4 will be removed periodically and dewatered using the filter press system. Removal of solids from T-4 can only be initiated manually and requires operator intervention throughout the entire process. Once the level of settled solids reaches a depth of 10 inches as indicated on the sludge level indicator, the operator will initiate sludge dewatering operations. Dewatering operations are further described in Section 4.7.

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4.6.2 Controls

One, two (2) level displacement switch is provided to control water level in T-4. Level switches are configured as follows:

- LSL activates the timer switch that operates the electrically actuated decant valve. The timer prevents the decant valve from opening until the programmed time interval has elapsed to allow the solids to settle. After the decant valve has opened and T-4 is drained, LSL closes the decant valve. LSL is set to an elevation equal to the invert of the decant line.
- LSH deactivates P-9 and P-10 in the event a backwash cycle continues beyond the capacity of T-4. LSH is provided as a redundant control to LSL in T-3. LSH also activates an alarm on the PC control system and calls out the alarm on the CAAP to alert the operator of a high water level condition in T-4. This alarm deactivates the entire GWTS and initiates a Group II (Groundwater Process Stoppage) alarm on the autodialer system. The differential elevation between LSL and LSH is set to allow for one backwash cycle. As discussed in Section 4.3 and 4.5, backwash cycles shall be set so that LSH is not activated during a normal backwash cycle.

A sludge level indicator is provided to identify the sludge level in T-4. A level element mounted inside of T-4 uses a light emitting source to detect the sludge level interface. Pulses of light are emitted along a 36 inch element and the refracted light from particles in solution is sent back to the element, interpreted, and the interface is displayed on the sludge level indicator located on the control panel near T-4. The sludge level indicator can be programmed to alarm at a specified level setpoint. The alarm is annunciated locally and requires operator intervention to

defeat the alarm. Additional information regarding the sludge level indicating system is included in Section 010 of Attachment II.

As discussed in Section 4.6.1, an electrically actuated valve is provided on the side of T-4 to allow the system to automatically drain T-4 to the invert to the decant line once solids settle in the tank. Instructions for programming the settling time and operation of this valve are outlined in Section 4.6.1.

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4.6.3 Alternate Operation

Follow the procedures described under normal operation (Section 4.6.1) for operating the systems associated with T-4 on a constant volume basis.

The automatic decant valve system is provided with a bypass line to T-5 in the event that manual decant of the clarified backwash water is required. Operator intervention is required to initiate and stop the decant operation when using the bypass.

NOTE: The operator shall close the decant bypass line on T-4 when manual decant operation is complete. Failure to close HV-41 will cause suspended solids to drain to T-5 upon subsequent backwash cycles.

Conditioning of the backwash solids may be required to provide adequate dewatering characteristics. This would involve addition of a dewatering (bulking) aid such as lime, sawdust, or fly ash and therefore require additional equipment and facilities. Bulking aid requirements will be determined during full-scale treatment plant operations.

4.7 PACKAGED FILTER PRESS SYSTEM

4.7.1 Normal Operation

Under normal operation, the filter press will be operated at a frequency of once per week or as needed. The resulting sludge cake will be collected for off-site disposal.

Dewatering operations will involve pumping settled solids from T-4 to the filter press (FP-1) using the filter press feed pump P-11. The filtrate generated during dewatering will drain under pressure via line FTF to T-5. The dewatering operations will be performed by the operator and manually initiated. General procedures for operating the filter press system are as follows. These procedures may be revised once training by the manufacturer is completed and dewatering operations take place.

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NOTE: Review all operating instruction associated with the filter press, air diaphragm pump, and air compressor prior to operation the filter press system. Reference Section 001 of Attachment III for the manufacturer's O&M manual for addition information regarding the operation of the filter press system.

1. Check to see that entire GWTS is operating properly. Check differential pressure of the on-line granular media filter to be sure that a backwash cycle is not initiated during the solids dewatering operation. If differential pressure is 8 psi or greater, do not initiate the dewatering operation. Manually initiate a backwash cycle and perform the solids dewatering operation after the supernatant drains from T-4 (see Section 4.3.3 for manual initiation of backwash cycle).
2. Check water elevation in T-5. Be sure systems associated with T-5 are properly functioning so that filtrate returned to T-5 during the dewatering operation can be conveyed to T-1.
3. Turn on the air compressor DISCONNECT switch (1L) located at the motor control center (MCC) and allow pressure in tank to reach 100 psig. The regulator on the discharge of the compressor regulates the air pressure at 100 psig.
4. Open air line to supply air to P-11 and filter press.
5. Turn on the air supply to the power unit of the filter press.

6. Shift the control valve located on the south end of the press to the closed position. When the closing pressure is achieved (2,500 to 2,800 psig), the power unit will automatically stop. Leave the control switch in the closed position.
7. Open the handvalves on the suction side of P-11, the discharge side of P-11, and the discharge manifold from the filter press.
8. Switch P-11 on using the manual on/off switch located on the control panel near the pressure filter. The sludge feed pump (P-11) will begin pumping and the pressure will increase automatically as the dewatering process progresses.
9. The pump will automatically stop when a backpressure of 100 psig is detected on the pump discharge line.
10. Close valves on the discharge manifold of the filter press.
11. Activate the blow down process by opening the air valve located on the filtrate discharge line (the regulator for the blow down air shall be set at 40 psig)
12. Close air valve once blow down operation is complete.
13. Shift control valve on filter press to open position.
14. When press is fully open, shift control valve switch to the neutral position.
15. Remove filter cake by separating filter plates using the semi-automatic plate shifter.
16. Containerize filter cake using approved storage container. Filter cake should have no free liquid. Contact supervisor for handling instructions for free liquid, if required.
17. Deactivate air supply (compressor) at the MCC and evacuate air from air lines, filter press, and P-11.

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4.7.2 Controls

A pressure indicator (PI) located on the discharge side of P-11 is provided to monitor the influent pressure being supplied to the filter press. The PI transmits a signal to a pressure controller (PC) located on the filter press. The PC controls the feed rate of P-11 and automatically deactivates the system when the operation is completed. The PC also signals a locally mounted pressure alarm (PA) to alert the operator to a high pressure condition. The PC automatically deactivates P-11 in the event of a high pressure condition.

The air compressor (AC-1) provided as part of the filter press system supplies air to P-11 and the filter press. A hand switch (HS) is provided on AC-1 to enable manual on/off operation of the air compressor.

CAUTION: The air compressor is a pressure vessel containing compressed air at 100 to 125 psig. The operator shall deactivate the air compressor and evacuate pressurized air from the compressor tank and air lines whenever dewatering operations are not being performed. Review all O&M instructions associated with the air compressor prior to operating this system (see Section 001 of Attachment III for the manufacturer's O&M manual for operating instructions).

4.8 FILTRATE TANK (T-5) AND FILTRATE RETURN PUMPS (P-12 AND P-13)

4.8.1 Normal Operations

Tank T-5 is used as a temporary storage vessel for clarified backwash water and filtrate generated from dewatering operations. Liquid from T-5 is pumped via line EQR to T-1 by the filtrate return pumps (P-12 and P-13). Operation of P-12 and P-13 will be performed as required and controlled automatically by level switches located within the tank. Under normal operation, P-12 and P-13 will operate when T-4 is decanting or when the filter press system is operating and filtrate is entering T-5. Pumps P-12 and P-13 shall be set to operate at 25 gpm.

Hand valves associated with this portion of the system include HV-42 through HV-46. See Table D-1 for HV position schedule for normal operation of the system.

4.8.2 Controls

One (1) three level displacement switch is provided to control water level in T-5. Level switch configuration is as follows:

- LSL deactivates P-12 and P-13
- LSH activates P-12 or P-13
- LSHH closes the automatic decant valve located in T-4, activates an alarm on the PC control system, and calls out the alarm on the CAAP to alert the operator of a high water level condition in T-5. This alarm also deactivates the entire GWTS and initiates a Group II (groundwater process stoppage) alarm on the autodialer system. Operator intervention will be required to restart the GWTS if LSHH is activated.

A direct reading pressure indicator is provided on the discharge side of P-12 and P-13 to monitor the performance of these pumps.

4.8.3 Alternate Operation

Follow the procedures described under normal operation (Section 4.8.1) for operation the systems associated with T-5 when the GWTS is operated on a constant volume basis.

Tank T-5 can be used as a reservoir to drain T-3 in the event maintenance is required on T-3. Deactivation of the GWTS will be required and manual operation of P-9 and P-10 will be required to drain T-3 to T-5. Follow the procedures outlined in Section 4.5.3 for diverting water from T-3 to T-5.

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4.9 POTASSIUM PERMANGANATE FEED SYSTEM

4.9.1 Normal Operation

The potassium permanganate feed system consists of a mixing tank (T-2) and two chemical feed pumps (P-3 and P-4). Dry potassium permanganate will be prepared as a 1.5 percent solution (w/w) in T-2, which is equipped with a constant speed mixer. The mixer shall only be operated when a new batch of solution is prepared or upon weekly inspection visits by the operator.

Based on the results of the pilot scale treatability study, potassium permanganate is to be added at a dose of 4 mg/L to T-1 using P-3 or P-4. Adjustments to the chemical feed rate may be required based on influent flow rates and chemical composition of the groundwater. Chemical feed rates will be better determined during full-scale operation of the GWTS, however, recommended feed rates and corresponding influent flow rates are provided in Table E-2 (Appendix E). Feed rates as well as other settings can be adjusted on the front side of the pump. Refer to the manufacturer's O&M information for additional instructions for proper operation of the chemical feed pumps (Section 008, Attachment II).

A 1.5 percent potassium permanganate solution will be prepared using a ratio of 12 pounds of dry potassium permanganate to 100 gallons of water. A minimum of 50 pounds of dry potassium permanganate shall be stored on site. This should provide enough chemical for approximately four to five weeks of operation. The operator shall follow the procedure outlined below to makeup a batch of potassium permanganate solution.

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NOTE: The operator shall follow all health and Safety procedures outlined in Appendix A. Personal protective equipment (PPE) including chemical resistant gloves, safety glasses (face shield), and a chemical resistant apron shall be worn when mixing a new batch of potassium permanganate solution or when handling the chemical. In the event potassium permanganate is exposed to the skin or eyes, the exposed operator shall flush the exposed area with water using the nearby safety shower/eyewash station. Exposed personnel shall seek appropriate medical attention and notify the Site Supervisor. A copy of the MSDS is provided at the Site.

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1. Measure existing water elevation in T-2
2. Add 2 foot, 8 inches to the measurement taken in Step 1
3. Fill T-2 with water from potable water source located at the tank until the water elevation reaches the elevation calculated in Step 2. (Note: 2 foot, 8 inches, of water equates to 100 gallons in T-2)
4. Measure 12 pounds of dry potassium permanganate (or an equivalent volume)
5. Switch the mixer in T-2 ON and allow to mix for approximately 1 minute.
6. Slowly (very slowly) add the potassium permanganate material to T-2. This step should take approximately 5 minutes to complete.
7. Allow the mixer to mix the solution for at least 5 minutes
8. Turn the mixer in T-2 off
9. Remove and dispose of PPE as described in Appendix A.

Pumps P-3 and P-4 are not configured to alternate automatically. The operator will need to manually rotate pump operation when a new batch of potassium permanganate solution is mixed. Pump rotation can be accomplished at the main

control panel located in the electrical equipment room. Pumps P-3 and P-4 are controlled using a three position switch (pumps(s) off, P-3 on, or P-4 on).

4.9.2 Controls

One, dual level displacement switch is provided to control liquid levels in T-2. The switches are configured as follows:

- LSL activates an alarm on the PC control system, and calls out the alarm on the CAAP to alert the operator of a low water level condition in T-2. This alarm also deactivates the entire GWTS and initiates a Group II (Groundwater Process Stoppage) alarm on the autodialer system. Operator intervention will be required to restart the GWTS if LSL in T-2 is activated.
- LSH closes the electrically actuated valve located on the water supply line to T-2. This automatic system will prevent overfilling of T-2 when a new batch of potassium permanganate solution is prepared.

Pumps P-3 and P-4 are configured to operate when an influent flow of greater than 1 gpm is detected by the flow indicator on the influent line (GWI) to T-1. The control system is configured to terminate power to the outlet designated for the metering pumps when this minimum flow rate is not detected. Power is restored to this outlet when a flow rate greater than 1 gpm is detected as described.

A mixer is provided in T-2 to enable mixing of the potassium permanganate solution when a new batch is made. The mixer has a locally mounted hand switch (HS) that enables manual on/off operation of the mixer.

Controls for setting feed rates are located on the front of P-3 and P-4. Refer to Table E-2 of Appendix E and Section 008 of Attachment II for instructions on setting chemical feed rates.

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4.9.3 Alternate Operation

Follow the procedures described under normal operation (Section 4.9.1) for operating systems associated with T-2 when the GWTS is operated on a constant volume basis.

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The oxidation and precipitation of iron solids in the system is to be controlled through the addition of potassium permanganate. As a contingency, additional metals removal equipment may be installed if determined necessary to meet performance requirements as based on initial operation of the GWTS.

4.10 MAINTENANCE PROCEDURES

Maintenance activities to be performed on the GWR system and GWTS are described in this section. A schedule of maintenance activities for the entire site is included in Appendix F of this manual. Additional information regarding inspections and operator functions is discussed in Section 7.0.

Maintenance information provided as part of this manual include general instructions and recommended frequencies for performing maintenance work. The operator should note that procedures described herein are not all inclusive and may not provide complete descriptions for maintenance or replacement activities. Activities including well redevelopment and pump replacement work may require the services of contractors specialized to address these types of activities.

Maintenance activities shall be performed in accordance with the Health and Safety/Contingency Plan (HASCP) included as Appendix A of this manual. Documentation of activities shall be performed as specified in the HASCP and Section 7.0 of this manual.

4.10.1 Groundwater Recovery System

Maintenance activities will be performed as required based on routine inspections of the GWR system. It is anticipated that the following maintenance activities may be required:

- Pump repair or replacement
- Well redevelopment
- Valve and instrumentation repairs

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Table F-1 provides a summary of maintenance activities, frequencies and reference sections included in the Attachments to this manual where the manufacturers instructions for maintenance procedures are located.

Due to the nature of the groundwater plume (i.e. very slow migration), there is no imminent hazard related to an interruption in pumping groundwater. Therefore, contingency measures for operating the system when repairs or maintenance is required are not necessary. The GWR system and GWTS can be deactivated when repairs are required.

The aboveground piping at each well is heat traced and insulated to prevent freezing. Aboveground portions of the header system shall be inspected once every week during winter months to verify that heat tracing systems are operable and aboveground piping has not frozen.

CAUTION: In the event of power loss during below freezing weather conditions, the aboveground portions of the groundwater extraction system header are to be drained immediately upon notice of a power failure. Operator intervention will be required to manually drain aboveground portions of the forcemain piping. See Section 4.1 for instructions for draining the groundwater extraction system header.

4.10.2 Groundwater Treatment System

The GWTS will require routine maintenance of system components in order to achieve proper system performance. Maintenance activities to be performed may include:

- Lubrication of moving parts per manufacturer's specifications
- Pump and blower repair or replacement
- Valve and instrumentation repairs
- Piping inspections and repairs

- Granular filter media replacement
- Air stripping aeration tray cleaning
- Tank cleaning
- Mixer repairs or replacement
- Filter press plate repair/replacement
- Filter press filter cloth replacement
- Air compressor inspection, maintenance, and registration

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SAFETY/CAUTION Entry into the process tanks requires a confined space entry permit. Follow procedures outlined in the HASCP included in Appendix A.

Table F-1 provides a summary of maintenance activities and the reference sections included in the attachments to this manual where the manufacturer's instructions for maintenance procedures are located. Valves and other GWTS equipment have been tagged and recorded on the P&ID for use by the operator. A copy of this drawing is included in Appendix C.

Pumps for the GWTS are designed to alternate operation when an operating limit (i.e. high water or low water level) is achieved. For example, P-1 and P-2 are installed as a parallel system. Pump P-1 will operate until the level switch low in T-1 is activated and P-1 is deactivated. When the water level in T-1 reaches LSH, P-2 will be activated and operate until the water level in T-1 reaches LSL. This alternating cycle occurs for pumps P-1 and P-2, P-5 and P-6, P-7 and P-8, P-9 and P-10, and P-12 and P-13. The operator should monitor the system to verify that pumps are alternating properly. Automatic pump alternation will occur when the control switch located in the electrical equipment room is set in the AUTO position. Each of the pumps systems listed above can be set to alternate or operate exclusively (i.e., no alternation). Normal operation requires that the pumps are set to alternate automatically.

5.0 ISVS SYSTEM OPERATING AND MAINTENANCE PROCEDURES

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5.1 ISVS SYSTEM GENERAL OPERATING PROCEDURES

Based on operations performed during the pilot-scale treatability study and initial operation of the ISVS system, the normal operating procedures will consist of the following activities:

- Checking condensate tank and pump for proper operation
- Manually starting the vapor treatment system and blower
- Checking flow readings on the PC control system and sensors located at extraction points
- Recording readings from sensors on the Thermal Oxidizer (TO) log sheets and Vapor Extraction Well log sheets (No. 1 and No. 2)
- Manually adjusting header system valves to achieve specified flow rates
- Manually monitoring vacuum gauges and balancing each area by manually adjusting valves at extraction points
- Re-checking header system flow and, if necessary re-adjusting header system valves
- Monitoring system data and verifying that automatic and manual control systems for shut down of the ISVS system are operating properly
- Manually deactivating the system after established run time
- Re-starting system after established shut down time
- As necessary, evaluating monitoring data and making adjustments in established flow rates, system run times, and system shut down time

During initial operation, the ISVS system was operated with a continuous vapor stream extracted from the crest area and landfill area with vapor recovery from the landfill area being collected at low flow rates. Initially it was expected that vapor extraction from the landfill area would be pulsed. However, the system appeared to be operating properly (i.e. no indication of conditions which may result in combustion, e.g., significant temperature increase) after the first pulse of one landfill pore volume (i.e., approximately 1 million cubic feet of recovered vapor) and therefore, the recovery of extracted vapors from the landfill area was continued.

Operating procedures determined during initial startup may be adjusted as necessary to prevent possible landfill fires and as conditions change to optimize recovery and operating costs. Procedures for making such changes will be developed during full scale operation and as required to address changing field conditions.

Specific information and procedures for the operating the ISVS system are provided below. Where appropriate, references to the thermal oxidizer Operation and Maintenance manual included in Section 001 and Section 002 of Attachment I are identified.

A summary of controls and monitoring points for the ISVS system is presented in Table 5-1. This summary includes the temperature probes, extraction system, condensate tank, and thermal oxidizer.

Typical operating parameters for the ISVS system including flow rates, temperatures, and vacuum levels are included in Table 5-2.

ATTENTION: The operator should note that Table 5-2 are typical values and under certain operating conditions, actual operating parameters may differ. It is the operator's responsibility to notify the site supervisor whenever actual operating parameters fall outside these typical ranges. It is the supervisor's responsibility to determine and direct the operator when implementing changes in control settings or alarm setpoints for the ISVS system or PC control system.

5.2 LANDFILL TEMPERATURE WELLS

As described in Section 2.1, twelve (12) landfill temperature wells designated T-1 through T-12 are located throughout the landfill area. During normal operation, the temperature probes installed in these wells will be used to monitor the subsurface temperature in the landfill and serve as one of the indicators for a possible landfill fire. Each well is equipped with a probe that transmits a signal to the PC control system to monitor the subsurface temperatures of the landfill. The PC control system is configured to monitor a temperature range from 50°F to 250°F.

TABLE 5-1

**CONTROLS AND MONITORING FOR ISVS SYSTEM
LORD-SHOPES LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Sensor/Control Location	Type	Readout Location	Control/Monitor Function	Recording Frequency	Purpose
Thermal Oxidizer	Flow	Local/PC	(m) Extracted Vapor Flow rate	Hourly	Monitor total extracted vapor flow from three areas
	Flow	Local/PC	(m) Ambient Air Influent	NA	Performance Monitoring
	Temperature	Local/PC	(m) Extracted Vapor Temp.	Hourly	Landfill Fire Indicator
	FID	Local/PC	(m) Total Extracted VOCs	Hourly	Performance Monitoring
	LEL	Local/PC	(m) Lower Explosive Limit	Hourly	Performance Monitoring
	O ₂	Local/PC	(c) Thermal Oxidizer	Hourly	Performance Monitoring
	CO	Local/PC	(c) Extracted Vapor	Hourly	Landfill Fire Indicator
	Vacuum	Local/PC	(m) ISVS Applied Vacuum	Hourly	Performance Monitoring
	Temperature	Local/PC	(m) Combustion Temperature	Hourly	Performance Monitoring
Landfill Header	Flow	Local/PC	(m) Landfill Area Flow Rate	Hourly	Monitor area flow rate
	Globe Valve	Local	(c) Flow Rate	NA	To balance system flow rates (manually)
Crest Header	Flow	Local/PC	(m) Crest Area Flow Rate	Hourly	Monitor area flow rate
	Globe Valve	Local	(c) Flow Rate	NA	To balance system flow rates (manually)
Toe Header	Vacuum	Local	(m) Applied Vacuum	Weekly	Monitor vacuum at toe area (manually)
	Globe Valve	Local	(c) Flow Rate	NA	To balance system flow rates (manually)
Extraction Wells	Flow	Local	(m) Flow Rate	Weekly	To balance system flow rates (manually)
	Temperature	Local	(m) Extracted Vapor Temp.	Weekly	Monitor Vapor Temperature (manually)
	Vacuum	Local	(m) Applied Vacuum	Weekly	To balance system (manually)
Temperature Wells	Temperature	Local/PC	(m&c) Landfill Temperature	Hourly	Early warning of potential landfill fire, Deactivate ISVS system
	Vacuum	Local	(m) Applied Vacuum	Weekly	Monitor system performance (manually)

TABLE 5-2

TYPICAL OPERATING PARAMETER VALUES FOR THE ISVS SYSTEM

LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Parameter	Monitoring Location	Typical Operating Range	Unit	Comments
Extracted Vapor Flow Rate				
- Crest Header	PC	30 - 60	SCFM	
- Landfill Header	PC	36 - 160	SCFM	Operate at maximum flow only when other areas are closed
- Toe Area	Calculation	0 - 10	SCFM	See Section 5.3.3 for instructions on calculating flow for this area.
Landfill Temperature Wells	PC	40 - 90	°F	
Extracted Vapor Vacuum	PC	20 - 50	Inches WC	
Thermal Oxidizer Combustion Temperature	PC/Thermal Oxidizer	1,600 - 1,750	°F	Unit should be set to operate at 1,700°F
Dilution Air Flow	PC	0 - 160	SCFM	
Extracted Vapor O ₂	PC	19 - 21	percent	
Extracted Vapor LEL	PC	0 - 10	percent	
Extracted Vapor CO	PC	0 - 20	PPMV	
Extracted Total Hydrocarbons	PC	0 - 10	percent	
Extracted Vapor Flow	PC	30 - 160	SCFM	

TABLE 5-2 (Continued)

TYPICAL OPERATING PARAMETER VALUES FOR THE ISVS SYSTEM

LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Parameter	Monitoring Location	Typical Operating Range	Unit	Comments
Extracted Vapor Temperature	PC	32 - 90	°F	Temperature may fall below range during extreme cold weather conditions
Crest Area Vacuum	Extraction Well	0 - 5	Inches WC	Typical value observed at each extraction well
Landfill Area Vacuum	Extraction Well	10 - 40	Inches WC	Typical value observed at each extraction well
Toe Area	Toe Header	NA		Vacuum for this area typically too small to read

The PC control system is equipped with an alarm temperature setpoint that can be user defined. The input point for altering the temperature probe high temperature alarm level is included on the TEMPWELL screen display. Input alarm setpoints for this monitoring point are presented in Table 5-2. Altering the high temperature alarm setpoint can be performed as follows:

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ATTENTION: Landfill temperatures will vary seasonally and this setpoint will need to be altered several times a year. Contact the site supervisor for approval prior to altering the high temperature alarm setpoint for the landfill temperature probes .

1. Access the TEMPWELL screen display.
2. Press the HOME key to move the cursor to the graphics field of the screen display.
3. Use the arrow keys to move the cursor until the box is situated in the High Temp. box.
4. Enter the desired alarm setpoint and press the ENTER key to input the change.
4. To return to the command area of the screen, press the HOME key

Landfill temperatures are recorded hourly by the PC control system. Real time observation of the landfill temperatures can be observed by accessing the TEMPWELL screen display. Subscreens are also provided on the PC control system that allow the operator to observe the temperatures across the east and west portions of the landfill exclusively. This information can be viewed by accessing the subscreen as follows:

1. Access the TEMPWELL screen display
2. Press the HOME key to move the cursor to the graphics field of the screen display
3. Press the ENTER key to access the subscreen
4. To return, press the HOME key

Each temperature well is also equipped with a vacuum gauge. The vacuum gauge is used to monitor performance of the extraction system and to balance vapor recovery.

across the landfill area. Typical vacuum gauge ranges for these monitoring points are presented in Table 5-2.

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An inert gas port is also provided at each temperature well in the landfill area. The port consists of a 1-inch threaded PVC plug to be used as an access point to inject liquid nitrogen into the landfill in the event of a subsurface fire.

5.3 ISVS EXTRACTION SYSTEM

5.3.1 Normal Operation

As discussed in Section 2.1.3, the extraction system consists of a header system connected to three vapor extraction wells (EX-1, EX-2, and EX-3) located in the landfill area; six vapor extraction wells (EX-4 through EX-9) located in the crest area; and a horizontal extraction pipe located in the toe area.

The ISVS system is monitored by the PC control system. Operating parameters including flow rates from the landfill area, crest area, and total of the three areas (landfill, crest, and toe) can be observed by accessing the EX-WELL and ISVS display screens on the PC control system. The flow rate for the toe area must be calculated as described in Section 5.3.3. These flow rates shall be used to balance the ISVS system as described below.

Adjustment of the header and well valves will be required to balance and maintain the appropriate vacuum and air flow distribution. Valves will be adjusted based on flow and vacuum instrumentation located throughout the extraction system. Recommended extracted air flows for each area are shown in Table 5-2.

Follow the procedure described below for balancing the air flow for the crest area and landfill area portions of the extraction system to achieve the recommended flow rates:

1. Once the thermal oxidizer is operating and adjusted per the procedures described in Section 11.1, slowly open the hand valve located on the crest area header.

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2. Periodically check the vapor flow rate for the crest area by accessing the EX-WELL screen display on the PC control system.
3. Continue to adjust this hand valve until the desired vapor flow rate is achieved. Note that this step should take no less than 10 minutes to complete.
4. Slowly (very slowly) open the hand valve located on the landfill area header.
5. Periodically check the vapor flow rate on the PC control system as described in Step 2. Note that the vapor flow rate for the crest area may change when vapor extraction from the landfill area commences.
6. Continue to adjust this hand valve until the desired vapor flow rate from the landfill is achieved. Note that this step should take no less than 20 minutes to complete.
7. Check the flow rate for the crest area as described in Step 2. If the system is not operating at the desired flow rate for this area, repeat this procedure from Step 3. Note that several iterations may be required to balance the extracted vapor flow rates from each area.
8. Check the Total Air Flow gauge located on the thermal oxidizer. Under normal operating conditions, this gauge should measure 0.38 inches W.C. If the gauge indicates a different value, adjust the Process Recirculating Valve number 4 (PRV-4) accordingly.

Follow the procedure below for balancing the air flow for the toe area extraction system to achieve the recommended flow rates:

1. Slowly open the hand valve located on the north side of the toe area header. Note that this valve will not need to be more than 10 percent open to achieve the desired flow rate.

2. Periodically check the vapor flow rate for the toe area by accessing the EX-WELL screen display on the PC control system and using the flow calculation presented in Section 5.3.3.
3. Continue to adjust this hand valve until the desired vapor flow rate is achieved.
4. Repeat Steps 1, 2, and 3 for adjusting the extracted vapor flow rate for the south portion of the toe area extraction system.
5. Check the flow rates for the crest area and landfill area as described in Step 2. If the system is not operating at the desired flow rate for these areas, repeat the procedures for balancing the crest area and landfill area described above. Once this is accomplished, verify that the toe area is operating properly or adjust accordingly. Note that several iterations may be required to balance the extracted vapor flow rates from each area.
6. Check the Total Air Flow gauge located on the thermal oxidizer. Under normal operating conditions, this gauge should measure 0.38 inches W.C. If the gauge indicates a different value, adjust the Process Recirculating Valve number 4 (PRV-4) accordingly.

5.3.2 Additional ISVS System Adjustment Procedures

The hand valves located at each extraction well in the crest area and landfill area should be fully open under normal operation. As part of the operator functions described in Section 7.0, weekly readings of the vacuum gauges from each extraction point in the system will be recorded on the appropriate log sheet. The individual extraction points may require adjustment based on these readings to achieve a uniform vacuum across the associated area (i.e., crest area, landfill area, and toe area). The following procedure outlines the method for adjusting the valves at each extraction point to achieve a uniform vacuum.

NOTE: Adjustments to the hand valves located at the various extraction points may alter the total vapor flow from the area being adjusted. The total vapor flow from the area should be checked after adjusting the valves at the extraction points. As necessary, adjustments to the total vapor flow for the area should be made accordingly to accomplish the specified flow rate. Adjusting the flow rate from any one area may affect the flow rate from the other areas. The operator shall check all area flow rates and adjust the system accordingly.

Crest Area:

1. Adjust each hand valve at the six (6) extraction wells so that vacuum gauge reading on each well is within 5 inches W.C. of each other.
2. Check the landfill, crest, and toe area flow rates on the PC control system and adjust accordingly. Follow the procedures described in Section 5.3.1.
3. Record vacuum gauge readings, temperature gauge readings, and flow gauge readings on the Vapor Extraction Well Log Sheet No. 2.

Landfill Area:

1. Adjust each hand valve at the three (3) extraction wells so that vacuum gauge on each well is within 5 inches W.C. of each other.
2. Check vacuum gauges at the twelve (12) temperature wells. As necessary, adjust the extraction well valves to produce an even distribution of applied vacuum across the landfill. Note that slight adjustments to the extraction wells will not yield instantaneous changes in the vacuum readings at the temperature wells. Changes in the applied vacuum across the landfill area must be allowed to respond over a period of several days before additional adjustments can be made.
3. Check the landfill, crest, and toe area flow rates on the PC control system and adjust accordingly. Follow the procedures described in Section 5.3.1.

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4. Record vacuum gauge, temperature gauge, and flow gauge readings on the Vapor Extraction Well Log Sheet No. 1.

Toe Area:

1. Adjust the two hand valves on each end of the horizontal extraction pipe so that the vacuum gauge on each end cap is within 5 inches W.C. of each other. Note that the toe area extraction system does not develop significant vacuum and may be difficult to balance. In addition, since air flow is easily extracted from this portion of the site, the hand valves used to control extraction flows from this area only need to be opened slightly.
2. Check the toe area air flow rate using the flow calculation presented in Section 5.3.3. Adjust the flow rate accordingly.
3. Record vacuum gauge reading on the Vapor Extraction Well Log Sheet No. 1.

5.3.3 Controls

Controls for the vapor extraction system include temperature probes, flow sensors, vacuum gauges, and valves as summarized in Table 5-1. Direct reading temperature gauges are installed at each extraction point in the landfill and crest areas. This monitoring equipment will be checked by the operator as described in Section 7.0 of this manual. A temperature probe is also provided at the inlet to the thermal oxidizer. This piece of monitoring equipment is further described in Section 5.5.2.

NOTE: Extracted vapor temperature is only monitored and recorded by the PC control system at the point of entry to the thermal oxidizer. Manual collection of temperature measurements for other areas of the extraction system are part of the operator functions described in Section 7.0.

A flow sensing device is installed in the landfill header, crest header, and inlet to the thermal oxidizer (total for all three areas). Flow rates for these three locations

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are monitored and recorded by the PC control system. Flow rates for the three flow sensors can be observed by accessing the EX-WELL display screen on the PC control system. The flow rate for the toe area will require that the operator perform a manual calculation per the following equation:

$$\text{TAFR (cfm)} = \text{TEVF} - (\text{LAFR} + \text{CAFR} + \text{DAFR})$$

Where: TAFR - Toe Area Flow Rate
TEVF - Total Extracted Vapor Flow Rate (EX-WELL display)
LAFR - Landfill Area Flow Rate (EX-WELL display)
CAFR - Crest Area Flow Rate (EX-WELL display)
DAFR - Dilution Air Flow Rate (ISVS display)

Adjustments to the system can be accomplished using the flow sensors discussed above along with the flow sensors and vacuum gauges provided at each extraction well located in the landfill and crest areas. Flow sensors installed at each vapor extraction well require direct reading by the operator. The flow sensors are manometers and measure velocity pressure in inches of water column. The flow may be calculated using the following equation:

$$Q = 128.8 \times K \times D^2 \times \sqrt{\frac{P \times \Delta P}{(T + 460) \times S_g}}$$

Where:

Q = Flow (SCFM)
K = Flow coefficient (0.620 for 2.5 inch Schedule 40; 0.640 to 3 inch schedule 40; 0.670 for 4 inch schedule 40)
D = Inside diameter of pipe (2.323 for 2.5 inch schedule 80; 2.90 for 3 inch schedule 80; 4.026 for 4 inch schedule 40)
P = Static Line Pressure (14.277 psia, corrected to 800 foot elevation)
 ΔP = Differential Pressure Measurement (inches W.C.) - Gauge Reading
T = Extracted Vapor Temperature (°F)
 S_g = Specific Gravity at 60°F (1.0)

The PC control system utilizes the same equation presented above to calculate and display the flow rates for the crest area, landfill area, and total extracted vapor flow. In order for the flow rate for these locations to be properly calculated, specific input parameters are required to be entered on the EX-WELL and ISVS screen displays. Input parameters for these screen displays are summarized in Table 5-3.

Hand actuated control valves are provided at each extraction well location and along each header system to allow the system to be balanced as described in Section 5.2.1.

5.4 CONDENSATE TANK AND PUMP

5.4.1 Normal Operation

Condensate that forms in the header system will flow either back to the vapor extraction wells or to the condensate tank. Liquid collected in the condensate tank is automatically pumped at a rate of 10 gpm to the GWTS system Equalization Tank (T-1). The discharge line (CET) is equipped with a control valve and a flow totalizer for adjusting flow rate and determining the total volume of condensate generated. Based on calculations performed as part of the RD, the volume of condensate to be generated and collected in the condensate tank is estimated to be between 5 gallons per day (gpd) during warm weather months and 20 gpd during cold weather months. This value is an estimate and may be revised based on observations made during operation of the system.

5.4.2 Controls

As discussed above, liquid collected in the condensate tank is automatically pumped to the GWTS. The liquid level in the tank is controlled by three (3) float switches located in the condensate tank. The float switches are configured as follows:

- LSL deactivates the condensate pump (set at 2 inches from tank bottom)
- LSH activates the condensate pump (set at 6 inches from tank bottom)

TABLE 5-3

**RECOMMENDED PC CONTROL SYSTEM INPUT
PARAMETERS AND ALARM LEVELS FOR THE ISVS SYSTEM**

**LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Input Parameter	Input Value	Screen Display
Vacuum (Landfill Header)	See note ^a	EX-WELL
Specific Gravity (Landfill Header)	0.78/1.0 ^b	EX-WELL
Vacuum (Crest Header)	See note ^a	EX-WELL
Specific Gravity (Crest Header)	1.0	EX-WELL
Dilution Air Temperature	Daily Average ^c	ISVS
Extracted CO	100	ISVS
Extracted Vapor Temperature	100 (Summer) 70 (Winter)	ISVS
High Alarm Temperature	80 (Winter) 100 (Summer)	TEMPWELL

^aInput parameter for vacuum shall be as follows:

$$\text{Landfill Header} = \frac{[\text{Vacuum Gauge Reading @ EX - 3}] + [\text{Extracted Vapor Vacuum @ Oxidizer}]}{2}$$

$$\text{Crest Header} = \frac{[\text{Vacuum Gauge Reading @ EX - 9}] + [\text{Extracted Vapor Vacuum @ Oxidizer}]}{2}$$

^bInput value of 0.78 should be used for landfill header when high levels of methane are detected (i.e., 1.0 percent or greater). Otherwise a value of 1.0 can be used.

^cDilution air temperature will vary throughout the year. Input values can be changed seasonally based on average daily temperatures.

- **LSHH** activates an alarm on the PC control system and CAAP to alert the operator of a high liquid level in the condensate tank. LSHH also initiates a controlled shutdown of the ISVS system and initiates a Group III (ISVS Process Stoppage) alarm on the autodialer system. LSHH is set at 18 inches above the bottom of the condensate tank.

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5.5 THERMAL OXIDIZER AND BLOWER

NOTE: The operator shall review all information presented in the sections below as well as the information provided in Section 001 and Section 002 of Attachment I prior to operating the thermal oxidizer. The operator shall also receive the necessary training by qualified personnel prior to operating the ISVS system.

5.5.1 Normal Operation

The thermal oxidizer and blower system requires operator intervention to manually activate the system. Procedures for startup are outlined in Section 11.0 and further described in Section VI of the manufacturer's operation and maintenance manual (Section 001, Attachment I).

The thermal oxidizer is designed with intrinsic monitoring and control systems to compensate for changes in operating conditions and allow the unit to function without regular operator intervention. These intrinsic monitoring and control systems are also designed to automatically initiate a controlled shutdown of the ISVS system and initiate an alarm to notify the operator that the system has been deactivated. In addition to the intrinsic systems provided by the manufacturer, the PC control system monitors specific parameters associated with the thermal oxidizer, extraction system, and landfill area and provides control (i.e. controlled shutdown) of the ISVS system based on these monitored parameters. Additional information regarding monitoring parameters and control actions performed by the PC control system is described in Section 5.4.2.

As part of normal operating procedures, the operator shall check the parameters monitored by the PC control system for the ISVS system as specified in Section 7.0. The operator shall perform this task daily (on site or via modem) to verify that the

system is operating properly. Daily checks of system operating parameters shall be printed and retained for record keeping purposes.

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5.5.2 Controls

As discussed in Section 5.4.1, the thermal oxidizer is self adjusting and should require minimal operator intervention while operating. Monitoring and control functions intrinsic to the thermal oxidizer are summarized in Table 5-4. In general, whenever a monitoring parameter intrinsic to the thermal oxidizer goes into alarm, the ISVS system is automatically deactivated in a controlled shut down mode and an alarm signal is sent to the PC control system to alert the operator that the ISVS system has been deactivated. This alarm signal also initiates a Group III (ISVS System Stoppage) alarm on the autodialer system.

NOTE: Operator intervention is required to restart the ISVS system in the event the system is deactivated. If the thermal oxidizer is deactivated automatically by either the intrinsic systems or other interlock system, the cause of the shut down shall be identified and rectified prior to restarting the ISVS system.

In addition to the temperature probes located in the landfill, the thermal oxidizer is equipped with two monitoring points designed to provide an indication of a potential landfill fire. These monitoring points include carbon monoxide (CO) and extracted vapor temperature. These two (2) parameters are monitored continuously by the PC control system and configured to deactivate the ISVS system in a controlled shut down mode in the event the alarm set point for either is exceeded. The alarm levels for the extracted vapor temperature and CO are user defined and can be changed by accessing the ISVS screen display on the PC control system. Recommended values for these input alarm levels are included on Table 5-3.

The PC control system also monitors and records several other parameters for performance monitoring purposes. These parameters include the thermal oxidizer combustion temperature, the extracted vapor lower explosive limit (LEL), the total hydrocarbons in the extracted vapor stream, the extracted vapor oxygen level, the applied vacuum, and the total extracted vapor flow rate. These parameters along with their associated recording frequencies are summarized in Table 5-1.

TABLE 5-4

**INTRINSIC MONITORING POINTS AND CONTROL ACTIONS FOR
THE THERMAL OXIDIZER SYSTEM**

**LORD-SHOPES LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Control Point ^a	Operating Range	Alarm Condition	Control Action
High Fuel Gas Pressure	6 - 25 inches W.C.	≥25 inches W.C.	Controlled shut-down of ISVS system
Low Fuel Gas Pressure	6 - 25 inches W.C.	≤6 inches W.C.	Controlled shut-down of ISVS system
Loss of Burner Flame/No Ignition	on/off	Off	Controlled shut-down of ISVS system
Process Vapor Low Pressure	NA	Low	Controlled shut-down of ISVS system
High Combustion Temperature	1,600°F - 1,700°F	1,800°F	Controlled shut-down of ISVS system
Low Combustion Temperature	NA	1,680°F	Controlled shut-down of ISVS system
Power Interruption	NA	23% Voltage Drop	Controlled shut-down of ISVS system
Air Blower Failure	NA	Off	Controlled shut-down of ISVS system
Process Blower Failure	NA	Off	Controlled shut-down of ISVS system
Combustion Blower Failure	NA	Off	Controlled shut-down of ISVS system
Knockout Pot LSHH	NA	High Liquid Level	Controlled shut-down of ISVS system

^aControl point not specifically monitored by the PC control system. However, deactivation of the ISVS system by this control function will transmit an alarm signal to the PC control system and initiate a Group III (ISVS System Stoppage) alarm on the autodialer system.

