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UTAH DIVISION OF
SOLID & HAZARDOUS WASTE

PERMIT APPLICATION
PART III
TECHNICAL REPORT
SALT LAKE VALLEY
SOLID WASTE MANAGEMENT FACILITY
SALT LAKE COUNTY, UTAH

March 28, 2005

TABLE OF CONTENTS

SECTION			PAGE
1.	**INTRODUCTION**		**1**
2.	**TOPOGRAPHY AND SITE FEATURES**		**2**
	2.1	Regional Topography and Features	2
	2.2	Proposed Local Topography and Features	2
3.	**LANDFILL DESIGN**		**4**
	3.1	Cell Design	4
		3.1.1 Construction	4
		3.1.2 Fill Method	4
		3.1.3 Liner and Cover Elevations	5
		3.1.4 Design Details	5
	3.2	Monitoring System Design	6
		3.2.1 Groundwater Monitoring System	6
		3.2.2 Landfill Gas Monitoring System	7
		3.2.3 Landfill Gas Collection System	8
	3.3	Run-On/Run-Off System Design	8
		3.3.1 Permanent Drainage Control Facilities	9
		3.3.2 Interim Drainage Control Facilities	10
4.	**HYDROGEOLOGICAL ASSESSMENT**		**11**
	4.1	Regional Geology and Hydrology	11
		4.1.1 Geologic Setting	11
		4.1.2 Faults and Seismicity	12
		4.1.3 Surface Water Hydrology	12
		4.1.4 Groundwater Hydrology	13
	4.2	Site Soils	13
		4.2.1 Surface Soils	14
		4.2.2 Subsurface Soils	14
		4.2.3 Soil Chemistry	15
		4.2.4 Soil Properties	16
	4.3	Local Groundwater Conditions	21
		4.3.1 Shallow Groundwater Depth and Gradient	21
		4.3.2 Shallow Groundwater Quality	22
		4.3.3 Local Groundwater Use and Groundwater Rights	22
	4.4	Local Surface Water Conditions	22
		4.4.1 Presence of Surface Water	22
		4.4.2 Local Surface Water Quality	23
		4.4.3 Local Surface Water Use and Surface Water Rights	23
	4.5	Site Water Balance	24
	4.6	Groundwater and Surface Water Monitoring System Design	24
		4.6.1 Groundwater Monitoring System	24
		4.6.2 Surface Water Monitoring System	25

TABLE OF CONTENTS
(continued)

SECTION		PAGE
5.	ENGINEERING ASSESSMENT	27
5.1	Solid Waste Site Location Standard	27
5.2	Salt Lake County Solid Waste Management Plan	27
5.3	Landfill Design and Operation	27
5.3.1	Landfill Design	27
5.3.2	Landfill Operations	28
5.3.3	Sources of Daily and Final Cover, and Soil Liners	28
5.3.4	Equipment Needs and Availability	28
5.4	Leachate Collection, Removal, Treatment and Disposal	29
5.5	Surface Water Run-On/Run-Off Controls	29
5.6	Closure and Post-Closure	29
6.	REFERENCES	30

TABLES

1 Well Construction Details
2 Results of Chemical Analysis of Soil Samples from Parcels VII and VIII
3 Summary of Recent Analytical Results (Groundwater)
4 Summary of Analytical Results (Surface Water)
5 Laboratory Analysis for Groundwater Monitoring

FIGURES

1 Site Map
2 Active Landfill Cells
3 Monitoring Well Locations
4 Landfill Gas Monitoring Probes
5 Landfill Gas Collection System
6 Landfill Drainage Plan
7 Landfill Drainage Plan Details (1 of 2)
8 Landfill Drainage Plan Details (2 of 2)
9 Fault Map
10 Groundwater Elevation Contours
11 Surface Water Sample Locations

TABLE OF CONTENTS
(continued)

APPENDICES

A Figures
B Engineering Drawings from the SLVSWMF Master Plan
C Specifications for Groundwater and Landfill Gas Monitoring Wells
D Drainage Calculations
E Soil Report Drawings, Figures and Tables
F Point-of-Diversion Plot Map and Water Rights Information
G Site Water Balance Calculations
H Site Conditions and Compliance with Location Standards
I Projected Soil Needs for Development and Closure
J Correspondence with Division of Water Quality

1. INTRODUCTION

The Salt Lake Valley Solid Waste Management Facility (SLVSWMF) is located approximately 9 miles west of the center of Salt Lake City. The facility currently serves the disposal needs of approximately 65 percent of the businesses and residents of Salt Lake County. The active landfill cell has been accepting waste since July 1993 under an agreement between Salt Lake City Corporation and Salt Lake County to jointly own and operate the facility. The City provides engineering support services for the facility. The County provides accounting and legal support services, and manages and operates the facility. The Salt Lake Valley Solid Waste Management Council (SLVSWMC), a facility management council made up of five members from governing and regulating agencies and an outside technical expert, develops policy, rules and regulations to promote safe and efficient solid waste disposal. The SLVSWMC plans, establishes, and approves all construction and expansion projects and prepares budgets for operation and maintenance of the facility.

In 1991, EMCON prepared an updated Master Plan for the SLVSWMF (EMCON, 1991). This Master Plan details the development of the active landfill cell, which is designed to be built sequentially in 11 modules. The first module (Module 2) was completed according to the Master Plan and began receiving waste on July 1, 1993. The second module (Module 1) was completed and began receiving waste in February 1994. Modules 3, 4, and 5 were completed and began receiving waste between 1994 and 1997. Modules 6 and 7 were completed in 2001 and 2003, respectively, and are currently receiving waste.

Based on the effective dates listed in R315-303-2 of the Utah Solid Waste Permitting and Management Rules, Module 1 and Modules 3 through 11 are subject to the performance standards, design standards, and maintenance and operation standards described in R315-303-3, R315-303-4, and R315-303-5. Module 2 is subject to all of the above listed rules except those requiring a liner or leachate collection system. However, Module 2 has been constructed with both features in accordance with the Master Plan.

2. TOPOGRAPHY AND SITE FEATURES

2.1 REGIONAL TOPOGRAPHY AND FEATURES

The SLVSWMF is located within the Jordan River Valley, a relatively flat-lying valley bounded by mountain ranges on the west, south, and east and by the Great Salt Lake on the northwest. The Jordan River Valley ranges from approximately 4,200 feet mean sea level (msl) on the north to 5,200 feet msl on the south.

Topography at the facility site prior to development was relatively flat, ranging from approximately 4,235 to 4,215 feet msl, sloping downward slightly toward the northwest.

Figure 1 (Appendix A) is a compilation of the most current 7½ minute USGS *Magna, Utah* and *Saltair, Utah* quadrangle maps, showing the area around the SLVSWMF. These maps were generated in 1952, (photo revised in 1969 and 1975) and 1972, respectively. Therefore, none of the historic or new facility features were present at the time the map was generated or revised. The facility boundary, property boundary, surrounding land use/zoning, existing utilities and structures, surface drainage channels, and the direction of prevailing winds are drawn on Figure 1. The latitude and longitude coordinates of the SLVSWMF entrance facilities are approximately 40° 44' 25" North, 112° 1' 57" West.

2.2 PROPOSED LOCAL TOPOGRAPHY AND FEATURES

Currently, elevations at the site range from approximately 4,210 to 4,290 feet above mean sea level (msl). The highest elevations at the site are located along the east and north ends of the landfill (Modules 1 through 5) where waste has been placed in the past. The local topography prior to landfilling activities is shown on Figure 2 in Appendix A.

Once completed, the closed landfill cell will range in elevation from 4,230 to 4,340 feet msl, an elevation change of 110 feet. The proposed final topography is shown on the grading plan, Drawing 1 in Appendix B.

The facility refuse limits are set back 110 feet from the property boundary around most of the property. Additional setbacks in the southeastern corner of the property allow for the maintenance of facilities in this area.

The excavation plan, Drawing 2 in Appendix B, shows the excavation grading contours. The central part of the active cell will be excavated approximately 20 feet to a bottom elevation of 4210 ft, msl. The 11 cells will be excavated sequentially and the soils generated during excavation will be used for cover, soil liners, embankment construction, etc. Additional soil needs will be met by existing stockpiles and off-site sources.

3. LANDFILL DESIGN

3.1 CELL DESIGN

3.1.1 Construction

The excavation and base preparation plan (Drawing 2 in Appendix B) shows the excavation grading contours, refuse fill limits, earthfills, drainage facilities, and roadways for access from the entrance area to the disposal area. The landfill area is divided into 11 excavation cells to facilitate efficient excavation and handling of soils, access, drainage, and controlled waste placement. Excavations will generate the soils needed for (1) daily, intermediate, and final cover over the refuse; (2) soil liners and protective cover; and (3) embankment construction and other earthfills. The remaining soils will come from existing stockpiles and off-site sources.