Combustion temperature for the thermal oxidizer is also charted on a continuous basis by the PC control system. The operator can view this information by accessing the OX-TEMP screen display.

The dilution air flow rate recorded by the PC control system is a function of the pressure velocity as measured by the flow sensor installed on the dilution air inlet of the thermal oxidizer. The PC control system is configured to automatically calculate the flow rate for this monitoring point as well as the crest area and landfill area using the equation presented in Section 5.3.3. In order for the PC control system to properly convert the measurement of the dilution air flow sensor to cubic feet per minute (cfm), the operator is required to input the ambient air temperature. The input point for this parameter can be found by accessing the ISVS screen display on the PC control system (identified as DILUTION AIR TEMP). The input temperature will be required to be changed periodically as the weather changes (seasonally). Input parameters for these screen displays are summarized on Table 5-3.

The thermal oxidizer is equipped with a secondary moisture removal system (knock out pot) to remove fine moisture droplets from the extracted vapor stream. This tank also contains a filter that removes particulate matter that may be present in the vapor stream. This tank holds approximately 11 gallons and liquid collected in this tank is automatically pumped to the GWTS Equalization Tank (T-1) via line CEX. The return pump is controlled by a three level switch system configured as follows:

- LSL deactivates return pump
- LSH activates return pump
- LSHH initiates a controlled shut down of the thermal oxidizer, signals an alarm on the PC control system to alert the operator of an ISVS system stoppage, and initiates a Group III (ISVS system stoppage) alarm on the autodialer system. Operator intervention will be required to restart the ISVS system if LSHH is activated.

Additional information describing the operating controls for the thermal oxidizer are included in Section 001 and Section 002 of Attachment I.

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5.6 ALTERNATE OPERATION

The primary goal of the ISVS system is to remove the maximum volume of VOCs from the landfill, crest, and toe areas in the most efficient manner. In order to meet this goal, the operation of the ISVS system will be modified from time to time to accommodate changing conditions at the site.

As remediation of each area progresses, the VOC recovery levels will start to decrease. Alternate operating procedures may be implemented to improve removal efficiencies and conserve secondary fuel consumption. Pulsing of each area will be evaluated as a potential operating alternative and will be based on the concentration of VOCs in the recovered vapor as well as observations made during the operation of the ISVS system.

5.7 LANDFILL FIRE CONTINGENCY PLAN

Although the ISVS system will be operated and monitored to prevent the occurrence of a landfill fire, the following contingency measures will be implemented if a fire is suspected or actually detected.

1. Cease vapor extraction immediately
2. Notify the Lord Project Manager (Mr. Robert Nipper)
3. Monitor landfill temperature for changes (increase in temperature)
4. If conditions indicating a fire persist, liquid nitrogen will be injected into the inert gas port of the temperature probe (i.e., through the inert gas port located closest to the suspected fire location to displace oxygen containing ambient air and smother the fire.

NOTE: The nitrogen supplier is Universal Well Services (814) 724-5111. At a minimum, this supplier is capable of providing 1 million cubic feet of nitrogen as required. This volume is consistent with the volume required to evacuate the air pore volume from the entire area landfill.

5. As a last resort, the fire could be excavated and smothered with soil or water. An emergency response contractor (O.H. Materials or Weavertown Environmental) will be contacted and mobilized to perform the earthwork activities required to extinguish the fire. Telephone numbers for these contractors are posted in the site office located in the treatment building. Following extinguishing of the fire, the cap would be repaired.

5.8 MAINTENANCE PROCEDURES

Maintenance activities to be performed on the ISVS system are described in this section. A schedule of inspection requirements and maintenance activities for the entire site is included in Appendix F of this manual. Additional information regarding inspections and operator functions is discussed in Section 7.0.

Maintenance information provided as part of this manual include general instructions and recommended frequencies for performing maintenance work. The operator should note that procedures described herein are not all inclusive and may not provide complete descriptions for maintenance or replacement activities. In addition, certain maintenance tasks may require the services of contractors specialized to address these types of activities.

Maintenance activities shall be performed in accordance with the Health and Safety/Contingency Plan (HASCP) included as Appendix A of this manual. Documentation of activities shall be performed as specified in the HASCP and Section 7.0 of this manual.

Maintenance activities will be performed as required based on routine inspections of the ISVS system. It is anticipated that the following maintenance activities may be required:

- Weekly (minimum) inspection of all mechanical components
- Weekly inspection of thermal oxidizer for evidence of corrosion. Repair as necessary.
- Filter replacement (i.e. gas and air)
- Tighten bolts and screws
- Oil changes (blower) and lubrication
- Repair refractory
- Testing of safety interlock systems

NOTE: Equipment replacement is not anticipated to be required during the relatively brief duration of the ISVS system operation (approximately two to five years).

Table F-1 provides a summary of maintenance activities, frequencies, and reference sections included in the Attachments to this manual where the manufacturer's instructions for maintenance procedures are located. In general, maintenance procedures for the thermal oxidizer are included in Section 001 of Attachment I.

Due to the nature of the areas to be remediated by the ISVS system, there is no imminent hazard related to an interruption in the extraction process. Therefore, contingency measures for operating the system when repairs or maintenance is required are not necessary. The ISVS system should be deactivated when repairs are required.

6.0 SITE FACILITIES OPERATING AND MAINTENANCE PROCEDURES

Site facilities covered under this manual include the thermal oxidizer area, GWTS building, and existing storage building. In addition to these facilities, site security is also discussed in this section. Operating and maintenance procedures for each of these is further described below.

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6.1 THERMAL OXIDIZER AREA

The thermal oxidizer area is located along the west side of the GWTS building. Minimal maintenance of this area is expected during the short time period this system is expected to be operated (i.e. approximately 2 to 5 years). The area surrounding the thermal oxidizer shall be kept clean and clear to allow access around the entire unit.

6.2 GWTS BUILDING

The treatment building is used to house all the equipment associated with the GWTS. Equipment for the GWTS has been grouped by process and access to each piece of equipment has been provided to allow for maintenance, repairs, and if necessary, removal.

Design features of the building include the following:

- Building Type - Pre-engineered with customized openings, equipment penetrations, and doorways
- Dimensions - Approximately 50 feet by 60 feet
- Foundation - Concrete footings and concrete slab
- Other Features - Electrical equipment room, space for contingent metals system, perimeter containment curbing, and floor sump

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The building slab is designed to slope to the centrally located floor sump for collection of spills or water used when cleaning the floor area. The sump is provided with a steel grate and two submersible type pumps (SP-1 and SP-2). These pumps are designed to convey water collected in the sump to tank T-1. The pumps are controlled by level switches located in the sump and configured as follows:

- LSL activates SP-1
- LSH activates SP-2
- LSHH deactivates the entire GWTS and activates an alarm on both the PC control system and the CAAP to alert the operator of a high water level condition in the sump. This monitoring point, when activated, also initiates a Group II (Groundwater Process Stoppage) alarm on the autodialer system. Operator intervention will be required to restart the GWTS if LSHH is activated (see Section 11.2 for start-up procedures for the GWTS).

The sump is also provided with a hand switch located in the electrical equipment room for manual operation of SP-1 if in the event the volume of water collected in the sump is not large enough to start this pump automatically.

The GWTS building shall be kept clean and nonessential equipment or materials shall not be stored in this area. The floor area shall be cleaned as needed and water collected in the sump shall be removed as necessary. Dirt or other materials shall not be allowed to accumulate in the floor sump. A monthly inspection of the sump shall be performed and removal of accumulated material shall be performed as necessary.

Temperatures within the GWTS building shall be maintained at 68°F during winter months and 78°F during summer months. In the event the ambient temperature in the GWTS building drops below 50°F or exceeds 120°F, a Group IV (Environmental Condition) alarm will be activated on the autodialer system to alert the operator of this condition. The autodialer system is provided with a backup battery system and in the event of a loss of power at the site, the autodialer system will automatically activate a Group IV alarm.

The GWTS building is provided with several emergency stop buttons located at each exit, in the electrical equipment room, and in the office of the storage building. These red mushroom shaped buttons will deactivate all the treatment systems at the site including the ISVS system, GWR system, and GWTS. These buttons shall only be used in emergency situations.

6.3 EXISTING STORAGE BUILDING

The existing storage building is located south of the GWTS building and is connected by an enclosed vestibule. This building is used as a storage area for equipment and materials and houses the site office and lavatory facilities. The site office functions as the operator's access point for the on site PC control system. The control system computer is located in the site office along with the system printer. This office shall also serve as the location where essential site files including a copy of this O&M Manual are to be kept.

6.4 SITE SECURITY

The site is secured with an eight (8) foot chain link fence along the south and west perimeter of the landfill area and along the north and east property boundaries. Gates are located at the site entrance, along the east property line, and at the west end of the landfill to allow access along the GWTS discharge line. Gates are to be locked at all times when the Lord personnel are not on site. A monthly inspection of the perimeter fencing shall be performed and repairs made as necessary.

The treatment building is equipped with an alarm system that includes motion detector type monitors. This system is monitored by a 24 hour service contractor (i.e., ADT) and will notify local police in the event an alarm is signaled. This system shall be activated whenever Lord personnel are not on site.



7.0 OPERATOR FUNCTIONS

As part of normal operations for the ISVS system, GWR system, and GWTS, the operator will be required to perform specific tasks associated with inspection and maintenance requirements. In addition, certain regulatory requirements will also need to be met on scheduled intervals.

This section presents a summary of the tasks to be performed by the operator. Tables are included in this section that outline these tasks and the frequencies with which they are to be performed. In addition, an operator checklist form is also included as part of this manual. The form includes an outline of items the operator shall be required to check during each site visit including a checklist of items to be completed prior to leaving the site. A copy of these forms are included in Appendix I.

7.1 REGULATORY PAPERWORK

Regulatory reporting requirements include a monthly effluent discharge report, an annual groundwater monitoring report, and a five-year monitoring report. A monthly discharge monitoring report will be prepared in accordance with the requirements of the NPDES permit and submitted to the agencies listed in the Long-Term Monitoring Plan (Appendix J). The annual groundwater monitoring report consisting of hydraulic and groundwater quality data and applicable discussions shall be prepared and submitted to PADEP and USEPA Region III. Specific requirements and details concerning the annual groundwater monitoring report are presented in Appendix J. In addition to monthly and annual regulatory reporting, a comprehensive monitoring report shall be prepared and submitted every five (5) years in accordance with the procedures discussed in the Long-Term Monitoring Plan (Appendix J).

As part of the reports discussed above, documentation associated with sample collection, shipping, and analysis shall be prepared and included with these reports as required. Specific requirements for supporting documentation for regulatory reports is further discussed in Appendix J.

7.2 GROUNDWATER RECOVERY SYSTEM

Operator functions for the GWR system are summarized in Table 7-1. In general, the operator must verify that the GWR system is operating properly by remotely accessing the PC control system on a daily basis. On a weekly basis, or as necessary (e.g., if the PC control indicates that the system is not working correctly), the operator shall visit the site, visually inspect the system, and address any operational problems. The control valves and pressure relief valves shall be checked quarterly. On an annual basis, the pumps and conductive level control switches shall be removed from the well, cleaned, and repaired, as necessary. The aboveground portions of the conveyance lines shall be checked weekly for possible leaks or other damage. Comparisons of the total volume of influent measured by the PC control system into the treatment plant and the sum of the total flows recorded at each recovery well shall be performed monthly. If the volumes differ significantly, an investigation to identify the cause of the difference shall be performed. The investigation shall include, at a minimum, an inspection of aboveground portions of the GWR system header to verify that there are no leaks in the lines.

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7.3 GROUNDWATER TREATMENT SYSTEM

Operator functions for the GWTS are summarized on Table 7-1. In general, the operator must verify on a daily basis, that the groundwater treatment system is operating properly on a daily basis by accessing the PC control system via the remote PC. Once a week or as necessary (e.g., if the PC control system indicates that the system is not functioning properly), the operator shall visit the site, visually inspect the system, and correct any operating problems. Other specific tasks, including manual operating tasks are listed on Table 7-1.

7.4 GROUNDWATER DISCHARGE SYSTEM

The effluent discharge line and the discharge point shall be inspected at a minimum of once every month (more frequently if necessary). The discharge point shall be inspected to verify that discharge of the treated effluent is not causing adverse affects (i.e., excessive erosion, turbidity, etc.) to the unnamed tributary to Elk Creek. The air release valve on the discharge line in the manhole shall be inspected

TABLE 7-1

**SCHEDULE OF OPERATOR TASKS FOR THE
GWR SYSTEM AND GWTS**

**LORD-SHOPES LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Activity	Location	Comment
Daily Activities:			
Recovery Wells	Verify System is Operating	Remotely/PC	Check influent flow rate on PC. Verify that flow rate has not decreased.
Pressure Filter (F-1 & F-2)	Check Differential Pressure	Remote/PC	Backwash pressure differential set at 10 psig
Effluent Holding Tank (T-3)	Check Flow Rate	Remotely/PC	Maximum allowable flow rate is 47 gpm
Weekly Activities:			
Recovery Wells	Record Water Elevation in IPE-1 and IPE-2	Recovery Well	See Section 4.1.1 for instructions
	Record Flow Totals for IPE-1 and IPE-2	Recovery Well	Required when system is operating only (Performance Monitoring Data)
	Record Flow Rate for IPE-1 and IPE-2	Recovery Well	Measure flow rate by timing gauge at the wellhead
	Check Heat Tracing	Recovery Well	Required during cold weather months; Physical inspection by checking for warmth.
Recovery Conveyance Lines	Check for Leaks	Recovery Well	Compare total flow to sum of each well.
Equalization Tank (T-1)	Check Mixer (M-1)	Local	Verify that mixer is operating by checking motor on top of T-1

TABLE 7-1 (Continued)

**SCHEDULE OF OPERATOR TASKS FOR THE
GWR SYSTEM AND GWTS**

**LORD-SHOPES LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Activity	Location	Comment
Pressure Filter (F-1 & F-2)	Check Backwash Cycle	PC	Minimum 1 cycle per week
	Check Backwash Duration	PC	Maximum of 8 minutes
	Check Differential Pressure	Operating Filter	Verify gauge readings correspond to PC output; differential pressure should not exceed 10 psi
Air Stripper (AS-1)	Check Air Flow Rate	Local	Should operate at an air flow of 0.3 inches w.c.
	Check Air Pressure	Local	Should operate at a pressure of 11.0 inches w.c.
Air Stripper Pumps (P-5 & P-6)	Check Pump Cycle Times	Local	Each pump should operate no more than 3-times per hour.
Sludge Holding Tank (T-4)	Check Sludge Level	Local	Observe sludge level indicator; Record value
Potassium Permanganate	Check Liquid Level	Local	Mix new batch of potassium permanganate solution as necessary. Follow instructions in Section 4.9.1.
Metering Pumps (P-3 & P-4)	Check Metering Rate Against Influent Flow	Local	See Table E-2 for feed rate vs. influent flow
Filtrate Return Tank (T-5)	Check Water Level in Tank	Local	Verify decant is operating
Plant Piping	Check for Leaks	Local	Visual inspection of entire system
Monthly Activities:			
Air Stripper (AS-1)	Inspect Unit for Fouling	Local	Deactivate GWTS and inspect air stripper aeration trays

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TABLE 7-1 (Continued)

**SCHEDULE OF OPERATOR TASKS FOR THE
GWR SYSTEM AND GWTS**

**LORD-SHOPES LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Activity	Location	Comment
Filter Backwash pumps (P-9 & P- 10)	Check that Pumps are Alternating	Local	Pumps should alternate between pumping events. Verify by observing between two consecutive backwash events.
Quarterly Activities:			
Recovery Wells	Check Air Release Valve, Globe Valve, and Check Valve	Recovery Well	Visually inspect to determine condition of equipment
Semi-Annual Activities:			
Monitoring Wells	Collect Water Levels	Monitoring Wells	Performance monitoring; see Section 10.0 for additional information
Annual Activities:			
Equalization Tank (T-1)	Check Level Switches	Local	Verify that switches are operating properly
Filtrate Return Tank (T-5)	Check Level Switches	Local	Verify that switches are functioning
Activities As Required:			
Recovery Well Pumps	Check and Adjust Pumping Rate	Recovery Well	As described in Section 4.1.1
Equalization Tank (T-1)	Check and Adjust Flow Rate	PC	See Section 4.2.2 for instructions
Pressure Filter (F-1 & F-2)	Check Backwash Flow Rate	Local	Approximately 180 gpm
Air Stripper (AS-1)	Clean Air Stripper	Local	Clean based on visual inspection

TABLE 7-1 (Continued)

**SCHEDULE OF OPERATOR TASKS FOR THE
GWR SYSTEM AND GWTS**

**LORD-SHOPES LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

Item	Activity	Location	Comment
Sludge Holding Tank (T-4)	Process Sludge through Filter Press	Local	Sludge will be dewatered when a depth of 10 inches is measured on the sludge depth meter.
	Check and Clean Level Indicator	Local	
Potassium Permanganate	Mix New Batch of Solution	Local	See Section 4.9.1
Metering Pumps (P-3 & P-4)	Alternate Pump Operation	Local	Manually switch pump operation when a new batch of solution is prepared
Routine Operating Activities:			
Filter Press (FP-1)	Check Air Compressor Pressure	Local	Pressure not to exceed 100 psig
	Check Air Pressure at Pump	Local	Pressure shall not exceed 100 psig
Five Year Activities:			
Recovery Conveyance Lines	Pressure Test Lines	Local	More often if leaks are suspected
Other Activities:^b			
GWTS Effluent	Compliance Monitoring	Local	

^aHydraulic Monitoring shall be performed at frequencies described in the Long-Term Monitoring Plan (Appendix J).

^bCompliance monitoring shall be performed at frequencies prescribed in the NPDES permit (see Appendix G).

Note: Items marked as performance monitoring in the comment column are to be manually recorded by the operator.

a minimum of once per year. Once every two years, the drain valve for the discharge line located in the manhole shall be opened to flush out any collected sediment. The released water shall be pumped out of the manhole and discharged to the creek. As necessary, the cleanout port on the discharge line can be used for access when cleaning the discharge line.

NOTE: All Health and Safety procedures shall be adhered to during maintenance of the GWTS discharge line including confined space entry procedures. See Appendix A for the HASCP.

ORIGINAL
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7.5 ISVS SYSTEM

Operator functions for the ISVS system are summarized in Table 7-2. In general, all PC control system monitoring parameters shall be checked remotely by the operator to verify proper operation of the system. The operator shall inspect the entire ISVS system at a minimum of once per week or more often as dictated by the monitoring parameters. The entire system shall also be inspected prior to each startup. Inspection items and frequencies for the thermal oxidizer are provided in the thermal oxidizer operation and maintenance manual included in Section 001 and Section 002 of Attachment I.

TABLE 7-2

ISVS SYSTEM
OPERATOR SCHEDULE OF TASKS

LORD-SHOPES LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Item	Activity	Location	Comment
Daily Activities:			
Thermal Oxidizer	Check Operating Parameters	Remotely/PC	See Section 5.1 for typical operating parameter values.
Header System	Check Total and Area Flow Rates	Remotely/PC	See Section 5.1 for typical operating parameter values.
	Check Total Vapor Temperature	Remotely/PC	See Section 5.1 for typical operating parameter values.
Landfill Temperature Wells	Check Landfill Temperature	Remotely/PC	See Section 5.1 for typical operating parameter values.
Weekly Activities:			
Condensate Tank and Pump	Check and Record Volume Pumped	Flow Totalizer	Record gauge reading (Performance Monitoring)
Thermal Oxidizer	Check: - FID gas - Natural gas	Thermal Oxidizer	Replace calibrating gas as necessary Replace calibrating gas as necessary
Extraction Points	Record Air Flow	Extraction Wells	Flows shall also be checked upon each startup (Performance Monitoring)
	Record Vacuum	Extraction Wells	Performance Monitoring
	Record Extracted Vapor Temperature	Extraction Wells	Performance Monitoring
Landfill Temperature Wells	Check and Record Vacuum	Temperature Well	Vacuum levels shall also be recorded upon startup (Performance Monitoring)

TABLE 7-2 (Continued)

ISVS SYSTEM
OPERATOR SCHEDULE OF TASKS

LORD-SHOPES LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Item	Activity	Location	Comment
PC Control System	Adjust Monitoring Parameters -Vacuum -Specific Gravity -Dilution Air Temperature	Local/PC	See Section 5.0 for instructions See Section 5.0 for instructions See Section 5.0 for instructions
Monthly Activities:			
Thermal Oxidizer	Calibrate FID	Local	See Section 002 of Attachment I.
	Download Data Acquisition Files	Remotely/PC	
Header System	Download Data Acquisition Files	Remotely/PC	
Landfill Temperature Wells	Download Data Acquisition Files	Remotely/PC	
Quarterly Activities:			
Extracted Vapor	Sample and Analyze for Specific VOCs	Sample port at -landfill header -toe header -crest header	
Monitoring Equipment	Calibrate CO, O ₂ , and LEL meters	Local	See Section 002 of Attachment I
As Necessary Activities:			
Extraction Points	Adjust Air Flow	Extraction Wells	

Note: Items marked as performance monitoring in the comment column are to be manually recorded by the operator.

SECTION 8

8.0 TROUBLESHOOTING

This section contains troubleshooting guides for the major processes of the ISVS system, the GWR system, and the GWTS. These guides are presented in tabular format and are intended to help diagnose the potential cause of performance-related operational problems or irregularities. Also, it identifies possible corrective actions to be selected. As operating experience increases, the supervising staff and operators should revise and/or supplement the information contained herein to make the guides more helpful. Equipment manufacturer troubleshooting guides should be used to supplement this information (see Attachments).

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The troubleshooting guide for the ISVS system is included in Table 8-1. The troubleshooting guide for the GWR system and GWTS is included Table 8-2. In addition, historical troubleshooting logs should be referenced for additional information.

The troubleshooting format is divided into three sections: Observation (the problem), Potential Cause, and Corrective Action. The "Observation" column contains a brief statement of the observed irregularity. The "Potential Cause" column identifies a possible cause to the observed problem. However, care must be taken in that not every potential performance problem will be identified by these guides. Also, the listed "potential causes" should be initially reviewed to consider the most likely cause of a problem once it has been identified. Then, the "Corrective Action" column lists measures to resolve the potential cause of the problem.

Appropriate operators and supervisory personnel should be familiar with the troubleshooting guides and procedures to minimize review time and more quickly identify potential causes of problems. Malfunctions should be evaluated, logged, and discussed with appropriate supervisory personnel.

As discussed above, operational problems and corresponding corrective actions should be logged for future reference. A log sheet is provided in the office of the treatment building so that troubleshooting events can be documented for future reference. Copies of these logs shall remain at the site and as necessary, revisions to this section of the O&M manual can be made based on these recorded events.

TABLE 8-1

**ISVS SYSTEM TROUBLESHOOTING^a
LORD SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

System	Observation	Potential Cause	Corrective Action
Vacuum Extraction and Thermal Oxidation System	Recovery Piping - Loss of vacuum	1) Fracture or damage to recovery piping	1) Inspect and repair pipe, as necessary
	Recovery Piping - High vacuum	1) High groundwater table	1) Monitor and adjust operations accordingly
		2) Recovery line or valve blockage	2) Inspect and service pipe or valve, as necessary
	Condensate Tank - High Level Shut Down	1) Condensate Discharge Pump failure	1) Service pump and inspect pump influent and effluent lines
	Extraction/emission control system trouble	Reference manufacturer's O&M manual- Section 001 of Attachment I.	

^aInformation provided by Dames & Moore.

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TABLE 8-2

**GWR AND GWTS TROUBLESHOOTING^a
LORD SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

System	Observation	Potential Cause	Corrective Action
GWR System	Unusually Low Recovery Flow Rates	1) Recovery Pump	1) Service Pump
		2) Flowmeter, Line, Valve Obstruction	2) Replace/service flowmeter, line, valve
		3) Leak or break in recovery line	3) Locate and repair leak
		4) Freezing of recovery line	4) Service heat tracing
Equalization Tank	Frequent LSHH Condition	1) T-1 influent flow rate exceeds effluent	1) Decrease influent flow rate or increase T-1 effluent flow rate (P-1/P-2) using flow control valve
		2) P-1/P-2 Failure	2) Inspect and service P-1/P-2 and pump influent/effluent piping
	Frequent LSLI Condition	1) T-1 effluent flow rate exceeds influent	1) Increase influent flow rate or decrease T-1 effluent flow rate
		2) LSLI Failure	2) Inspect and service level switch
Pressure Filter System	Flow Rate Lower Than Programmed Value	1) Filter media fouling - unsuccessful backwashing	1) Check backwash flow rates, volume, and time of cycle to assure proper backwash
		2) Flow Element or automatic flow valve failure	2) Monitor and service as required
		3) Other filter troubles	3) Refer to filter package manufacturer's information
	High Flow Rate	1) Flow element or automatic flow valve failure	1) Monitor and service as required

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TABLE 8-2 (Continued)

**GWR AND GWTS TROUBLESHOOTING^a
LORD SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

System	Observation	Potential Cause	Corrective Action
Air Stripping System			Reference manufacturer's O & M Manual - Section 006 of Attachment II.
Effluent and Backwashing System	High-high water level in T-3	1) Unbalanced flow rates	1) Adjust flow rates
		2) Pump P-7/P-8 failure	2) Service P-7/P-8
	Frequent cycling of discharge pump P-7/P-8	1) Unbalanced flow rates	1) Adjust flow rates
Sludge Handling System	Air Compressor Not Pressurized above 100 psig	No power to compressor. Pressure setting incorrectly adjusted	Check circuit breaker. Recalibrate pressure setting as per manufacture's O&M manual.
	Pump does not deliver material to Filter Press	Solids may be lodged in pump.	Remove ends and check diaphragm pump.
Miscellaneous Systems	Sump Pumps running but not pumping	Solids clogging suction port	Clean suction port
	Sump Pumps will not turn on or turn off	Tangled float switches	Free Float Switches

^aInformation provided by Dames & Moore

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SECTION 9

9.0 PERFORMANCE MONITORING PROGRAM

The performance monitoring program is designed to verify that the remedial systems operating at the site are functioning properly. Monitoring the performance of the remedial systems at the site will be accomplished through the use of information collected by the PC control system as well as the routine collection of data by the operator. A summary of the performance monitoring data to be collected during operation of the ISVS system, GWR system, and GWTS is presented in Table 9-1.

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In the following sections, a description of the performance monitoring tasks performed by the PC control system is presented. In addition, a discussion outlining the cleanup criteria for groundwater and site soils is also presented.

9.1 PC CONTROL SYSTEM

The PC control system is designed to monitor and control specific functions associated with the ISVS system and GWTS in order to ensure that these systems function properly. Detailed descriptions of the control systems for the GWTS and ISVS system are provided in Section 4.0 and Section 5.0 respectively. In addition to these descriptions, tables outlining the control points, alarm conditions, and control actions for both the ISVS system and GWTS are included in Appendix H. Performance monitoring data collected by the PC control system are also summarized in Table 9-1.

As stated above, the PC control system serves as an automated monitoring system that helps to maintain proper operation of the remedial systems at the site. One function of the PC control system is to alert the operator when operating conditions of a particular system may result in unfavorable remedial performance (i.e. low combustion temperature in the thermal oxidizer). The PC control system is configured to activate an alarm if these conditions occur. Annunciation of alarms is accomplished either on the PC control system, the CAAP located at the site, or by remote annunciation via the autodialer system. The autodialer system is configured to dial out to a 24-hour service in the event an alarm associated with a specific alarm group is activated. There are four (4) separate alarm groups associated with the autodialer system and a summary of the alarm groups is included in Table 9-2.

TABLE 9-1
SUMMARY OF MONITORING CRITERIA
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP PENNSYLVANIA

Criteria	Method of Collection		Performance Criteria
	PC	Operator	
ISVS System			
Opacity	✓		
Extracted Vapor Temperature	✓		
LEL	✓		
Total Hydrocarbons	✓		√a
Oxygen	✓		
Carbon Monoxide	✓		
Crest Header Flow	✓		√a
Landfill Header Flow	✓		√a
Toe Area Flow	✓	✓	√a
Dilution Air Flow	✓		√a
Combustion Temperature	✓		✓
Extracted Vapor Vacuum	✓		√a
Extraction Well Flow (9 ea.)		✓	
Extraction Well Vacuum (9 ea.)		✓	
Extraction Well Temperature (9 ea.)		✓	
Toe Area Vacuum		✓	
Landfill Temperature Probes	✓		
GWR System:			
Hydraulic Monitoring		✓	√a, b
Groundwater Quality Monitoring		✓	√a, b
Recovery Well Flow Total	✓		√a
GWTS:			
Influent Flow Rate	✓		
Influent Flow Total	✓		√a
Backwash Duration	✓		
Granular Media Differential Pressure		✓	
Pump Discharge Pressure		✓	
Solids Generation		✓	√a
Effluent Flow Rate	✓		
Effluent Flow Total	✓		√a,
Treated Effluent Monitoring	✓c	✓	√a, b
Air Stripper Air Pressure		✓	√a

^aValue measured will vary based on conditions in the field.

^bMonitoring criteria necessary to monitor performance of the system as well as to support regulatory conformance.

^cPC control system records pH and specific conductivity of treated effluent.

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TABLE 9-2
SUMMARY OF ALARM GROUPS FOR THE
AUTODIALER SYSTEM

LORD-SHOP LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Alarm Group ^a	Alarm Group Condition
Group I	Potential Landfill Fire
Group II	Groundwater Process Stoppage
Group III	ISVS System Stoppage
Group IV	Building Environmental Condition

^aSee Appendix H for specific control points for each alarm group.

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Alarms annunciated via the autodialer system must be acknowledged with a response code in order to stop the autodialer from continuing to call the programmed list of telephone numbers.

The PC control system is also designed to record essential parameters for the ISVS system and GWTS in order to evaluate the performance of these remedial systems. Specific monitoring parameters and recording frequencies for the GWTS and the ISVS system are described in detail in Section 4.0 and Section 5.0, respectively. The PC control system is capable of enabling the operator to access and download performance criteria remotely using the telephone modem system provided with the on site computer. Instructions for accessing and downloading performance criteria (historical data) files are provided in the PC control system operations manual(s).

Historical data files will be downloaded monthly from the data acquisition system and reconfigured to Microsoft® Excel format for use in evaluating the performance of the GWTS and ISVS system. Conversion of these files can be accomplished using the software provided with the PC control system. The information recorded by the PC control system along with the compliance monitoring data described in Section 10.0 will be stored in an operation and maintenance file for future reference and evaluation of system performance.

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SECTION 16

10.0 COMPLIANCE MONITORING

The primary goals of the recovery system are to prevent the plume of volatile organic compounds from migrating and to implement a long-term program to clean up the groundwater plume. The compliance monitoring program has been developed to evaluate the performance and effectiveness of the GWR system, GWTS, and intrinsic bioremediation program. The compliance monitoring program includes hydraulic monitoring for the GWR system, groundwater quality monitoring including biodegradation parameters, and treated effluent monitoring for the GWTS. Hydraulic monitoring will consist of obtaining water level measurements to assess the size and stability of the zone of capture over time. Groundwater quality monitoring will be conducted to evaluate if the composition, size, and shape of the plume changes over time and to evaluate biodegradation parameters. Lastly, the treatment system effluent will be monitored in accordance with the NPDES discharge permit.

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The principal aspects of the monitoring program are summarized on Table 10-1. Furthermore, the Long-Term Monitoring Program is described in detail in Appendix J.

TABLE 10-1
SUMMARY OF COMPLIANCE MONITORING PROGRAM
LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Medium	Parameters	Frequency	Stations
<u>Groundwater Recovery (Hydraulic Monitoring)</u>			
	Depth to water	Semi-annually	51 wells ^{a,b}
<u>Groundwater Quality</u>			
	VOCs, select metals ^c	Semi-annually: Project Duration	<u>21 wells (as per Table 2-3)^b</u>
	VOCs, select metals ^c	Annually: after 2nd year	Plume wells only ^b
	<u>VOCs, select metals^c</u>	<u>Annually</u>	<u>7 Residential wells</u>
<u>Biodegradation Parameters</u>			
	D.o., Eh., temperature, conductivity, <u>nitrate/nitrite, methane, ethene, ethane, sulfate, TKN, ammonium ion, manganese, iron, phosphate, carbonate/biocarbonate</u>	Semi-annually: Project Duration	<u>24 wells (as per Table 2-4)^b</u>
	D.o., Eh., temperature, conductivity, <u>nitrate/nitrite, methane, ethene, ethane, sulfate, TKN, ammonium ion, manganese, iron, phosphate, carbonate/biocarbonate</u>	Annually: after 2nd year	Number to be determined
<u>Wastewater^{d,e}</u>			
	Flow	Continuously	1 - Effluent
	Flow, pH, COD, TOC, Specific Conductivity	Weekly	1 - Effluent
	Select Metals, Oil & Grease ^c	Monthly	1 - Effluent
	VOCs ^c	Monthly	1 - Effluent

^aDesigned hydraulic monitoring wells are listed in Table 2-2 of the Long-Term Monitoring Plan.

^bSpecific wells in groundwater quality monitoring and hydraulic monitoring networks will be periodically evaluated.

^cSpecific VOC and metals constituents are listed on Table 4-1 of the Long-Term Monitoring Plan.

^dIn accordance with NPDES permit.

^eInfluent monitoring for the first three months of plant operation. Frequency and parameters to be determined thereafter.

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11.0 OPERATIONS STARTUP

The ISVS system, GWR system, and the GWTS are all monitored and controlled by the PC control system. In the event that the system needs to be restarted, operator intervention will be required to start these systems. Procedures for starting these systems are described in further detail in the following sections. These procedures will be field tested and revised accordingly during the initial operation of the ISVS system and GWTS.

In general, when an alarm condition stops one of the processes controlled by the PC control system, the alarm condition will have to be cleared prior to restarting the system. Clearing an alarm condition (e.g. high water level in a tank) may require that the system is operated manually. The PC control system includes a manual interlock defeat system that enables the operator to override the process interlocks and operate the system in a manual mode.

CAUTION: Manual operation of the system will require certain system interlocks to be overridden. The operator must be present during manual operation of the GWTS and monitor conditions in each system component to prevent overflow of tanks or dry operation of pumps. Manual operation is not recommended under normal operation.

The manual interlock defeat system can be activated using the switch located in the electrical equipment room. The button must be depressed for more than 30 seconds. The interlock defeat disables the PC control system for 30 minutes to allow the operator clear the cause of the alarm condition.

11.1 ISVS SYSTEM

Prior to starting the ISVS system, the thermal oxidizer, header system, and extraction points shall be inspected throughout to verify that equipment including control valves are properly configured. The GWTS shall also be inspected to verify that conditions within this system are acceptable in the event condensate is pumped to T-1 upon startup of the ISVS system. In an alarm event, the ISVS system shall

be started only after the cause of the alarm and system shutdown has been identified and corrected.

The procedures for starting the ISVS system from a cold startup are as follows:

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NOTE: Procedures for starting the thermal oxidizer are presented in Section 1.0 of Attachment I. The operator shall review all manufacturer's information and receive the necessary training prior to starting or operating this equipment.

In the event the ISVS system is automatically deactivated by a controlled shutdown, the operator can skip to step 6G for re-start procedures. However, it is good operating practice to inspect the ISVS system upon each site visit prior to starting the thermal oxidizer or making changes in the operating conditions.

1. Inspect the entire ISVS system and GWTS to verify that conditions within these systems are acceptable for startup.
2. Verify that I/O circuit breakers No. 24 through No. 30 located in Lighting Panel No. LP1 are in the ON position. If not, turn these breakers ON. An alarm on the CAAP should sound. Reset this alarm by pressing the ACK button located on the front of the CAAP.
3. Verify that the PC control system is activated. The PC control system can be activated by turning on the computer located in the site office or rebooting the machine (i.e. pushing the reset button on the front of the machine). Note that rebooting the PC control system will reset certain default values. Refer to Section 4.0 and Section 5.0 for information on setting system default values for the GWTS and ISVS system, respectively.

NOTE: If the ISVS system was deactivated by the PC control system (i.e. activated the shunt trip), the alarm condition must be acknowledged on the PC control system and the alarm condition must be cleared by operator intervention. Disconnect switches deactivated by the PC control system cannot be reset until the alarm condition is rectified.

4. Check the valve positions for the ISVS system to verify that positions are properly set. If a process stoppage occurs where no maintenance or changes to the system have been performed, the operator may skip this step. However, it is good practice to inspect the entire system prior to restarting the operation.
5. Set the DISCONNECT SWITCH (1K) on the motor control center (MCC) located in the electrical equipment room to the ON position.
6. Start the thermal oxidizer following the procedure outlined below and as described in Section VI of the manufacturer's operation and maintenance manual (Section 1.0 of Attachment I).
 - A. Close the Well Flow Blocking Valve and open the Manual Dilution Air Valve. Note that the High Temperature Dilution Valve (HTDV) should also be open. (This valve operates automatically and should only be observed.)
 - B. Verify that all manual valves in the gas train excluding the fail-safe locktight valves (2 each) are open.
 - C. Verify that the (red) Emergency Stop Button located on the oxidizer control panel is pulled out.
 - D. Turn the Main Disconnect switch on the oxidizer control panel to the ON position. Lights on the oxidizer control panel should be illuminated as follows:

Description	Light On/Off	Light Color
Power On	ON	Green
Oxidizer On	OFF	Green
Power Interruption	ON	Red
Combustion Blower Running	ON	Green
Main Gas Valve at Low Fire	ON	Green
Pilot Solenoid Open	OFF	Green
Main Gas Solenoid	OFF	Green
Process Blower Running	ON	Green

Description	Light On/Off	Light Color
Process Blower Failure	OFF	Green
High Temp. Dilution Valve Closed	ON	Green
High Temp. Dilution Valve Open	OFF	Green
High/Low Gas Pressure	OFF	Red
Control Faults	ON	Red
High Temp. Shutdown	ON	Red
Low Temp. Shutdown	OFF	Red
Knockout Pot HLL	OFF	Red

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(Red)

- E. Open the clear access door on the oxidizer control panel.
- F. Reset the High Temperature Shut Down Controller by pressing the Set button followed by the Reset button. The Control Fault and High Temperature Fault lights should turn off (clear).
- G. Press the Power Interruption Reset Button on the oxidizer control panel. The Power Interruption Fault Light should go off and only green lights on the oxidizer panel should be illuminated.
- H. Turn Oxidizer switch ON and Run/Bypass switch to BYPASS. The Oxidizer On light should now be illuminated.
- I. The Combustion Air Actuator will go to high fire for a 90 second purge cycle. After the purge cycle is complete, the Main Gas Valve at Low Fire light will illuminate.
- J. The Pilot solenoid will now open and the "Pilot Solenoid Open" light will illuminate. Note that the Flame Intensity Meter located on the oxidizer control panel will indicate a reading of the Flame Intensity.
- K. If the Flame Control registers a flame, it will open the Main Gas Solenoid Valve and the "Main Gas Solenoid" Open light will illuminate.
- L. The Main Gas Manual Reset Valve (MGMRV) is now energized. Open this valve manually.
- M. The Process Flow Manual Reset Valve (PFMRV) located on the blower side of the oxidizer is also energized. Open this valve manually.
- N. Verify that the oxidizer is functioning by observing the pilot flame within the oxidizer chamber using the site glass located near the exhaust stack of the thermal oxidizer.

- O. Observe the indicator lights located on the oxidizer control panel. The following lights should be illuminated:

Description	Light On/Off	Light Color
Power On	ON	Green
Oxidizer On	ON	Green
Combustion Blower Running	ON	Green
Main Gas Valve at Low Fire	ON	Green
Pilot Solenoid Open	ON	Green
Process Blower Running	ON	Green
High Temp. Dilution Valve Open	ON	Green

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- P. Turn the Run/Bypass switch to RUN. When the thermal oxidizer combustion temperature nears 1,680°F, the High Temperature Dilution Valve Open indicator light will go off and the High Temperature Dilution Valve Closed indicator light will illuminate. Allow the thermal oxidizer to stabilize at 1,700°F before proceeding to the next step. This entire step may take approximately 10 minutes to complete and possibly longer during cold weather months.
- Q. Verify that the High Temperature Dilution Valve (HTDV) is closed.
- R. Once the thermal oxidizer combustion temperature has stabilized at the operating setpoint (i.e., 1,700°F), open the Well Flow Blocking Valve a little at a time while monitoring the temperature display on the thermal oxidizer temperature controller. The valve should be opened in a manner such that the combustion temperature is maintained.
- S. After completely opening the Well Flow Blocking Valve, slowly (very slowly) close the Manual Dilution Air Valve while monitoring the temperature display on the Combustion Temperature Controller. For normal, operation try to maintain combustion temperature around 1,700°F.