Base contours show base excavation elevations, upon which a geosynthetic clay liner (GCL) and a 60-mil high-density polyethylene (HDPE) low-permeability composite liner will be placed. In some modules (Modules 1 and 2 and potential other modules between 8 and 11), the GCL may be replaced by a 2-foot compacted clay liner.

The proposed leachate collection and removal system (LCRS) will be composed of a network of perforated piping and blanket drain rock, which will promote gravity flow to lined leachate sumps. A conceptual design for the LCRS is shown in Drawing 3, Appendix B. A detailed design for the LCRS will be prepared as part of the construction documents for each module.

3.1.2 Fill Method

The fill sequence plan (Drawing 4, Appendix B) and sections (Drawing 5, Appendix B) present a multistage sequence of fill placement in Modules 1 though 11 to achieve the final grades shown on Drawing 1. The plans provide operations guidance, identify wet-weather disposal areas, and show interim access roads and storm-water drainage facilities needed to construct the landfill. The drawing indicates the approximate module limits and recommended filling sequence.

The sequencing plan shows the soil source for each module (pond or module excavation, stockpile, or import), and soil excavation destination (either to another module or to a stockpile). The location and direction of the initial fill placement and general direction of fill progression in each module is also shown.

The sequence of fill modules is designed to enable near-term filling-to-final surfaces and capping with final soil cover to minimize infiltration and reduce leachate production. The plan is designed to enable sequential excavation of soils from subsequent modules and the soil borrow area for orderly preparation of the module and minimization of soil "double handling." The sequence of filling and intermediate landfill slopes are shown in section view. Access, drainage, and other site improvements that must be completed before or in conjunction with subsequent modules are also depicted.

3.1.3 Liner and Cover Elevations

Sectional views of the completed landfill, showing excavation and refuse fill depths, are presented in Drawing 4, Appendix B.

3.1.4 Design Details

Various design details for drainage control, erosion protection and sediment control facilities, the LCRS, internal access and haul roads, and earthfills are shown on Drawings 6 and 7 in Appendix B. Currently, the base liner may be 2 feet of compacted clay overlain by HDPE (as shown on Drawing 7), or may be a GCL overlain by HDPE. Currently, the planned final landfill cover is proposed to be:

- A low-permeability layer of 18 inches of soil with a hydraulic conductivity of $\leq 1 \times 10^{-5}$ cm/sec overlying the intermediate cover or a geosynthetic clay liner, overlying the intermediate cover;

- A geomembrane;

- A geonet; and

- A minimum of 12 inches of soil suitable for plant growth.

Each soil layer shall be compacted as required by a dozer or compactor to provide a stable foundation layer and a cap capable of supporting vegetation.

This is a design change from the detail shown on Drawing 6.

3.2 MONITORING SYSTEM DESIGN

3.2.1 Groundwater Monitoring System

Groundwater around the active landfill will be monitored by ten monitoring wells, MW-1A through MW-10A. The locations of these wells are shown on Figure 3, Appendix A. Based on a historical groundwater gradient to the north-northwest, MW-1A, MW-2A and MW-3A will represent upgradient groundwater quality while MW-4A through MW-10A represent downgradient water quality. MW-1A through MW-8A are currently in place and being monitored. The remaining two planned wells (MW-9A and MW-10A) will be installed as landfill operations move toward the south and west. One temporary well, "F," is currently north of MW-1A and will be properly abandoned as landfilling operations move toward the south end of the site.

In general, the wells are constructed with 10 feet of slotted PVC screen set at and below the water table, with PVC blank from the water table to ground surface. The annular space around each well screen is filter packed and the top of each filter pack is sealed with a bentonite plug. Specific construction details for the existing wells are summarized in Table 1. New wells will be constructed in accordance with Salt Lake City Specification 02650 (see Appendix C). For additional information, see Section 4.6.

Groundwater is monitored semiannually according to Kleinfelder's Groundwater Monitoring Plan dated February 14, 2005 (see Addendum 2 of Part II, *General Report in Support of Permit Application*).

3.2.2 Landfill Gas Monitoring System

Landfill gas around the active landfill will be monitored at ten gas monitoring probes located around the perimeter of the cell. The locations of these wells are shown on Figure 4, Appendix A. Four wells, Probes GM-1 through GM-4, are currently in place and being monitored. The remaining six planned wells will be installed as landfill operations move toward the south and west.

In general, each well is constructed with a ½-inch-diameter, 12-inch-long slotted or drilled PVC gas probe tip set above the water table, generally 4 feet below ground surface. The gas probe tip is connected to the ground surface with ½-inch-diameter PVC blank. The probe tip is accessed by 1/8-inch tygon tubing through the center of the PVC blank. The annular space around each probe tip is filter-packed with pea gravel and the top of each filter pack is sealed with a 6-inch concrete plug. Wells are constructed in accordance with Salt Lake City Specification 02651 (see Appendix C).

3.2.3 Landfill Gas Collection System

The active landfill is equipped with a landfill gas collection system (LGCS), which was brought online in December 2000. The LGCS consists of a network of vertical and horizontal gas collection wells through which landfill gas is collected. These collection wells are connected to lateral lines, which in turn bring the gas into a main header pipeline. The header pipeline is designed to ring the perimeter of the landfill, and includes a series of condensate knockout units where condensate is removed from the gas and returned to the landfill via leachate collection system lines. The main header pipeline terminates at the flare station, where gas is fed into a large, internal combustor flare, and incinerated to remove hazardous organic materials. The combustion process is fueled by the methane inherent in the landfill gas. Gas moving equipment, which consists of large blower fans which move gas from the landfill into the flare, is considered as part of the flare station operation. The LGCS is presented in Figure 5.

3.3 RUN-ON/RUN-OFF SYSTEM DESIGN

To prevent inundation or washout during the operating life of the landfill, storm water run-on and run-off will be controlled through the perimeter and module termination berms. Storm water collected by the perimeter drainage system will be diverted around the landfill, through one of three treatment ditches, and discharged to the natural drainage path. Figure 6 in Appendix A shows the final site drainage plan. Figures 7 and 8 in Appendix A show details of the drains and treatment ditches.

Temporary berms will be placed on lifts as necessary to divert storm water away from the active working face. Working faces advanced upslope will be aligned as necessary to avoid trapping runoff. The working face is sloped toward the interior of the landfill cell, such that stormwater runoff generally flows to the middle of the cell, percolates through waste in the cell, and is captured in the leachate collection system for the cell. There it is treated like landfill leachate.

Any stormwater run-on or run-off that does run off of a module is captured in drains that encircle each module. These drains flow to the landfill perimeter drain (see Figure 6, Appendix A). Water that flows in the perimeter drain runs to one of three treatment ditches on the north side of California Avenue (Figure 6). There, the water flows through five stages that restrict the flow to encourage settlement. The treatment ditches are lined with vegetation to encourage biological activity. The water subsequently flows out of the treatment ditches, under California Avenue, to flood control ponds along Lee Drain ("Post Treatment Ponds" on Figure 5). For details of the treatment ditches, see Figures 7 and 8.

In order to convey storm water from the landfill areas with minimum erosion, the surface drainage system for the landfill will include diversion berms, ditches, culverts, oversize drains, and energy dissipaters. Temporary storm runoff basins and silt fences will also be used to minimize soil migration from the landfill.

All drainage improvements were designed using the Rational method, as provided by Utah State Department of Highways guidelines, with a time of concentration intensity for a 25-year return frequency storm. The Heasted Method *Flow Master* computer program, based on Manning's equation, was used by EMCON to calculate the open channel flow characteristic; that is, flow capacity, flow velocity, and depth of flow. Reference material presented in *The Utah State Department of Highways*, (UDH) *Manual of Instruction, Part 4 Roadway Drainage* (1981), was used to develop peak flow rates. Drainage calculations prepared by EMCON for the final landfill surface and ancillary facilities are presented in Appendix D.

3.3.1 Permanent Drainage Control Facilities

The National Flood Insurance Program maps for Salt Lake County indicate the landfill expansion area is outside of the 500-year flood plain for Lee Creek (National Flood Insurance Program, 2001). Final (permanent) drainage control facilities on the landfill are designed to carry peak discharge resulting from the 25-year storm event, in accordance with the provisions of R315-303-3-1(d). Storm-water runoff and final storm-water drainage control facilities were sized by EMCON in the Master Plan using applicable design criteria from the UDH Roadway Drainage Manual (Utah Department of Transportation, 1984). Drainage facilities are shown on Drawings 1 and 2, with details provided on Drawings 6 and 7 (Appendix B).