NOTE: When opening the Manual Dilution Air Valve, observe the air flow pressure gauge located near the thermal oxidizer blowers. As the Manual Dilution Air Valve is closed, the air flow pressure indicated on this gauge should decrease.

T. Observe the Total Air Flow gauge located near the oxidizer blowers. Under normal operating conditions this gauge should read **0.38 inches W.C.** Adjust the Process Recirculating Valve number 4 (PRV-4) so that the Total Air Flow registers 0.38 inches W.C. (This valve should only be adjusted if operating conditions change significantly, i.e., increase total CFM flow rates or vacuum levels.)

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7. Check the flow rate for the landfill area, dilution air, crest area, and total extracted vapor flow to verify that the ISVS system is operating properly. This can be accomplished by accessing the EX-WELL and ISVS screen displays on the PC control system.
8. Check the landfill temperature probe readings on the PC control system. Temperature probe measurements can be observed by accessing the LF-TEMP screen display. Verify that temperatures are in the ranges specified in Section 5.1.
9. Refer to Section 5.0 for normal operating procedures for the ISVS system.
10. Observe the system operating for a minimum of 30 minutes prior to leaving the site. Complete the appropriate log sheets and review the operator site exit checklist prior to leaving the site.

11.2 GWR SYSTEM AND GWTS

As previously discussed, when an alarm condition stops one of the processes operated by the PC control system, the alarm condition will have to be cleared prior to restarting the system. The GWR system and GWTS system shall be started only after the cause of the alarm and shutdown has been investigated and corrected.

The following steps shall be performed to start the GWR system and GWTS and assume all alarm conditions have been rectified and cleared from the PC control system:

1. Inspect the GWR system and GWTS to verify that conditions within these systems are acceptable for startup. Check the valve positions for the GWTS to

verify that positions are set in accordance with the valve schedule table (Table D-1). If a process stoppage occurs where no maintenance or changes to the system have been performed, the operator may skip this step. However, it is good practice to inspect the entire system prior to restarting the operation.

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2. Verify that I/O breakers No. 24 through No. 30 located in Lighting Panel No. LP1 are in the ON position. If not, turn these breakers ON. An alarm on the CAAP should sound. Reset this alarm by pressing the **ACK** button located on the front of the CAAP.
3. Verify that the PC control system is activated. The PC control system can be activated by turning on the computer located in the site office or by rebooting the machine (i.e. pushing the reset button of the front of the machine). Note that rebooting the PC control system will reset certain default values. Refer to Section 4.0 and Section 5.0 for information on setting system default values for the GWTS and ISVS system, respectively.
4. Set the **CONTROL SWITCHES** on the MCC to the positions identified in Table A:
5. Start the air stripper per the following steps:
 - A. Set the switches located on the air stripper control panel to the following positions:
 - Inlet Blower - OFF
 - Alarm Horn - OFF
 - B. Turn **DISCONNECT SWITCH** 1J to the ON position.
 - C. Turn Inlet Blower switch located on the air stripper control panel **AUTO**. Blower will not start until pump P-1 or P-2 is engaged.
 - D. Turn Alarm Horn switch located on the air stripper control panel **ON**.

TABLE A
INITIAL SETTINGS FOR MCC

MCC Location	Device	Description	Switch Position	
			Control Switch (Step 4)	Disconnect Switch (Step 6)
1A	Main	Entire Complex	--	ON
1G	M-2	Permanganate Tank Mixer	OFF	ON
1J	AS	Air Stripper	--	ON ^a
1K	ISVS	Thermal Oxidizer	--	ON
1L	Air Comp.	Filter Press Air Compressor	--	OFF
1M	XMR	34.5 KVA Transformer	--	ON
2A	P-9/P-10	Backwash Pump	OFF	ON
2C	P-5/P-6	Eff. Tank Feed Pump	OFF	ON
2E	P-1/P-2	Filter Feed Pump	OFF	ON
2G	M-1	EQ Tank Mixer	OFF	ON
2J	P-7/P-8	Eff. Discharge Pump	OFF	ON
2L	P-12/P-13	Filtrate Return Pump	OFF	ON
3A	Cond. Pump	ISVS Condensate Pump	AUTO	ON
3C	IPE-1	GWR Pump	OFF	ON
3E	IPE-2	GWR Pump	OFF	ON
3G	IPE-3	GWR Pump	OFF	ON
3J	IPL-2	GWR Pump	OFF	ON
3L	HVAC	Process Area Air Handler	--	ON
4A	Sub Feed	Existing Bldg. Feeder	--	ON

^a Disconnect Switch previously turned ON in step 5

6. Set the DISCONNECT SWITCHES located on the MCC to the positions listed on Table A.

NOTE: If the a Disconnect Switch was deactivated by the PC control system (i.e. activated the shunt trip), the alarm condition must be acknowledged on the PC control system and the alarm condition must be cleared by the operator. Disconnect Switches deactivated by the PC control system cannot be reset until the alarm condition is rectified.

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7. Set the switches on I/O Panel No. 1 to the following positions:

INITIAL SETTINGS FOR I/O PANEL No. 1

Control Switch	Description	Switch Position
P-1/P-2	Filter Feed Pumps	Alternate
P-5/P-6	Eff. Tank Feed Pumps	Alternate
P-7/P-8	Eff. Discharge Pumps	Alternate
P-12/P-13	Filtrate Return Pumps	Alternate
P-3/P-4	Chemical Metering Pumps	P-3 or P-4
P-9/P-10	Backwash Pumps	Alternate

8. Start the GWTS by switching the CONTROL SWITCHES located on the MCC to the **AUTO** position in the following order:

- A. Switch 2J - AUTO
- B. Switch 2C - AUTO
- C. Switch 2E - AUTO (Note that air stripper blower will start with the activation of P-1 or P-2)

9. Start the GWR system by switching the CONTROL SWITCHES located on the MCC to the **AUTO** position in the following order:

- A. Switch 3C - AUTO
- B. Switch 3E - AUTO

C. Switch 3G - AUTO (Well not installed)

D. Switch 3J - AUTO (Well not installed)

10. Activate the remaining portions of the GWTS by setting the CONTROL SWITCHES to the following positions:

A. Switch 2A - AUTO

B. Switch 2G - ON

C. Switch 2L - AUTO

D. Switch 1G - AUTO

11. Check the GWTS and GWR system to verify that the system is operating properly. Refer to Section 4.0 for instructions for balancing flows through the GWTS.
12. Observe the system operating for a minimum of 30 minutes prior to leaving the site. Complete the appropriate log sheets and review the operator site exit checklist prior to leaving the site.

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APPENDICES

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APPENDIX A
HEALTH & SAFETY/CONTINGENCY PLAN

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1.0 BACKGROUND

1.1 SCOPE AND APPLICABILITY OF HEALTH AND SAFETY/CONTINGENCY PLAN

The purpose of this Health and Safety/Contingency Plan (HASCP) is to identify, evaluate, and control potential safety and health hazards, and to provide emergency response to incidents during operations of the remedy at the Lord Shope Landfill, Girard Township, Pennsylvania. The Lord Corporation personnel covered by this HASCP include those individuals working at the site who have potential for exposure to hazardous waste, hazardous substances, or a combination of these materials. This HASCP does not address procedures for activities performed by an emergency response contractor. Activities outside of the provisions of this HASCP will be covered under another HASCP written specifically for emergency response activities.

This HASCP complies with the requirements of the Occupational Safety and Health Administration (OSHA) Standards as stated in 29 CFR 1910 with emphasis on subsection 1910.120 (Hazardous Waste Operations and Emergency Response), 1910.1000 (Air Contaminants), and 1910.1200 (Hazard Communication, Right-to-Know Law); 1904 (Recording and Reporting Occupational Injuries and Illnesses); 1990 (Identification, Classification and Regulation of Potential Occupational Carcinogens), applicable portions of 29 CFR 1926 (Safety and Health Regulations for Construction); and any other federal and state statutes or regulations that may be determined applicable.

Amendments to this Plan will be made as the contaminant profile information is updated, a change in work status or task is made, or as regulatory requirements dictate. Changes to the Plan will be brought to the attention of those covered under the Plan through additional training.

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1.2 OBJECTIVES OF THE HEALTH AND SAFETY/CONTINGENCY PLAN

The objectives of this HASCP include the following:

- The identification and evaluation of potential hazards.
- The definition of levels of protection required for certain work activities.
- The evaluation and implementation of worker protective measures.
- The formulation of emergency action plans.
- The confirmation of medical monitoring.
- The implementation of personnel training.
- The design and implementation of decontamination procedures.
- The enforcement of appropriate record keeping.

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1.3 SITE BACKGROUND

A site background description has been included in the "Operations and Maintenance Manual Lord/Shope Landfill, Girard Township, Pennsylvania." As future data are generated or operations or maintenance activities change, they will be reviewed and this HASCP changed accordingly.

1.4 OBJECTIVES OF THE WORK PLAN

The site activities to be conducted during operations at the site have been identified and discussed in detail in the operations and maintenance manual. The site activities are summarized on Table 1-1.

1.5 VISITORS

Visitors to the Site will comply with Lord Corporation training requirements. Visitors will sign in the visitor log (Figure 3-3).

TABLE 1-1

**LIST OF OPERATIONS AND MAINTENANCE ACTIVITIES
LORD SHOPE LANDFILL, GIRARD TOWNSHIP, PENNSYLVANIA**

Site Activities will include the operation and routine maintenance of the following:

1. Operation of the In-Situ Vapor Stripping System (ISVS) which consists of extraction wells, piping, a vacuum blower, condensate collection tank, and a thermal oxidizer.
 2. Operation of the groundwater extraction system wells and forcemain.
 3. Operation of the groundwater treatment and discharge system.
 4. Long-term monitoring of groundwater quality and treated groundwater effluent quality.
 5. Routine maintenance of the above items which may also include confined space entry.
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1.6 KEY PERSONNEL

The following list of key personnel have been identified.

RESPONSIBILITY	AFFILIATION	NAME	PHONE NUMBER
Project Manager	Lord Corporation	E.A. Miller	814/869-0924, Ext. 3504
Alternate Contact	Lord Corporation	George Kickel	814/868-0924 Pager 814/451-4610
Alternate Contact	Lord Corporation	Bob Nipper	814/868-0924

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1.7 DEFINITIONS

The following terms have been described in the HASCP.

- **"Active Operations"** - Activities resulting in disturbance of soil, buildings, or equipment at a work area.
- **"Authorized Personnel"** - Any person, such as task-specific personnel, project personnel, oversight personnel, contractors, and consultants whose presence is authorized at the Shope Landfill site by Lord Corporation
- **"Best Management Practice (BMP)"** - Refers to recommended practices and management techniques that are effective in reducing potential losses due to injury or accidents. These practices are not necessarily mandated or required by specific regulations. An example is having two persons present when working over or near water. The BMP for this would be to schedule these type of activities during periods when two people are in the area.
- **"Contamination Reduction Zone"** - The area encircling the Exclusion Zone which includes both personnel and equipment decontamination areas. Personnel working in the contamination reduction zone must wear the designated PPE and meet the training and medical monitoring requirements. Also known as the Secure Zone.

- **"Contractor/Consultant"** - Any person or firm, retained or hired by Lord Corporation to carry out and/or supervise any portion of the activities conducted at the Project Site.
- **"Exclusion Zone"** - The area in which all entering personnel must be directly involved in the ongoing work, have designated personal protective equipment (PPE), and meet training and medical monitoring requirements. This includes any activity which disturbs the surface soils of this site. The exclusion zone will be defined by an approximate 25-foot radius around the work area, which will be suitably marked.
- **"Hazardous Substances"** - The liquid and solid materials found in the Exclusion Zone of the Lord Shope Landfill contain "listed" hazardous wastes. By the "derived from" rule, the wastewater and wastewater treatment residues that originate from the landfill area are also considered hazardous waste.
- **"mg/m³"** - Milligrams per cubic meter of air that describes concentrations of dusts, mists, and fumes present in the air.
- **"MSDS"** - Material Safety Data Sheet, which provide information on the physical, chemical, and hazardous properties of chemical compounds that may brought on the site by Lord Corporation or by authorized contractors.
- **"Oversight Personnel"** - Any person designated by the State Government, Federal Government, or Lord Corporation who is assigned to carry out oversight work. Oversight personnel must comply with the requirements of this HASCP.
- **"ppm"** - Parts per million; expressed as PPM(v) for gases and vapors.
- **"Project Director"** is responsible for the overall direction and completion of the project.
- **"Project Health and Safety Manager"** - The designated person responsible for the overall content, proper implementation, and

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maintenance of this site HASCP. This person is also responsible for the identification of any hazards which are not discussed in the Plan. Upon a major change in planned activities, the Project Health and Safety Manager shall evaluate the effectiveness of the PPE program for the site and for the planned activities. This shall include reviewing the site inspection notes, employee use and decontamination of PPE, review of site air monitoring and calibration data, and consideration of possible PPE program modifications. This report shall be made available to site personnel.

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- **"Project Manager"** is responsible for the direction and coordination of the field activities.
- **"Project Personnel"** - Any person or contractor, assigned by Lord Corporation, its consultants, or its contractors to carry out work at the Project Site (e.g., Project Director, Project Manager, etc.).
- **"Project Site"** - The area defined by a specific project Work Plan, as well as contiguous areas to which access is required for the execution of the field tasks which may be set forth in a Work Plan.
- **"Secure Zone"** - The area within a radius of approximately 50 feet established from the center of the work area (e.g. intrusive activities) and indicated by a visible surface device. Personnel entering a secure zone must have the designated PPE and meet the training and medical monitoring requirements.
- **"Site Contact/Coordinator"** is responsible for the education of site workers in Lord Corporation safety procedures and equipment not specifically discussed in this Plan.
- **"Site Safety Officer"** - The person(s) designated by Lord Corporation or the Contractor/Consultant who is responsible for supervising the HASCP. This person is responsible for conveying the information contained in the HASCP to the workers present on site, and in the absence of the Project Health and Safety Manager from the site, will fulfill the obligations of the Project Health and Safety Manager. This includes attendance at Site

Safety meetings, conducting site training and orientation sessions, reporting all incidents which happen to personnel under his/her supervision, and the timely submission of required forms.

- **"Site Safety Officer (Alternate)"** is responsible for fulfilling health and safety duties in the absence of the Site Safety Officer.
- **"Support Zone"** - The area outside the exclusion zone that is considered to have low levels of contamination. It is used for transfer of equipment and materials (i.e., support) into the secure area and does not require specialized training or protective equipment for personnel in this area.

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2.0 SAFETY AND HEALTH RISK ANALYSIS

2.1 IDENTIFICATION OF POTENTIALLY HAZARDOUS SUBSTANCES

Potentially hazardous chemicals present in the soils and groundwater at this site have been determined based on previous investigations (ECKENFELDER INC. September, 1991). The potential routes of exposure to these site chemicals include inhalation, skin absorption, and ingestion. Table 2-1 provides an inventory of these compounds and their various occupational exposure limits. The Permissible Exposure Limits (PELs) established by the Occupational Safety and Health Administration (OSHA) reflect the vacated final rule values of 1993 as well as the less stringent values found in the earlier air contaminants table (29 CFR 1910.1000). The Threshold Limit Values (TLV) published by the American Conference of Governmental Industrial Hygienists (ACGIH) are from the 1995-1996 edition.

Material Safety Data Sheets (MSDS) for these chemicals will be maintained in a separate binder at the site for ready reference by personnel and medical staff, should it be necessary. Site personnel will be informed of the potential chemical risks and appropriate monitoring and personal protective equipment (PPE) will be utilized.

The MSDS binder will also include chemicals commonly used in the site laboratory and treatment processes. These chemicals include hydrochloric acid, isopropanol, nitric acid, potassium permanganate, and sodium hydroxide.

2.2 RISK ANALYSIS OF PROJECT ACTIVITIES

A general risk analysis for each Site activity covered by the HASCP has been conducted. Most planned activities are associated with operations and maintenance activities. Table 2-2 provides a summary of tasks planned for the site with hazards and protective measures anticipated for each. The three potential routes of exposure to hazardous substances are: 1) the inhalation of hazardous vapors from the groundwater or soil, 2) direct dermal contact with contaminants contained in the groundwater or soil, and 3) ingestion by hand-to-mouth transfer of contaminants. For inhalation, prevention of exposure is accomplished by limiting exposure within

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TABLE 2-1

**COMPOUNDS OF INTEREST AND OSHA PERMISSIBLE EXPOSURE LIMITS (PEL)
LORD SHOPE LANDFILL SITE**

Compounds	CAS No.(a)	1989 OSHA PEL (Vacated) ^b	1993 OSHA PEL (Current) ^b	1994 NIOSH REL (Recommend) ^b	1996 ACGIH TLV (Recommend) ^b	1993 ShortTerm Limit (Current) ^c	Skin Absorbed ^d	Suspected or Confirmed Carcinogen	Ionization Potential ^f
		ppm(v)	ppm(v)	ppm(v)	ppm(v)	ppm(v)			eV
Acetone	67-64-1	750	1000	250	750	--	YES	--	9.69
Benzene	71-43-2	1	1	0.1 ^e	10	5	YES	YES	9.24
2-Butanol	78-92-2	100	150	100	100	150	--	--	10.10
2-Butanone (MEK)	78-93-3	200	200	200	200	300	YES	--	9.54
Chloroform	67-66-3	2	50	-- ^e	10	2	--	YES	11.42
1,1-Dichloroethane	75-34-3	100	100	100	100	--	--	--	11.06
1,2-Dichloroethylene	540-59-0	200	200	200	200	--	--	--	9.65
Hexone	108-10-1	50	100	50	50	--	YES	--	9.30
(MIBK, 4-Methyl-2-pentanone)									
Isopropyl alcohol	67-63-0	400	400	400	400	500	--	--	10.10
Landfill gas (Methane)	74-82-8	NEG	NE	NE	NE	NE	--	-213°F	12.98
								Flash point	5% v/v LEL
Tetrachloroethylene (Perk)	127-18-4	25	100	-- ^e	25	200	--	YES	9.32
Tetrahydrofuran	109-99-9	200	200	200	200	250	--	--	9.45
Toluene	108-88-3	100	200	100	50	300	YES	--	8.82
Trichloroethylene	79-01-6	50	100	-- ^e	50	200	--	YES	9.45
Vinyl chloride	75-01-4	1	1	-- ^e	5	5	YES	YES	9.99
Xylene	95-47-6	100	100	100	100	150	--	--	8.56

^aChemical Abstracts Service Number.

^bTime Weighted Average (8 hour day, 40 hour week); expressed as part per million of substance in air by volume.

^cShort Term Exposure Limit; 15 minute duration of exposure not to be exceeded any time during the day without respiratory protection.

^dSubstance may absorb through intact skin and contribute to overall dose. Sources include listings by OSHA, NIOSH, ACGIH and OHMTADS.

^eCarcinogen substance should be treated as potential occupational carcinogen and to reduce exposures to lowest feasible concentration.

^fElectron Volts - ionization potential of compounds.

^gNE = None Established.

TABLE 2-2

OPERATOR TASKS, POTENTIAL HAZARDS, AND CONTROL MEASURES
Lord Shope Landfill, Girard Township, Pennsylvania

OPERATOR TASKS	POTENTIAL HAZARDS	CONTROL MEASURES	REQUIRED PPE
1. Operation of ISVS System. Includes daily inspection and observation of site conditions.	a. Slips, trips and falls. b. Weather conditions and temperature extremes. c. Possible inhalation or direct contact with site contaminants. d. Flammable gases and vapors. e. Blower noise. f. Other site hazards including thermal.	a. Remove obstructions/debris from work areas. b. Personnel training and recognition of temperature related illness. c. Wearing of appropriate PPE when working near contaminants. d. Air monitoring for possible gases or vapors. e. Post warning signs in high noise areas that exceed 85 dBA. f. Personnel training in site operations, hot work permit system, first aid; decontamination; and evacuation procedures.	LEVEL D - Work clothes, hard hats, safety glasses, and safety boots. Rainsuits, coveralls, hearing protection, or gloves as required.
2. Operation of Groundwater Recovery System.	a. Slips, trips and falls. b. Weather conditions and temperature extremes. c. Possible inhalation or direct contact with site contaminants. d. Electrical shock. e. Other site hazards.	a. Remove obstructions/debris from work areas. b. Personnel training and recognition of temperature related illness. c. Wearing of appropriate PPE when working near contaminants. d. Follow Lord Corporation Lockout/Tagout procedures. e. Personnel training in site operations, hot work permit system, first aid; decontamination; and evacuation procedures.	LEVEL D - (noted in Task 1).
3. Operation of Groundwater Treatment and Discharge System	a. Slips, trips and falls. b. Weather conditions and temperature extremes. c. Possible inhalation or direct contact with site contaminants. d. Electrical shock. e. Contact with chemicals during batch preparation. f. Other site hazards.	a. Remove obstructions/debris from work areas. b. Personnel training and recognition of temperature related illness. c. Wearing of appropriate PPE when working near contaminants. d. Follow Lord Corporation Lockout/Tagout procedures. e. Wear chemically resistant clothing. f. Personnel training in site operations, hot work permit system, first aid; decontamination; and evacuation procedures.	LEVEL D - (noted in Task 1). Wear chemical splash goggles, neoprene gloves, and chemically resistant splash clothing or coveralls when exposed to site contaminants and liquids.

TABLE 2-2 (Continued)

OPERATOR TASKS, POTENTIAL HAZARDS, AND CONTROL MEASURES

OPERATOR TASKS	POTENTIAL HAZARDS	CONTROL MEASURES	REQUIRED PPE
4. Monitoring of Groundwater and Groundwater Effluent.	a. Slips, trips and falls. b. Weather conditions and temperature extremes. c. Possible inhalation or direct contact with site contaminants. d. Other site hazards.	a. Remove obstructions/debris from work areas. b. Personnel training and recognition of temperature related illness. c. Wearing of appropriate PPE when working near contaminants. d. Personnel training in site operations, hot work permit system, first aid; decontamination; and evacuation procedures.	LEVEL D - (noted in Task 1).
5. Routine Maintenance of Systems Listed Above.	a. Slips, trips and falls. b. Weather conditions and temperature extremes. c. Possible inhalation or direct contact with site contaminants. d. Electrical shock, moving parts, stored energy. e. Confined space entry. f. Other site hazards.	a. Remove obstructions/debris from work areas. b. Personnel training and recognition of temperature related illness. c. Wearing of appropriate PPE when working near contaminants. d. Follow Lord Corporation Lockout/Tagout procedures. e. Follow Lord Corporation Confined Space Entry procedures. f. Personnel training in site operations, hot work permit system, first aid; decontamination; and evacuation procedures.	LEVEL D - (noted in Task 1). Wear chemical splash goggles, neoprene gloves, and chemically resistant apron when handling chemicals.

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the breathing zone and the use of air-purifying respirators, if appropriate. For direct contact, prevention of exposure is accomplished by the proper selection and use of protective clothing. For ingestion, prevention may be accomplished by the use of gloves, frequent hand-washing, and other proper hygiene techniques.

The Lord Corporation Project Manager will address precautions taken to avoid the following potential hazards that are common to most work places:

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- Electrical
- Mechanical
- Fire/Explosion
- Heat and Cold Stress
- Acoustical

Workers will be advised of known potential hazards at the site prior to beginning work, and thereafter, as needed. Equipment will be operated by trained personnel as required. Employees will be cautioned by the designated Site Safety Officer during site safety meetings to be aware of moving equipment and to watch out for other workers as well. They will be encouraged to be observant of site safety and health hazards and to report them to their supervisors.

Fire extinguishers, respirators, and first aid kits will be available for use as needed at the site. Site workers will be trained in their use prior to arrival on site and advised of their availability and location.

2.3 MISCELLANEOUS PHYSICAL, HEALTH, FIRE AND EXPLOSION HAZARDS

Fire is a remote possibility when air is introduced into a capped industrial landfill. If any of the monitored parameters (temperature, CO content, opacity as monitored by the ISVS system) indicated an unacceptable increase in value, work will stop and the potential for an incipient fire investigated. Non-essential personnel will leave the site. Emergency response procedure outlined in Section 8.6 of this plan will be implemented in the event that a suspected landfill fire is occurring.

2.4 UNANTICIPATED HAZARDS

The following conditions, situations, or activities are not anticipated at this site and, therefore, safety procedures appropriate to them are not included in this Plan.

- The need to handle, enter, open, sample, or ship tanks or vaults containing hazardous substances.
- Field work in non-illuminated areas during darkness. Work areas must be lighted to intensities specified in Table H-102.1 of 29 CFR 1910.120.
- Any activities which cause breaching of the landfill cap (i.e., vapor extraction well installation, construction activities, etc.).

2.5 GENERAL SAFETY PROCEDURES

The following general safety rules must be followed by site personnel:

- Safety equipment and protective clothing will be worn in conformance with this Plan and other appropriate OSHA regulatory requirements.
- Unnecessary contact with contaminated surfaces or with surfaces suspected of being contaminated should be avoided.
- Eating, drinking, chewing gum or tobacco, and smoking is prohibited in work areas. These activities increase the probability of hand-to-mouth transfer and ingestion of contaminated material.
- Certain medicines and alcohol consumption can increase the toxic effects of chemicals and should not be used by employees while working on site. Personnel needing medication must advise their supervisor.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or other activities. Personnel should shower as soon as possible after the protective clothing is removed and the activity for the day has been terminated.

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2.6 METHANE HAZARD

Methane (CH₄) is a flammable gas that is colorless, odorless, and tasteless. It is typically found when organic materials decompose in an oxygen-deficient environment such as marshlands and solid waste landfills. Methane has an flammable range from 5.0 to 15.0% by volume in air (50,000 to 150,000 ppm), has an auto ignition temperature of 999 °F (537 °C), and a vapor density of 0.6 which is lighter than air. Methane acts as a simple asphyxiant by displacing oxygen from the breathing air.

Methane can not be detected with the human senses and has poor warning properties and is considered to be very dangerous. Methane can be detected with direct reading instruments such as combustible gas indicators and flame ionization devices such as an OVA. It is not acceptable to use an HNU to test for methane.

During intrusive activities into the landfill, a combustible gas/oxygen monitor must be used to measure gases as a percentage of their Lower Explosive Limit (LEL) or Lower Flammable Limit (LFL). The instrument must calibrated to the target gas in question, in this case methane. Continuous measurements of the LEL (or LFL) should be taken near the landfill opening, in the breathing zone, and near possible ignition sources.. The following actions will be taken when sustained measurements over one minute are:

Under 10% of the LEL	Continue work and to monitor the air.
Over 10% of the LEL	Suspend operations, shut off ignition sources, and evacuate the area until concentrations subside. Contact the site supervisor.
Over 50% of the LEL	If levels persist at this level, serious consideration should be given to abandoning that particular location and sealing the opening.

Oxygen levels below 19.5 percent will require an SCBA or airline respirator. Above 23.5 percent oxygen, activities will be suspended because of increased fire hazard.

2.7 PROCEDURES FOR WEATHER-RELATED PROBLEMS

2.7.1 Heat Related Illness

When coveralls made of Tyvek/Saranex are worn, body ventilation and evaporation are greatly reduced. Frequent breaks will be scheduled for personnel wearing the coveralls during periods of hot weather. Employees will be advised of the effects of heat stress, provided with adequate liquids while on site, and be instructed to observe each other for signs of heat stress during hot weather. Signs of heat stress are summarized as follows:

- Heat Exhaustion - Clammy skin, confusion, dizziness, fainting, fatigue, heat rash, light-headedness, nausea, profuse sweating, slurred speech, weak pulse.
- Heat Stroke - Confusion, convulsion, hot dry skin, high temperature (yet may feel chilled), incoherent speech, staggering gait, cessation of sweating, unconsciousness.

These signs can be distinguished from those associated with chemical hazards which are characterized by behavioral changes, breathing difficulties, change in complexion or skin color, coordination difficulties, coughing, dizziness, drooling, diarrhea, fatigue or weakness, and irritability.

2.7.2 Cold Related Illness

Cold weather related stress factors such as frostbite and hypothermia must be considered.

Hypothermia is a general cooling of the body. The stages of hypothermia are as follows:

- Shivering (a response that generates heat).
- Apathy and decreased muscle function.

- Decreased level of consciousness with a glassy stare and possible freezing of the extremities.
- Decreased vital signs with slow pulse and slow respiration rate.

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Hypothermia is an acute emergency requiring immediate medical attention. Keep the patient as warm and dry as possible until professional medical attention is available.

Frostbite is a local injury resulting from cold. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frostnip or incipient frostbite, characterized by sudden blanching or a whitening of the skin.
- Superficial frostbite is where the skin has a waxy or white appearance and is firm to the touch, but the tissue beneath is resilient.
- Deep frostbite, is where the tissues are cold, pale, and solid; this is an extremely serious condition that requires immediate medical attention.

Prevention is important. Proper clothing is essential. Frequent breaks to warm indoor environments will be arranged during especially cold periods.

Work will be suspended during weather conditions that are sufficiently extreme to potentially affect the adequacy of the HASCP or the integrity of equipment, such as heavy rains, heavy snow fall, electrical storms, or extreme heat or cold. The site supervisor is responsible for determining when to suspend work.

2.8 LYME DISEASE PREVENTION

The prevention of Lyme Disease is important during spring, summer and fall months. Lyme Disease is a bacterial infection transmitted by the bite of a deer tick.

To prevent the bite of a deer tick, avoid grassy areas when possible. Wear protective clothing (light colored) with long sleeves and pants tucked inside of socks. Use repellent containing "Permethrin" or "Deet". Make self inspection a habit following exposure to an area which may contain deer ticks.

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- Symptoms: headache, flu-like symptoms, a spreading ring-like rash, swelling and pain of the joints.
- Tick Removal: Remove attached tick immediately. Use tweezers to grasp the tick's head, near the skin, and slowly pull straight out. If possible, save the tick for laboratory analysis.

Report incidents involving deer tick bites to the Lord Corporation Project Manager.

2.9 POISON IVY, OAK AND SUMAC PREVENTION

Poison ivy, oak, and sumac plants cause contact dermatitis or an allergic reaction in about 90 percent of all adults.

To prevent contact wear protective clothing (Tyvek, long sleeves, gloves). Remove clothing without touching the outside of the garments that may have come in contact with the plants.

2.9.1 Signs and Symptoms

- Mild reaction: some itching.
- Mild to moderate reaction: itching and redness.
- Moderate reaction: itching, redness, and swelling.
- Severe: itching, redness, swelling, and blisters.

A day or two is the usual time between contact and the onset of signs and symptoms.

2.9.2 First Aid

Those knowing that they have contacted a poisonous plant should take immediate action within five minutes. The action includes rinsing with plain water or using alcohol.

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During the acute or weeping and oozing stage, sodium bicarbonate (baking soda) solution should be used.

If symptoms are severe, contact the Lord Corporation Project Manager for instructions for treatment by a physician.

2.10 PERMIT REQUIRED CONFINED SPACE ENTRY PROCEDURES

A confined space provides the potential for unusually high concentrations of potential contaminants, explosive and/or oxygen deficient atmospheres, limited visibility and restricted movement. This section will establish requirements for safe entry, work, and exit from confined spaces. Additional information regarding confined space entry can be found in 29 CFR 1926.21, 1910.146 and National Institute of Occupational Safety and Health (NIOSH) publication 80-106, and in the Lord Corporation Confined Space Entry Procedures.

A Confined Space is defined as a space that an employee can bodily enter and perform work, not designed or intended for continuous employee occupancy, and having restricted means for entry or exit. A confined space may also include a structure (buildings or rooms) which has a limited means of egress or in the case of this HASCP, includes entry into limited access sumps, manholes, and tanks.

The following tank locations are identified as confined spaces at this site:

- T-1 Equalization Tank
- T-3 Backwash holding tank
- T-4 Solids holding tank
- T-5 Filtrate return tank

2.10.1 Ventilation and Testing

Prior to employee entry, the confined space shall be thoroughly ventilated and then tested to determine the presence of respirable atmosphere. The testing will consist of the determination for the percentage of oxygen and the percentage of possible combustible gasses. The accepted levels are as follows:

- Oxygen - minimum of 19.5 percent and a maximum of 23.5 percent
- Combustible Gas - maximum of 10 percent of LEL for each gas
- Toxics - below 25 percent of the PEL for Level D

If any detectable amount of a combustible of chemical gas or vapor is present or the percentage of oxygen is less than 19.5 percent, proper ventilation should be done by a qualified person who is familiar with the instrument calibration and operation and testing procedures. Additional monitoring must be conducted to test for toxic chemicals that may be present in the confined space.

It is recommended that oxygen, combustible gas, and toxic gas readings be taken three times each at five minute intervals before entry into the confined space.

2.10.2 Entry

Prior to entry, the Confined Space Entry Permit (Figure 2-1) must be properly completed.

Entry may commence if three readings at five minute intervals reveal:

- Oxygen >19.5 percent but less than <23.5 percent
- Combustible gas - 10 percent of LEL
- Toxics - $\leq$ PEL

Continuous monitoring of the confined space will continue while the entrant is in the confined space.

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FIGURE 2-1

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CONFINED SPACE ENTRY PERMIT																																																																																																																				
GENERAL INFORMATION								Permit No. _____																																																																																																												
Space to be Entered: _____				Purpose of Entry: _____																																																																																																																
Location/Building: _____				Authorized Duration of Permit: Date: _____ to _____ Time: _____ to _____																																																																																																																
PERMIT SPACE HAZARDS (Indicate specific hazards with initials). ☐ Oxygen deficiency (less than 19.5%) ☐ Oxygen enrichment (greater than 23.5%) ☐ Flammable gases or vapors (greater than 10% of LFL) ☐ Airborne combustible dust (meets or exceeds LFL) ☐ Toxic gases or vapors (greater than PEL) ☐ Mechanical hazards ☐ Electrical shock ☐ Materials harmful to skin ☐ Engulfment ☐ Other: _____				EQUIPMENT REQUIRED FOR ENTRY AND WORK Specify as required: Personal Protective Equipment: _____ Respiratory Protection: _____ Atmospheric Testing/Monitoring: _____ Communication: _____ Rescue Equipment: _____ Other: _____																																																																																																																
PREPARATION FOR ENTRY (Check after steps have been taken.) ☐ Notification of affected departments of service interruption. Isolation Methods: ☐ Lockout/tagout ☐ Blank/blind ☐ Purge/clean ☐ Inert ☐ Ventilate ☐ Atmospheric test ☐ Barriers ☐ Other: _____ Personnel Awareness: ☐ Pre-entry briefing on specific hazards and control methods ☐ Notify contractors of permit and hazard conditions ☐ Other: _____ Additional permits required and/or attached: ☐ Hot work ☐ Line breaking ☐ Other: _____				COMMUNICATION PROCEDURES To be used by attendants and entrants: _____ _____ _____																																																																																																																
EMERGENCY SERVICE <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; border-bottom: 1px solid black;">Name of Service</td> <td style="width: 33%; border-bottom: 1px solid black;">Phone Number</td> <td style="width: 33%; border-bottom: 1px solid black;">Method of Contact</td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> </table>				Name of Service	Phone Number	Method of Contact							AUTHORIZED ENTRANTS (List by name or attach roster.) _____ _____ _____																																																																																																							
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Printed Name			Signature			Date		Time																																																																																																												
THIS PERMIT MUST BE POSTED ON JOB SITE • GOOD ONLY ON INDICATED DATE																																																																																																																				

2.10.3 Safety Concerns

Means shall be provided for quick removal of employees in case of emergency.

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2.10.4 Rescue

Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head. Wristlets may be used in lieu of the chest or full body harness if the employee can demonstrate that the use of a chest or full body harness is not feasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the work site, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

2.10.5 Attendant

An attendant shall be stationed outside the entrance to the confined space to observe or communicate with the employee at all times. The attendant shall be trained and equipped to initiate rescue operation. It should be realized that a single person can seldom raise an unconscious body without a mechanical device. Therefore prior provisions must be made for confined space rescue.

Communications (visual, voice, or signal line) shall be maintained between individuals present. Under all circumstances, a standby employee must remain at the entrance to the space to coordinate the rescue and provide additional assistance.

2.10.6 Rescue and Emergency Services

Rescue and emergency services personnel must be trained to use proper personal protection equipment, and equipment necessary for making rescues.

Each member of the rescue service shall practice making permit space rescues once every 12 months. Each member of the rescue service shall be trained in basic first-aid and CPR.

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2.11 THE CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

2.11.1 Lockout/Tagout Procedure

The following is the minimum Lockout/Tagout Procedure for Lord Corporation employees working at the Lord Shope Landfill. Before conducting Lockout/Tagout, review the following requirements of the Lockout/Tagout Procedure and Lord Corporation's Lockout/Tagout Procedure, latest edition.

2.11.1.1 Purpose. This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from potentially hazardous energy sources, and locked out before employees perform servicing or maintenance where the unexpected energization or startup of the machine or equipment or release of stored energy could cause injury.

2.11.1.2 Compliance With This Program. Lord Corporation employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. Employees, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance shall not attempt to start, energize, or use that machine or equipment.

2.11.1.3 Sequence of Lockout/Tagout.

1. Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.
2. The authorized employee shall refer to the Lord Corporation Lockout/Tagout Procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.
3. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress stop button, open switch, close valve, etc.).
4. Deactivate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).
5. Lockout/tagout the energy isolating device(s) with assigned individual lock(s) with employee identification or with appropriate tags.
6. Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

8. The machine or equipment is now locked/tagged out.

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2.11.1.4 Restoring Equipment to Service. When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken.

1. Check the machine or equipment and the immediate area around the machine or equipment to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
2. Check the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the controls are in neutral.
4. Remove the lockout/tagout devices and re-energize the machine or equipment.

Note: The removal of some forms of blocking may require re-energization of the machine before safe removal.

5. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

Before lockout/tagout is conducted, contact Lord Corporation Project Manager to verify that the lockout is in accordance with Lord Corporation Lockout/Tagout Procedures (to be prepared).

2.11.1.5 Additional Information. The following Lockout/Tagout information is provided for additional guidance.

Lockout/Tagout must be conducted before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup, or release of stored energy could occur and cause injury. The machine or equipment shall be isolated from the energy source and rendered inoperative.

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If an energy isolation device is not capable of being locked out, a tagout system should be used. However, lockout is the preferred method.

2.11.2 Lockout

Lockout is the placement of a lockout device on an energy isolating device that will ensure that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

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- **Exposure**
 - Lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.
 - Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.
 - Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.
- **Substantial**
 - Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.
 - Tagout devices, including and their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.

- Identifiable

- Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s).

Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: *Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate.*

2.11.2.1 Preparation for Shutdown. Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

2.11.2.2 Machine or Equipment Shutdown. The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid additional or increased hazard(s) to employees as a result of the equipment stoppage.

2.11.2.3 Machine or Equipment Isolation. All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

2.11.2.4 Lockout or Tagout Device Application. Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.

Lockout devices, where used, shall be affixed in such a manner that will hold the energy isolating devices in a "safe" or "off" position.

Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.

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Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.

Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.

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2.11.2.5 Stored Energy. Following the application of lockout or tagout devices to energy isolating devices, potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

2.11.2.6 Verification of Isolation. Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and de-energization of the machines or equipment have been accomplished.

2.11.2.7 Release from Lockout or Tagout. Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

- The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.
- The work area shall be checked to ensure that all employees have been safely positioned or removed.
 - After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.
- Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. Exception to the specific procedure shall include at least the following elements:

- Verification by the employer that the authorized employee who applied the device is not at the facility.
- Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed.
- Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.

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2.11.2.8 Group Lockout or Tagout. When servicing and/or maintenance is performed by a crew, craft, department, or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

2.12 HOT-WORK PERMIT SYSTEM

2.12.1 Purpose

A hot-work permit system will be implemented to reduce the potential for a fire while working at the site.

2.12.2 System

Prior to an activity that will cause a spark or flame, a hot-work permit (Figure 2-2) will be obtained. If an activity requires more than one work day to complete, a new permit is required each day. The hot-work permit will state the time, date, source of ignition, area of activity, type of activity, and prevention methods. Emergency numbers will be readily available should a fire occur which cannot be controlled. Refer to Section 7.2 or Table 9-3 for emergency telephone numbers.

FIGURE 2-2

HOT WORK PERMIT

Permit Number _____

WORK TO BE DONE	TIME A.M. P.M.
SPECIAL HAZARDS	DATE
PERMIT ISSUED FOR	W.O. NO.

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To be completed by supervisor of area where work is to be performed.

ITEM	YES	NO	COMMENTS	ITEM	YES	NO	COMMENTS
Lines Washed				Neighboring area notified			
Lines Drained				Extinguisher			
Lines Pressure Vented				Manways, sewers, and floor drains			
Lines Disconnected				Oxygen Test			
Valves off and tagged				Explosimeter Test			
Power off and tagged				Fire watch (Name)			

I certify all the items above have been completed and hereby authorize this permit.