Ditches constructed over refuse fill areas will be underlain with at least a 1-foot-thick foundation layer and a 1-foot-thick low permeability soil layer. Drainage ditches will be lined with asphaltic concrete (or its equivalent) to minimize erosion and prevent infiltration of surface water into the landfill. Corrugated metal pipe drains, inlets, drainage ditches, and energy dissipaters will be used to collect surface-water runoff from the landfill and convey it to the natural drainage course.

Surface run-on collected by the landfill drainage system will be diverted around the landfill and discharged to the natural drainage way. Concrete rubble or rock riprap, placed at the point of discharge at the toe of the perimeter berm, will serve as an energy dissipater for the discharged storm water.

3.3.2 Interim Drainage Control Facilities

Temporary surface drainage facilities are designed to carry the peak flow from a 25-year storm. Temporary runoff is diverted to east and west perimeters, as well as into the dewatering trench. Water is channeled through the Lee Gate into the ponds south of the Landfill on the old landfill site. This system is designed to handle the volume from a 24-hour duration, 25-year storm event.

During landfill operations, surface water runoff near active refuse fill areas will be controlled by temporary berms and "V" ditches. The berms and ditches will direct surface water away from exposed refuse and prevent surface water from ponding against refuse. Each refuse lift will also be sloped to promote drainage towards interim drainage control facilities and prevent run-on to the active face. Surface runoff will be routed to the natural drainage course or to a temporary runoff containment basin for silt control. Temporary drainage facilities are shown on Drawing 4, Appendix B.

4. HYDROGEOLOGICAL ASSESSMENT

4.1 REGIONAL GEOLOGY AND HYDROLOGY

4.1.1 Geologic Setting

The SLVSWMF is located in the Jordan River Valley on the eastern edge of the Basin and Range Province. The Basin and Range Province, extending from California to the Wasatch Front of Utah, is characterized by a series of north-south trending valleys separated by mountain ranges. The valleys are created by down-dropped grabens as a result of regional tectonic extension. The down-dropped valleys generally contain thick deposits of sediments from the erosion of mountains on either side.

The Jordan River Valley is a graben valley, located between the Oquirrh Mountains to the west and the Wasatch Mountains to the east. The Jordan River Valley covers approximately 500 square miles, extending approximately 28 miles from the Great Salt Lake on the north to the Transverse Mountains on the south.

The Jordan River Valley contains Quaternary and Tertiary sediments deposited in a variety of depositional environments. The principal types of the valley fill are clay, silt, sand, and gravel (Hely, et al., 1971) which reach a maximum thickness of about 2,000 feet in the northern portion of Salt Lake County. The near-surface sediments in the vicinity of the landfill include both fluvial and lacustrine deposits. The most recent deposits are fluvial floodplain and delta deposits of the Jordan River and its tributaries. These deposits are underlain by older lake sediments deposited in the Pleistocene Lake Bonneville (Stokes, 1988).

4.1.2 Faults and Seismicity

The dominant fault zone in the region is the Wasatch Fault Zone. The Wasatch Fault Zone extends approximately 210 miles from Soda Springs, Idaho to Nephi in central Utah (Stokes, 1988). The Wasatch Fault Zone contains normal faults that trend north-south along the front of the Wasatch Mountains. Three miles of cumulative vertical displacement have occurred on the Wasatch Fault Zone since Holocene time (Arabasz, 1987). The Wasatch Mountain block, on the east side of the fault zone, has moved up relative to the Jordan River Valley block on the west. The East Bench Fault and Warm Springs Fault, members of the Wasatch Fault Zone, are located approximately 8 to 9 miles east of the landfill (Figure 9, Appendix A). The closest faults to the landfill are the Taylorsville and Granger faults, which are part of the West Valley Fault Zone. These normal faults are interpreted to be seismically independent of the Wasatch Fault Zone, but sympathetic movement is possible following movements of the Wasatch Fault Zone. The Granger fault lies approximately 9,000 feet east of the landfill. The West Valley Fault system appears to have had Holocene displacement (Keaton et al., 1986).

4.1.3 Surface Water Hydrology

The landfill lies within the Jordan River Valley. The major drainage in this area is the Jordan River, which originates at Utah Lake (south of the Transverse Mountains). The Jordan River enters the Jordan River Valley at the Jordan Narrows in the Transverse Mountains, and flows northward through the Jordan River Valley to the Great Salt Lake. The flow in the Jordan River is artificially controlled based on demand and water levels.

As the Jordan River flows northward through the valley, it gains water from saturated valley fill and from tributaries which largely flow out of the Wasatch Mountains on the east side of the valley. Water is lost from the river due to diversions for industrial and irrigation uses.

The Jordan River is approximately 5 miles east of the landfill at its closest approach. Smaller surface water bodies in the area around the landfill include Lee Creek, Kersey Creek, Lee Drain, Kennecott's Tailings Pond and ditches associated with the tailings pond and the Kennecott wastewater treatment plant.

4.1.4 Groundwater Hydrology

The Jordan River Valley is underlain by two principle aquifers within the Quaternary alluvial deposits. The deeper aquifer is a confined (artesian) aquifer found approximately 160 feet below ground surface in the vicinity of the landfill. This aquifer is up to 1,000 feet thick under the northern part of Salt Lake County and has an average transmissivity of about 20,000 ft^2 /day in the vicinity of the landfill (Hely, et al., 1971). This aquifer receives much of its recharge from a deep unconfined aquifer located on the pediment slopes of the mountains which in turn receives water from recharge areas in the mountains and foothills (Hely, et al., 1971). The confined aquifer is overlain by 40 to 1,000 feet of less permeable clays, silts, and fine sands that act as an aquitard.

The upper aquifer is a shallow unconfined aquifer overlying the aquitard. This shallow aquifer receives recharge from infiltration of irrigation water and from upward migration of groundwater through the aquitard. This aquifer is very shallow in the vicinity of the landfill (0 to 10 feet below ground surface). The average transmissivity of the shallow aquifer is approximately 1,300 ft^2 /day (Hely, et al., 1971).

4.2 SITE SOILS

Site soils, both surface and near surface, were studied extensively by EMCON during development of the Master Plan and were further evaluated during development of the first three modules. EMCON's original results are presented in Section 6 of Appendix E, SLVSWMF Master Plan (EMCON, 1991). EMCON's results, based on 85 soil borings and 40 trenches, are summarized in this section.

4.2.1 Surface Soils

Silty clay covers most of the surface of parcels VII and VIII (approximately 60 percent), as shown in Drawing B-3, Appendix E. There is a sandy area in the northwest corner of Parcel VIII, which accounts for approximately 10 percent of the total surface area, while the remaining area (30 percent) is covered by fill material. Native soils encountered at the surface of the site include both sandy or clayey soils that are locally covered by a thin layer (less than 6 inches thick) of windblown very fine-grained sand and silt. The surface exposures of sands are typically restricted to the northwest corner of the parcel. Clay soils are more generally distributed over the site.

The native soils at the site are locally covered with artificial fill including railroad roadbase and ballast, as well as landfarmed waste materials. The railroad roadbase material, which is generally a well-graded sandy gravel (GW), is confined to three narrow east-west trending former rights of way of Southern Pacific Railroad tracks, which cross the center and southern edge of parcels VII and VIII. An ephemeral pond, located on the west central portion of Parcel VIII, is inferred to be underlain by clay soils.

The largest area of fill material, comprising approximately 66 acres is the "landfarming area" operated on a portion of the southern half of the parcel VII site by E. T. Technologies (Drawings B-1 and B-3 in Appendix E). A variety of soil types and waste material are stockpiled and land treated in this area.

4.2.2 Subsurface Soils

Subsurface conditions are summarized on EMCON's interpretive cross sections A-A' through E-E' (Drawings B-1 and B-4 in Appendix E) and cross sections F-F' through J-J' on Drawing B-4 in Appendix E. These 10 cross sections show that three or more soil layers are encountered in the shallow subsurface beneath the site. The three principal soil horizons beneath the site are as follows: 1) surface fine-grained layer; 2) intermediate silty sand horizon and; 3) lower sandy layer. The intermediate silty sand layer and lower sand layer are commonly separated by a clay horizon.