Supervisor's Initials _____

To be completed by Maintenance Personnel.

ITEM	YES	NO	COMMENTS	ITEM	YES	NO	COMMENTS
Lines Blinded				Glasses & gloves			
Power Locked				Protective Cloth			
Valves Locked				Area Roped off			
Air Mask				Barricade & signs			
Air Bottles checked				Screens & Curtains			

Supervisor's Signature _____

Maintenance Initials _____

I certify all the items above have been completed and hereby authorize this permit.

Copy - SITE SAFETY OFFICER
Copy - PLANT OFFICE FILE
Copy - DISPLAY AT WORK AREA

3.0 PERSONNEL TRAINING REQUIREMENTS

3.1 TRAINING

Lord Corporation personnel training requirements are based on Mr. George Kickel's letter of May 9, 1990 to Ms. Anku of OSHA and her response to Mr. Kickel dated May 29, 1990. A summary of the agreed-upon minimum training requirements are listed below and in Table 3-1:

ORIGINAL
(Red)

- Laboratory employees engaged in groundwater monitoring and soil sampling: 24 hours initial Hazardous Waste Operations and Emergency Response (HAZWOPER) training (per 29 CFR 1910.120) and one day of field experience under the direct supervision of a trained, experienced supervisor.
- Maintenance employees engaged in maintenance activities, i.e., painting monitoring wells, cutting grass: 24 hours initial Hazardous Waste Operations and Emergency Response (HAZWOPER) training (per 29 CFR 1910.120) and one day of field experience under the direct supervision of a trained, experienced supervisor.
- ISVS system and GWTS operators: 40 hours initial Hazardous Waste Operations and Emergency Response (HAZWOPER) training (per 29 CFR 1910.120) and three days of field experience under the direct supervision of a trained, experienced supervisor.
- Construction employees, facility engineers, and public utility employees engaged in the design and construction of the wastewater treatment plant and air stripping unit: Employees of the groups listed above must attend a comprehensive Hazard Communication Program which is site-specific. The program will include a site-specific emergency action plan and health and safety information.

TABLE 3-1**PERSONNEL TRAINING REQUIREMENTS**

Personnel	Activity	Health and Safety Training (HAZ-COM, Emergency Action Plan, HASCP familiarization)	24 Hour HAZWOPER (plus one day supervised field experience)	40-Hour HAZWOPER (plus three days supervised field experience)
Contractors (Construction, facility engineers, public utility employees)	Design and construction of wastewater treatment plant	REQUIRED	NR	NR
Laboratory Employee	Soil sampling, Groundwater monitoring	REQUIRED	REQUIRED	NR
Maintenance Employee	Cutting grass, Painting monitoring wells,	REQUIRED	REQUIRED	NR
ISVS and GWTS Operators	Treatment plant operations	REQUIRED	NR	REQUIRED

NR - Not Required

3.2 TRAINING AND BRIEFING TOPICS FOR SITE ACTIVITIES

The following topics are applicable to site activities:

- Site Characterization
- Hazards
- Medical Surveillance Requirements
- Symptoms of Overexposure to Hazards
- Site Control
- Training Requirements
- Overhead and Underground Utilities

ORIGINAL
(Red)

These topics will be discussed by Lord Corporation during a work start-up briefing conducted by the site supervisor. Personnel will complete and sign a Personnel Acknowledgment form (Figure 3-1) attesting to their review of the HASCP and attendance at the work start-up briefing. Additional training may occur on a daily basis relative to planned tasks and may also occur as events or circumstances arise that require revision of the HASCP.

3.3 SITE SAFETY OFFICER DUTIES

When present, the Site Safety Officer shall visually inspect site activities for compliance with this HASCP. Observations from this inspection shall be noted in the site log book or noted on the Health and Safety Site Daily Log (Figure 3-2). Deficiencies in compliance will be corrected as soon as practical. The remedial action taken shall be noted on the site log book or daily log as well as when the remedial action is completed. The following items further define the responsibilities of the Site Safety Officer:

- Complete the daily site log book. Note any deviations from the site HASCP in the daily site log book, record why deviations occurred, and record follow-up action(s) taken.
- Have all visitors sign in and out of the Visitor Logbook (Figure 3-3).

FIGURE 3-1

**PERSONNEL ACKNOWLEDGMENT
TO BE SIGNED AND RETURNED TO
LORD CORPORATION**

NAME _____ DATE _____

EMPLOYER _____

ORIGINAL
(Red)

I have received and carefully read the Site Health and Safety/Contingency Plan for the Shope's Landfill site. I agree to abide by these safety rules, regulations, and guidelines while working at the Lord/Shope site, and understand that a violation of these rules will result in my removal from the site.

I have completed and understand the training program, including the subjects listed below addressed during the course of site specific training.

- Work Rules and Safety Requirements
- Personal Protective Equipment (PPE)
- Potentially Hazardous Chemicals
- Emergency Equipment
- Reporting of Injuries and Illnesses
- Emergency Procedures
- Job Assignment
- Personal Hygiene
- Motor Vehicle Equipment
- Standard Operating Procedures

I affirm that I have a medical examination certifying my fitness for duty including the ability to wear required PPE under work site conditions per 29 CFR 1910.120(f) and have been trained in the proper use and fitting of an appropriate respirator.

Signature _____ Date _____

Print Name _____

Employer Name _____

I certify that this individual has received adequate training in the aspects of this Health and Safety/Contingency Plan and is knowledgeable in the use and care of personal protective equipment.

LORD CORPORATION PROJECT MANAGER

Signature _____ Date _____

Print Name _____

FIGURE 3-2

LORD CORPORATION	HEALTH AND SAFETY SITE DAILY LOG
-------------------------	---

Project: _____

Client: _____ Job No. _____

Location: _____ Instrument Readings & Specifications by: _____

Date: _____

Weather Conditions: _____ Hazards Noted: _____

Chemical: _____

Personnel On Site: _____

Site Instrument Readings:

☐ HNU or ☐ OVA ☐ Other _____

Level of Protection: _____

Calibration Date: _____

Dress of the Day: _____

	<u>Reading</u>	<u>Time</u>
Background:	_____	_____
Perimeter Areas:	_____	_____
Active Work Area:	_____	_____

Changes During the Day: _____

Explosion Meter:

Decontamination Procedures: _____

	<u>Reading</u>	<u>Time</u>
Perimeter Areas:	_____	_____
Active Work Area:	_____	_____

Oxygen Meter:

Remedial Actions Taken: _____

	<u>Reading</u>	<u>Time</u>
Perimeter Areas:	_____	_____
Active Work Area:	_____	_____

Other Readings: _____

Date Remedial Action Complete: _____

Site Safety Officer:

Name: _____

Signature: _____

Title: _____

Work Planned: _____

Work Area: _____

ORIGINAL
(Red)

FIGURE 3-3
VISITOR SIGN IN SHEET

Date	Name	Representing	Time In	Time Out	Safety Plan Read?	Site Location Visited	Protective Clothing Required?	Remarks

- Verify visitor training and medical clearance records for those visitors and contractor personnel conducting site field activities. Visitors or contractors must complete the Personnel Acknowledgment form (Figure 3-1) indicating their understanding of the key elements of the site HASCP.
- Provide site visitors with a safety orientation to include an overview of safety procedures, active operations in restricted areas, required personal protective equipment, location of emergency equipment, and the site emergency procedures. All first-time visitors to the site must be accompanied by the Site Safety Officer.
- The Site Safety Officer shall interpret the basic requirements of the HASCP and request non-compliant visitors to leave the site as applicable.

ORIGINAL
(Red)

As a minimum, a monthly site safety meeting will be conducted by the Site Safety Officer to address current site conditions and operations which effect site personnel. Any changes in PPE levels, results of environmental monitoring, accidents or incidents that have occurred will be discussed and prevention methods implemented.

3.4 HAZARD COMMUNICATION PROGRAM

The operation of the laboratory and groundwater treatment plant may expose personnel to additional chemical hazards. The OSHA Hazard Communication (Haz-Com) Standard (29 CFR 1910.1200), requires that hazard information on workplace chemicals be communicated to all workers present at a site. This standard further requires the employer to provide a written program, a warning label system, MSDS information, and employee training. The company policy is to provide this Haz-Com information to both employees and contractors at the Lord Shope Landfill site. The Project Manager shall be responsible for the development and administration of the site Haz-Com program.

All contractors must supply Lord Corporation with a list of chemicals that they will bring onto the site and the MSDS for each chemical. Contractors must also apply labels on all chemical containers brought into the work place. When contractors are finished working at the site, they must either dispose of or take with them any unused chemicals brought onto the site.

Chemical information will be maintained on site for ready reference by personnel as part of the Lord Corporation Hazard Communication program. MSDS for these chemicals are included in the MSDS binder for the site contaminants and noted in Table 3-2.

ORIGINAL
(Red)

TABLE 3-2**CHEMICAL INVENTORY LIST
LORD SHOPE LANDFILL**ORIGINAL
(Red)

Chemical	CAS Number	Exposure Limit	Hazard Type
Hydrochloric acid	7647-01- 0	5 ppm	CORROSIVE. Strong irritant to the eyes, skin, and mucous membranes.
Isopropanol (Isopropyl alcohol)	67-63-0	400 ppm	FLAMMABLE. Irritating to eyes and skin.
Nitric acid	7697-37- 2	2 ppm	OXIDIZER and CORROSIVE. Corrosive to eyes, skin, mucous membranes and teeth. Burning may not be immediate upon skin contact.
Potassium permanganate	7722-64- 7	5 mg Mn/m ³	OXIDIZER. Corrosive solid. Severe eye and skin irritant.
Sodium hydroxide	1310-73- 2	2 mg/m ³ (Ceiling)	CORROSIVE. Can be highly irritating to the eyes, skin, and mucous membranes.

4.0 PERSONAL PROTECTIVE EQUIPMENT TO BE USED

4.1 PERSONAL PROTECTION

Use of personal protective equipment (PPE) is a major means to minimize potential exposure. The levels of protection for personnel have been based on OSHA Guidelines for the compounds of concern, the US. Environmental Protection Agency (EPA) Occupational Health and Safety Manual, and the Hazardous Substances Data Bank of the National Library of Medicine.

Personnel working at the site will have their own personal safety equipment and protective clothing, which will be used according to the direction of the Lord Corporation Project Manager. Non-disposable PPE will be kept clean and maintained. Personnel will be trained in the use and maintenance of PPE and will be properly fitted prior to beginning site activities.

The levels of protection for operations and maintenance activities are listed on Table 4-1.

It is unlikely that personnel will encounter conditions which are immediately dangerous to life and health (IDLH). Therefore, no special engineering controls or extraordinary work practices are deemed necessary at this time.

4.2 REASSESSMENT OF PROTECTION PROGRAM

The Level of Protection provided by the selected PPE will be upgraded or downgraded based upon a change in site conditions or later findings. When a significant change occurs, the hazards will be reassessed. Some indicators of the need for reassessment may include:

- The commencement of a new work phase not previously identified in this HASCP.
- Chemical compounds other than those previously found at the site identified in this HASCP.

TABLE 4-1

LEVELS OF PERSONAL PROTECTIVE EQUIPMENT AND WORK ACTIVITIES

Level	Level Application
LEVEL B¹	Uncharacterized air with unknown chemicals
Level C plus:	Oxygen level below 19.5%
Air supplied respirator or SCBA with positive pressure regulator	Any identified concentration exceeds 50% of the Immediately Dangerous to Life and Health (IDLH) Limit.
LEVEL C¹	Breathing zone HNU/OVA readings in excess of 25 ppm over the background level for more than five minutes.
Modified Level D plus:	Any identified concentration exceeds 25% of a PEL.
- Tyvek®/Saranex® coveralls with hood - Full face respirators equipped with cartridges for organic gases and vapors^a or particulates - Breathing zone air monitoring with an HNU or OVA and a combustible gas/oxygen indicator	Confined space entry.
MODIFIED LEVEL D¹	Breathing zone HNU/OVA reading less than 5 ppm from the background level for more than five minutes.
Level D plus:	Routine Maintenance Activities and Sampling Activities.
- Tyvek® coveralls^a - Chemical resistant gloves (Nitrile or Neoprene) with inner latex gloves - Boots and chemical resistant boot covers - Breathing zone air monitoring with an HNU or OVA; and a combustible gas/oxygen indicator	
LEVEL D¹	System operations.
- Work uniform with long sleeves and long pants - Safety Boots - Safety glasses with side shields - Hard hat and hearing protection as required	

^aTyvek® coveralls to be used during specified sampling or intrusive operations.

1. Cotton gloves and undergarments are recommended to be worn to provide for perspiration absorption which serves as a cooling device for the body.

- A change in the work scope that affects the degree of contact with the chemical compounds.

4.3 CHEMICAL RESISTANCE AND INTEGRITY OF PROTECTIVE MATERIAL

The specific clothing materials have been specified on Tables 4-2 and 4-3 for the tasks to be performed under this HASCP. Information regarding the integrity and limitations of personnel protective equipment can be found in the publication *Quick Selection Guide to Chemical Protective Clothing* (1993). Should compounds be encountered on site that have not been identified by this HASCP or are not printed within the Guide, the Lord Corporation Project Manager will be contacted.

4.4 INSPECTION OF PROTECTIVE EQUIPMENT

The proper inspection of PPE features several sequences of inspection depending upon the specific articles of PPE and frequency of use. The different levels of inspection are as follows:

- The inspection and operational testing of equipment received from the factory or distributor.
- The inspection of equipment as it is issued to workers.
- The inspection after use or training and prior maintenance.
- The periodic inspection of stored equipment.
- The periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arises.
- The periodic cleaning and disinfecting of equipment.

The primary inspection of PPE for activities will occur prior to immediate use and will be performed by the user so that the specific device or article has been checked

ORIGINAL
(Red)

TABLE 4-2

**CHEMICAL PROTECTION OF CLOTHING MATERIALS
BY GENERIC CLASS**

Generic Class	Butyl Rubber	Polyvinyl Chloride	Neoprene	Natural Rubber
Alcohols	E	E	E	E
Aldehydes	E-G	G-F	E-G	E-F
Amines	E-F	G-F	E-G	G-F
Esters	G-F	P	G	F-P
Ethers	G-F	G	E-G	G-F
Fuels	F-P	G-P	E-G	F-P
Halogenated Hydrocarbons	G-P	G-P	G-F	F-P
Hydrocarbons	F-P	F	G-F	F-P
Inorganic Acids	G-F	E	E-G	F-P
Inorganic Bases and Salts	E	E	E	E
Ketones	E	P	G-F	E-F
Natural Fats and Oils	G-F	G	E-G	G-F
Organic Acids	E	E	E	E

Legend: E - Excellent
G - Good
F - Fair
P - Poor

Source: *Survey of Personnel Protective Clothing and Respiratory Apparata.*, September 1974, DOT, USCG, Office of Research and Development.

ORIGINAL
(Red)

TABLE 4-3

GLOVE MATERIALS - COMPARATIVE CHEMICAL RESISTANCE
 (KEY: E - excellent; G - good; F - fair; P - poor; NR - not recommended)

ORIGINAL
(Red)

Chemical	Neo- prene	Latex or Rubber	Milled Nitrile	Butyl
Acetaldehyde	E	G	G	E
Acetate	G	F	P	G
Acetic acid	E	E	E	E
Acetone	G	E	P	E
Acetylene gas	E	E	E	E
Acetylene tetrachloride	F	NR	F	F
Acrylonitrile	G	F	F	G
Amidol	G	E	F	E
Amine hardeners	F	F	G	G
Ammonium hydroxide	E	E	E	E
Amyl acetate	F	P	P	F
Amyl alcohol	E	E	E	E
Anhydrous ammonia	G	E	E	E
Aniline	G	F	P	F
Aniline hydrochloride	F	G	P	F
Aniline oil	F	G	P	F
Animal fats	E	P	E	G
Animal oils	E	F	E	G
Anodex	G	E	--	E
Anthracene	F	P	F	P
Aromatic fuels	P	NR	F	NR
Arsine	E	E	E	E
Asbestos	E	E	E	E
Asphalt	G	F	E	F
Banana oil	F	P	P	F
Benzaldehyde	F	F	G	G
Benzene	P	NR	F	NR
Benzol	P	NR	F	NR
Benzyl alcohol	E	E	E	E
Benzyl benzoate	G	F	G	F
Benzyl chloride	F	P	F	G
Biacosolve	G	P	G	P
Boron tribromide	G	P	P	P
Bromine	G	P	P	P
Bromoform	G	P	P	P
Butane	E	F	E	F
2-Butanone	G	G	F	G
Butyl acetate	G	F	P	F
Butyl alcohol	E	E	E	E
Butylaldehyde	G	G	E	G
Butylene	E	G	E	G
Cadmium oxide fume	E	E	E	E
Calcium hydroxide	E	E	E	E
Carbolic acid	E	E	F	E
Carbon dioxide	E	E	E	E
Carbon disulfide	F	F	F	F
Carbon tetrachloride	F	P	G	P
Castor oil	F	P	E	F
Cellosolve	F	G	G	G
Cellosolve acetate	G	F	G	G
Chlordane	G	F	G	F
Chlorine	G	F	F	G
Chlorine gas	G	F	F	G
Chlorobenzene	F	P	P	F
Chloroacetone	F	F	P	E
Chlorobromomethane	F	P	F	P
Chloroform	G	P	E	P
Chloronaphthalene	F	P	F	F
Chlorophenylene diamine	G	P	F	F
Chloropierin	P	P	P	F
Chloroethene	P	NR	F	NR
Chromic acid	F	P	F	F
Chromotex	G	G	G	G
Citric acid	E	E	E	E
Cool tar pitch volatiles	F	P	F	--
Cottonseed oil	G	G	E	F
Cotton dust (raw)	E	E	E	E
Creosote	G	G	F	G
Cresol	G	G	F	G
Cupric nitrate	G	G	E	E

Chemical	Neo- prene	Latex or Rubber	Milled Nitrile	Butyl
Cyanide	G	G	G	G
Cyclohexane	G	F	G	F
Cyclohexanol	G	F	E	G
Cyclohexanone	G	E	F	G
Decaborane	F	P	F	F
Degreasing fluids	F	P	G	P
Diacetone alcohol	E	E	E	E
Diborane	F	P	F	F
Dibenzyl ether	G	G	F	G
Dibutyle phthalate	G	P	G	G
Dichloroethane	P	NR	F	NR
Dichloropropene	P	P	F	F
Diesel fuel	G	P	E	P
Diethanolamine	E	G	E	E
Diethylamine	E	G	E	G
Diethyltriamine	G	F	E	G
Diisobutyl ketone	P	F	P	G
Diisocyanate	G	P	G	E
Dimethyl formamide	F	F	G	G
Diethyl phthalate	G	P	E	F
Dioxane	E	G	G	G
Emulsifying agent	G	F	E	E
Emulthogene	G	F	G	E
Epichlorohydrin	G	P	F	G
Epoxy resins, dry	E	E	E	E
Esters	F	P	P	F
Ethane gas	E	G	E	E
Ethanol	E	E	E	E
Ethers	E	G	G	G
Ethyl acetate	G	F	F	G
Ethyl alcohol	E	E	E	E
Ethyl bromide	--	--	P	--
Ethyl ether	E	G	G	E
Ethyl cutyl ketone	--	--	P	--
Ethyl formate	G	F	G	G
Ethylaniline	F	F	P	G
Ethylenediamine	E	G	E	G
Ethylene dichloride	F	P	P	F
Ethylene gas	E	G	E	E
Ethylene glycol	E	E	E	E
Ethylene oxide	G	F	G	--
Ethylene trichloride	F	P	G	P
Fatty acids	E	P	E	F
Ferrocyanide	F	G	G	E
Fluoric acid	E	G	E	E
Fluorine	G	F	F	G
Flourine gas	G	F	F	G
Formaldehyde	E	E	E	E
Formic acid	E	E	E	E
Freon 11	G	P	G	F
Freon 12	G	P	G	F
Freon 21	G	P	G	F
Freon 22	G	P	G	F
Furfural	G	G	G	G
Gasoline, leaded	G	P	E	F
Gasoline, unleaded	G	P	E	F
Glycerine	E	E	E	E
Glycerol	E	E	E	E
Glycol	E	E	E	E
Gold fluoride	G	E	E	E
Grain alcohol	E	E	E	E
Halogens	G	F	F	G
Hexamethylenetetramine	F	G	F	G
Hexane	F	P	G	P
Hexyl acetate	F	P	P	F
Hydraulic oil	--	--	--	--
ester base	E	P	F	G
petroleum base	G	P	E	P
Hydrazine	F	G	G	G
Hydrochloric acid	E	G	G	G
Hydrofluoric acid	E	G	G	G

TABLE 4-3 (Continued)

GLOVE MATERIALS - COMPARATIVE CHEMICAL RESISTANCE
(KEY: E - excellent; G - good; F - fair; P - poor; NR - not recommended)

ORIGINAL
(Red)

Chemical	Neo- prene	Latex or Rubber	Milled Nitrile	Butyl
Hydrogen gas	E	E	E	E
Hydrogen peroxide 30%	G	G	G	G
Hydrofluosilicic acid	F	G	G	G
Hydroquinone	G	G	F	G
Inorganic salts	E	E	E	E
Iodine	G	F	G	G
Isooctane	F	P	E	P
Isopropanol	E	E	E	E
Isopropyl alcohol	E	E	E	E
Kerosene	E	F	E	F
Ketones	G	E	P	E
Lacquer thinner	G	F	P	F
Lactic acid	E	E	E	E
Lauric acid	E	F	E	E
Linoleic acid	E	P	E	F
Linseed oil	E	P	E	F
Maleic acid	E	E	E	E
Mercuric chloride	G	E	G	E
Mercury	G	G	G	E
Methane gas	E	E	E	E
Methanol	E	E	E	E
Methyl acetate	G	F	P	G
Methyl alcohol	E	E	E	E
Methylamine	F	F	G	G
Methyl bromide	G	F	F	G
Methyl cellosolve	G	G	G	G
Methyl chloride	NR	NR	NR	NR
Methyl ethyl ketone	G	G	NR	E
Methyl formate	G	F	F	G
Methylene bromide	G	G	F	G
Methylene chloride	G	F	F	G
Methyl isobutyl ketone	F	F	P	E
Methyl methacrylate	G	G	F	E
Mineral oils	E	F	E	F
Monochlorobenzene	F	P	P	F
Monoethanolamine	E	G	E	E
Morpholine	E	E	G	E
Muriatic acid	E	G	G	E
Naphthalene	G	F	G	F
Naphthas, aliphatic	E	F	E	F
Naphthas, aromatic	G	P	G	P
Nitric acid	G	F	F	F
Nitric acid, red and white fuming	--	--	--	--
Nitrobenzene	F	P	F	F
Nitroethane	F	P	F	F
Nitrogen gas	E	E	E	E
Nitromethane	F	P	F	F
Nitropropane	F	P	F	F
Nitrous oxide	G	G	G	G
Octyl alcohol	E	E	E	E
Oleic acid	E	F	E	G
Oxalic acid	E	E	E	E
Oxygen, liquid	F	P	NR	F
Ozone	G	P	P	G
Paint thinners	G	F	G	F
Paint and varnish removers	G	F	F	F
Palmitic acid	E	E	E	E
Paradichlorobenzene	E	F	E	E
Parathion	P	F	F	F
Pentaborane	F	P	F	F
Pentachlorophenol	F	G	G	G
Pentane	E	G	E	G
Perchloric acid	E	F	G	G
Perchloroethylene	F	NR	G	NR
Perklene	E	NR	G	NR
Permachlor	E	F	E	NR
Petroleum distillates (naphtha)	G	P	E	-
Petroleum spirits	E	F	E	F
Phenol	E	F	F	G

Chemical	Neo- prene	Latex or Rubber	Milled Nitrile	Butyl
Phenylenediamine	G	P	G	G
Phenythydrazine	G	G	G	G
Phil. solv	E	F	E	G
Phosphoric acid	E	G	E	E
Pickling solution	G	G	G	E
Picric acid	E	G	E	G
Pine oil	E	P	E	F
Pitch	E	P	E	F
Plating solutions	E	E	E	E
Potassium alum	G	G	G	E
Potassium bromide	G	G	G	E
Potassium chrome alum	G	G	G	E
Potassium dichromate	F	F	F	E
Potassium ferrocyanide	G	G	G	E
Potassium hydroxide	E	E	E	E
Printing inks	E	G	G	G
Propane gas	E	E	E	E
Propanol (iso)	E	E	E	E
Propyl acetate	G	F	F	G
Propyl alcohol	E	E	E	E
Propyl alcohol (iso)	E	E	E	E
Propylene gas	E	F	E	E
Propyne gas	E	F	E	E
Pyrethrum	E	E	E	E
Red fuming nitric acid	P	P	P	P
Rhodium fume and dust	E	E	E	E
Silver nitrate	E	G	E	E
Skidrol 500	P	G	P	G
Sodium carbonate metal	G	G	G	E
Sodium hydroxide	E	E	E	E
Sodium sulfite	G	G	E	E
Sodium thiosulfide	G	G	E	E
Solvarsol	E	F	E	F
Solvessos	P	P	G	P
Stearic acid	E	E	E	E
Stoddard solvent	E	F	E	G
Styrene	P	P	F	P
Styrene 100%	P	P	F	P
Sulfuric acid	G	G	G	G
Tannic acid	E	E	E	E
Tetrahydroborane	F	P	F	F
Tetraethyl lead	E	F	E	G
Tetrahydrofuran	P	F	F	F
Toluene	F	P	F	NR
Toluene diisocyanate	F	G	F	G
Toluol	F	P	F	NR
Trichlor	F	P	G	P
Trichloroethane	F	F	G	P
Trichloroethylene	P	P	F	P
Tricresyl phosphate	G	F	E	F
Tridecyl alcohol	G	F	E	F
Triethanolamine	E	G	E	G
Trinitrotoluene	G	P	G	F
Trinitralolual	G	P	G	F
Tripiane	E	P	E	F
Tung oil	E	P	E	F
Turca No. 2998	P	P	-	F
Turpentine	G	F	E	F
Unsymmetrical Dimethylhydrazine	--	--	--	--
Varnoline gas	E	F	E	F
Vanadium fume and dust	E	E	E	E
Varsol	G	F	G	F
Vegetable oils	E	G	E	G
Wood alcohol	E	E	E	E
Wood preservatives	G	F	G	G
Woodyouth	F	P	F	G
Xylene	P	P	F	P
Xylol	P	P	F	P
Xylidene	E	F	F	F
Zinc chloride	E	E	E	E

out by the user, and the user is familiar with its use. Table 4-4 is a PPE Inspection Checklist that should be referenced before, during, and after use of personal protective equipment.

TABLE 4-4
SAMPLE PPE INSPECTION CHECKLISTS

CLOTHING

Before Use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
 - imperfect seams
 - non-uniform coatings
 - tears
 - malfunctioning closures
- Hold up to the light and check for pinholes.
- Flex product:
 - observe cracks
 - observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical attack:
 - discoloration
 - swelling
 - stiffness

During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind however, that chemical permeation can occur without any visible effects.
- Closure failure
- Tears
- Punctures
- Seam discontinuities

GLOVES

Before Use:

- Visually inspect for:
 - imperfect seams
 - tears, abrasions
 - non-uniform coating
- pressurize glove with air; listen for pin-hole leaks

BOOT COVERS

Before Use:

- Visually inspect for:
 - imperfect seams
 - tears
 - missing or ripped elastic band
 - insects, snakes, spiders, etc. that may have crawled into PPE

FULL-FACE RESPIRATOR INSPECTION

Before Use:

- Visually inspect for:
 - proper size
 - proper cartridges
 - cleanliness
 - exhalation valves
 - inhalation valves
 - facepiece cracks, splits
 - gasket for cartridge seal
 - deformities in facepiece
 - integrity of straps
- Perform positive and negative pressure fit test every time respirator is worn

ORIGINAL
(Red)

5.0 MEDICAL SURVEILLANCE REQUIREMENTS

5.1 MEDICAL MONITORING

Medical monitoring will be performed for personnel working in operations and maintenance activities. Fitness to use respiratory protection will have been conducted within the last year. The medical monitoring physical will serve as either the baseline for new employees or as the annual physical for existing employees. The examination will have been conducted by a licensed physician who will maintain permanent records of examinations and tests. Medical monitoring should meet or exceed regulatory compliance issues pursuant to OSHA 29 CFR 1910.94, .120, .134 and .1001 through .1050.

Included within these regulatory issues are the determination by a physician that an individual being examined is physically able to use an air purifying respirator and is able to perform the work defined within the specific job description. The capability of an individual to perform the specified work will be determined from examinations that will include:

- Medical and work histories
- Physical examination
- Pulmonary function test (FVC and FEV1)
- Chest x-ray every three years or earlier if required
- ECG (Electrocardiogram)
- Eye examination and visual acuity
- Audiometry
- Urinalysis
- Blood chemistry (hematology, serum analyses, heavy metals toxicology)

5.2 PERIODIC MONITORING

Personnel are required to have a medical physical within the last 12 months. This period may be lengthened to 24 months under the recommendations of the physician and Lord Corporation. This period may be shortened if the physician or Lord Corporation believes a shorter interval is appropriate. The physician performing the physical will ensure the physical fulfills the requirements of 29 CFR 1910.120(f).

ORIGINAL
(Red)

Documentation attesting to current medical monitoring compliance will be maintained in a central file and will be available upon request from authorized personnel.

5.3 EXPOSURE/INJURY/MEDICAL SUPPORT

Personnel covered by this HASCP must report injuries and exposures and are encouraged to seek medical attention and physical testing following an injury or possible exposure above established exposure levels.

ORIGINAL
(Red)

6.0 FREQUENCY AND TYPES OF AIR MONITORING/SAMPLING

6.1 PURPOSE

During ISVS maintenance activities, a combustible gas/oxygen monitor will be used to measure the percentage of the combustible gas/oxygen present in the breathing zone. A sustained indication of combustible gas at 10 percent of the lower explosive limit or more for one minute, will cause work to cease immediately and personnel will be evacuated to a safe area until provisions can be made to reduce the 10 percent LEL. Below 19.5 percent oxygen all activities will be suspended because of the lack of oxygen. Above 23.5 percent oxygen, all activities will be suspended because of fire hazard.

During routine maintenance activities which require confined space entry, monitoring for toxic, flammable, and oxygen deficient atmospheres must be done. Refer to Section 2.10 for Confined Space Entry Procedures.

ORIGINAL
(Red)

7.0 SITE CONTROL MEASURES

7.1 ACCESS

Personnel entering the site are required to have read this HASCP, to sign the entry/exit log (Figure 3-3), and to adhere to the Plan requirements while on site.

Visitors must have their own National Institute of Occupational Safety and Health (NIOSH) approved safety equipment or they will be denied entry to the work site.

7.2 MEDICAL ASSISTANCE / EMERGENCY CONTACTS

In the event of personnel exposure, accident, injury, or fire at the Lord Shope Landfill, the following general accident and emergency response procedures are to be followed by personnel working under this HASCP.

Should an emergency requiring evacuation occur, personnel will evacuate the area to a location established by Lord Corporation. These locations will be located upwind of the predominant wind flow and be designated on a daily basis to reflect the daily wind direction. Designated locations will be located away from the area in which the emergency occurred and be identified during the initial site safety briefing and as work locations change.

Following the evacuation, Lord Corporation personnel will initiate a head count to check that personnel who entered the site have successfully been evacuated. Discrepancies will be brought to the immediate attention of the Project Manager and/or the responding emergency service(s). Site personnel should, as soon as possible, notify the Project Manager and explain that an emergency incident has or is occurring. Individuals so notified should, as the circumstances indicate, contact the appropriate emergency assistance number found in Table 7-1.

7.3 DIRECTIONS TO MEDICAL FACILITY

The nearest medical facility is the HAMOT Medical Center in Erie, Pennsylvania. To travel to the HAMOT Medical Center, take Pieper Road to Route 20. Turn right on Route 20, and continue on Route 20 to Asbury Road. Continue on Asbury Road

ORIGINAL
(Red)

TABLE 7-1

**EMERGENCY CONTACT PHONE LIST
LORD SHOPE LANDFILL**

KEEP AVAILABLE AT ALL TIMES

ORIGINAL
(Red)

LORD SHOPE LANDFILL SITE
Pieper Road
Girard Township, PA.

SITE PHONE:

(814) 774-4518

Site Manager - Robert E. Nipper

Office Number: (814) 868-0924, Ext. 3438
Home Number: 814) 838-2137

EMERGENCY SERVICES

HAMOT Medical Center, Erie, PA.

(814) 870-6000

Girard Borough Police Department

911

Pennsylvania State Police

911

Fire Department

911

**Erie County Emergency Management
Agency**

(814) 870-1911

OH Material
(Emergency Response Contractor)

(800) 537-9540

Regional Poison Control Center
Regional USEPA Emergency Response
National Response Center

(412) 681-6669 or (800) 962-1253
(800) 425-8500
(800) 424-8802

LORD CORPORATION PERSONNEL

Office Number: (814) 868-0924

Project Manager Eugene A. Miller
Alternate Contact George M. Kickel
Alternate Contact Robert E. Nipper
Alternate Contact Jim Mercier
Alternate Contact Matt A. Comi
Alternate Contact Dennis D. Howard
Alternate Contact Don W. Saurer

Work Ext.: 3504 **Home: (814) 838-8763**
Pager: (814) 451-4610 **Home: (814) 833-6153**
Work Ext.: 3438 **Home: (814) 838-2137**
Work Ext.: 3610 **Home:**
 Home: (814) 835-2282
 Home: (814) 734-1456
 Home: (919) 319-6916

Gas Supplier: Universal Well Services
Meadville, PA.

Scott Aitken
Work: (814) 337-1115 **Home: (814) 724-5111**

Pager Instructions: Dial the pager number and after the beep, enter the number you are calling from. Then push the # sign and hang-up. I will call back.

until you reach Route 5. Turn right and travel east on Route 5 to Greengarden Blvd. Turn left on Greengarden Blvd. When reaching Bayfront Highway, turn right and travel to State Street. Turn right on State Street. The hospital is located at 201 State Street. (Refer to Figure 7-2.)

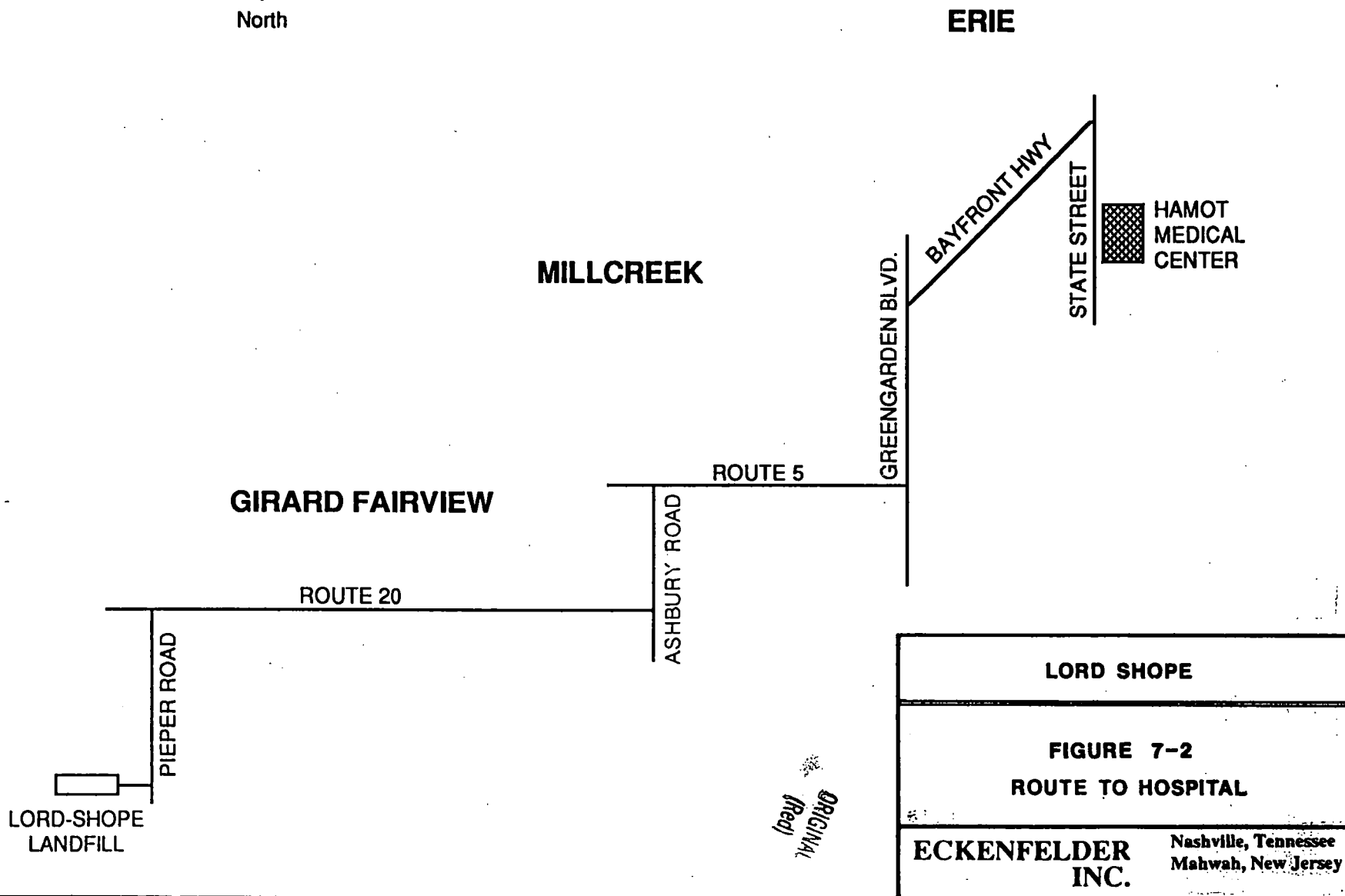
ORIGINAL
(Red)

7.4 DECONTAMINATION PLAN

Decontamination (DECON) is the physical process of removal of contaminants or potential contaminants from personnel and equipment. Personal decontamination for this HASCP will primarily consist of periodic disposal of outer protective clothing in containers. Those items for disposal will be collected in a plastic-lined container and disposed of in a proper manner established by Lord Corporation.

The procedure for Modified Level D decontamination will be:

- Step 1 - Removal of outer boots.
- Step 2 - Removal of outer gloves.
- Step 3 - Removal of Tyvek clothing.
- Step 4 - Removal of respirator (if required).
- Step 5 - Removal of inner gloves.



LORD SHOPE

FIGURE 7-2
ROUTE TO HOSPITAL

ECKENFELDER INC. Nashville, Tennessee
Mahwah, New Jersey

8.0 EMERGENCY/DISASTER CONTINGENCY PLAN

8.1 PRE-EMERGENCY PLANNING

This Section will be reviewed with maintenance personnel along with the HASCP before treatment systems are operated. Section 2.0 and Table 8-1 identify the potentially hazardous conditions that may be associated with specific task activities. Table 8-2 describes prevention and control techniques/mechanisms. Personnel working at the site will be familiar with the techniques of hazard recognition from preassignment training and from site-specific briefings. The Emergency/Disaster Contingency Plan will be reviewed and revised as necessary by Lord Corporation personnel.

ORIGINAL
(Red)

8.2 PERSONNEL ROLES AND LINES OF AUTHORITY

It is the responsibility of anyone observing an emergency situation to notify the Lord Corporation Project Manager. In case the Lord Corporation Project Manager or one of the alternate site contacts cannot be reached immediately, the person observing the emergency can contact any of the emergency services previously noted in Table 7-1, as necessary.

8.3 EVACUATION ROUTES AND PROCEDURES

Should an emergency requiring evacuation occur, personnel will evacuate the area to a location pre-established by the Lord Corporation Project Manager. These locations will be selected, marked and will be at least 250 feet upwind of the evacuated area. Following the evacuation, the Lord Corporation Work Leader will initiate a head count to check that personnel who entered the site have successfully been evacuated.

In the event of an emergency which necessitates an evacuation of the site, the following alarm procedure will be implemented:

- Three loud blasts on a horn (vehicle horn or other) - personnel will be expected to proceed to the designated evacuation area and will remain in the area until a re-entry to the site is authorized.