The surface fine-grained layer, consisting of silt (ML) to clay (CH), is absent in the northwest portion of Parcel VIII and reaches a maximum thickness (30 feet) in the southwest corner of Parcel IV near boring E-13. The average unit thickness is approximately 10 feet beneath parcels III through VIII. The surface clay layer is locally punctuated by thin stringers of silty and clayey sand. These thin sand and silt stringers are locally saturated but produce little water. Below the surface clay layer, the intermediate horizon and lower sand layer consist of variably well-graded, silty and poorly graded sands (SW, SM and SP) and gravel and gravelly sands (GW-SW) at depths from about 3 to 30 feet below the ground surface. These shallow sands are typically water-saturated and form the principal shallow aquifer beneath the site. In cross-sectional view, many of the thin sand beds are interpreted to be laterally interconnected and locally thicken and wedge out. Interbedded low permeability units are typically clays, silty clays, silts and clayey sands that are also interpreted to connect vertically and laterally with the shallow surface clay layer and other deeper clay layers. In cross sections G-G', F-F', and J-J' clay layers were noted to underlie the shallow aquifer sands at depths of 20 to 30 feet below the ground surface.

4.2.3 Soil Chemistry

During their investigation, EMCON (1991) analyzed three soil samples, one each from borings E-24 (4.5-6.0'), E-25 (3-4.5') and E-29 (5-6.5') for soil pH and total metals. One sample, E-29 (5-6.5') from the ET Technologies operating area was also analyzed for VOCs. The results of these chemical analyses are summarized in Table 2. The analytical reports for pH, metals, and VOC analyses are presented in the SLVSWMF Master Plan, Attachment II of Appendix B (EMCON, 1991).

The soil pH measured in soil samples dissolved in water ranged from 7.96 to 8.21. Eighteen metals analyzed in the three soil samples included major, minor, and trace constituents. The major elemental metals included aluminum, calcium, iron, magnesium, potassium, and sodium. With the exception of barium and manganese in boring E-29, the concentrations of minor elements were detected at generally low levels. These metals were detected in the soil sample from E-29 at levels of 713 and 1,020 mg/kg respectively, which are more than 10 times the concentrations in the other two samples analyzed, but are within reported concentrations for clay-clay loamy soils in the United States (Kebata-Pendias, 1984). Background levels of six trace elements were noted including arsenic, chromium, copper, lead, nickel, and zinc. The concentrations of these elements ranged from none detected (less than 1 mg/kg) to 42 mg/kg and are typical for trace element composition in terrestrial soils (Kubota, 1977). Cadmium, mercury, selenium and silver were not detected above the method reporting limits. The only VOC detected at or above method reporting limits in the sample from E-29 was 20 micrograms per kilogram (µg/kg) of methylene chloride. Methylene chloride is a common laboratory solvent and drying agent. The detection of methylene chloride in the soil sample could be an artifact of laboratory analysis or residual methylene chloride present in the sample container. Samples from E-24 and E-25 contained no detected VOCs.

4.2.4 Soil Properties

KLEINFELDER STUDY

On February 4, 1997, Kleinfelder, drilled one soil boring near the central portion of the landfill to obtain further information on soil types and characteristics in the upper 200 feet of soils underlying the Facility. The boring was completed to 198 feet below existing grade and samples were collected at 5-foot intervals for the first 50 feet and at 10-foot intervals from 50 to 198 feet. Disturbed and undisturbed samples were obtained alternately using a standard split-spoon sampler and thin walled Shelby tubes, respectively. Laboratory testing of the samples included moisture content, density, percent of material passing the No. 200 sieve, plasticity index, and consolidation tests. The results of all laboratory tests and the boring summary log are presented in Appendix E.

General Lithology

Based on the one boring log completed for this investigation, the subsurface profile near the center of the completed landfill is summarized as follows:

0 to 56 feet	Predominantly medium stiff Lean CLAY with interbedded sandy silt layers/lenses and a few small sand layers/lenses
56 to 65 feet	Fine to medium grained SAND with silt
65 to 108 feet	Stiff SILT with interbedded layers/lenses of stiff lean clay and some small sand layers
108 to 127 feet	Medium to fine grained SAND with silt
127 to 160 feet	Very stiff Lean CLAY with seams and layers/lenses of silty sand
160 to 192 feet	Medium grained SAND with some silt
192 to 198 feet	Very stiff Lean CLAY

Based on this one boring, the initial 198 feet of native soil beneath the landfill consists of approximately 140 feet of lean clay/silt soils and approximately 60 feet of sandy soils.