TABLE 8-1

EMERGENCY RECOGNITION AND CONTROL MEASURES

ORIGINAL
(Red)

Hazard	Specific Condition Location	Prevention Control
Fire/Explosion	Wellhead; gasoline fueled equipment; ISVS unit; landfill fire	An alarm system; evacuation routes; fire inspections; fire extinguisher; inert gas system; emergency response contractor
Air Release	Wellhead; ISVS Unit	Water spray; foam; alarm system; seal opening with on site material; evacuation routes
Spill	Groundwater; DECON solvents and contaminated water/residues; wellhead; potassium permanganate	Berms; dikes; sorbent materials; foams

TABLE 8-2

EVACUATION ROUTES AND SAFE DISTANCES

EVACUATION ROUTES

- Place in predominantly upwind direction from the Exclusion Zone
- Run the route through the Contamination Reduction Zone
- Develop main and alternate routes to exit the site
- Consider the mobility constraints of personnel wearing personal protective equipment

SAFE DISTANCES

- Dependent on specific conditions present at the time of an incident
- Depends on toxicological and physical properties of the released substance
- Depends on quantity, rate, and method of release
- Depends on wind speed and direction
- Depends on air temperature
- Depends on local topography

The 1996 North American Emergency Response Guidebook can provide helpful information on determining safe distances when working with chemical releases.

Should an emergency response contractor be summoned to the site, the emergency response contractor will follow its own health and safety procedures and level of protection for the specific emergency.

ORIGINAL
(Red)

8.4 INCIDENT REPORTING

Following an accident or incident, an Accident/Incident Report (Figure 8-1) will be completed by a responsible individual at the scene. Information in the incident report will include the following items:

- Name(s) of individuals involved or witnesses
- Date and time
- Exact location
- Description of incident
- Type of exposure suspected or nature of injury
- Nature of emergency response actions
- Corrective measures taken to prevent repeat of the incident

Should an accident occur where an employee rendering first aid is exposed to blood, contact the Lord Corporation Project Manager immediately and complete the Bloodborne Pathogen Report of Exposure to Incident (Figure 8-2) as required under the OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030) and the Lord Corporation written "Exposure Control Plan" (latest edition).

Refer to Section 7.3 for directions and to the nearest medical facility and to Figure 7-2 for a map to the HAMOT Medical Center in Erie, Pennsylvania.

Incident reports will be filed with the Lord Corporation Project Manager.

In the event of a hazardous material spill or chemical release above the reportable quantity, the appropriate Federal and State agencies will be notified. **Notification will be made through the Lord Corporation Project Manager.**

FIGURE 8-1
ACCIDENT / INCIDENT REPORT

Individual Reporting: _____ Date: _____
Time: _____

Location of Accident/Incident: _____

Nature of Accident/Incident and Cause: _____

Chemical Compounds Involved: _____

Electrical Apparatus Involved: _____

Individuals Involved: _____

Supervised by: _____

Type of Emergency Actions Required: _____

Performed by: _____

Equipment Used: _____

Emergency Organizations Notified: _____

First Aid Provided To: _____

Nature and Extent of Injury: _____

Number of Work Hours Missed by Individual(s): _____

Duration Work Area Closed: _____

Actions Required to Prevent Reoccurrence of Accident/Incidents: _____

Actions Initiated to Prevent Reoccurrence: _____

ORIGINAL
(Red)

This report must be submitted within five working days to the Project Manager.

FIGURE 8-2

**BLOODBORNE PATHOGEN
REPORT OF EXPOSURE TO INCIDENT**

ORIGINAL
(Red)

_____/_____
Exposed Employee Name Job Title

_____/_____
Date of Incident Social Security Number

Describe the route(s) of exposure and body part(s) affected:

Describe the circumstances surrounding the incident:

State the name(s) of the individual(s) whose blood or other potentially infectious materials you were exposed to: (If unknown, can you describe them?)

What could be done in the future to prevent this type of exposure?

Please initial the appropriate consent below:

I consent to having my blood drawn and tested as soon as possible for the AIDS virus, Hepatitis B, and any other test my healthcare professional deems appropriate. _____

I consent to having my blood drawn but will decide about testing within the next 90 days. _____

I do not consent to having my blood drawn. _____

_____/_____
Employee's Signature Today's Date

PLEASE TAKE THIS FORM TO YOUR HEALTHCARE PROFESSIONAL AND HAVE A BLOOD SAMPLE DRAWN AS SOON AS POSSIBLE. YOU HAVE 90 DAYS TO DECIDE IF YOU WANT IT TESTED FOR AIDS, HEPATITIS B, ETC. ALL TESTS AND EVALUATIONS ARE STRICTLY CONFIDENTIAL. YOUR HEALTHCARE PROFESSIONAL WILL INFORM YOU OF ANY MEDICAL EVALUATION, COUNSELING, AND/OR FOLLOW-UP APPROPRIATE FOR YOU.

8.5 EMERGENCY MEDICAL TREATMENT PROCEDURES

Any individual who becomes ill or is injured while working with contaminated or hazardous soil, groundwater, or other compounds must be decontaminated to the maximum extent possible. Should the injury or illness be minor in nature, full DECON will be administered prior to transport to a medical facility. If the individual's condition is serious, a partial DECON should be completed (i.e., complete clothing removal and redressing in clean overalls or wrap the individual in a blanket). First aid should be administered while awaiting an ambulance or trained medical personnel. Injuries and illnesses will be reported immediately as described in Section 8.2. A vehicle used to transport contaminated or potentially contaminated personnel will be decontaminated as necessary.

ORIGINAL
(Red)

8.6 FIRE OR EXPLOSION

In the event of a fire or explosion, the Lord Corporation Project Manager should be notified immediately. If it is suspected that a fire is occurring under the cap of the Lord Shope landfill during remediation activities the following steps are to be taken in the order listed. What constitutes a fire is defined in the remediation plan. In general it is when a temperature probe records a temperature greater than 80°F or carbon monoxide, extracted vapor temperature, and/or opacity sensors measuring the gas stream detect abnormal conditions. These alarm conditions will be monitored by Lord Personnel who will determine if a suspected fire condition exists.

The following procedures for addressing a suspected landfill fire are based on the Emergency Response Plan developed by Mr. George M. Kickel (Lord Corporation):

1. Dial 911. Request the Girard Fire Department (Dobbler Hose Co.) to respond to a fire under the cap of the landfill. Be very specific and tell them the fire is under the cap. We have preplanned this event and their response will be specific for a fire under the cap. Also, provide any additional information that may be necessary such as the contents of the landfill gas stream as know at the time (i.e., what percentage of methane is in the gas). Also suggest the Erie County HAZ-MAT team to be dispatched as well.

2. Send someone from the ALERT Team to meet the responders at the Landfill. Current phone numbers are shown in Table 7-1. If someone on the ALERT Team can not be contacted use the alternate call list provided in Table 7-1. Continue to call until you reach someone on the ALERT Team.
3. Discuss with the emergency responders the preferred methods of extinguishment and actions to be taken in this order:

NOTE: IT IS IMPORTANT TO INSTRUCT THE RESPONDERS THAT METHANE AND OTHER FLAMMABLE GASES AND VAPORS MAYBE PRESENT IN THE LANDFILL.

- 3.1 Stop the ISVS unit and lock it out.
- 3.2 Notify the supplier of the nitrogen to send the tank truck. The phone number is shown in attachment two.
- 3.3 The primary preferred method is to remove the caps on the temperature probes that show high heat and inject nitrogen into the landfill with the specially designed lances. If necessary the top of the temperature probe caps must be cut with a hand saw. The nitrogen will have an immediate cooling effect on the probes and it will be some time before it can be ascertained if the fire is out. Readings taken from surrounding probes may give a good indication and also readings for carbon monoxide from both inside the temperature probe and extraction points.
- 3.4 A second preferred step if the nitrogen is not readily available or the fire appears to be a small localized event. Would be to discharge a large Halon 20 lb. extinguisher down the nearest possible point to see if it can extinguish the fire or hold it in check.
- 3.5 A third preferred step if the nitrogen cannot be obtained or fails and the Halon fails would be to try a small quantity of light water foam. Girard

fire department can work with this material. A small quantity would be 200 to 400 gallons of foam water mixture.

3.6 If all attempts fail to extinguish the fire the landfill should be flooded with water using the nearest available temperature probes and other entries into the cap. Under no circumstances should an excavation be made to penetrate the cap. This could allow large amounts of air into the cap and could cause a flash fire or explosion.

Water should be delivered with standard small diameter fire hose at low pressure to avoid pressurizing any landfill system (i.e., the piping and cap). Any runoff from this process that may leak out of the landfill should be contained to the extent possible. If water is seeping from the landfill it maybe possible to pump it with portable pumps back into the waste water treatment plant holding tanks. It will take several thousand gallons of water to complete this evolution. Water should be added in 1,000 gallon increments and then new temperature and air measurements taken. It would also be helpful to use an infrared thermal scanner to look for hot spots if this is possible as well.

8.7 SPILLS AND LEAKS

Personnel will report spills or leaks to the Lord Corporation Project Manager. Should a spill or leak occur which is a threat to human health or a release to environment (air, water or soil), the person observing the spill will:

- Evacuate or request an evacuation of persons at risk.
- Inform Lord Corporation Project Manager.
- Locate the source of the spillage and stop the flow if it can be done safely.
- If safe to do so, begin containment and recovery of the spilled materials utilizing appropriate response methodology and PPE.
- If necessary, call the emergency response contractor.

8.8 EMERGENCY EQUIPMENT AND FACILITIES

The following equipment will be available at the site:

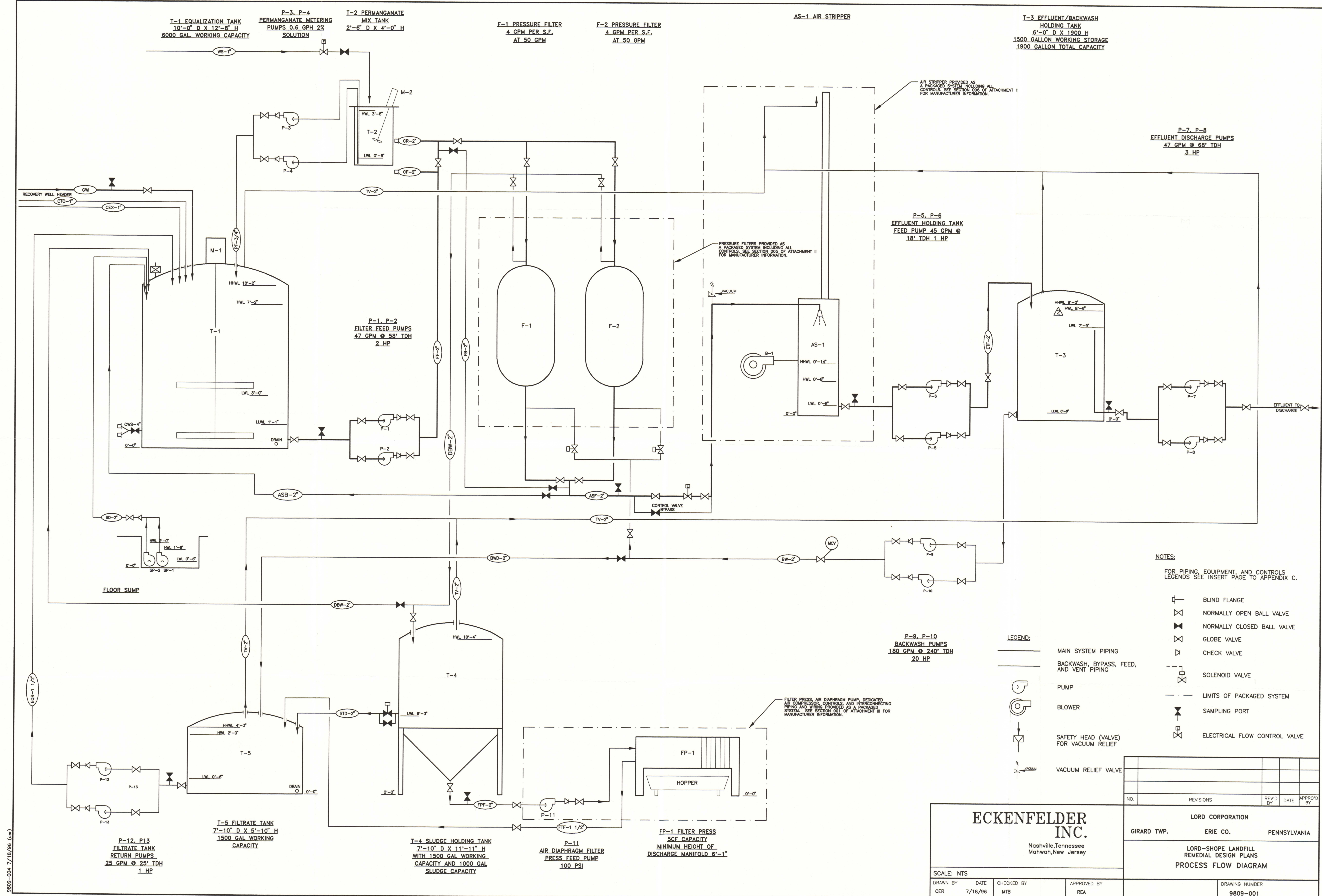
- First aid kit
- Fire extinguisher/Nitrogen Delivery system
- Eye wash station
- Emergency shower
- Personal protective equipment

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(Red)

ORIGINAL
(Red)

ORIGINAL
(Red)

APPENDIX B
GWTS PROCESS FLOW DIAGRAM

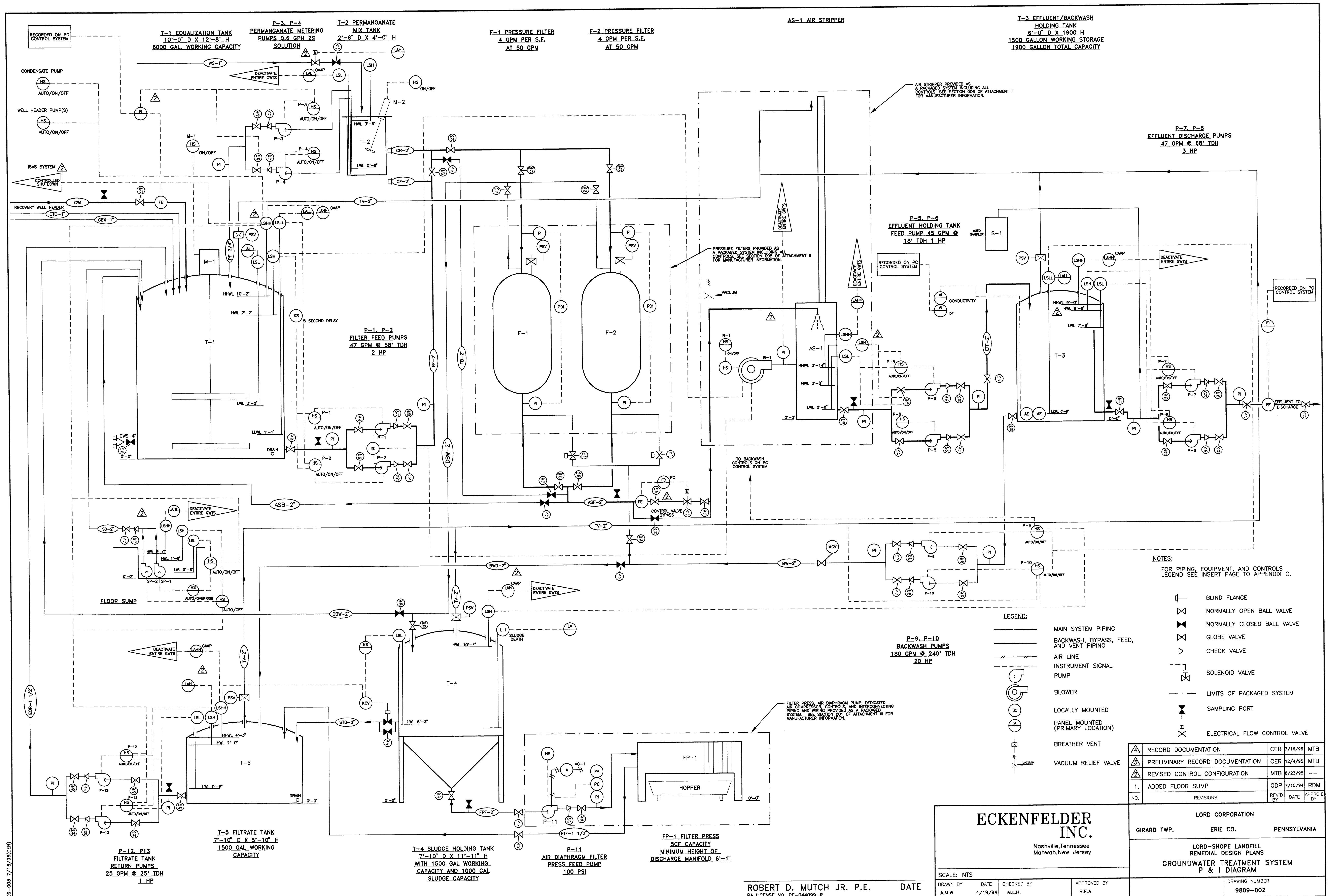


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(Red)

APPENDIX C
GWTS PIPING & INSTRUMENTATION DIAGRAM



NOTES:
FOR PIPING, EQUIPMENT, AND CONTROLS
LEGEND SEE INSERT PAGE TO APPENDIX C.

- LEGEND:
- MAIN SYSTEM PIPING
 - BACKWASH, BYPASS, FEED, AND VENT PIPING
 - AIR LINE
 - INSTRUMENT SIGNAL
 - PUMP
 - BLOWER
 - LOCALLY MOUNTED
 - PANEL MOUNTED (PRIMARY LOCATION)
 - BREATHING VENT
 - VACUUM RELIEF VALVE
 - BLIND FLANGE
 - NORMALLY OPEN BALL VALVE
 - NORMALLY CLOSED BALL VALVE
 - GLOBE VALVE
 - CHECK VALVE
 - SOLENOID VALVE
 - LIMITS OF PACKAGED SYSTEM
 - SAMPLING PORT
 - ELECTRICAL FLOW CONTROL VALVE

RECORD DOCUMENTATION	CER 7/16/96	MTB
PRELIMINARY RECORD DOCUMENTATION	CER 12/4/95	MTB
REVISED CONTROL CONFIGURATION	MTB 8/23/95	--
1. ADDED FLOOR SUMP	GDP 7/15/94	RDM
NO.	REVISIONS	REV'D BY DATE APPROV'D BY

ECKENFELDER INC.
Nashville, Tennessee
Mahwah, New Jersey

SCALE: NTS

DRAWN BY
A.M.W.

DATE
4/19/94

CHECKED BY
M.L.H.

APPROVED BY
R.E.A.

LORD CORPORATION

GIRARD TWP. ERIE CO. PENNSYLVANIA

LORD-SHOPE LANDFILL
REMEDIAL DESIGN PLANS
GROUNDWATER TREATMENT SYSTEM
P & I DIAGRAM

DRAWING NUMBER
9809-002

PIPING AND INSTRUMENTATION LEGEND

PIPING LEGEND:

ASB	--	AIR STRIPPER BYPASS
ASF	--	AIR STRIPPER FEED
ASV	--	AIR STRIPPER VENT
BW	--	BACKWASH WATER
BWD	--	BACKWASH WATER DRAIN
CF	--	CLARIFIER FEED
CR	--	CLARIFIER RETURN
DBD	--	DIRTY BACKWASH DRAIN
DBW	--	DIRTY BACKWASH WATER
ETF	--	EFFLUENT TANK FEED
EQR	--	EQUALIZATION TANK RETURN
FB	--	FILTER BYPASS
FF	--	FILTER FEED
FPF	--	FILTER PRESS FEED
FTF	--	FILTRATE TANK FEED
GW	--	GROUNDWATER INFLUENT
PF	--	PERMANGANATE FEED
STD	--	SLUDGE TANK DRAIN
TV	--	TANK VENT
WE	--	WATER EFFLUENT
WS	--	WATER SERVICE
CTO	--	CONDENSATE THERMAL OXIDIZER
CEX	--	CONDENSATE EXTRACTION
CWS	--	CONTINGENT WATER SERVICE
SD	--	SUMP DISCHARGE

CONTROLS LEGEND:

AE	--	ANALYSIS ELEMENT (pH) OR CONDUCTIVITY
AI	--	ANALYSIS INDICATOR (pH) OR CONDUCTIVITY
CV	--	CHECK VALVE
IA	--	CURRENT ALARM
FE	--	FLOW ELEMENT
FI	--	FLOW INDICATOR
FR	--	FLOW RECORDER
FQ	--	FLOW TOTALIZER
SC	--	FREQUENCY CONTROL
HS	--	HAND SWITCH
HV	--	HAND VALVE
LAH	--	LEVEL ALARM HIGH
LAHH	--	LEVEL ALARM HIGH HIGH
LAL	--	LEVEL ALARM LOW
LSH	--	LEVEL SWITCH HIGH
LSHH	--	LEVEL SWITCH HIGH HIGH
LSL	--	LEVEL SWITCH LOW
LSLL	--	LEVEL SWITCH LOW LOW
MCV	--	MECHANICAL CONTROL VALVE
PA	--	PRESSURE ALARM
PC	--	PRESSURE CONTROL
PD	--	PRESSURE DIFFERENTIAL
PI	--	PRESSURE INDICATOR
PSV	--	PRESSURE SAFETY VALVE
KS	--	TIME SWITCH
KCV	--	TIME CONTROL VALVE

EQUIPMENT LEGEND:

T-1	--	EQUALIZATION TANK
T-2	--	PERMANGANATE MIX TANK
T-3	--	EFFLUENT/BACKWASH HOLDING TANK
T-4	--	SLUDGE HOLDING TANK
T-5	--	FILTRATE TANK
F-1 and F-2	--	PRESSURE FILTER 1 AND 2
M-1 and M-2	--	MIXER 1 AND 2
P-1 through P-13	--	PUMPS 1 THROUGH 13
B-1 and B-2	--	BLOWERS 1 AND 2
AS-1	--	AIR STRIPPER 1
FP-1	--	FILTER PRESS 1
S-1	--	AUTOMATIC SAMPLER 1
AC-1	--	AIR COMPRESSOR 1

ORIGINAL
(Red)

CONTROL AND INSTRUMENTATION IDENTIFICATION LETTERS

ORIGINAL
(Red)

FIRST-LETTER			SUCCEEDING-LETTER		
	MEASURED INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE			CONTROL	
D	USER'S CHOICE	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS, VIEWING DEVICE (19)		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	USER'S CHOICE	MOMENTARY			MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

SOURCE: AMERICAN NATIONAL STANDARD INSTITUTE, INSTRUMENT SOCIETY OF AMERICA S5.1-1987 (R1992)

ORIGINAL
(Red)

APPENDIX D
GWTS HAND VALVE POSITION SCHEDULE

**TABLE D-1
HAND VALVE POSITION SCHEDULE
FOR THE GWTS**

**LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

ORIGINAL
(Red)

Valve Tag No.	Associated System	Operating Position		Purpose of Alternate Position
		Normal	Alternate	
HV-1	Influent Line (GWI)	Open	Open	
HV-2	Effluent of T-1	Open	Open	
HV-3	Isolate P-1	Open	Closed	Maintenance on P-1
HV-4	Isolate P-2	Open	Closed	Maintenance on P-2
HV-5	Isolate P-1	Open	Closed	Maintenance on P-1
HV-6	Isolate P-2	Open	Closed	Maintenance on P-2
HV-7	Filter Feed Line (FF)	Open	Open	
HV-8	Filter Bypass Line (FB)	Closed	Open	Bypass the Granular Media Filter System
HV-9	Filter Feed Line (FF)	Open	Closed	Bypass the Granular Media Filter System
HV-10	Filter Bypass Line (FB)	Closed	Open	Bypass the Granular Media Filter System
FHV-1	Pressure Filter Control Valve	Open	Open	
FHV-2	Pressure Filter Control Valve	Open	Open	
FHV-3	Pressure Filter Control Valve	Open	Open	
FHV-4	Pressure Filter Control Valve	Open	Open	
FHV-5	Pressure Filter Control Valve	Open	Closed	Bypass the Granular Media Filter System
FHV-6	Pressure Filter Control Valve	Open	Closed	Bypass the Granular Media Filter System
HV-11	Air Stripper Bypass (ASB)	Closed	Open	Bypass the Air Stripper and Return to T-1
HV-12	Air Stripper Feed (ASF)	Open	Closed	Bypass Flow Control Valve or Isolate Valve
HV-13	Air Stripper Feed (ASF)	Open	Closed	Bypass Flow Control Valve or Isolate Valve
HV-14	FCV Bypass Line	Closed	Open	Bypass Flow Control Valve or Isolate Valve
HV-15	Effluent of Air Stripper	Open	Open	
HV-16	Isolate P-6	Open	Closed	Maintenance on P-6
HV-17	Isolate P-5	Open	Closed	Maintenance on P-5
HV-18	Isolate P-6	Open	Closed	Maintenance on P-6
HV-19	Isolate P-5	Open	Closed	Maintenance on P-5
HV-20	Effluent Tank Feed (ETF)	Open	Open	Note: Globe Valve for Flow Control
HV-21	Effluent of T-3	Open	Open	
HV-22	Isolate P-8	Open	Closed	Maintenance on P-8
HV-23	Isolate P-7	Open	Closed	Maintenance on P-7
HV-24	Isolate P-8	Open	Closed	Maintenance on P-8
HV-25	Isolate P-7	Open	Closed	Maintenance on P-7
HV-26	Effluent Discharge Line	Open	Open	Note: Globe Valve for Flow Control
HV-27	Effluent Discharge Line	Open	Open	
HV-28	Backwash Line from T-3	Open	Open	
HV-29	Isolate P-9	Open	Closed	Maintenance on P-9
HV-30	Isolate P-10	Open	Closed	Maintenance on P-10
HV-31	Isolate P-9	Open	Closed	Maintenance on P-9
HV-32	Isolate P-10	Open	Closed	Maintenance on P-10
HV-33	Backwash Bypass (BWD)	Closed	Open	Bypass Backwash or drain T-3 to T-5
HV-34	Backwash Feed Line (BW)	Open	Closed	Bypass Backwash or drain T-3 to T-5
HV-35	Dirty Backwash Line (DWB)	Open	Closed	Divert Dirty Backwash Water to T-1
HV-36	Dirty Backwash Bypass	Closed	Open	Divert Dirty Backwash Water to T-1

**TABLE D-1
HAND VALVE POSITION SCHEDULE
FOR THE GWTS**

**LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA**

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Valve Tag No.	Associated System	Operating Position		Purpose of Alternate Position
		Normal	Alternate	
HV-37	Sludge Effluent of T-4	Closed	Open	Open Only When Dewatering Solids
HV-38	Filter Press Feed (FPF)	Open	Closed	Isolate P-11 for Maintenance
HV-39	Filter Press Feed (FPF)	Open	Closed	Isolate P-11 for Maintenance
FPHV-1	Effluent Manifold Line	Open	Open	
FPHV-2	Effluent Manifold Line	Open	Open	
FPHV-3	Effluent Manifold Line	Open	Open	
HV-40	Filtrate Return Line (FTF)	Open	Open	
HV-41	Decant Line	Closed	Open	Bypass Automatic Decant Valve
HV-42	Effluent of T-5	Open	Open	
HV-43	Isolate P-12	Open	Closed	Maintenance on P-12
HV-44	Isolate P-13	Open	Closed	Maintenance on P-13
HV-45	Isolate P-12	Open	Closed	Maintenance on P-12
HV-46	Isolate P-13	Open	Closed	Maintenance on P-13
HV-47	Sump Discharge Line (SD)	Open	Closed	Maintenance on SP-1 or SP-2
HV-48	Isolate P-3	Open	Closed	Maintenance on P-3
HV-49	Isolate P-4	Open	Closed	Maintenance on P-4
HV-50	Contingent Water Supply	Closed	Open	T-1 to be used as a contingent water supply to address landfill fire

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APPENDIX E
GWTS PROCESS CONTROL TABLES

TABLE E-1
FLOW RATE ADJUSTMENT PERCENTAGES
FOR THE AUTOMATIC FLOW CONTROL VALVE

Lord-Shope Landfill
Girard Township, Pennsylvania

ORIGINAL
 (Red)

Desired Flow Rate (GPM)	Input Parameter (%)
14	27
15	29
16	31
17	33
18	35
19	37
20	39
21	41
22	43
23	45
24	47
25	49
26	51
27	53
28	55
29	57
30	59
31	61
32	63
33	65
34	67
35	69
36	71
37	73
38	75
39	76
40	78
41	80
42	82
43	84
44	86
45	88
46	90
47	92

Note: Input parameter based on percentage of maximum capacity of
 P-1 and P-2 (51 gpm).

TABLE E-2
POTASSIUM PERMANGATE FEED RATES
Lord-Shope Landfill
Girard Township, Pennsylvania

ORIGINAL
(Red)

Influent Flow Rate (GPM)	Potassium Permanganate Feed Rate			Metering Pump Setting	
	(GPM)	(GPH)	(GPD)	Stroke Rate (%)	Stroke Length (%)
14	0.004	0.224	5.4	10	19
15	0.004	0.240	5.8	10	21
16	0.004	0.256	6.1	10	22
17	0.005	0.272	6.5	10	23
18	0.005	0.288	6.9	10	25
19	0.005	0.304	7.3	10	26
20	0.005	0.320	7.7	10	27
21	0.006	0.336	8.1	10	29
22	0.006	0.352	8.4	15	20
23	0.006	0.368	8.8	15	21
24	0.006	0.384	9.2	15	22
25	0.007	0.400	9.6	15	23
26	0.007	0.416	10.0	15	24
27	0.007	0.432	10.4	15	25
28	0.007	0.448	10.8	15	26
29	0.008	0.464	11.1	20	20
30	0.008	0.480	11.5	20	21
31	0.008	0.496	11.9	20	21
32	0.009	0.512	12.3	20	22
33	0.009	0.528	12.7	20	23
34	0.009	0.544	13.1	20	23
35	0.009	0.560	13.4	20	24
36	0.010	0.576	13.8	20	25
37	0.010	0.592	14.2	25	20
38	0.010	0.608	14.6	25	21
39	0.010	0.624	15.0	25	21
40	0.011	0.640	15.4	25	22
41	0.011	0.656	15.7	25	22
42	0.011	0.672	16.1	25	23
43	0.011	0.688	16.5	25	24
44	0.012	0.704	16.9	30	20
45	0.012	0.720	17.3	30	21
46	0.012	0.736	17.7	30	21
47	0.013	0.752	18.1	30	21

Note: Potassium permanganate feed rates are based on a dose rate of 4.0 mg/L with a solution concentration of 1.5 percent. Metering pump settings based on a measured output capacity of 281 gpd for each pump.

TABLE E-3

GWTS ALARM SCHEDULE SUMMARY

LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Monitoring Point Location	Monitoring Point Description ^a	Alarm Condition	Alarm Annunciation Location ^b	Action
Tank T-1	LSHH	High water level in T-1	PC and CAAP	Deactivate well pumps, condensate tank pump, P-12 and P-13, and sump pumps ^c Deactivate P-1 and P-2
	LSLL	Low water level in T-1	PC	
Tank T-2	LSL	Low liquid level in T-2	PC and CAAP	Deactivates entire GWTS and initiates a Group II alarm on the autodialer system
Air Stripper	LSHH	High water level in air stripper reservoir	PC and CAAP	Deactivates entire GWTS and initiates a Group II alarm on the autodialer system
Tank T-3	LSHH	High water level in T-3	PC and CAAP	Deactivates entire GWTS and initiates a Group II alarm on the autodialer system Deactivates P-9 and P-10 and alerts the operator of incomplete backwash cycle
	LSLL	Low water level in T-3	PC	
Tank T-4	LSH	High water level in T-4	PC and CAAP	Deactivates entire GWTS and initiates a Group II alarm on the autodialer system
Tank T-5	LSHH	High water level in T-5	PC and CAAP	Deactivates entire GWTS and initiates a Group II alarm on the autodialer system
Floor Sump	LSHH	High water level in building	PC and CAAP	Deactivates entire GWTS and initiates a Group II alarm on the autodialer system

^aLSHH - level switch high high; LSH - level switch high; LSL - level switch low; LSLL - level switch low low

^bPC refers to the PC control system. CAAP refers to central alarm annunciation panel located in the GWTS building.

^cThe LSHH alarm condition in T-1 can be reset locally or remotely via the PC control system by entering a "1" in the circle on the ALARM screen display provided the water level in T-1 is lowered to LSH elevation.

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APPENDIX F
SCHEDULE OF MAINTENANCE ACTIVITIES

TABLE F-1
GENERAL MAINTENANCE GUIDELINES^a

LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Equipment	Maintenance Task	Manufacturer's Reference Information	Comment
Monthly Maintenance Activities:			
Process Tank Level Switches Air Stripper	Inspect and Clean Inspect Motor Bearings	Attachment II, Section 003 Attachment II, Section 006	Inspect mercury switches; look for cracks in glass tube. Inspect bearings and lubricate as necessary. Lubricate bearings at least than once every 3 years.
Air Stripper	Inspect Air Inlet		Verify that air inlet is free from blockage.
Autosampler	Clean Equipment	Attachment III, Section 002	Clean interior and exterior of sampler. Use laboratory grade detergent and water.
Quarterly Maintenance Activities:			
Thermal Oxidizer	Inspect Air and Gas Filters	Attachment I, Section 001	Replace air and gas filters as necessary. Refer to manufacturer's information for part numbers.
Thermal Oxidizer	Inspect Flame Monitoring Device	Attachment I, Section 001	Refer to manufacturer's information for instructions and part numbers.
Thermal Oxidizer	Test Blower Overloads	Attachment I, Section 001	Test blower overload switches to verify that pressure switches are operational.
Pressure Filter System	Filter Media	Attachment II, Section 005	Inspect filter media. Look for media loss, excessive staining, reduction in run time between required backwashes, etc. Replace media as necessary.
Pressure Filter System	Filter System Valves & Equipment	Attachment II, Section 005	Refer to manufacturer's instructions for routine maintenance of filter system equipment.
Sump Pump Level Switches	Inspect and Clean	Attachment II, Section 009	Check that switches are operable; clean and repair as necessary.
Autosampler	Inspect Sample Tubing	Attachment III, Section 002	Inspect sample tubing from sample port to sampler. Replace if damaged, discolored, etc.
Autosampler	Inspect Pump Tubing	Attachment III, Section 002	Inspect pump tubing and replace as necessary.
Conductivity & pH Probes	Inspect and Clean	Attachment III, Section 010 and Section 012	Remove probes from T-3; inspect, clean, replace components as necessary.

TABLE F-1 (Continued)
GENERAL MAINTENANCE GUIDELINES^a

LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Equipment	Maintenance Task	Manufacturer's Reference Information	Comment
Bi-Annual Maintenance Activities:			
Air Stripper	Clean Aeration Trays	Attachment II, Section 006	Clean aeration trays per manufacturer's procedure. More frequent cleaning may be required based on monthly inspections.
Centrifugal Process Pumps Sump Pumps	Replace Motor Couplings Clean Pumps	Attachment II, Section 007 Attachment II, Section 009	Replace couplings more frequently if inspections require. Wash exterior of submersible pumps every six months to remove sediment.
Annual Maintenance Activities:			
Thermal Oxidizer	Inspect Combustion Chamber Refractory	Attachment I, Section 001	Repair refractory material as necessary. Task may require assistance from manufacturer.
GWR Well Pumps	Remove and Clean		Remove pumps and clean based a visual inspection.
Fiberglass Process Tanks	Clean Interior	Attachment II, Section 001	Drain each tank and clean interior to remove excess solids. Follow confined space entry procedures.
Tank Vents	Inspect and Clean	Attachment II, Section 004	Refer to manufacturer's information for cleaning instructions.
Air Stripper	Inspect and Clean Wheel Blades	Attachment II, Section 006	Clean fan blades per manufacturer's instructions. More frequent cleaning may be required based on operating environment.
Sludge Depth Meter	Clean Probe in T-4	Attachment II, Section 010	Clean probe more frequently if required.
Mechanical Flow Control Valve	Disassemble and Inspect	Attachment III, Section 005	Disassemble and inspect mechanical flow control valve associated with backwash system. Clean and replace cartridge as necessary.

TABLE F-1 (Continued)
GENERAL MAINTENANCE GUIDELINES^a

LORD-SHOPE LANDFILL
GIRARD TOWNSHIP, PENNSYLVANIA

Equipment	Maintenance Task	Manufacturer's Reference Information	Comment
Miscellaneous Maintenance Activities:			
Thermal Oxidizer	Lubricate Valves	Attachment III, Section 001	Lubricate linkage swivels on electrically actuated valves as necessary. Inspect equipment monthly.
Thermal Oxidizer	Lubricate Blower	Attachment I, Section 001	Lubricate blowers and replace oil as necessary. Inspect equipment monthly.
Thermal Oxidizer	Paint Exterior Surfaces	Attachment I, Section 001	Clean and paint exterior surfaces of the thermal oxidizer as required. Use paint and materials recommended by the manufacturer.
Centrifugal Process Pumps	Lubricate Motor Bearings	Attachment II, Section 007	Follow instructions printed on pump motor tag.
Filter Press System	Check Oil Reservoir	Attachment III, Section 001	Check reservoir prior to operating. Replace hydraulic oil as necessary.
Filter Press System	Clean Air Line Filter	Attachment III, Section 001	Clean as necessary.
Filter Press System	Adjust Relief Valve	Attachment III, Section 001	Adjust valve as necessary. Refer to manufacturer's operation & maintenance information.
Filter Press System	Replace Filter Cloths	Attachment III, Section 001	Replace filter cloths as necessary. Inspect prior to each use.
Filter Press System	Replace Hydraulic Power Unit Oil	Attachment III, Section 001	Replace oil as necessary. Refer to manufacturer's operation & maintenance information for replacement basis.

^aFrequencies for performing maintenance activities have been developed based on manufacturer's recommendations and good engineering practices. Frequencies may be increased or decreased based on routine inspections and experience acquired from actual operating conditions.

APPENDIX G
NPDES PERMIT

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Permit Requirements:

The final discharge limitations are based on either Best Available Treatment (BAT) or Best Conventional Treatment (BCT) as defined by the promulgated effluent limitation guidelines, Best Professional Judgement (BPJ), Water Quality based on criteria in Chapter 93 (WQ-93), Water Quality based on criteria in Chapter 16 (WQ-16), monitoring only in order to develop a firmer database for future evaluation (MO), discharge standards based on Chapter 97 (CH-97), or other requirements as identified in a subnote to the outfall (subnote). The basis of the following permit limits are identified in the parenthesis beside each parameter.

Outfall No. 001 Lat: 41° 58' 44" Long: 80° 21' 37"

Which Receives Waste From: Superfund Site Cleanup

The proposed discharge limits are based upon a design average flow of 0.115 MGD.

		Loadings (lb/day)			Concentrations (mg/l)			Monitoring	
Parameters		Monthly Average	Daily Maximum	Annual Average	Monthly Average	Daily Maximum	Instant. Maximum	Measurement Frequency	Sample Type
(MO)	Flow (MGD)				Monitoring only.			Daily	Measured Flow
(CH-97)	Oil & Grease				15		30	1/mo	Grab
(MO)	COD				Monitoring only.			5/wk	Grab
(MO)	Conductivity				Monitoring only.			1/month	Grab
(MO)	TOC				Monitoring only.			5/week	Grab
(WQ-CFC)	Aluminum				0.460	0.920	1.15	1/month	8 hr comp
(WQ-THH)	Barium				1.700	3.400	4.25	1/month	8 hr comp
(WQ-CFC)	Iron, Total				1.600	3.200	4.00	1/month	8 hr comp
(WQ-CFC)	Cadmium				0.0016	0.003	0.004	1/month	8 hr comp
(WQ-AFC)	Copper				0.009	0.018	0.02	1/month	8 hr comp
(WQ-CFC)	Lead				0.005	0.010	0.01	1/month	8 hr comp
(WQ-AFC)	Zinc				0.06	0.120	0.16	1/month	8 hr comp
(WQ-CFC)	Mercury	Not detectable using EPA Test Method*					245.1.	1/month	8 hr comp
(WQ-CRL)	Benzene**			0.0058			0.07	1/month	Grab****
(WQ-THH)	1,2-Trans-Dichloroethylene				0.59	1.180		1/month	Grab****
(WQ-CRL)	Trichloroethylene**			0.018			0.22	1/month	Grab****
(WQ-CRL)	Vinyl Chloride**	Not detectable using EPA Test Method					601.	1/month	Grab****
(WQ-THH)	Methyl Ethyl Ketone				3.4	6.8		1/month	Grab****
(WQ-THH)	Methyl Isobutyl Ketone				3.4	6.8		1/month	Grab****
(WQ-THH)	Acetone				6.7	13.4		1/month	Grab****
(CH-93)	pH	6.0-9.0 standard units at all times.						Weekly	Grab

**See Special Condition A in Part C (Annual Average);
***See Special Condition B in Part C (Not Detectable).
****See Special Condition C in Part C (Volatile Organics).

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FACT SHEET ADDENDUM

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Based on the June, 1991 comments prepared by, Eckenfelder Inc., the Department has modified the permit as follows:

- 1.) Established Water Quality Based Effluent Limits (WQBEL's) using a wasteflow of 47.4 gpm (.068256 MGD).
- 2.) Deleted the discharge limit for arsenic.
- 3.) Changed the mercury and vinyl chloride limits to "non-detectable" and placed the appropriate WQBEL in Part C of the permit to be complied, with if a more sensitive test method becomes available.
- 4.) Revised the remainder of the permit limits based on the decreased wasteflow and the revised Coefficient of Variation used in WQAT 2_04 v.4.01c.
- 5.) Changed the monitoring frequency for COD, Conductivity and O&G to 1/month and 5/week for COD.
- 6.) Revised the Latitude/Longitude.

Other Comments

Section 2.0 Location of and low flow estimate for receiving stream.

Based on conversations with USGS from Ohio and New York, the Erie County Health Department has determined that the development of the Q7-10 is accurate. The use of the flow monitoring at the Pennsylvania Fish Commission Hatchery for calculating Q7-10 has been addressed in correspondence between EPA and Eckenfelder, Inc.

Section 3.0 Applicability of Analytical Methods

The revised WQBEL for lead is above the Minimum Detection Level (MDL) found in Chapter 16 of the Department's Rules and Regulations and has been placed in Part A of the permit. In reference to mercury and vinyl chloride, the Department's current permitting guidance recommends that any WQBEL that is below the MDL be placed in Part A of the permit as "not detectable" with the numerical limit to be placed in Part C. The Part C limit is to be complied with if a more sensitive test method becomes available.

Section 4.0 Water Quality Limits

The Department has applied the WQBEL's for copper and zinc that protect the governing Acute Fish Criteria calculated using a hardness of 123 ug/l. Although the equations on Page 9 of the document are correct, to be applied correctly the resulting criteria must be converted to 30 day average values. Page 10 lists the conversion factors for acute and

ORIGINAL
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chronic criteria. The WQAT 2_04 template currently applies .3160583 (Acute) and .8275892 (Chronic) as stated in the November, 1991 WQAT 2_04 Technical Reference Guide. The template calculates the criteria (acute, chronic and human health) and then applies the appropriate conversion factor to the criteria. The WQBEL is based on the governing criteria.

The Department is currently considering the EPA proposal to use the Water Effects Ratio strategy for determination of site specific criteria development and if adopted by the Department could change the effluent limits for this discharge.

Action 5.0 Frequency of Sampling and Analysis

The NPDES permitting program is designed to regulate discharges to waters of the Commonwealth. Including a condition to perform a fish tissue analysis in the permit would not be consistent with the Guidelines under Chapter 92 of the Rules and Regulations. A fish tissue analysis may be performed in addition to the requirements of the permit and the results submitted to us for review and comment.

Action 6.0 Evaluation of Groundwater Treatment Capabilities

All new discharges are required to comply with WQBEL upon issuance of an NPDES permit. If the applicant cannot provide proof that the effluent limitations can be complied with, the Department may deny the permit.

The document should address the treatability of the pollutants based on the revisions listed above.

ER-BWQ-15.1 9/78 (Rev. 5/81)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

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AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

INDUSTRIAL PERMIT NO. PA _____

In compliance with the provisions of the Clean Water Act, 33 U.S.C. Section 1251 et seq. (the "Act") and Pennsylvania's Clean Streams Law, as amended, 35 P.S. Section 691.1 et seq.,

Lord Corporation

is authorized to discharge from a facility located at

Lord Shope Landfill

Girard Township, Erie County

to receiving waters named unnamed tributary to Elk Creek

In accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts A, B, and C hereof.

This permit and the authorization to discharge shall expire at midnight,

_____.

The authority granted by this permit is subject to the following further qualifications:

1. If there is a conflict between the application, its supporting documents and/or amendments and the terms and conditions of this permit, the terms and conditions shall apply.

~~2. Failure to comply with the terms or conditions of this permit is grounds for enforcement action; for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.~~

~~3. Application for renewal of this permit, or notification of intent to cease discharging by the expiration date, must be submitted to the Department at least 180 days prior to the above expiration date (unless permission has been granted by the Department for submission at a later date), using the appropriate NPDES permit application form. In the event that a timely and complete application for renewal has been submitted and the Department is unable, through no fault of the permittee, to reissue the permit before the above expiration date, the terms and conditions of this permit will be automatically continued and will remain fully effective and enforceable pending the grant or denial of the application for permit renewal.~~

4. This NPDES permit does not constitute authorization to construct or make modifications to wastewater treatment facilities necessary to meet the terms and conditions of this permit.

PERMIT ISSUED

BY _____

E.P. 7/20

AUG 18 '92 01:34PM PA D.E.R. HEADVILLE

P. 8/23
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS, OUTFALL
WHICH RECEIVES WASTE FROM: Superfund Site Cleanup

001

LAT. 41° 58' 44"

LONG 80° 21' 37"

- a. The permittee is authorized to discharge during the period from issuance date through expiration date.
- b. Based on the production data and anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply:

Discharge Limitations*

Monitoring Requirements

Discharge Parameter	Mass Units (lbs/day)		Concentrations (mg/l)			Measurement Frequency	Sample Type	24-Hour Report Under A.3.C?
	Average Monthly	Max. Daily	Annual Average	Average Monthly	Max. Daily	Instantaneous Maximum		
Flow (MGD)								
Oil & Grease				15		30	Daily	Measured Flow
Chemical Oxygen Demand							Daily 1/mo	Grab
Conductivity							1/month 5/wk	Grab
Total Organic Carbon							1/month	Grab
Aluminum							5/week	Grab
Barium				0.460	0.920	1.15	1/month	8 hr comp
Boron, Total				1.700	3.400	4.25	1/month	8 hr comp
Bromine				1.600	3.200	4.00	1/month	8 hr comp
Cadmium				0.0016	0.003	0.004	1/month	8 hr comp
Chloride				0.009	0.018	0.02	1/month	8 hr comp
Copper				0.005	0.010	0.01	1/month	8 hr comp
Cyanide				0.06	0.120	0.16	1/month	8 hr comp
Fluoride							1/month	8 hr comp
Mercury			Not detectable using EPA Test Method* 245.1.				1/month	8 hr comp
Nitrobenzene**			0.0058			0.07	1/month	Grab****
o,p'-Trans-Dichloroethylene				0.59	1.180		1/month	Grab****
p,p'-Dichloroethylene**			0.018			0.22	1/month	Grab****
Diethyl Chloride**			Not detectable using EPA Test Method 601.				1/month	Grab****
Diethyl Ethyl Ketone				3.4	6.8		1/month	Grab****
Diethyl Isobutyl Ketone				3.4	6.8		1/month	Grab****
Diethyl Ketone				6.7	13.4		1/month	Grab****
Oil: Not less than 6.0 standard units nor greater than 9.0 standard units at all times.							Weekly	Grab

There shall be no discharge of floating solids or visible foam in other than trace amounts,

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

Outfall 001 (discharge from treatment facility)

*Unless otherwise indicated, these are gross discharge limitations.

**See Special Condition A in Part C.

***See Special Condition B in Part C.

****See Special Condition C in Part C.

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PART A

Page 3 of 14

ORIGINAL
(Red)2. Definitions

- a. The term "Bypass" means the intentional diversion of wastes from any portion of a treatment facility.
- b. The term "severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- c. The "average monthly" mass discharge means the total discharge by weight during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the average monthly mass discharge shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made.
- d. The "maximum daily" mass discharge means the total discharge by weight during any calendar day.
- e. The "average monthly" concentration means the arithmetic average of all the daily determinations of concentration made during a calendar month.
- f. The "daily determination of concentration" means either the concentration of a composite sample taken during a calendar day or the arithmetic average of all grab samples taken during a calendar day.
- g. The "maximum daily" concentration means the daily determination of concentration for any calendar day.
- h. The "instantaneous maximum" concentration means the concentration not to be exceeded at any time in any grab sample.
- i. The term "Composite Sample" means a combination of individual samples obtained at regular intervals over a time period. Either the volume of each individual sample is proportional to discharge flow rates, or the sampling interval (for constant volume samples) is proportional to the flow rates over the time period used to produce the composite. The maximum time period between individual samples shall not exceed two hours, except that for wastes of a uniform nature the samples may be collected on a frequency of at least twice per working shift and shall be equally-spaced over a 24-hour period (or over the operating day if flows are of a shorter duration).
- j. The term "Grab Sample" means an individual sample collected in less than 15 minutes.

- k. The term "I-s" means Immersion stabilization - in which a calibrated device is immersed in the effluent stream until the reading is stabilized.
- l. The "average monthly" temperature means the arithmetic mean of temperature measurement made on an hourly basis, or the mean value plot of the record of a continuous automated temperature recording instrument, either during a calendar month or during the operating month if flows are of a shorter duration.
- m. The "maximum daily" temperature means the highest arithmetic mean of the hourly temperatures observed for any two (2) consecutive hours during a 24-hour day, or during the operating day if flows are of a shorter duration.
- n. The term "Measured Flow" means any method of liquid volume measurement, the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.
- o. The term "At outfall XXX" means a sampling location in outfall line XXX downstream from the last point at which wastes are added to outfall line XXX, or otherwise specified.
- p. The term "Estimate" means to be based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters and batch discharge volumes.
- q. The term "non-contact cooling water" shall mean water which is used in a cooling system designed so as to maintain constant separation of the cooling medium from all contact with process chemicals but which may on occasion, as a result of corrosion, cooling system leakage or similar cooling system failures contain small amounts of process chemicals: provided, that all reasonable measures have been taken to prevent, reduce, eliminate and control to the maximum extent feasible such contamination; and provided further, that all reasonable measures have been taken that will mitigate the effects of such contamination once it has occurred.

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3. SELF-MONITORING, REPORTING, AND RECORDS KEEPING

a. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

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b. Reporting of Monitoring Results

- (1) Monitoring results obtained during each month shall be summarized for that month and reported on a Discharge Monitoring Report (DMR) Form.. postmarked no later than the 28th day of the following month. Duplicate signed copies of these and all other reports required herein shall be submitted to the Department at the following addresses:

Dept. of Environmental Resources
Bureau of Water Quality Management
1012 Water Street
Meadville, PA 16335

Erie County Health Department
606 West Second Street
Erie, PA 16509

Program Management Section (3WMS2)
Permits Enforcement Branch
Water Management Division
U.S. Environmental Protection
Agency - Region III
841 Chestnut Building
Philadelphia, PA 19107

- (2) If the permittee monitors any pollutant, using analytical methods described in A.3.e. below, more frequently than the permit requires, the results of this monitoring shall be incorporated, as appropriate, into the calculations used to report self-monitoring data on the DMR.

c. Non-Compliance Reporting

- (1) 24-Hour Reporting - The permittee shall orally report to the Department within 24-hours of becoming aware of the following:

(a) Actual or anticipated non-compliance with any term or condition of this permit which may endanger health or the environment.

(b) Actual or anticipated non-compliance with any "maximum daily" discharge limitation which is identified in Part A.1 of this permit as being either:

(i) A toxic pollutant effluent standard established by EPA pursuant to Section 307(a) of the Clean Water Act,

(ii) For a toxic or hazardous pollutant which, if not adequately treated, could constitute a threat to human health, welfare, or the environment, or

(III) Any pollutant identified as the method to control a toxic pollutant or hazardous substance (i.e. indicator pollutant).

(c) Any unanticipated bypass which exceeds any effluent limitations in the permit.

(d) Where the permittee orally reports this information within the above mentioned 24-hour time period, a written submission outlining the above information must be submitted to the Department within 5-days of becoming aware of such a condition, unless this requirement is waived by the Department upon receipt of the oral report.

ORIGINAL
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(2) Other Non-Compliance Reporting

(a) The permittee shall give advance notice to the Department of any planned changes to the permitted activity or facility which may result in non-compliance with permit requirements.

(b) Where the permittee knows in advance of the need for a by-pass which will exceed effluent limitations, it shall submit prior notice to the Department at least 10 days, if possible, before the date of the bypass.

(c) The permittee shall report all instances of non-compliance which are not reported above at the time of DMR submission.

(3) The reports and notifications required above shall contain the following information:

(a) A description of the discharge and cause of non-compliance;

(b) The period of non-compliance, including exact dates and times and/or the anticipated time when the discharge will return to compliance; and

(c) Steps being taken to reduce, eliminate, and prevent recurrence of the non-complying discharge.

d. Specific Toxic Substance Notification Levels - The permittee shall notify the Department as soon as it knows or has reason to believe the following:

(1) That any activity has occurred, or will occur, which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels".

(a) One hundred micrograms per liter

- (b) Two hundred micrograms per liter for acrolein and acrylonitrile
 - (c) Five hundred micrograms per liter for 2, 4-dinitrophenol and 2-methyl -4, 6-dinitrophenol
 - (d) One milligram per liter for antimony
 - (e) Five (5) times the maximum concentration value reported for that pollutant in the permit application
 - (f) Any other notification level established by the Department
- (2) That it has begun, or expects to begin, to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

ORIGINAL
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e. Test Procedures

Unless otherwise specified in this permit, the test procedures for the analysis of pollutants shall be those contained in 40 CFR Part 136, or alternate test procedures approved pursuant to that part.

f. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- (1) The exact place, date, and time of sampling or measurements;
- (2) The person(s) who performed the sampling or measurements;
- (3) The dates the analyses were performed;
- (4) The person(s) who performed the analyses;
- (5) The analytical techniques or methods used; and
- (6) The results of such analyses.

g. Records Retention

All records of monitoring activities and results (including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records), copies of all reports required by this permit, and records of all data used to complete the application for this permit shall be retained by the permittee for three (3) years. The three year period shall be extended as requested by the Department or the EPA Regional Administrator.

SCHEDULE OF COMPLIANCE

a. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

ORIGINAL
(Red)

b. Periodic Reports Required

No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit to the Department a written notice of compliance or non-compliance with the specific schedule requirement. In the case of non-compliance, the notice shall include the cause of non-compliance, any remedial actions taken, the estimated date when compliance with the elapsed date shall occur, and the probability of meeting the next scheduled requirement.

1. MANAGEMENT REQUIREMENTS

ORIGINAL
(Red)a. Permit Modification, Termination, or Revocation and Reissuance

~~(1) This permit may be modified, terminated, or revoked and reissued during its term for any of the causes specified in 25 Pa. Code Chapter 93.~~

~~(2) The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated non-compliance, does not stay any permit violation.~~

~~(3) Toxic Pollutants~~

~~Notwithstanding the above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge, and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, then this permit shall be modified or revoked and reissued by the Department to conform with the toxic effluent standard or prohibition and the permittee so notified.~~

~~In the absence of a Departmental action to modify or to revoke and reissue this permit, any toxic effluent standard or prohibition established under Section 307(a) of the Act is considered to be effective and enforceable against the permittee.~~

b. Duty to Provide Information

~~(1) The permittee shall furnish to the Department, within a reasonable time any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.~~

(2) The permittee shall furnish to the Department, upon request, copies of records required to be kept by this permit.

(3) Other Information - Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information to the Department.

(4) The permittee shall give advance notice to the Department of any planned physical alterations or additions to the permitted facility.

ORIGINAL
(Red)c. Facilities Operation

The permittee shall at all times maintain in good working order and properly operate all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee for water pollution control and abatement to achieve compliance with the terms and conditions of the permit. Proper operation and maintenance includes but is not limited to effective performance based on designed facility removals, adequate funding, effective management, adequate operator staffing and training, and adequate laboratory and processing controls including appropriate quality assurance procedures. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with this permit.

d. Adverse Impact

The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from non-compliance with this permit.

e. Bypassing

(1) Bypassing not Exceeding Permit Limitations - The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if the bypass is for essential maintenance to assure efficient operation. This type of bypassing is not subject to the reporting and notification requirements of Part A.3.c above.

(2) Other Bypassing - In all other situations bypassing is prohibited unless the following conditions are met:

(a) A bypass is unavoidable to prevent loss of life, personal injury or "severe property damage";

(b) There are no feasible alternatives to a bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down-time. (This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance); and

(c) The permittee submitted the necessary reports required under Part A.3.c above.

(3) The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three conditions listed above.

ORIGINAL
(Red)f. Reduction, Loss, or Failure of the Treatment Facilities

Upon reduction, loss, or failure of the treatment facilities, in order to maintain compliance with its permit, the permittee shall control production and all discharges until either the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

g. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from adversely affecting the environment.

2. RESPONSIBILITIES

a. Right of Entry

Pursuant to Sections 5(b) and 305 of Pennsylvania's Clean Streams Law and 25 Pa. Code, Chapter 92, the permittee shall allow the head of the Department, the EPA Regional Administrator, and/or their authorized representatives, upon the presentation of credentials and other documents as may be required by law:

- (1) To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and
- (2) At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; to inspect any collection, treatment, pollution management, or discharge facilities required under the permit; and to sample any substances or parameters at any location.

b. Transfer of Ownership or Control

- (1) No permit may be transferred unless approved by the Department.
- (2) In the event of any pending change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the Department by letter of such pending change at least 30 days prior to the change in ownership or control.

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(Red)

- (3) The letter shall be accompanied by the appropriate Department forms for transfer of the permit and a written agreement between the existing permittee and the new owner or controller stating that the existing permittee shall be liable for violations of the permit up to and until the date of permit transfer and that the new owner or controller shall be liable for permit violations from that date on.
- (4) After receipt of the documentation above, the Department shall notify the existing permittee and the new owner or controller of its decision concerning approval of the transfer. In approving a transfer the Department may modify or revoke and reissue the permit.
- (5) ... In the event the Department does not approve transfer of the permit, the new owner or controller must submit a new permit application.

c. Confidentiality of Reports

Except for data determined to be confidential under 25 Pa. Code, Chapter 92 all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department and the EPA Regional Administrator. Effluent data shall not be considered confidential.

d. Penalties and Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for non-compliance pursuant to Section 309 of the Clean Water Act or Sections 602 or 603 of the Clean Streams Law.

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

e. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges; nor does it authorize any injury to private property or any invasion of personal rights.

ORIGINAL
(Red)f. Other Laws

Nothing herein contained shall be construed to be an intent on the part of the Department to approve any act made or to be made by the permittee inconsistent with the permittee's lawful powers or with existing laws of the Commonwealth regulating industrial wastes and the practice of professional engineering, nor shall this permit be construed to sanction any act otherwise forbidden by federal or state law or regulation, or by local ordinance. Nor does it pre-empt any duty to obtain state or local assent required by law for the discharge(s).

g. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

ORIGINAL
(Red)

OTHER REQUIREMENTS/SPECIAL CONDITIONS

A. "Annual Average"

The term "annual average" effluent limits for CRL (Carcinogens) based toxics criteria means average of the most recent twelve (12) months of data for the parameter in question, ending with the month of the report. The annual average shall be computed by averaging all analytical results, not just the twelve monthly averages. If less than twelve months of data are available, the annual average shall be the average of all available data up to the month of the report. The annual average shall be reported once per year.

B. Non-Detectable (N.D.) Water Quality-Based Effluent Limitations:

The calculated water quality-based effluent limitations for these pollutants are below the currently approved specified method detection levels (MDLs). "Not Detectable" (or N.D.) using an EPA approved method is specified as effluent limitations for these toxic pollutants in Part A of this permit. The calculated water quality-based effluent limitations for these pollutants are as follows:

<u>Pollutant Name</u>	<u>Calculated Limit (ug/l)</u>
Mercury	0.000014
Vinyl Chloride	0.00012

No final date for compliance with these calculated limitations is established at this time. The Department may modify this permit to establish a final compliance date, if a new more sensitive MDL or test procedure is available at a later date.

C. Volatile Organics Sampling

Because of the unstable character of the volatile fraction compounds, composite sampling (as defined in Part A, Section 21) is not appropriate. Therefore, 4 grab samples collected during actual hours of discharge over a 24 hour period (not necessarily flow proportional) shall be taken for GC/MS Volatile Organic Analysis. These samples shall be taken in accordance with Table II "Analytical Methods and Sample Collection, Preservation and Handling for the 126 Priority Pollutants" found in Special Condition D. These 4 grab samples shall be combined in the laboratory immediately before analysis and one analysis shall be performed.

D. Analytical Methods and Sample Collection, Preservation, and Handling Techniques

The sample collection, preservation, and handling techniques associated with self-monitoring of priority pollutants shall be in accordance with the attached table.

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APPENDIX H

PC CONTROL SYSTEM TABLES

Lord Shope Landfill Project - Control System

Input Parameter										
Input Parameter					Action Taken					
Item	Control Point	Alarm Condition	Record Freq.	PC Monitor Point	ISVS Shutdown		Ground-water Process Stop	Auto Dial-Out	P.C. Display Screen	C.A.A.P. Annunciation
			H=hourly Q=4/day	(- R = Recorded Point)	Controlled	Emergency (Shunt-trip)	(Shunt-trip for P1/2, P3/4, P5/6, P7/8, P9/10, P11, P12/13, SP1/2, and Air Stripper)	Group # (1 = Fire, 2 = GW Stop, 3 = ISVS, 4 = Envir.)	(Process, Backwash, Ex-Well, LF-Temp, WA-Wells, ISVS, Alarms[text] and Shope)	(Local alarm annunciation only)
ISVS System										
1	ISVS Condensate Tank Water Level	LSHH	---	Yes	Yes	---	---	# 3	Alarms	Yes (Cond. HH)
2	ThermTech Combustion Temperature	---	H	Yes - R	---	---	---	---	---	---
3	ISVS Extracted Vapor Opacity	---	H	Yes - R	Yes	---	---	---	ISVS	---
4	ISVS Extracted Vapor Temperature	80 F (User Defined)	H	Yes - R	Yes	---	---	# 1	ISVS	---
5	ISVS Extracted Vapor LEL	---	H	Yes - R	---	---	---	---	ISVS	---
6	ISVS Extracted Vapor Total Hydrocarbons	---	H	Yes - R	---	---	---	---	ISVS	---
7	ISVS Extracted Vapor Oxygen (O2)	---	H	Yes - R	---	---	---	---	ISVS	---
8	ISVS Extracted Vapor Carbon Monoxide (CO)	50 ppmv (User Defined)	H	Yes - R	---	---	---	# 1	ISVS	---
9	ISVS Extracted Vapor Flow Total	---	H	Yes - R	---	---	---	---	ISVS / Ex-Well	---
10	ISVS Extracted Vapor Crest Flow	---	H	Yes - R	---	---	---	---	ISVS / Ex-Well	---
11	ISVS Extracted Vapor Landfill Flow	---	H	Yes - R	---	---	---	---	ISVS / Ex-Well	---
12	ISVS Dilution Air Flow Rate	---	H	Yes - R	---	---	---	---	ISVS	---
13	ISVS Extracted Vapor Vacuum	---	H	Yes - R	---	---	---	---	ISVS	---
14	ThermTech High High Knock-out Pot	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
15	ThermTech Process Blower Failure	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
16	ThermTech Low Flow to Oxidizer	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
17	ThermTech Low Combustion Air Flow	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
18	ThermTech Combustion Air Blower Failure	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
19	ThermTech High & Low Fuel Gas Pressure	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
20	ThermTech Loss of Burner Flame	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
21	ThermTech High Temperature Shutdown	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
22	ThermTech Low Temperature Shutdown	Therm. Ox. (internal)	---	---	Yes	---	---	# 3	---	---
23	Landfill Temperature Probe T-1	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
24	Landfill Temperature Probe T-2	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
25	Landfill Temperature Probe T-3	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
26	Landfill Temperature Probe T-4	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
27	Landfill Temperature Probe T-5	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
28	Landfill Temperature Probe T-6	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
29	Landfill Temperature Probe T-7	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
30	Landfill Temperature Probe T-8	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
31	Landfill Temperature Probe T-9	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
32	Landfill Temperature Probe T-10	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
33	Landfill Temperature Probe T-11	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---
34	Landfill Temperature Probe T-12	80 F (User defined)	H	Yes - R	Yes	---	---	# 1	LF-Temp.	---

Table Developed By Lord Corporation

Lord Shope Landfill Project - Control System

Input Parameter					Action Taken						
Item	Control Point	Alarm Condition	Record Freq.	PC Monitor Point	ISVS Shutdown		Ground-water Process Stop	Auto Dial-Out	P.C. Display Screen	C.A.A.P. Annunciation	Control Action
			H=hourly Q=4/day	(- R = Recorded Point)	<u>Controlled</u>	<u>Emergency (Shunt-trip)</u>	(Shunt-trip for P1/2, P3/4, P5/6, P7/8, P9/10, P11, P12/13, SP1/2, and Air Stripper)	Group # (1 = Fire, 2 = GW Stop, 3 = ISVS, 4 = Envir.)	(Process, Backwash, Ex-Well, LF-Temp, WA-Wells, ISVS, Alarms[text] and Shope)	(Local alarm annunciation only)	
Groundwater System											
35	Tank T-1 Water Level, "LSHH"	LSHH	---	Yes	Yes	---	---	# 2	Process, Alarms	Yes (T-1, LAHH)	G.W. Influent Stop (P12/13, IPE-1, IPE-2, IPE-3, IPL-2 SP1/2, & Condensate Pump) (Non-shunt trip termination)
36	Tank T-1 Water Level, "LSH"	---	---	Yes	---	---	---	---	Alarms	---	Start pumps P1/P2
37	Tank T-1 Water Level, "LSL"	LSL	---	Yes	---	---	---	---	Alarms	---	Early Warning Alarm
38	Tank T-1 Water Level, "LSLL"	LSLL	---	Yes	---	---	---	---	Alarms	---	Stops Pumps P1/P2
39	Tank T-2 Water Level, "LSL"	LSL	---	Yes	---	---	Yes	# 2	Alarms	Yes (T-2 LAL)	Stop Entire Groundwater Process
40	Tank T-2 Water Level, "LSH"	LSH	---	Yes	---	---	---	---	Alarms	---	Close T-2 water solenoid
41	Ground Water Influent, Flow Rate	---	Q	Yes	---	---	---	---	WA-Wells / Process	---	Stops P3/4 < 1gpm
42	Ground Water Influent, Flow Total	---	@5000	Yes - R	---	---	---	---	Process	---	---
43	Process Flow Control, Flow Rate (User defined)	---	---	Yes	---	---	---	---	---	---	Maintains desired flow rate
44	Ground Water Effluent, Flow Rate	---	Q	Yes	---	---	---	---	Process	---	---
45	Ground Water Effluent, Flow Total	---	@5000	Yes - R	---	---	---	---	Process	---	---
46	Backwash Filter Diff. Pressure (User defined)	---	Q	Yes	---	---	---	---	Backwash	---	Automatic Starts Backwash
47	Backwash System Auxiliary Inputs	---	---	Yes	---	---	---	---	Backwash	---	Set backwash diff. pressure; Select filter unit; Set duration time; Select Auto/Manual
48	Air Stripper, "LSHH"	LSHH	---	Yes	---	---	Yes	# 2	Alarms	Yes (AS LAHH)	Stop Entire Groundwater Process
49	Air Stripper, Low Air Pressure	"Low Air"	---	Yes	---	---	Yes	# 2	Alarms	Yes (AS Low Air)	Stop Entire Groundwater Process
50	Tank T-3 Water Level, "LSLL"	LSLL	---	Yes	---	---	---	---	Alarms	---	Deactivates Backwash Cycle
51	Tank T-3 Water Level, "LSL"	---	---	Yes	---	---	---	---	---	---	Stops Pumps P7/8
52	Tank T-3 Water Level, "LSH"	---	---	Yes	---	---	---	---	---	---	Starts Pumps P7/8
53	Tank T-3 Water Level, "LSHH"	LSHH	---	Yes	---	---	Yes	# 2	Alarms	Yes (T-3 LAHH)	Stop Entire Groundwater Process
54	Tank T-4 Water Level, "LSL"	---	---	---	---	---	---	---	---	---	Upon activation, opens decant valve after pre-determined time delay; recloses upon water level drop & decant stops.
55	Tank T-4 Water Level, "LSH"	LSH	---	Yes	---	---	Yes	# 2	Alarms	Yes (T-4 LAH)	Stop Entire Groundwater Process
56	Tank T-5 Water Level, "LSL"	---	---	Yes	---	---	---	---	---	---	Stop Pumps P12/13
57	Tank T-5 Water Level, "LSH"	---	---	Yes	---	---	---	---	---	---	Start Pumps P12/13
58	Tank T-5 Water Level, "LSHH"	LSHH	---	Yes	---	---	Yes	# 2	Alarms	Yes (T-5 LAHH)	Stop Entire Groundwater Process and Close Decant Valve on T-4
59	Floor Sump Water Level "LSL"	LSL	---	Yes	---	---	---	---	---	---	Starts Pump # SP-1
60	Floor Sump Water Level "LSH"	LSH	---	Yes	---	---	---	---	---	---	Starts Pump # SP-2
61	Floor Sump Water Level "LSHH"	LSHH	---	Yes	---	---	Yes	# 2	Alarms	Yes (SP LAHH)	Stop Entire Groundwater Process
62	Emergency Stop, Panic Button	E-Stop	---	Yes	---	Yes	Yes	# 2	Alarms	Yes (E-Stop)	Activates All Shunt Trips
63	Loss of Up-Link (Data Communications)	---	---	Yes	Yes	---	Yes	# 2	---	---	Terminates Processes due to loss of PC control.
64	Process Area Room Temperature, Low	Low Amb. (500F)	---	Yes	---	---	---	# 4	Alarms	---	Dial-out to Operator
65	Process Area Room Temperature, High	High Amb. (1200F)	---	Yes	---	---	---	# 4	Alarms	---	Dial-out to Operator
66	Groundwater Effluent, pH Level	---	Q	Yes - R	---	---	---	---	---	---	---
67	Groundwater Effluent, Conductivity	---	Q	Yes - R	---	---	---	---	---	---	---
68	Auto-Dialer for PC Alarm Conditions	Loss of Elec. Power	---	---	---	---	---	Automatic	---	---	Dials Answering Service and leaves "Loss of Power" message automatically.
69											
70											

Table Developed By Lord Corporation

ORIGINAL
(Red)

APPENDIX I
OPERATOR CHECKLISTS AND DATA SHEETS

SHOPE LANDFILL ACTIVITY LOG SHEET

(Use this log to record changes in operating conditions, routine activities including sampling, purpose of site visit, etc.)

Note: Be sure to check instructions for required monthly, quarterly, or semiannual duties.

DATE	OPERATOR INITIALS	ACTIVITY/COMMENT

ORIGINAL
(Red)

SHOPE LANDFILL TROUBLESHOOTING LOG SHEET

(Use this log to describe cause and corrective action for operational problems, etc.)

DATE	OPERATOR INITIALS	PROBLEM	ACTION	COMMENT

ORIGINAL
(Red)

Groundwater Recover System

Date: _____
Operators: _____

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Temperature: _____ °F

Did flow rates require adjustment?
If yes, which wells: _____

Page 1 of ____

**Weekly Inspection Checklist
Lord-Shope Landfill**

Groundwater Treatment System

Date: _____

Equalization Tank (T-1)

Influent Flow Rate _____ GPM

Is mixer (M-1) operating? ☐ Yes ☐ No

Water volume in Tank T-1 _____ gallons

Metering pump currently operating: ☐ P-3 ☐ P-4

Stroke Rate _____ %

Stroke Length _____ %

Liquid level in Tank T-3 (measured above finished floor) _____ feet

Pressure Filters

Filter currently operating: ☐ F-1 ☐ F-2

Influent (upper) pressure gauge reading _____ psi

Effluent (lower) pressure gauge reading: _____ psi

Differential Pressure _____ psi

Flow rate at control valve _____ GPM

Air Stripper

Flow gauge reading _____ in. w.c.

Pressure gauge reading _____ in. w.c.

Have aeration trays been inspected this month? ☐ Yes ☐ No

Effluent Holding Tank (T-3)

Water volume in Tank T-3 _____ gallons

Discharge flow rate _____ GPM

Solids Holding Tank (T-4)

Water volume in Tank T-4 _____ gallons *ORIGINAL (Red)*

Sludge Level in Tank T-4 _____ inches

Have solids been dewatered during this site visit? ☐ Yes ☐ No

Filtrate Return Tank (T-5)

Water volume in Tank T-5 _____ gallons

Pumps Currently Operating
(Reference green lights on I/O Panel No. 1)

Check Box Currently Illuminated:

☐ P-1	☐ P-2	☐ P-7	☐ P-8
☐ P-3	☐ P-4	☐ P-9	☐ P-10
☐ P-5	☐ P-6	☐ P-12	☐ P-13

Current Control Switch Settings

	Control Switch Setting			Disconnect Switch
1A	NA			On
1G	☐ Hand	☐ Off	☐ Auto	On
1J	NA			On
1K	NA			On
1L	NA			Off
1M	NA			On
2A	☐ Hand	☐ Off	☐ Auto	On
2C	☐ Hand	☐ Off	☐ Auto	On
2E	☐ Hand	☐ Off	☐ Auto	On
2G	☐ Off ☐ On			On
2J	☐ Hand	☐ Off	☐ Auto	On
2L	☐ Hand	☐ Off	☐ Auto	On
3A	☐ Hand	☐ Off	☐ Auto	On
3C	☐ Hand	☐ Off	☐ Auto	On
3E	☐ Hand	☐ Off	☐ Auto	On
3G	NA			Off
3J	NA			Off
3L	NA			On
4A	NA			On

THERMAL OXIDIZER (TO) LOG SHEET

		TO CONTROL PANEL					GAS TECH CONTROL PANEL						WALK AROUND READINGS									
Date	Oper. Initial	TO Comb. Temp. °F	TO Stack Temp. °F	FID %	Hr. Meter	Flame Inten. Meter DC Volts	CO ppm	CO scfh (0.6-0.8)	O ₂ %	O ₂ scfh (0.6-0.8)	LEL %	LEL scfh (0.6-0.8)	Blow Temp. °F	Total Air Flow in.WC	Dil. Air Flow in.WC	Total Vac. in.WC	dP Filter in.WC	Total Press. in.WC	dP Burn. in.WC	dP Main Gas Orif. in.WC	Cond. Tank Gall.	

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VAPOR EXTRACTION WELL LOG SHEET #1

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VAPOR EXTRACTION WELL LOG SHEET #2

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TEMPERATURE PROBE LOG SHEET

[illegible]

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ISVS INSTRUMENTATION CALIBRATION LOG SHEET

YEAR _____

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
INSTRU	FID	FID	FID	FID	FID	FID	FID	FID	FID	FID	FID	FID
DATE												
INIT.												
INSTRU			CO			CO			CO			CO
DATE												
INIT.												
INSTRU			O ₂			O ₂			O ₂			O ₂
DATE												
INIT.												
INSTRU			LEL			LEL			LEL			LEL
DATE												
INIT.												

Note: Calibration schedule is: FID - monthly; and all other instruments - last month of quarter.

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WATER LEVEL FIELD DATA SHEET
Hydraulic Monitoring Program
Lord/Shope Site

Page 1 of 2

ORIGINAL
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Well I.D.	Depth to Water From Ref. Point * Date: ____/____/____ (feet)	Hydro. Zone	Well Depth (feet)	Reference Elevation (ft., ngvd)	Comments
W-1A	]	Int	28.0	791.87	
W-1WT	]	WT	15.0	793.26	
W-2	]	Int	61.3	829.55	
W-2WT	]	WT	24.0	818.72	
W-3	]	Int	37.0	800.66	
W-3WT	]	WT	13.5	803.83	
W-4	]	Int	48.8	797.22	
W-4WT	]	WT	13.5	796.70	
W-5	]	Int	51.0	815.20	
W-5WT	]	WT	10.0	817.73	
W-6A		Int	27.2	793.60	
W-7	]	Int	48.0	811.81	
W-7WT	]	WT	13.0	811.62	
W-8A	]	Int	28.5	796.86	
W-8WT	]	WT	9.5	796.38	
W-9	]	Int	55.0	797.38	
W-9WT(Ref)	]	WT	14.0	797.81	
W-10	]	Int	57.0	795.85	
W-10WT	]	WT	29.0	795.85	
W-11A	]	Int	31.1	785.07	
W-11WT	]	WT	7.5	784.98	
W-12A	]	Int	52.5	790.83	Overlake
W-12C	]	WT	20.0	791.34	Overlake
W-14		WT	11.0	820.62	
W-15		WT	13.0	820.97	
W-16		WT	18.0	820.67	
W-18		WT	18.0	816.41	

* Water levels referenced to Protective Casing or Top of Well, whichever is higher.

7/15/98 H:\ord-shp\DATA-SHT.XLS

WATER LEVEL FIELD DATA SHEET
Hydraulic Monitoring Program
Lord/Shope Site

Page 2 of 2

ORIGINAL
(Red)

Well I.D.	Depth to Water From Ref. Point *		Hydro. Zone	Well Depth (feet)	Reference Elevation (ft., ngvd)	Comments
	Date: ____/____/____					
	(feet)					
W-20A	]	.	WT	16.0	790.52	Overlake
W-20B	]	.	Int	47.0	790.26	Overlake
W-21A	]	.	WT	14.5	786.04	Overlake
W-21B	]	.	Int	48.5	785.66	Overlake
W-22A	]	.	WT	10.5	777.74	Overlake
W-22B	]	.	Int	52.0	777.37	Overlake
W-24A	]	.	WT	10.0	786.66	
W-24B	]	.	Int	59.0	786.66	
W-25WT		.	WT	15.0	789.18	
W-26A	]	.	WT	25.0	834.29	
W-26B	]	.	Int	56.5	834.41	
W-34		.	WT\In		796.94	Overlake
EW-35A	]	.	WT	20.5	809.38	
EW-35B	]	.	Int	52.5	809.79	
W-40A	]	.	WT	19.0	784.00	
W-40B	]	.	Int	45.0	783.99	
W-41A	]	.	WT	11.0	801.54	
W-41B	]	.	Int	50.0	802.53	
WTP-1		.	WT	17.0	802.86	
WTP-2		.	WT	15.0	805.44	
IPE-1		.	Int	46.5	--	Extraction well
IPE-2		.	Int	51.5	--	Extraction well
PZ-38		.	Int	60.0	830.10	

I certify that the water level data were measured and recorded in accordance with applicable regulatory and Lord Corp. protocols.

Signature: _____ Date: ____/____/____

Water Level Instrument: _____

* Water levels referenced to Protective Casing or Top of Well, whichever is higher.

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APPENDIX J
LONG-TERM MONITORING PLAN

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**REVISION 1
LONG TERM MONITORING PLAN
LORD-SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA**

Prepared for:

**Lord Corporation
2000 West Grandview Boulevard
Erie, Pennsylvania 16512**

Prepared by:

**ECKENFELDER INC.®
1200 MacArthur Boulevard
Mahwah, New Jersey 07430**

**ECKENFELDER INC.®
227 French Landing Drive
Nashville, Tennessee 37228**

**April 1994
Revised April 1996**

9770

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1.0 INTRODUCTION

1.1 PURPOSE

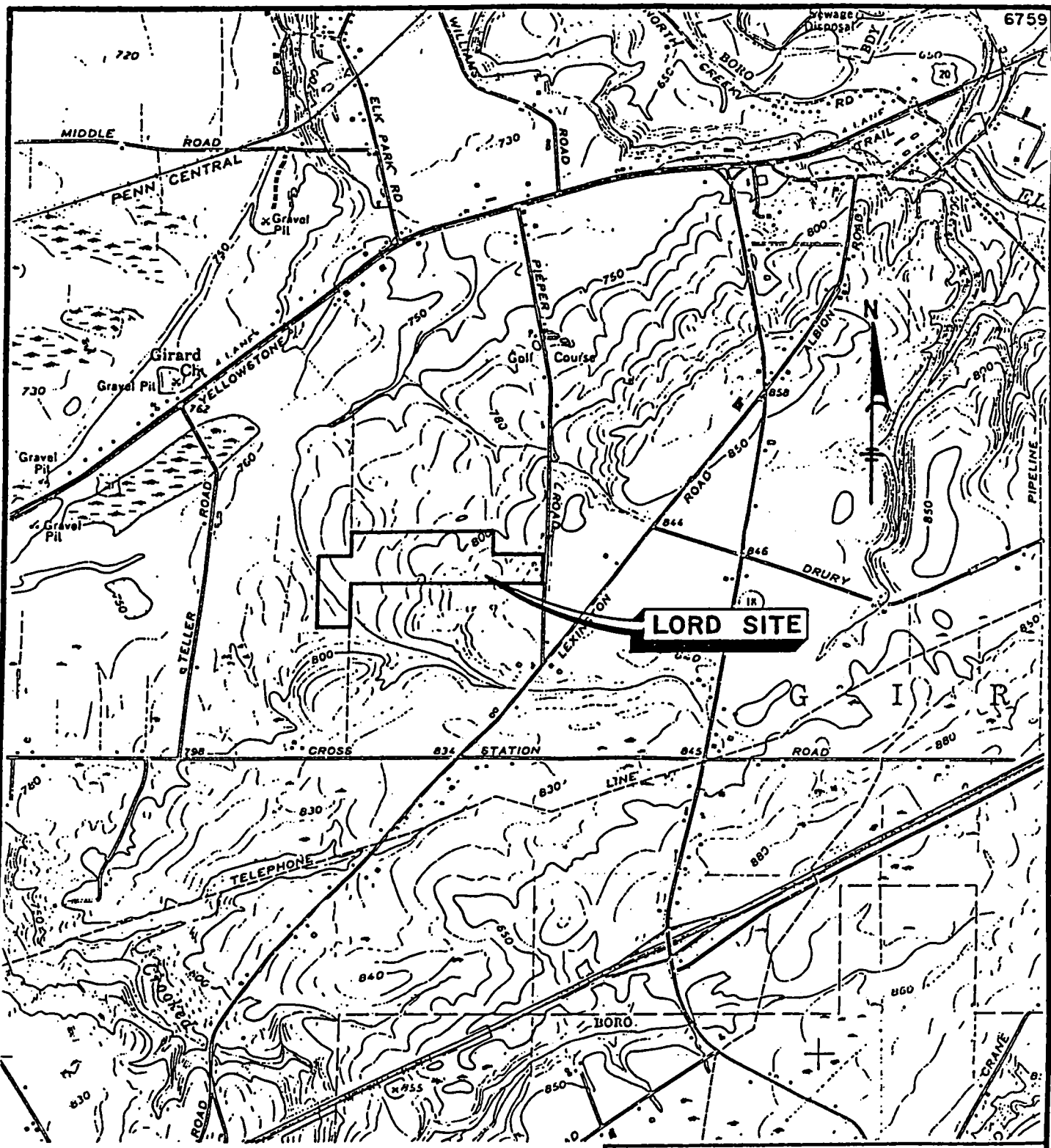
The Long-Term Monitoring Plan (ECKENFELDER INC., 1994) was initially designed to track the performance of the remediation system at the Lord-Shope site. The Long-Term Monitoring Plan has been revised to include the evaluation of the impact of intrinsic remediation on water quality. The plan (with the exception of hydraulic monitoring) ~~will~~ commenced upon initial operation of the groundwater extraction system and will continue (unless formally amended) for the duration of system operation. The Long-Term Monitoring Plan was submitted to USEPA and PADER and approved in 1994. The revised plan includes additional monitoring for groundwater quality at several well locations and the inclusion of biodegradation parameters. Long-term hydraulic monitoring will commence following the initial year of groundwater extraction operation. Hydraulic monitoring that will be conducted during the initial year of operation is addressed in the Field Sampling Plan.

The revised Long-Term Monitoring Plan addresses the performance of the groundwater remediation through active pumping and intrinsic remediation, including the zone of capture, groundwater quality, and groundwater treatment. The plan specifically describes the following:

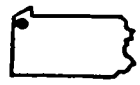
- The locations of stations for each medium to be monitored.
- Analytical parameters and sampling schedule.
- Specific procedures for the collection of samples from each medium.
- Laboratory analytical procedures.

It is anticipated that active site remediation (groundwater recovery) may be operated for a period as long as 50 years unless intrinsic remediation (natural attenuation) can be shown at some point in time to be protective of groundwater quality downgradient of the landfill. Due to the long implementation time of the plan, it is probable that some aspects of the plan will be periodically revised in response to clean up of the site and technological advances in monitoring and analytical methods that will undoubtedly take place.

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SOURCE: ALBION (1959, REV. 1969)
PA. 7.5' QUADRANGLE



MAP LOCATION

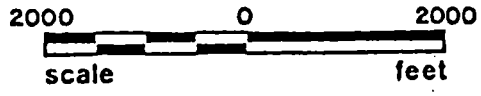


FIGURE I-1

LOCATION MAP

SHOPE'S LANDFILL SITE
LORD CORP.
GIRARD TWP., PA.

**ECKENFELDER
INC.**

Nashville, Tennessee
Mahwah, New Jersey

1.2 SITE LOCATION AND DESCRIPTION

The Lord-Shope Site is located west of Pieper Road approximately 4,500 feet south of the intersection of U.S. Route 20 and Pieper Road in Girard Township, Erie County, Pennsylvania (see Figure 1-1). To the north and to the west of the site are two unnamed tributaries of Elk Creek. The site consists of an inactive, industrial waste landfill covering approximately four acres, as well as the adjacent areas of contaminated groundwater. The property containing the landfill is currently owned by the Lord Corporation of Erie, Pennsylvania.

The landfill currently appears as a grass-covered mound which rises approximately 20 feet at its highest point. The surrounding area is primarily rural agricultural with scattered residential areas bordering the roads. The property is bounded to the east by Pieper Road, by an apple orchard and vineyard to the south, by an evergreen nursery to the west, and by an overgrown field to the north. A golf course is located to the north of the landfill property, adjacent to the field. The only nearby residences are located along Pieper Road to the east and along Route 20 to the north. The nearest population center, Girard Borough, is located approximately two miles to the northeast.

1.3 SITE HISTORY

From the mid-1950s until 1979, industrial wastes, including spent adhesives; solvents; cutting oils; acids; and caustics, along with miscellaneous paper, wood, and rubber wastes, were disposed of at the site. Some wastes were disposed of in drums. The property was then owned by the late Mr. Melvin Shope, who was at that time an employee of Lord Corporation. The wastes originated at Lord Corporation's Erie (12th Street) and Saegertown plants.

A partial remediation of the site was performed from 1982 to 1983. This remediation included regrading of the waste, installation of an upgradient cut-off wall, installation of a composite cap, and improvements in stormwater management.

The site was placed on the National Priorities List (NPL) in September 1983. In the intervening years, the environmental conditions of the site have been extensively investigated. The study area has included the landfill and the area immediately surrounding the landfill, a plume area located downgradient (north) of the landfill, the two tributaries and drainage patterns that make up the surface hydrology, and the groundwater system below each of these areas.

A groundwater monitoring program has been in effect at the Lord-Shope site from 1984 to the present. This monitoring program has been updated several times in response to advances in the hydrogeologic database at the site. The most recent revision to the monitoring plan, known as the "Interim Groundwater Monitoring Program", is described in Section 2.2.1 of the Engineering Report. Upon the implementation of the final site remediation, this Long-Term Monitoring Program will replace the Interim Groundwater Monitoring Program.

An in-situ vapor stripping system was implemented as part of the remedial action in 1995 to reduce further potential impact from VOCs, HVOCs, and other organic compounds present above the water table. Additionally, a groundwater recovery and treatment system is currently being installed at the site. Further, a recently completed evaluation of historical groundwater quality concluded that "intrinsic remediation or biodegradation" has and should continue to contribute to improved groundwater quality.

1.4 SITE SETTING

1.4.1 Hydrogeologic Conditions

The site is underlain by a complex series of glacial deposits. These deposits include at least three discrete glacio-lacustrine units that are interbedded with intervening glacial tills. Each of these units has been shown to be stratigraphically continuous across the study area. However, significant lateral heterogeneity in the grain size and thickness of these units has been observed. This heterogeneity is due to the dynamic glacial environment under which the glacio-lacustrine deposits and glacial tills were deposited.

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Revision 1

Three discrete water-bearing zones have been identified that correspond to the coarse-grained subunits of each the glacio-lacustrine units and the adjacent coarse-grained fractions of the glacial tills. These units include the following:

- Water Table Zone: Uppermost water-bearing zone contained within the shallow soils.
- Intermediate Zone: Partially confined water-bearing zone that occurs at intermediate depths within the relatively coarse-grained fractions of a glacio-lacustrine unit and contiguous coarse-grained glacial till.
- Deep Zone: Confined water-bearing zone contained within the coarse-grained fraction of a glacio-lacustrine unit at a depth of approximately 75 to 105 feet below the ground surface.

While these water-bearing zones have been shown to be laterally continuous, the transmissivity (ability to transmit water) of these zones is highly variable. This variability is due to the heterogeneity in both the grain size and the thickness of the materials that comprise the water-bearing zones.

1.4.2 Groundwater Quality Conditions

Groundwater quality data have been collected as a part of previous investigations and from the Interim Groundwater Monitoring Program that has been ongoing since the completion of the Phase II RI. On the basis of the available groundwater quality data, well-defined, a volatile organic compound (VOC) plume has been identified in both the Water Table and Intermediate zones. No groundwater quality degradation has been observed in any of the nearby residential wells or within the Deep water-bearing zone. A detailed discussion of the historical groundwater quality is provided in the report entitled Evaluation of Intrinsic Remediation (ECKENFELDER INC., 1996).

The volatile plume has migrated to the north and northwest in response to the direction of groundwater flow. The 1992 configuration of the volatile organic plume was presented in Section 2.2.2.2 of the Engineering Report. The volatile plume

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Revision 1

within the Water Table zone is presently located only along the downgradient margin of the landfill. In contrast, the Intermediate zone plume covers a somewhat larger area and contains higher VOC concentrations than the Water Table plume. However, because limited sampling has been conducted since 1989, the current water quality conditions will be determined as a result of the implementation of this amended Long-Term Monitoring Plan.

2.0 MONITORING PROGRAM

The Long-Term Monitoring Program has been developed to evaluate the performance and effectiveness of the groundwater recovery and treatment systems and amended to include residential wells for water quality analysis and an evaluation of the impact of and potential for intrinsic remediation to improve groundwater quality. This program is described in the following sections.

The primary goals of the recovery system are to prevent the plume of volatile organic compounds from migrating and to implement a long-term program to facilitate natural attenuation in the clean up of the groundwater plume. The monitoring program will include both hydraulic monitoring and chemical monitoring. Hydraulic monitoring will consist of obtaining water level measurements to assess the size and stability of the zone of capture over time. Groundwater quality monitoring will be conducted to evaluate if the composition, size, and shape of the plume changes over time and to evaluate biodegradation parameters. Lastly, the treatment system effluent will be monitored in accordance with the NPDES discharge permit.

The principal aspects of the monitoring program are summarized on Table 2-1. Furthermore, the Long-Term Monitoring Program is described in detail in the following sections.

2.1 LONG TERM HYDRAULIC MONITORING

The objectives of the groundwater recovery system are to control the migration of the groundwater contamination plume and to decrease the concentration of the VOCs in the plume. This will reduce the mass of organic compounds and thus improve the potential for intrinsic remediation to be successful. In order for these objectives to be accomplished, the groundwater extraction system must create a zone of capture, that is, induce a hydraulic gradient such that all groundwater within the contaminated area flows towards and into the recovery wells. A zone of capture is different from a zone of influence in that groundwater within the zone of influence is affected by the induced gradient, but does not necessarily flow into the

TABLE 2-1
MONITORING SUMMARY
LONG-TERM MONITORING PROGRAM

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Medium	Parameters	Frequency	Stations
<u>Groundwater Recovery (Hydraulic Monitoring)</u>			
	Depth to water	Semi-annually	51 wells ^{a,b}
<u>Groundwater Quality</u>			
	VOCs, select metals ^c	Semi-annually: Project Duration	<u>21</u> wells (as per Table 2-3) ^b
	VOCs, select metals ^c	Annually: after 2nd year	Plume wells only ^b
	VOCs, select metals ^c	Annually	<u>7 Residential wells</u>
<u>Biodegradation Parameters</u>			
	D.o., Eh., temperature, conductivity, <u>nitrate/nitrite, methane, ethene, ethane, sulfate, TKN, ammonium ion, manganese, iron, phosphate, carbonate/bicarbonate</u>	Semi-annually: Project Duration	<u>24</u> wells (as per Table 2-4) ^b
	D.o., Eh., temperature, conductivity, <u>nitrate/nitrite, methane, ethene, ethane, sulfate, TKN, ammonium ion, manganese, iron, phosphate, carbonate/bicarbonate</u>	Annually: after 2nd year	Number to be determined
<u>Wastewater^{d,e}</u>			
	Flow	Continuously	1 - Effluent
	Flow, pH, COD, TOC, Specific Conductivity	Weekly	1 - Effluent
	Select Metals, Oil & Grease ^c	Monthly	1 - Effluent
	VOCs ^c	Monthly	1 - Effluent

^aDesigned hydraulic monitoring wells are listed in Table 2-2.

^bSpecific wells in groundwater quality monitoring and hydraulic monitoring networks will be periodically evaluated.

^cSpecific VOC and metals constituents are listed on Table 4-1.

^dIn accordance with NPDES permit.

^eInfluent monitoring for the first three months of plant operation. Frequency and parameters to be determined thereafter.

recovery system. In other words, the zone of capture is a smaller portion of the zone of influence.

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The objective of the hydraulic monitoring program is to verify that the groundwater recovery system is accomplishing its intended purpose, namely achieve and maintain the required zone of capture. The hydraulic monitoring program, described herein, is designed to provide the data needed for verification. The program consists of two parts:

- Monitoring drawdown in observation wells
- Monitoring recovery well pumping rates

2.1.1 Long-Term Hydraulic Monitoring Well Network

Long-term hydraulic monitoring will be initiated after the completion of the Initial Hydraulic Monitoring Program, one year after the start-up of the groundwater recovery system. The long-term hydraulic monitoring network will consist of 48 monitoring and observation wells and the two pumping wells. The locations of the wells are shown in Figure 2-1. Water level measurements will be obtained semi-annually in May and November from each of the designated wells. These measurements will correspond to the same schedule as the water quality monitoring, as described in Section 2.2.

The wells to be utilized in the hydraulic monitoring network will be periodically evaluated on the basis of the water level data. Wells may be deleted (or added) to the network in order to provide the optimum data for the determination of the configuration of the zone of capture. These evaluations will be presented in the annual reporting, as described in Section 5.2.

2.1.2 Measurement Methods

Flow Monitoring

Each recovery well will be equipped with a cumulative flow meter. The meter will be inspected and the cumulative flow will be recorded at the aforementioned schedule. The data and time of the reading will also be recorded.

Drawdown Monitoring

Once groundwater recovery is initiated, the depth to water in each of the observation wells and the recovery wells will be measured. The following methodology will be used:

- An electric water level meter (QED Sample Pro® Model 6000 or equivalent) will be used to measure the depth to water in each well. The meter is used by lowering the associated probe into the well until the meter indicates that water has been contacted by the probe. The probe should be raised above the water level and slowly lowered again until water is indicated. The cable should be held against the side of the inner protective casing at the point designated for water level measurements and a depth reading recorded to the nearest 0.01 foot.
- The value will be recorded to the nearest 0.01 foot on a pre-printed data form.

Upon completion of a measurement, the probe will be raised to the surface and, along with the wetted portion of the tape, will be decontaminated with the following procedure:

- Wash in potable water and laboratory detergent
- Potable water rinse
- Distilled/Deionized water rinse

2.1.3 Data Evaluation

The data collected as part of the hydraulic monitoring program will be used to prepare the following:

- Tabulation of pumping rates for each of the recovery wells.
- Tabulation of depth to water, drawdown, and corresponding water level elevation for each well.
- Construction of contour maps showing the configuration of the Water Table zone determined from the wells listed in Table 2-2 and shown in Figure 2-1.
- Construction of contour maps showing the configuration of the Intermediate water-bearing zone.

A computer software contouring program (e.g., SDS) may be used to assist in the construction of contour maps for the Water Table and Intermediate zones. The use of computer plotting could help to make the contouring process consistent with the preparation of each map.

Recommendations may be made periodically regarding the hydraulic monitoring which may include:

- Continuing hydraulic monitoring at the intervals specified in Section 2.1.2.
- Continuing hydraulic monitoring at intervals other than those specified in Section 2.1.2.
- Adjustment of pumping rates in selected pumping wells.
- Shutting down one or more existing recovery wells.
- Installation of additional recovery wells.

TABLE 2-2
LONG-TERM HYDRAULIC
MONITORING WELL NETWORK

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(Red)

Well Number	Well Depth (feet)	Well Type
<u>Monitoring Wells</u>		
W-1A	28.0	Int
W-1WT	15.0	WT
W-2	61.3	Int
W-2WT	24.0	WT
W-3	37.0	Int
W-3WT	13.5	WT
W-4	48.8	Int
W-4WT	13.5	WT
W-5	51.0	Int
W-5WT	10.0	WT
W-6A	27.2	Int
W-7	48.0	Int
W-7WT	13.0	WT
W-8A	28.5	Int
W-8WT	9.5	WT
W-9	55.0	Int
W-9WT(Rep)	14.0	WT
W-10	57.0	Int
W-10WT	29.0	WT
W-11A	31.1	Int
W-11WT	7.5	WT
W-12A	52.5	Int
W-12C	20.0	WT
W-14	11.0	WT
W-15	13.0	WT
W-16	18.0	WT
W-18	18.0	WT
W-20A	16.0	WT
W-20B	47.0	Int
W-21A	14.5	WT
W-21B	48.5	Int
W-22A	10.5	WT
W-22B	52.	Int
W-24A	10.	WT
W-24B	59.	Int
W-25WT	15.	WT
W-26A	25.	WT
W-26B	56.5	Int

TABLE 2-2 (Con't)
LONG-TERM HYDRAULIC
MONITORING WELL NETWORK

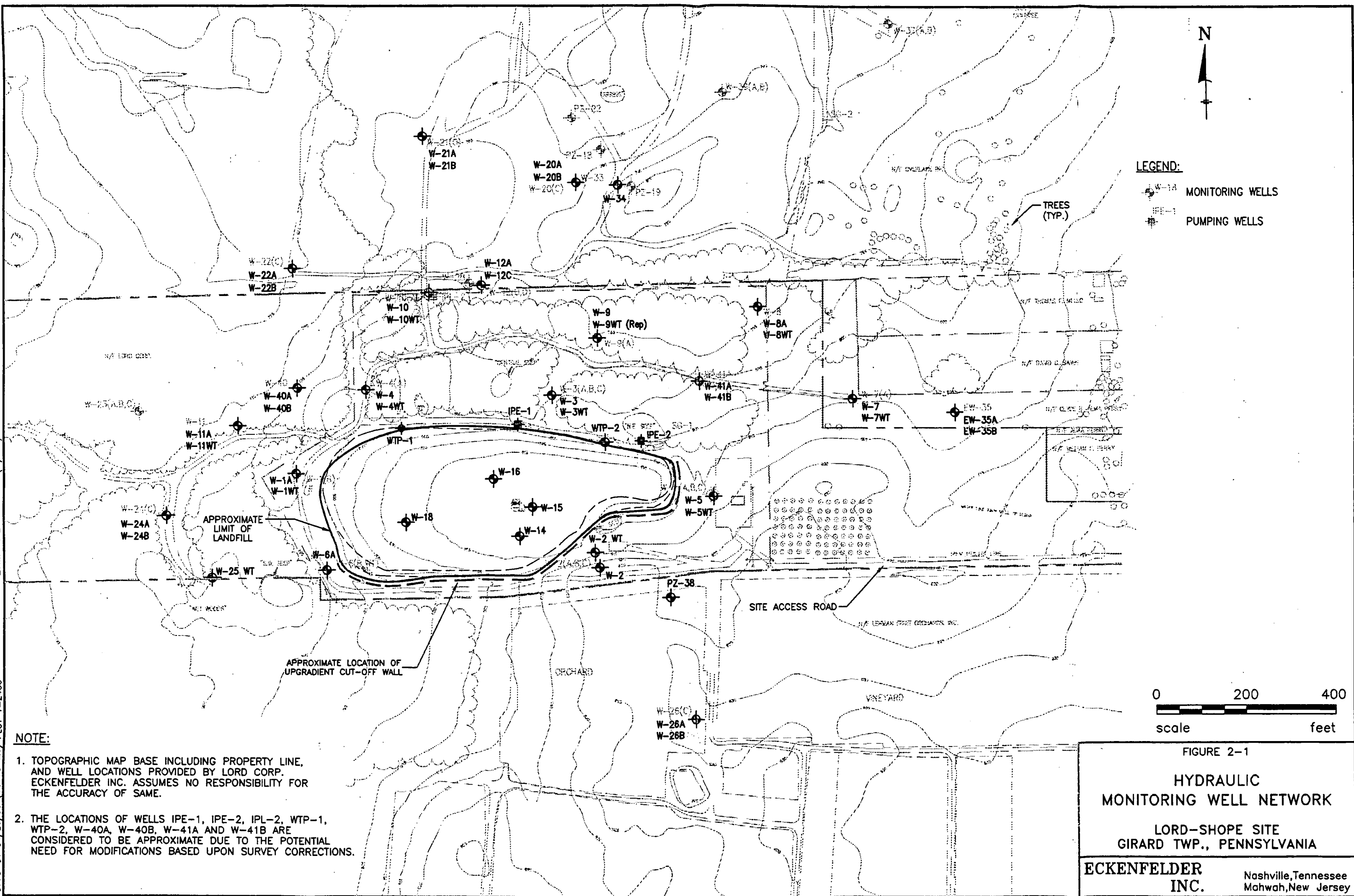
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(Red)

Well Number	Well Depth (feet)	Well Type
W-34		WT\Int
EW-35A	20.5	WT
EW-35B	52.5	Int
W-40A	19.0	WT
W-40B	45.0	Int
W-41A	11.0	WT
W-41B	50.0	Int
WTP-1	17.0	WT
WTP-2	15.0	WT
PZ-38	60.0	Int
<u>Pumping Wells</u>		
IPE-1	46.5	Int
IPE-2	51.5	Int

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- Installation of additional observation wells.
- Deletion of existing observation wells from the hydraulic monitoring program.

2.2 LONG-TERM GROUNDWATER QUALITY AND BIODEGRADATION PARAMETER MONITORING

The objectives of the long-term groundwater quality monitoring program are three-fold, as follows:

- To monitor groundwater quality conditions within the Water Table and Intermediate plume. This will be accomplished through the testing of "Plume" wells.
- To provide a downgradient array of "Perimeter-Detection" wells within the Water Table and Intermediate zones in order to define the outer boundary of the groundwater plume.
- To monitor water quality from residential wells.
- To characterize background conditions through the testing of upgradient wells.
- To evaluate the progress of intrinsic remediation in contributing to improved groundwater quality.

2.2.1 Monitoring Well Placement

The Long-Term Monitoring Plan initially includes a network of 21 monitoring wells for evaluating groundwater quality. Eight of the 21 monitoring wells are screened within the Water Table Zone, and the remaining 13 wells are completed in the Intermediate water-bearing zone. The specific monitoring wells to be used are listed on Table 2-3 and shown in Figure 2-2. Additionally, wells are included for

TABLE 2-3
LONG-TERM GROUNDWATER QUALITY
MONITORING NETWORK

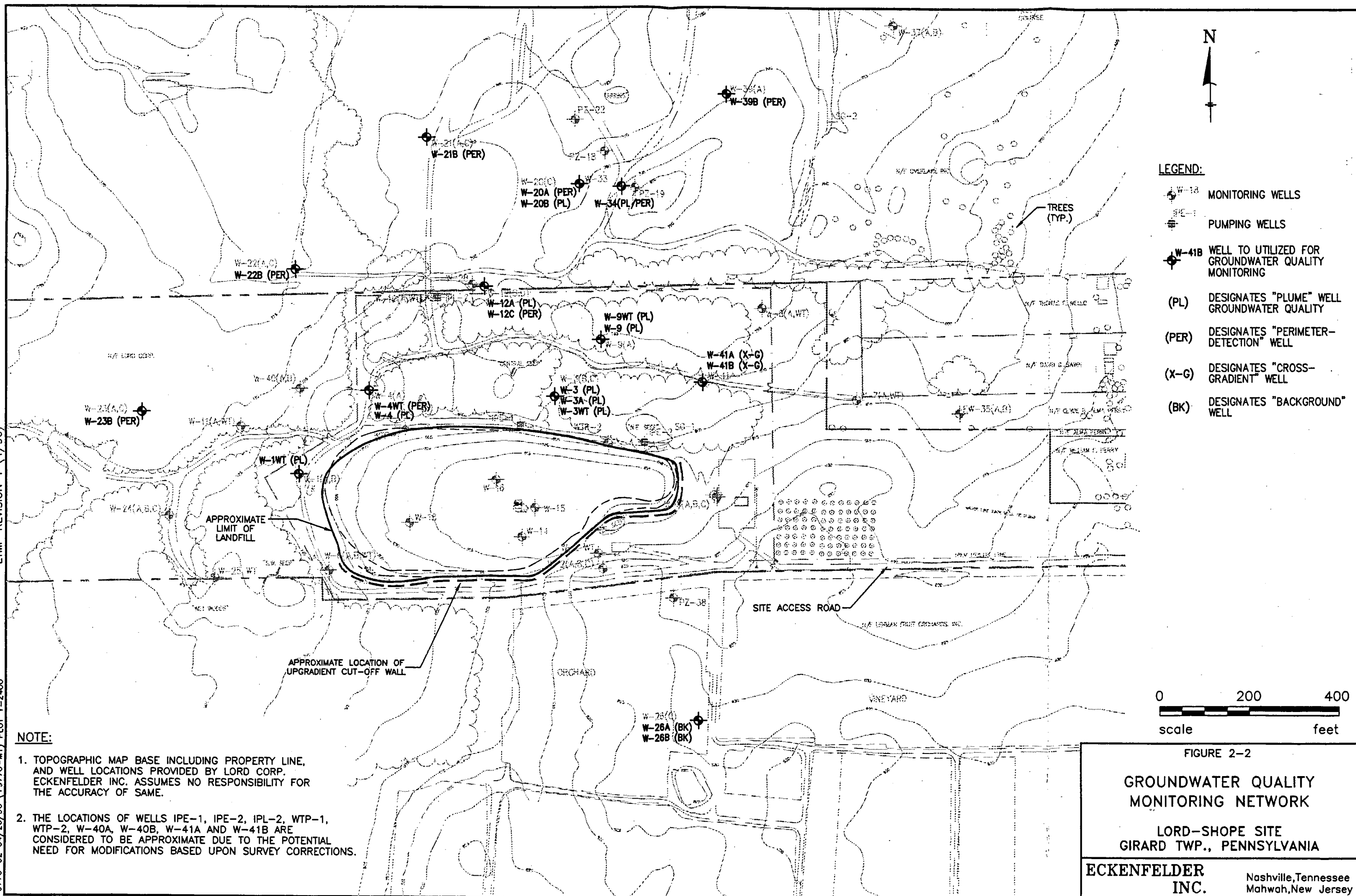
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Well Number	Well Type	Well Depth (ft.)
<u>Water Table Zone</u>		
W-26A	Background	25.0
W-1WT	Plume	15.0
W-3WT	Plume	13.5
W-9WT	Plume	14.0
W-4WT	Perimeter-Detection	13.5
W-12C	Perimeter-Detection	20.0
W-20A	Perimeter-Detection	16.0
W-41A	Cross-Gradient	11.0
<u>Intermediate Zone</u>		
W-26B	Background	56.5
W-3	Plume	37.0
W-3A	Plume	28.0
W-4	Plume	48.8
W-9	Plume	55.0
W-12A	Plume	52.5
W-20B	Plume	47.0
W-34	Plume/Perimeter	41.0
W-21B	Perimeter-Detection	48.5
W-22B	Perimeter-Detection	52.0
W-23B	Perimeter-Detection	37.0
W-39B	Perimeter-Detection	57.5
W-41B	Cross-Gradient	50.0

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- LEGEND:**
- W-1B MONITORING WELLS
 - IPE-1 PUMPING WELLS
 - W-41B WELL TO UTILIZED FOR GROUNDWATER QUALITY MONITORING
 - (PL) DESIGNATES "PLUME" WELL GROUNDWATER QUALITY
 - (PER) DESIGNATES "PERIMETER-DETECTION" WELL
 - (X-G) DESIGNATES "CROSS-GRADIENT" WELL
 - (BK) DESIGNATES "BACKGROUND" WELL

NOTE:

1. TOPOGRAPHIC MAP BASE INCLUDING PROPERTY LINE, AND WELL LOCATIONS PROVIDED BY LORD CORP. ECKENFELDER INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF SAME.
2. THE LOCATIONS OF WELLS IPE-1, IPE-2, IPL-2, WTP-1, WTP-2, W-40A, W-40B, W-41A AND W-41B ARE CONSIDERED TO BE APPROXIMATE DUE TO THE POTENTIAL NEED FOR MODIFICATIONS BASED UPON SURVEY CORRECTIONS.

FIGURE 2-2

GROUNDWATER QUALITY MONITORING NETWORK

LORD-SHOPE SITE
GIRARD TWP., PENNSYLVANIA

ECKENFELDER INC. Nashville, Tennessee
Mahwah, New Jersey

monitoring biodegradation parameters as listed on Table 2-4. These include nine water table zone wells and 15 intermediate zone wells. The locations of the individual monitoring wells are presented on Drawing No. 6759-MP1.

The Intermediate zone plume extends further from the site than does the Water Table plume. Therefore, the shallow well in a given cluster may constitute the "Perimeter-Detection" well for the Water Table zone, while the deeper well in the same cluster could be a "Plume" well.

The list of wells to be used as a part of the groundwater quality monitoring network will be periodically re-evaluated. Decreases in the lateral extent and concentrations of the plume resulting from the groundwater recovery system may allow the ring of Perimeter-Detection wells to be moved back closer to the landfill. This could be accomplished either through the re-designation of existing Plume wells as Perimeter-Detection wells and/or through the installation of new wells. Conversely, the ring of Perimeter-Detection and Plume wells might have to be expanded if it were determined on the basis of data from the Long-Term Monitoring Program that the lateral bounds of the plume were more extensive, although this is not expected.

Most monitoring wells installed prior to 1990 are constructed of two-inch diameter carbon steel with a stainless steel well screen. Exceptions to this include a number of the water table wells, installed prior to 1984, which are constructed of one-inch diameter PVC. All (new) proposed monitoring wells will be constructed of two-inch flush joint PVC with PVC wellscreen.

2.2.2 Schedule and Parameters

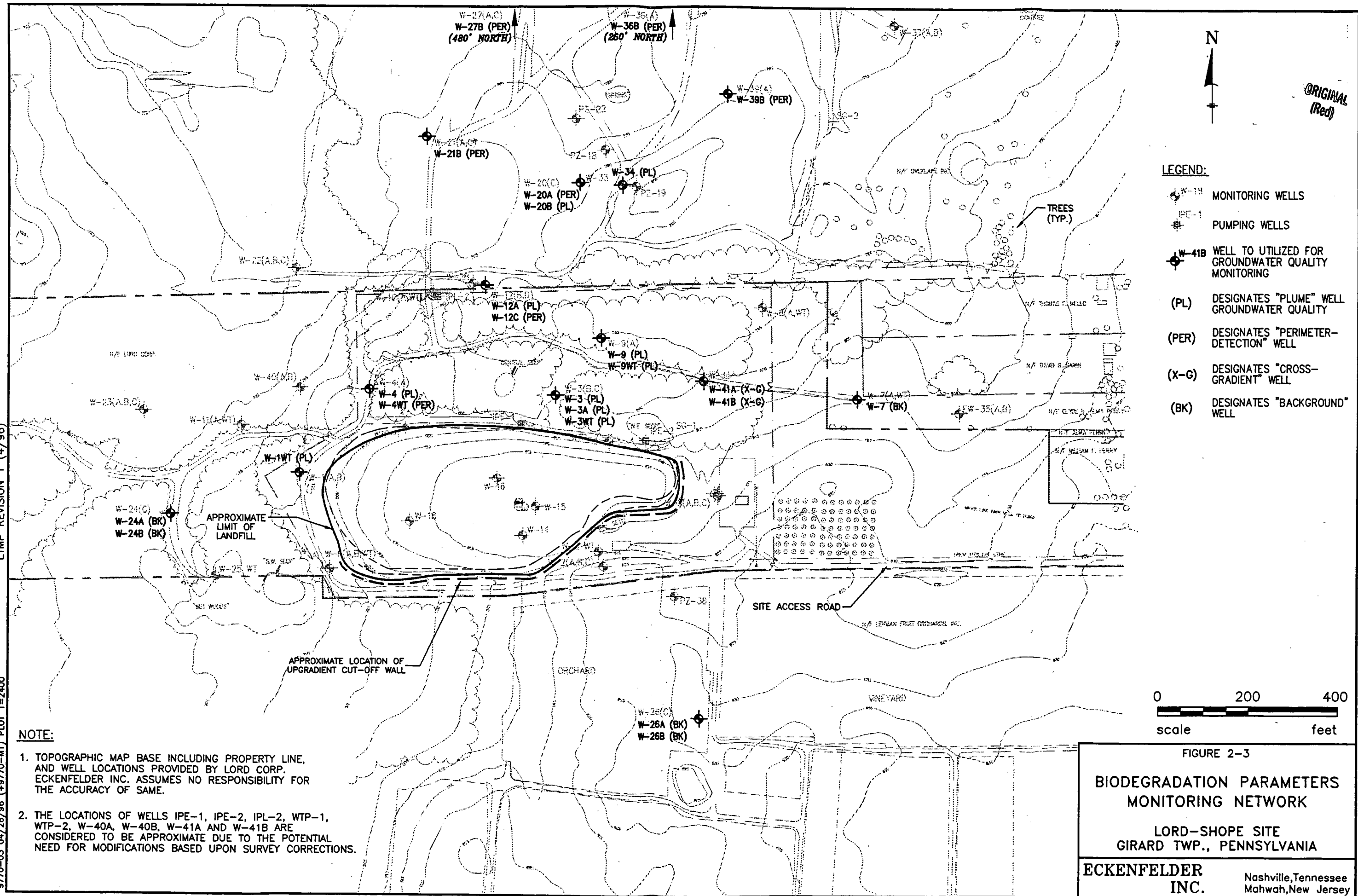
For the first two (2) years, groundwater samples will be collected semi-annually from all of the wells in the monitoring network. Thereafter, the sampling frequency for the Plume wells will be decreased to once per year while the Background and Perimeter-Detection wells will continue to be sampled semi-annually (Table 2-1). Semi-annual samples will be collected in May and November. Annual samples will be collected in November.

TABLE 2-4
BIODEGRADATION PARAMETERS
MONITORING NETWORK

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Well Number	Well Type	Well Depth (ft.)
<u>Water Table Zone</u>		
W-24A	Background	
W-26A	Background	25.0
W-1WT	Plume	15.0
W-3WT	Plume	13.5
W-9WT	Plume	14.0
W-4WT	Perimeter-Detection	13.5
W-12C	Perimeter-Detection	20.0
W-20A	Perimeter-Detection	16.0
W-41A	Cross Gradient	11.0
<u>Intermediate Zone</u>		
W-24B	Background	
W-7	Background	51.0
W-26B	Background	56.5
W-3	Plume	
W-3A	Plume	28.0
W-4	Plume	48.8
W-12A	Plume	52.5
W-20B	Plume	47.0
W-34	Plume	41.0
W-9	Plume	55.0
W-21B	Perimeter-Detection	48.5
W-27B	Perimeter-Detection	49.0
W-36B	Perimeter-Detection	47.0
W-39B	Perimeter-Detection	57.5
W-41B	Cross-Gradient	50.0

Note: Specific wells in the biodegradation parameter monitoring network will be periodically evaluated and wells which are not yielding useful information will be deleted from the list.



The long-term groundwater monitoring samples listed in Table 2-3 and shown in Figure 2-2 will be analyzed for a select group of volatile organic compounds, metals and conventional parameters, in addition to the field measurement of pH, temperature, and specific conductivity. Each of the biodegradation parameter samples listed in Table 2-4 will be analyzed for nitrate/nitrite, sulfate, iron, manganese, phosphate, carbonate/bicarbonate, TKN, ammonium ion, methane, ethane, ethene, and field parameters consisting of dissolved oxygen and eH in addition to pH, temperature, and conductivity. The specific analytical constituents and the associated analytical methodology are described in Section 4.0. Additional details regarding the laboratory methods and procedures are described in detail in the Quality Assurance Project Plan (QAPP) prepared by the Lord Corporation laboratory and previously approved by the USEPA.

2.2.3 Groundwater Sample Collection

Preparatory Office Activities

Physical aspects of the sampling program will be organized in the office prior to embarking on a field sampling project.

Sampling Sequence

The sequence of sampling will be pre-determined. Generally, the cleanest wells will be sampled first in order to minimize the possibility of cross-contamination. In this way, the background wells will be sampled first, followed by the downgradient Perimeter-Detection wells and the Plume wells.

Initiation of Field Data Records

Field data sheets will be initiated prior to the start of sampling. Examples of initial data to be recorded include site and sampling location identification, well depth and construction, and purging and sample collection methods. Additional discussion regarding field records is presented in Section 3.4.

Preparatory Field Activities

The following procedures will be conducted in the field prior to well purging and sampling.

Well Maintenance Check

A well maintenance check that includes a visual inspection of the condition of the protective casing and surface seal will be performed. The following will be noted:

- Is the well number clearly labeled on the outer casing or lid?
- Is the protective casing intact and not bent or excessively corroded?
- Does the weep hole adequately drain the well head (flush mount wells)?
- Is the concrete pad intact-(no evidence of cracking or heaving from frost)?
- Is the padlock functional?
- Is the inner casing intact?
- Is the inner casing properly capped and vented?

If any damage or excessive wear to the well is observed, the well will be repaired, if possible. If it is not possible to repair the well and the damage can potentially affect the integrity of groundwater samples or water level measurements, the well will be properly decommissioned (and replaced, if required).

The degree of groundwater turbidity in each well will be periodically evaluated to determine if the well should be redeveloped. This is especially important for wells screened in fine-grained material, which may "silt-up" frequently. If the water is too turbid to yield representative groundwater samples, the well will be redeveloped.

The monitoring wells will not be sounded each time they are sampled. Routine sounding of the well can increase the risk of inadvertent well contamination because it is difficult to adequately decontaminate the tapes used for this purpose. Well depths obtained from well completion records are adequate for the purpose of the determination of well volume.

Water Level Measurements

The depth to water will be measured prior to initiation of sampling activities. The water level measurements will be made with an electronic depth-indicating meter following the methodology described below. Water level measurement devices should not be used in the well after it has been purged (i.e., immediately prior to sample collection). However, limited water level measurements may be made during purging in order to monitor well drawdown if special care is taken to thoroughly decontaminate the probe prior to use.

The electronic depth-indicating meter is used by lowering the associated probe into the well until the meter indicates that water has been contacted by the probe. The probe should be raised above the water level and slowly lowered again until water is indicated. The cable should be held against the side of the inner protective casing at the point designated for water level measurements and a depth reading recorded to the nearest 0.01 foot.

The electronic depth measurement probe will be decontaminated prior to being used in each well. The following procedure will be followed:

1. Wash in potable water and laboratory detergent.
2. Rinse with potable water.
3. Rinse with deionized water.

Calculation of Well Volume

The volume of water standing in the well will be calculated through the application of the depth to water data, the known well depth, and the well diameter using the constants presented below. Well depth data that are obtained from the well completion records are generally sufficiently precise for the purpose of well volume calculations that would be used for subsequent purging determinations.

<u>Well Diameter (inches)</u>	<u>Gallons per Foot of Water</u>
1.00	0.041
1.25	0.064

2.0	0.16
3.0	0.36
4.0	0.65
6.0	1.50

Well Purging and Sample Collection

Monitoring wells must be purged prior to the collection of aqueous phase samples. Well purging ideally results in the collection of a sample that has not been standing in the well or has not been in contact with the well casing, screen, or sand pack materials for a significant period of time. Proper purging is crucial in order to accomplish the collection of a representative groundwater sample.

Equipment Selection

The following specific methods will be used for well purging and sample collection.

- 2-inch diameter Water Table wells will be purged with the use of a peristaltic pump equipped dedicated tubing and will be sampled with the use of a disposable bailer.
- 2-inch diameter Intermediate zone wells will be purged and sampled with a dedicated bladder pump.
- 3/4-inch diameter Water Table wells will be purged and sampled with the use of a peristaltic pump equipped with dedicated tubing.
- 3/4-inch diameter Intermediate zone wells will be purged and sampled with the use of gas lift device with the use of compressed nitrogen.

Well Purging

Monitoring well purging will be continued until three to five well volumes have been removed from each well.

Purge Water Disposal

Purge water from the Background and Perimeter-Detection wells will be disposed of on the ground surface. Likewise, contaminated purge water from Plume wells installed in the Water Table zone will be disposed of on the ground surface because the surficial groundwater is known to be contaminated. However, purge water from the Intermediate zone Plume wells will be collected and transported to the on-site treatment plant for disposal.

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Sample Collection

The next step after a well has been purged is to collect the sample for subsequent analysis. Sample collection will occur as soon after purging as is practical, immediately, if possible.

A portion of each groundwater sample will be subjected to field tests for pH, temperature, and specific conductivity. These determinations will be made as soon as possible after the completion of purging and will be made prior to the containerization of other samples (except for VOCs).

Field Filtration

Portions of samples that will be subjected to metals analysis will be filtered. Filtration will be conducted in the field as soon after sample collection as is practical. Filtration will be accomplished with the use of a vacuum filter apparatus equipped with a 0.45 μ m membrane filter.

Equipment Instructions

This section provides specific instructions for the installation and use of the equipment that will be used for well purging and/or sample collection.

Bladder PumpORIGINAL
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A bladder pump will be used for both well purging and sample collection from the two-inch diameter wells installed in the Intermediate zone.

- Required Equipment:

- Bladder pump
- Teflon® tubing of appropriate length
- Bladder pump controller
- Compressed air source
- New disposable gloves of appropriate material
- Plastic Sheeting
- Five gallon pail, graduated in one gallon increments

- Installation Instructions:

- Lay plastic sheeting on the ground around the well.
- Don a new pair of gloves.
- Assemble the pump and tubing and lower into the well being careful not to contact any surface other than the interior of the well or the plastic sheeting. The pump will be placed several feet above the bottom of the well. However, it's vertical placement is not critical provided it is not moved between the purging and sampling operations.
- Install the air inlet and water discharge fittings on top of the well.

- Purging Instructions:

- Refuel the gasoline-powered compressor, if used, at a location that is remote from the well, being very careful not to spill any fuel on equipment or clothing that will be used at the well site. If spillage does occur, materials should be decontaminated prior to use.
- Place the gasoline-powered compressor as far from the well as possible in a down-wind direction.

- Connect the compressed air source and pump controller to the pump as per manufacturer's instructions.
 - Don a new pair of gloves after handling the gasoline-powered compressor.
 - Determine the volume of water to be purged, as previously described.
 - Start the pump by opening the regulator on the controller, which allows compressed air to flow into the system.
 - Adjust the controller to maximize the flow rate while minimizing the rapid "jolting" of the tubing as water is drawn into pump.
 - Direct the pump discharge to the five gallon pail and determine the pumping rate.
 - Continue pumping until the necessary volume of water has been purged from the well.
- Sampling Instructions:
 - Allow the well to recover after completion of purging, if necessary.
 - Resume pumping after adjusting the regulator to the minimum pressure that will still allow water to be pumped to the surface.
 - Collect the samples by pumping directly into each of the required containers.
 - Fill the sample containers in the order specified previously in this section.

Peristaltic Suction Pump

A peristaltic pump will be used to purge the shallow Water Table wells. In addition, the peristaltic pump will be to collect samples from existing 3/4 inch diameter wells. This type of pump will be used with dedicated tubing.

Required Equipment:

- Peristaltic pump, electric powered 12 V.D.C.
- 12 V.D.C. power source, such as a sealed motorcycle battery or connection to vehicle battery.

- 3/8" to 1/2" HDPE or Teflon® tubing of appropriate length.
- 5/8" OD, 3/8" ID medical grade silicone tubing. Do not attempt to use Tygon® tubing.
- New disposable gloves of appropriate material.
- Plastic Sheeting.
- Five gallon pail, graduated in one gallon increments.

Installation Instructions:

The placement of the intake end of the pump tubing is critical in order to ensure a complete exchange of the entire water column. The intake will be placed as high in the water column as is possible under pumping conditions. Upon completion of purging, the device will continue to be operated as it is slowly withdrawn from the well to purge any water that remains above the pump intake. Under no circumstances will the pump intake simply be placed at the bottom of the well without first making an effort to evaluate the pumping characteristics of the particular well.

It is recognized, in actual practice, that it may be difficult to determine the precise depth at which to place the pump intake in order to meet the objective of keeping it sufficiently high in the water column. However, the observation of pumping levels combined with careful adjustments in pumping rates can allow the pumping rate to be matched to the well yield which will aid in the placement of the pump intake.

The peristaltic pump will be installed, as follows:

- Lay plastic sheeting on the ground around the well.
- Don a new pair of gloves.
- Lower the tubing into the well, being careful not to contact any surface other than the interior of the well or the plastic sheeting.
- Place the intake of the tubing as high in the well as possible but deep enough that it will not break suction.

Purging Instructions:

- Connect the tubing to the pump.
- Determine the volume of water to be purged, as described in Section 2.3.3.
- Start the pump.
- Direct the pump discharge to the five gallon pail and determine the pumping rate.
- Continue pumping until the necessary volume of water has been purged from the well.
- Slowly withdraw the tubing upward through the water column while the pump is still running to purge all water standing above the pump intake and to remove all water from the tubing.
- Dispose of the tubing after use.

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Sampling Instructions:

- Allow the well to recover after completion of purging, if necessary.
- Resume pumping.
- Collect the samples by pumping directly into each of the required containers.
- Fill the sample containers in the order specified previously in this section.

Bailer

A bailer will be used for sample collection from Water Table wells upon completion of well purging with the use of a peristaltic pump.

Required Equipment:

- Disposable HDPE or Teflon® bailer
- Polypropylene bailer cord (to be disposed of along with bailer)
- New disposable gloves of appropriate material
- Clean trash can and supply of trash can liners
- Bottom emptying device (optional)

Purging Instructions:

A bailer will not be used for well purging.

Sampling Instructions:

- Prepare the well area as described in Section 2.3.3.
- Provide the trash can with a new plastic liner and place adjacent to well.
- Don a new pair of gloves.
- Attach cord to the bailer using a bowline knot.
- Lower the bailer into the well until it is completely submerged. The bailer will be lowered slowly so as not to cause a splash that could aerate the water column.
- Allow the bailer to fill slowly and then gently retrieve the bailer from the well while avoiding contact with the sides of the well. Care will be taken to prevent the bailer or the line from contacting any surface other than the interior of the well or the plastic trash can liner.
- Fill the sample containers slowly. The use of a bottom emptying device is preferred in that sample aeration and sample volume loss are minimized.
- Sample containers will be filled in the order as specified in Section 3.3.4.

2.3 TREATED GROUNDWATER MONITORING

The treated groundwater monitoring program will be used to evaluate the quality of the treated effluent and to verify that it meets the conditions of the NPDES permit prior to its discharge into the unnamed tributary. Treated groundwater monitoring will be conducted on a schedule that is dependent on the particular analytical parameter to be tested (Table 2-1), in accordance with the permit. The specific analytical parameters are described in greater detail in Section 4.

Monitoring of the groundwater treatment system will be performed in several different ways. The primary method will include the monitoring of treated effluent, to be performed in accordance with the NPDES permit issued by PADER to USEPA on August 18, 1992. However, certain treatment plant influent monitoring will also be conducted.

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Sample collection, preservation, and handling techniques associated with self-monitoring of applicable priority pollutants will be performed in accordance with the table titled "Analytical Methods of Sample Collection, Preservation, and Handling Techniques for the 126 Priority Pollutants", which is included as a part of the NPDES permit. This table was taken from 40 CFR 136, Section 136.3(e) and "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewaters" (EPA-600/4-82-057), July 1982. The specific monitoring methods and procedures are described in detail below.

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Flow will be continuously monitored, totalized, and recorded by means of an electric flow sensing device installed in the treatment plant influent header pipe. The flow sensing device will be directly connected to a digital flow monitor/ totalizer and recorder. Flow will also be continuously monitored this same way by means of a flow sensing device installed in the treated effluent line. This flow sensor will be connected to a separate digital flow monitor/ totalizer and recorder as required by the NPDES permit.

The flow monitoring devices will be calibrated, operated, and maintained in accordance with the manufacturer's instructions. The specific model and manufacturer of the flow monitoring equipment will be selected during remedial construction.

Conductivity and pH will be continuously monitored and analyzed. pH and conductivity sensors and analyzers and analyses will be recorded on a digital recorder. The sensors will be installed below the low level in the effluent holding tank.

The pH and conductivity devices will be calibrated, operated, and maintained in accordance with the manufacturer's instructions. The specific model and manufacturer of the pH and conductivity monitoring equipment will be selected during remedial construction.

Manual grab samples (TOC, COD, and VOCs) will be collected in the appropriate containers directly from the sample port. Influent samples will be collected from a

sample port located directly before the equalization tank. Effluent samples will be collected in the sample port in the treated effluent discharge line. The sampling port will be opened to allow the non-turbulent discharge of water at a rate of approximately 100 mL/min. Once this smooth stream has been achieved, it will be directed into each of the sample containers, as appropriate. Further, volatile organics sampling will be performed in accordance with Special Condition C in Part C of the NPDES Permit. This Special Condition specifies that four grab samples are to be collected over a 24-hour period and shall be combined in the laboratory immediately before analysis to constitute the grab sample.

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Treated effluent samples for metals analysis will be collected as eight hour composite samples. These will be collected with the use of an automatic sampling device connected to the effluent holding tank. The sampler will be capable of collecting and preserving, by refrigeration, individual samples at one hour intervals over the eight hour time period. The volume of each individual sample will be proportional to the discharge flow rate. The sampler will be programmed to collect one portion of the composite sample per hour for eight hours (collecting a total sample volume of at least one liter), will be completely electric, and will have manual override and battery back up in the event of malfunction or power loss. The specific equipment will be selected during remedial construction.

The following general procedures will apply to the use of the automatic sampler:

- Sampling equipment will be properly cleaned.
- No plastic or metal parts of the sampler will come in contact with the water stream when parameters to be analyzed could be impacted by these materials.
- The automatic sampler will provide adequate refrigeration during the sampling period.
- A minimum of 100 mL will be collected each time the sampler is activated by the peristaltic pump.

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- The automatic sampler will provide a lift of at least 20 feet and the sampler will be adjustable so that the volume is not a function of the pumping head.
- The intake line leading to the pump will be purged before each sample is collected.
- The intake tubing will have a nominal inside diameter (I.D.) of 1/4 inch.

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Specific operating instructions, capabilities, capacities, and other pertinent information for automatic samplers will be included in the respective operating manuals to be provided with the equipment.

Influent samples will be taken from the treatment plant influent line for a minimum period of three months. These samples will be collected manually from the sampling port and will be analyzed for certain metals and VOCs. Monitoring at this location is not required by the NPDES permit. The frequency of monitoring for certain metals and VOCs at this location will be determined at the end of the three-month period.

3.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) MEASURES

Specific Quality Assurance/Quality Control (QA/QC) procedures have been established regarding the collection and handling of the samples for chemical analysis. This includes all aqueous samples from the groundwater and wastewater sampling programs. The specific QA/QC procedures are described in the following sections.

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3.1 FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Quality control procedures will be followed so that laboratory preparation, sampling, and transport activities do not bias the results of the chemical analysis. Trip blanks, field blanks, and replicates will be prepared and analyzed as listed below to provide a quantitative basis for validating the analytical data.

Field QA/QC Sample Type	Minimum Frequency
Trip Blank (VOA only)	1 per sample shipment or 1 every other day, whichever is greater
Field Blank (VOA and metals only)	1 per day
Replicate	1 per 20 samples

These samples are described below in additional detail.

3.1.1 Trip Blanks

A trip blank will consist of a sample of analyte-free medium that is prepared by the laboratory and will accompany the sample container shipment from the laboratory to the field and back. Trip blanks will consist of deionized water (Type II, as per ASTM D 1193-77 - reapproved 1983). Trip blanks will be subject only to volatile organic analysis. Trip blanks will be collected at a rate of one per sample shipment or one per two day sampling event, whichever is greater.

3.1.2 Field Blanks

Field blanks will consist of analyte-free medium that has contacted any pre-cleaned sampling field (including disposable bailers), where applicable. Field blanks will consist of deionized water (Type II, as per ASTM D 1193-77 - reapproved 1983). Field blank samples will be analyzed for volatile organic compounds and metals. Field blanks will be collected at a rate of one for each day of sampling.

3.1.3 Replicates

Replicate samples will be collected as a measure of laboratory repeatability. Replicates will be collected during each sampling event at a rate of one per twenty monitoring samples.

3.2 SAMPLE PRESERVATION AND SHIPMENT

3.2.1 Sample Containers and Preservatives

The appropriate sample containers and associated preservatives must be obtained following the applicable USEPA protocols. The containers and preservatives are normally, but not always, supplied by the laboratory that will be responsible for the analyses. It is crucial that the sample containers be carefully organized and inventoried at least several days prior to initiation of the sampling program in order to provide sufficient time to rectify any problems, should they occur. Finally, pre-printed sample labels will be placed on all sample containers.

Different combinations of containers and preservation techniques are required for the aqueous samples in association with specified maximum allowable sample holding times. The various required preservation methods, container types, and maximum sample holding times for aqueous samples are listed on Tables 3-1 and 3-2.

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TABLE 3-1

**GROUNDWATER CLEANUP LEVELS FOR THE
LORD-SHOPE LANDFILL SITE**

Parameter	Concentration ($\mu\text{g/L}$)	Cleanup Level Basis
Acetone	3,500	Risk-Based Calculation ^a
Arsenic	2	Risk-Based Calculation ^b
Barium	1,000	MCL
Benzene	5	MCL
1,2-trans-Dichloroethene	100	Proposed MCL ^c
Lead	15	Risk-Based Calculation ^d
Methyl Ethyl Ketone	1,750	Risk-Based Calculation ^a
Methyl Isobutyl Ketone	1,750	Risk-Based Calculation ^a
Tetrachloroethene	5	Proposed MCL ^c
Trichloroethene	5	MCL
Vinyl Chloride	2	MCL ^e

^aThe risk-based calculations performed for the indicated noncarcinogenic compounds are calculated by comparing chronic human intake to Reference Dose information obtained either from the EPA's Integrated Risk Information Service (IRIS) database (June 1989) or from the April 1989 Health Effects Assessment Summary Tables (Heast). The ratio of these values is not to exceed 1.0.

^bThe risk-based calculation performed for arsenic is predicated on an excess cancer risk of 10^{-4} .

^cProposed in *Federal Register*, May 22, 1989.

^dThe risk-based level for lead is based on studies that indicate drinking water levels of $15 \mu\text{g/L}$ and lower correlate to blood levels below the concern level of $10 \mu\text{g/L}$.

^eRisk-based calculations performed on the MCL for vinyl chloride show an excess cancer risk of 1.4×10^{-4} . This limit is based on the limit of detection for this compound and is considered to be protective.

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TABLE 3-2

**REQUIRED CONTAINERS, PRESERVATION
TECHNIQUES, AND HOLDING TIMES-
BIODEGRADATION PARAMETER SAMPLES**

Analytical Parameter	Typical ^a Volume Required (mL)	Container ^b	Preservative ^c	Method No.	Detection Limit (mg/l)	Holding Times ^{d,e} (days)
LABORATORY PARAMETERS						
carbonate/bicarbonate						
Sulfate	200	Plastic	4°C	375.4/9038	1.0	28
Nitrate/Nitrite	100	Plastic	H ₂ SO ₄ , 4°C	353.2	0.02	28
Iron (Total)	100	Plastic	H ₂ SO ₄ , 4°C	6010A	1.0	180
Manganese	100	Plastic	H ₂ SO ₄ , 4°C	6010	0.02	28
Phosphate (total)	100	Plastic	H ₂ SO ₄ , 4°C	2320	0.20	28
TKN	100	Plastic	H ₂ SO ₄ , 4°C	365.2	0.10	28
Ammonium (N)	100	Plastic	H ₂ SO ₄ , 4°C	351.2		
Carbonate/Bicarbonate	150	Plastic	4°C	2320	1.0	
Methane	3 x 40	VOA	TSP, 4°C	8015 ^g		7
Ethane	3 x 40	VOA	TSP, 4°C	8015		7
Ethene	3 x 40	VOA	TSP, 4°C	8015		7
Field Parameters:						
Dissolved Oxygen	NA	NA	None	NA	±0.1 mg/l	Immediate ^j
Eh	NA	NA	None	D-1498-76 ⁱ	±mv	Immediate
pH	NA	NA	None	D-1293-84 ⁱ	±0.01 pH units	Immediate
Temperature	NA	NA	None	NA	±1°C	Immediate
Conductivity	NA	NA	None	D-1125-82 ⁱ	±1% Full Scale	Immediate
Iron (II)	NA	NA	None	HACH KIT		Immediate

NOTES: Sources: EPA

ASTM D-4448-85

^aAnalytical laboratory should be consulted for specific volume requirements.^bPolyethylene (P) or Glass (G) or Amber Glass (AG).^c"Dissolved" metals samples should be field filtered prior to preservation.^dSamples receiving no pH adjustment must be analyzed within 7 days.^e0.008 percent Na₂S₂O₆ should be added in the presence of residual chlorine.^fTSP = Trisodium phosphate^gModified^hNot applicableⁱASTM method^jWithin 1-10 minutes

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3.2.2 Sample Labels

Sample labels are required on all sample containers for the primary purpose of sample identification. Specific field data need not be recorded on the labels as they would be recorded on field data sheets. The sample labels will contain the following information:

- Sample or location identification number (i.e., well number, or arbitrary sample number)
- Analysis to be performed
- Preservative (optional)
- Project name and number
- Date and time of sample collection
- Initials of sampler

3.2.3 Sample Shipment

Shipment of samples to an analytical laboratory is usually required upon completion of sample collection. Proper packaging is necessary in order to protect the sample containers, to maintain the samples at a temperature of 4°C, and to comply with all applicable transportation regulations.

In general, samples are shipped using packaging that is supplied by the analytical laboratory. The packaging normally includes a shipable insulated box such as an ice cooler and contains protective internal packaging materials such as foam sleeves. Some laboratories use proprietary sample packaging with integral internal packaging. In either case, provisions need to be made for maintaining the temperature of the samples with the use of re-freezable ice packs.

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Regulations must be observed regarding the shipment of Dangerous Goods. Sample containers and certain field equipment may be defined as Dangerous Goods such that special requirements must be followed for their shipment. Air shipment of Dangerous Goods is regulated by the International Air Transport Association (IATA) as described in "Dangerous Goods Regulations" (IATA, current year). IATA Regulations are updated annually. Shipment by ground is regulated by the U.S. Department of Transportation (DOT; 49 CFR). Furthermore, individual shippers (e.g., Federal Express) or other countries (international shipments) may have additional requirements for dangerous goods shipment.

Environmental samples, (e.g., groundwater or wastewater samples) containing relatively low concentrations of contaminants (regulated under 40 CFR), are currently exempt from Hazardous Goods regulations. 40 CFR 261.40(d) states, "A sample of solid waste or a sample of water, soil, or air which is collected for the sole purpose of testing to determine its characteristics or composition is not subject to this Part or Parts 262 through 267 or Part 124 of this chapter or to the notification requirements of Section 3010 of RCRA". Sample containers must be properly packed such that inadvertent spillage does not occur during shipment.

Environmental samples which are known to be or suspected to be toxic, corrosive, flammable, or those which emit a noxious odor or anesthetic annoyance or discomfort to passengers and/or flight crews when shipped by air, must be packed, labeled and shipped in accordance with current IATA regulations. Refer to "Dangerous Good Regulations" (current year), Section 3 - Classification.

Specific regulations exist (Shipment in Excepted Quantities) for the shipment of many reagents that are commonly used as preservatives and decontamination agents. Consequently, the shipment to the field site of "empty" sample containers containing small quantities of preservatives must be conducted in accordance with the regulations. The most significant limitations for the shipment of preservatives (IATA, current year) involve those for nitric acid in which only small quantities (<0.5L) of low concentration (<20 percent) nitric acid can be shipped in any given sample shipment.

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3.3 CHAIN-OF-CUSTODY

Chain-of-custody procedures are designed to trace the sample from the time that it is collected until it, or its derived data, are used. A sample would be considered to be "in custody" under the following conditions:

- It is in personal possession.
- It is in personal view after being in personal possession.
- It was in personal possession when it was properly secured.
- It is in a designated secure area.

A Chain-Of-Custody form (to be supplied by the specific laboratory providing service) is to be initiated at the time that the sample containers leave the site at which they are prepared, usually that of the analytical laboratory supplying the containers. It is important that the field personnel completely fill out the applicable sections of the form. The chain-of-custody forms will be placed in shipping containers, protected from moisture using sealable, plastic bags (e.g., Ziploc®) and will accompany the containers during shipment to the laboratory. The field personnel collecting the samples will be responsible for the custody of the samples until transportation to the laboratory. Sample transfer requires the individuals relinquishing and receiving the samples to sign, date, and note the time of transfer on the chain-of-custody forms. The chain-of-custody is considered to be complete after it has been received and signed in by the analytical laboratory. A copy of the chain-of-custody record will be maintained by the field personnel along with the other field records.

Common carriers (e.g., Federal Express) are not expected to sign the chain-of-custody form. However, the bill of lading or airbill becomes part of the chain-of-custody record when a common carrier is used to transport the samples.

3.4 RECORD KEEPING

Field records that are both technically and legally defensible must be maintained for the various aspects of the monitoring program. These records include technical

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field data, sample identification labels, and chain-of-custody information for each sample. These records are described as follows.

Every attempt will be made to organize the sampling records prior to the commencement of field sampling activities. This will include the inventory and labeling of sample containers and the initiation of field data records and chain-of-custody forms. Technical field records will be provided on the data sheets that are appropriate to the given medium, as presented in Figure 3-1. Sample labels and chain-of-custody records have been described previously.

Data entries will be made using black indelible ink and will be written legibly. Entry errors will be crossed out with a single line, dated, and initialed by the person making the correction.

3.5 EQUIPMENT DECONTAMINATION

Equipment that will be in contact with the aqueous samples or any other surface that may potentially contact an aqueous sample (e.g., inside of well casing) and that is not dedicated to the particular well or purpose must be decontaminated prior to its use. This procedure has been developed in accordance with ASTM D 5088-90 "Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites".

3.5.1 Equipment and Materials

1. Laboratory detergent (Alconox®, Liquinox®, or equivalent)
2. Potable water
3. Acid Solution made from 10% reagent grade nitric or hydrochloric acid and deionized water (1% acid solution to be used on equipment constructed of low-carbon steel).
4. Acetone (Pesticide grade or better) contained in Teflon® wash bottle.

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GROUNDWATER SAMPLING FIELD DATA SHEET

Well Number: _____
Sample I.D.: _____ (if different from well no.)

Project: Long-Term Monitoring, Lord-Shope Site
Personnel: _____

Date: _____ Time: _____
Weather Conditions: _____ Air Temp: _____

WELL DATA:

Casing Diameter: _____ ☐ Stainless Steel ☐ Steel ☐ PVC ☐ Teflon® ☐ Other: _____
Intake Diameter: _____ ☐ Stainless Steel ☐ Galv. Steel ☐ PVC ☐ Teflon® ☐ Open rock
DEPTH TO: Static Water Level: _____ Bottom of Well: _____
DATUM: ☐ Top of Protective Casing ☐ Top of Well Casing ☐ Other: _____
Does the well appear to be in good condition? ☐ Yes ☐ No, describe: _____
VOLUME OF WATER: Standing in well: _____ To be purged: _____

PURGE DATA:

METHOD: ☐ Bailer, Size: _____ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump
☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____
MATERIALS: Pump/Bailer: ☐ Teflon® ☐ Stainless Steel ☐ Polyethylene
☐ PVC ☐ Polypropylene
☐ Other: _____ ☐ Other: _____
Pumping Rate: _____ Elapsed Time: _____ Volume Pumped: _____
Was well Evacuated? ☐ Yes ☐ No Number of Well Volumes Removed: _____

TIME SERIES DATA: Well Volumes: _____
Temp.: _____
pH: _____
Spec. Cond.: _____

PURGING EQUIPMENT: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned

SAMPLING DATA:

METHOD: ☐ Bailer, Size: _____ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump
☐ Syringe Sampler ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____
MATERIALS: Pump/Bailer: ☐ Teflon® ☐ Stainless Steel ☐ Polyethylene
☐ PVC ☐ Polypropylene
☐ Other: _____ ☐ Other: _____
SAMPLING EQUIPMENT: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned

Metals samples field filtered? ☐ Yes ☐ No Method: _____
APPEARANCE: ☐ Clear ☐ Turbid ☐ Color: _____ ☐ Contains Immiscible Liquid

FIELD DETERMINATIONS: pH: _____ Meter Model: _____ Meter S/N: _____
Temperature: _____ Spec. Cond.: _____ Meter Model: _____ Meter S/N: _____
ANALYTICAL PARAMETERS:

NO. OF CONTAINERS: _____ Field Blank I.D.: _____ Trip Blank I.D.: _____ Replicate I.D.: _____
REMARKS:

I certify that this sample was collected and handled in accordance with applicable regulatory and project protocols.
Signature: _____ Date: _____

5. Deionized Water (Type II, as per ASTM D 1193-77 - reapproved 1983) contained in Teflon® wash bottle.
6. Assorted brushes and buckets
7. Aluminum foil

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3.5.2 Procedure

The equipment will be cleaned by following the steps listed below:

- Wash in potable water and laboratory detergent with a brush to remove particles of soil or sediment.
- Equipment with internal mechanisms that cannot be contacted with a brush (e.g., submersible pumps) will be washed by circulating the detergent solution through the equipment.
- Rinse with potable water
- Rinse in acid solution, only if the samples will undergo analyses for inorganic parameters.
- Rinse with acetone from wash bottle.
- Rinse with deionized water from wash bottle.
- Allow equipment to air dry to the extent possible.
- Wrap equipment in aluminum foil, unless it is to be used immediately.

Wash and rinse water and solvents will be contained pending appropriate disposal.

4.0 LABORATORY ANALYSES

Samples will be collected as described in the previous sections. The chemical constituents to be tested and the analytical methods will be discussed in the following sections. Additional details regarding the laboratory analyses are provided in the approved Quality Assurance Project Plan (QAPP) prepared by Lord Corporation

Organic analyses will be provided by the Lord Corporation laboratory located in Erie, Pennsylvania. Inorganic and conventional parameters analyses will be provided by IT Corporation located in Pittsburgh, Pennsylvania. Other analytical laboratories which may be utilized will have the appropriate laboratory certifications.

4.1 ANALYTICAL CONSTITUENTS

Each medium will be analyzed for different analytes as discussed in previous sections and as summarized on Table 2-1. The specific analytes are listed on Tables 4-1 and 3-2. The groundwater samples, from monitoring wells, will be tested for VOCs and a group of metals. Analyses for treated groundwater will include a group of VOCs, metals, and conventional parameters.

4.2 ANALYTICAL METHODS

The volatile organic constituents (VOCs) will be analyzed with the use of Gas Chromatography/Mass Spectroscopy (GS/MS). The specific USEPA method numbers for the VOCs and the other constituents, including metals and conventional parameters, are listed on Tables 4-1 and 3-2.

4.3 QUANTIFICATION LEVELS

The quantification levels for each analytical constituent are listed on Tables 4-1 and 3-2. The quantification levels for organic compounds are specified on the basis of the "PQLs" (practical quantitation limits) which have been specified by the Lord Corporation laboratory. The PQL is defined as the lowest level that can be reliably

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TABLE 4-1

LIST OF ANALYTICAL PARAMETERS - AQUEOUS SAMPLES

Chemical Constituent	Monitoring Program		USEPA Analytical Method ^{c,d}	Detection Limit ^{c,d} (µg/L)	Groundwater Cleanup Levels (µg/L)	NPDES Permit Requirements (mg/L)			
	GW ^a	GWTP ^b				Annual Average	Monthly Average	Daily Maximum	Instant Maximum
1,2-trans-Dichloroethene	✓	✓	624	1.0	100		0.59	1.180	
2-Butanone (MEK)	✓	✓	624	2.0	1,750		3.4	6.8	
4-Methyl-2-Pentanone (MIBK)	✓	✓	624	1.7	1,750		3.4	6.8	
Acetone	✓	✓	624	15.5	3,500		6.7	13.4	
Benzene	✓	✓	624	0.8	5.0	0.0058			0.07
Tetrachloroethene	✓		624	0.8	5.0		-- ^e	--	--
Trichloroethene	✓	✓	624	2.1	5.0	0.018			0.22
Vinyl Chloride	✓	✓	624	1.6	2.0	Not detectable using EPA Test Method 601			
Aluminum		✓	200.7	10			0.460	0.920	1.15
Arsenic	✓		206.2	37	2.0		--	--	--
Barium	✓	✓	200.7	1.0	1,000		1.700	3.400	4.25
Cadmium		✓	200.7	7.0			0.0016	0.003	0.004
Copper		✓	200.7	5.0			0.009	0.018	0.02
Iron - total		✓	200.7	5.0			1.600	3.200	4.00
Lead	✓	✓	239.2	15.0	15		0.005	0.010	0.01
Mercury		✓	245.1	0.2		Not detectable using EPA Test Method 245.1			
Zinc		✓	200.7	2.0			0.06	0.120	0.16
Chemical Oxygen Demand (COD)		✓	410.1	6.0			Monitor only		
Oil & Grease		✓	9071	1,000			15		30
pH	✓	✓	field			6.0 to 9.0 standard units at all times			
Specific Conductivity	✓	✓	field				Monitor only		
Total Organic Carbon (TOC)		✓	9060	3,000			Monitor only		

^aGroundwater monitoring program.^bTreated groundwater effluent monitoring program.^cDetection limits for organics and metals specified on the basis of Instrument Detection Limits (IDLs) as provided by the Lord Corp. laboratory.^dMethod 601 will be used to analyze VOCs in treated groundwater effluent. Detection limits for Method 601 may be lower than reported values.^eAnalysis not required. Analysis required for groundwater monitoring program only.ORIGINAL
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achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The quantitation limits for the metals have been specified on the basis of the Instrument Detection Limits (IDLs).

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4.4 INTERNAL QUALITY CONTROL

Various laboratory Quality Assurance/Quality Control (QA/QC) procedures will be followed, as specified in the previously referenced analytical methods. In addition, a number of (internal) laboratory QA/QC samples will be utilized, as listed below:

QA/QC Sample Type	Parameter	Minimum Frequency
Matrix Spike/Matrix Spike Dup.	<u>Organics, Metals, & Inorganics</u>	1 per batch (20 max. in batch)
Laboratory Control Sample	<u>Organics, Metals, & Inorganics</u>	1 per batch (20 max. in batch)
Surrogate Spike Sample	Organics	Every sample
Method Blank Sample	<u>Organics, Metals, & Inorganics</u>	1 per batch (20 max. in batch)

Inorganic parameters include sulfate, nitrate, TKN, ammonium ion, manganese, iron, phosphate, and carbonate/biocarbonate.

4.5 LABORATORY REPORTING

The analytical data will be reported by the laboratory through the preparation of the following deliverables:

4.5.1 Sample Reporting Group Transmittal Letter

The transmittal letter will describe special circumstances that were encountered or observations made during the analysis of the related set of samples.

4.5.2 Sample Description

The sample description will contain sample field identification including date and time of sampling and a cross reference to the applicable laboratory identifiers. This

will also include date of sample receipt, date of sample report, and other project control information, as applicable.

4.5.3 Analytical Data Submission

- a. Sample analytical data report (hard copy) that will contain sample concentrations, equivalent CLP qualifiers, and detection limits (as applicable) for each parameter.
- b. QA/QC Report (hard copy), to include:

Matrix Spike/Matrix Spike Duplicate samples, Surrogate samples, and Laboratory Control Samples:

- Spike Concentration
- Spike Recovery Concentration
- Spike Recovery Percent
- Comparison of Recovery to Control Limits

Blank Samples:

- Method Blanks
 - Trip Blanks
 - Field Blanks
- c. Computer data report, provided either on disk or transmitted via modem. The data format will be comma delimited ASCII. The computer data report will include sample data (described in (a) above) and the data for blank and field replicate samples.

Additional supporting data will not be provided as a routine laboratory deliverable. However, the analytical laboratory will retain supporting data for a period of at least seven (7) years which can be made available, if required. These data will include the following:

Chronology

- Digestion/Extraction Dates
- Analysis Dates and Times
- Relevant Holding Times
- Collection Dates

Methodology

- Methods
- Reporting Limits (method detection limit)
- Instrument Detection Limit (where applicable)
- Any clean-up procedures used

Chain-of-Custody Packaging and Review Documentation

- Discussion of abnormalities, inconsistencies
- Temperature on Receipt of Sample Cooler

4.6 DATA QUALITY EVALUATION

A data quality evaluation will be conducted. The evaluation will address, at a minimum, the following issues:

- Overall data completeness.
- Analyses flagged with a "B" qualifier, indicating their presence in the associated laboratory method blank.
- Compounds found in field blank and trip blank samples.
- Analytes flagged with an "E" qualifier, indicating that the concentrations exceeded the calibration range of the GC/MS instrument.
- Field replicate samples.

- Review of laboratory QA/QC samples including comparison of spike recovery percentages to control limits.

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5.0 REPORTING

Various reports will be prepared for each aspect of the monitoring program. Each of these reports is described in the following sections.

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5.1 MONTHLY DISCHARGE REPORTS

Results of the wastewater treatment effluent discharge monitoring will be reported on a monthly basis. The monitoring results, for a particular month, will be summarized on a Discharge Monitoring Report (DMR) form and will be submitted to the agencies noted below, to be postmarked by the 28th of the following month. The DMR forms will be submitted to the regional office of the Pennsylvania Department of Environmental Protection (PADER), to the Erie County Health Department, and to Region III of the US Environmental Protection Agency, as is required in the NPDES permit.

5.2 ANNUAL GROUNDWATER MONITORING REPORTS

Annual monitoring reports containing hydraulic and groundwater quality monitoring data will be prepared for submittal to the regional office of the Pennsylvania Department of Environmental Protection (PADER) and to Region III of the US Environmental Protection Agency. The annual reports will contain the following information:

Hydraulic Monitoring Data

- Depth to water level measurements and corresponding water level elevations from the previous year.
- Contour map showing the configuration of the Water Table zone for one representative event per year.
- Contour map showing the configuration of the potentiometric surface of the Intermediate water-bearing zone for one representative event per year.

- An analysis of the performance of the groundwater recovery system, specifically with regard to the zone of capture in relationship to the present configuration of the plume.
- Recommendations will be made, as necessary, for changing the operation of the system, adding or deleting wells from the monitoring program, or changing the frequency of collecting certain measurements.

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Groundwater Quality Data

- Analytical data, as described previously in Section 4.5.3.
- Chain-of-Custody Data

Additional supporting data (such as detailed laboratory deliverables [described in Section 4.5.3] and field data sheets) will not be routinely provided as a part of the laboratory reporting. However, Lord Corporation will retain these supporting data for a period of at least seven (7) years and can be made available, if required.

5.3 FIVE-YEAR MONITORING REPORTS

Five-year monitoring reports will be prepared that provide additional analysis regarding the hydraulic and groundwater quality monitoring data. The comprehensive reports will contain the following:

- Isoconcentration map of the VOC plume in each water-bearing zone.
- A discussion of the present configuration of the VOC plume and any changes from previously described configurations.
- An analysis of the performance of the groundwater recovery system, specifically with regard to the zone of capture in relationship to the present configuration of the plume.
- Recommendations will be made, as necessary, for changing the operation of the system, adding or deleting wells from the monitoring program, or changing the frequency of collecting certain measurements.

5.4 REPORTING AND DISCUSSION OF INTRINSIC REMEDIATION

Every six months for two years, and annually thereafter, the results and interpretation of the data evaluation and modeling scenarios will be summarized and included in annual reports for review by the USEPA and PADEP. Following agency review, conclusions and recommendations will be presented at meetings whose agenda will include reaching a consensus regarding continued groundwater recovery.

At the end of two years a revised plan for the frequency and type of evaluation will be determined in conjunction with USEPA and PADEP.

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4.0 INTRINSIC REMEDIATION SCOPE OF WORK

The scope of intrinsic remediation for the Lord-Shope Landfill Superfund Site will consist of activities that are "supplementary" to other activities related to the approved remedy for the site. The activities explicit to intrinsic remediation are the inclusion of biodegradation parameters in the Long Term Monitoring Plan, evaluation of these additional data, review of groundwater quality improvement over time, and interpretation of groundwater quality and biodegradation parameter data with the aid of fate and transport modeling. The basis for intrinsic remediation, a summary of historical groundwater quality, and the evaluation of the potential for natural attenuation to contribute to improved groundwater quality are presented in Sections 2, 3, and 4, respectively, of the report entitled "Evaluation of Intrinsic Remediation" Lord-Shope Landfill Site, (ECKENFELDER INC., 1996).

Intrinsic remediation is being implemented in conjunction with four other activities, three of which have been implemented and one, groundwater recovery and treatment, whose implementation is imminent. These other remedy components are:

- composite landfill cover;
- upgradient cutoff wall;
- ISVS; and
- groundwater recovery and treatment.

4.1 INTRINSIC REMEDIATION SCOPE

Intrinsic remediation will consist of collection of groundwater quality and biodegradation parameters, review of the data, modeling, and interpretation and recommendations concerning ongoing and future active remediation as well as reliance on natural attenuation.

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4.1.1 Data Acquisition

The data acquisition procedures are a modification to that previously described in the approved Long Term Monitoring Plan. A modified Long Term Monitoring Plan (Revision 1) has been prepared and is included in this document as Appendix A. The amended document includes four additional wells for groundwater quality sampling (Table 2-2 of Appendix A) within the Intermediate Zone as well as the inclusion of other wells in both the Water Table Aquifer and Intermediate Zone Aquifer for the determination of biodegradation parameters (Table 2-3 of Appendix A). The groundwater quality data parameters remain unchanged as shown in Table 2-1 of Appendix A. It is anticipated that the number of wells and the list of biological parameters will both be reduced after the first two sampling events. For example, if ethene or ethane concentrations are below detection limits these parameters will no longer be analyzed for.

4.1.2 Data Evaluation

Every six months, following each sampling event, the available site data will be reviewed. The first level of evaluation of the groundwater quality data will be the observation of the existing distribution of the organic compounds for which cleanup goals have been established. This will establish the need for further groundwater quality improvement. The current groundwater quality will then be compared to historical data to determine trends and the extent to which intrinsic remediation may have resulted in improvement beyond that already observed. The groundwater quality data will then be evaluated with respect to the presence and pattern of compounds and their biodegradation byproducts. This will provide a more detailed understanding of the current role of natural attenuation.

The biodegradation parameters will be evaluated with respect to the presence or absence of electron acceptors and nutrients, pH values, and oxidation/reduction potential in order to determine whether environmental conditions are favorable to specific metabolic pathways that could be responsible for intrinsic remediation of the various compounds reported in groundwater. The relationship between distribution of electron acceptors and specific compounds will be compared to determine if these distributions are consistent with ongoing utilization of specific electron acceptors in the natural attenuation process.

4.1.3 Mathematical Modeling

Mathematical fate and transport modeling, which will incorporate retardation flow, adsorption of compounds by soils, and biodegradation will be used to assist in the evaluation of intrinsic remediation at the site. Because of the complexity of the groundwater flow in the Intermediate Zone Aquifer, a simplistic model will be used to bracket likely scenarios in the same manner as discussed in the intrinsic remediation evaluation report. Modeling will be used to both help interpret historical changes in groundwater quality and to help generate potential scenarios for future changes in groundwater quality. Several scenarios will be developed under both unstressed and groundwater pumping conditions. The goal of this effort will be to provide a range of probable outcomes of continued groundwater recovery, of modified groundwater recovery, and of discontinued groundwater recovery.

A review of existing models including the model used in the evaluation presented in Section 4 of the intrinsic remediation evaluation report will be conducted to determine which model is most appropriate. These include the model developed by ECKENFELDER INC., BIOPLUME II, BIOPLUME III, and BIOSCREEN.

4.1.4 Reporting and Discussion of Intrinsic Remediation

Every six months for two years, and annually thereafter, the results and interpretation of the data evaluation and modeling scenarios will be summarized and included in annual reports for review by the USEPA and PADEP. Following agency review, conclusions and recommendations will be presented at meetings whose agenda will include reaching a consensus regarding continued groundwater recovery.

At the end of two years a revised plan for the frequency and type of evaluation will be determined in conjunction with USEPA and PADEP.

4.2 HEALTH AND SAFETY PLAN

The existing Site Health and Safety Plan (HSP) for field activities will be adequate as this Work Plan requires only that additional samples be collected. The HSP was

prepared using existing site information as well as the hazards presented by the activities to be conducted.

4.3 GROUNDWATER SAMPLE COLLECTION

The groundwater sampling and equipment protocols are contained in Revision 1 of the Long Term Monitoring Plan which is included as Appendix A.

4.4 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) MEASURES

The amended Long Term Monitoring Plan includes QA/QC measures adequate for the work to be performed.

4.5 INTRINSIC REMEDIATION SCHEDULE

The intrinsic remediation schedule will follow the schedule in the Long Term Monitoring Plan. Subsequent to each sampling event, data will be compiled, included in the historical database, evaluated, utilized in modeling, and reported to USEPA and PADEP approximately two months after each sampling events. Meetings will be scheduled as needed based on consensus of the agencies and Lord Corporation.

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APPENDIX K
GLOSSARY

GLOSSARY OF ACRONYMS

GWR	-	Groundwater Recovery
GWTS	-	Groundwater Treatment System
CAAP	-	Central Alarm Annunciation Panel
ISVS	-	In Situ Vapor Stripping
LSL	-	Level Switch Low
LSLL	-	Level Switch Low Low
LSH	-	Level Switch High
LSHH	-	Level Switch High High
PC	-	Process Computer
HASCP	-	Health and Safety/Contingency Plan

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