Moisture Content and Density

Based on the laboratory test results, moisture contents of the silt and clay soils typically range from 23 to 30 percent of dry weight. Typical natural dry densities of these soils range from 85 to 97 pounds per cubic foot.

Consolidation Results

The results of the consolidation tests indicate that the clay/silt soils are overconsolidated with overconsolidation ratios ranging from 2.0 near the surface to typically around 1.5 at deeper depths. The consolidation tests further indicate that the clay/silt soils are moderately compressible. As a basis for analysis, the sandy soils were assumed to be non-compressible.

Evaluation of the potential settlement as a result of the proposed final loads associated with the filling of the landfill was performed using parameters provided by the SLVSWMF and documents produced by EMCON regarding landfill design. Pertinent parameters included a unit weight for the refuse of 1,200 pounds per cubic yard (44.4 pounds per cubic foot) and a completed refuse thickness of 160 feet. As the waste compacts the unit weight and thickness will decrease by approximately 25 percent, but for modeling purposes the values presented above are equally representative of the downward force. Consideration as to the thicknesses and unit weights of the bottom liner and final cover were also incorporated into the model. The modeled section of the landfill was derived from section B-B' as shown on EMCON's Drawing No. 5 (Part III, Appendix B).

Based on these parameters and our consolidation test data, the total estimated primary consolidation settlement within the initial 198 feet of soil under the center of the landfill was 62 inches (approximately 5 feet). Additional analysis regarding the settlement contribution of soils deeper than 200 feet was estimated using the consolidation test data from the 194-foot sample and assuming the clay/silt soils continued for another 200 feet without significant sand layers. Results from this analysis showed an additional 4 to 6 inches could occur in this depth range.

Additional primary settlement beyond depths of 400 feet as well as secondary consolidation settlement could also contribute an estimated additional 6 to 12 inches of settlement over the years following completion of the landfill, however it should be noted that no data was obtained to substantiate the potential settlement associated with secondary consolidation.

It should be noted that these settlement estimates are based on assumptions of soil stratigraphy and characteristics below 200 feet. Furthermore, these estimates are based on data obtained from one boring near the center of the landfill. Soil stratigraphy and consolidation characteristics may vary at other locations within the site. For the purposes of modeling, we have assumed that the profile remains the same across the site.

The settlement profile based on the model is shown in Appendix E. The actual settlement profile will differ slightly due to the variation in soil stratigraphy across the actual soil profile and the inaccuracies associated with the model. However, in general the settlement profile will follow a similar trend to that shown on the drawing. The vertical scale on the lower portion of the attached drawing is exaggerated to 40 times the rest of the section for clarity of settlement values. Since the settlement profile does not exactly follow a straight line as assumed by EMCON, consideration should be given to evaluating the performance of the liner with respect to the indicated profile.

EMCON STUDY

EMCON collected soil samples from seven borings and sixteen test pits throughout the active cell (see Appendix E) for moisture and density determinations, grain size analyses, Atterberg Limits tests, triaxial shear tests (relatively undisturbed and recompacted disturbed samples), and direct shear tests (relatively undisturbed samples). Consolidation and permeability tests were performed on selected samples to determine their engineering characteristics. The results of consolidation testing are shown on Figures C-3 through C-5, Appendix E. The results of direct shear tests are shown on Figures C-6 and C-7. A summary of all other testing is shown in Table E-1, Appendix E.

Surficial Clay Layer

The results of laboratory testing summarized in Table E-1 indicate that the surficial silty clay layer is predominantly lean clay, with low to moderate swelling potential. The lean clay frequently grades to a clayey silt with similar engineering characteristics. The results of laboratory testing indicate that the clay layer has an average shear strength of about 1,500 pounds per square foot (psf), based on the results of strength testing. Clay strength was also evaluated using Standard Penetrations Test (SPT) data. Over-consolidation ratios computed from the results of consolidation tests (Figures C-3, C-4, and C-5) indicate that the surficial clay layer is overconsolidated, probably as a result of desiccation.

Below 25 feet the clay soils appear to be normally consolidated. Based on the consolidation test results, the compression index, C_c, typically increased with depth (as in boring E-28) with values of 0.162, 0.250, and 0.350 at depths of 11.5, 21.5 and 26.5 feet, respectively. At depth 21.5 feet in boring E-28, the coefficient of consolidation, C_v, was computed to be 0.53 feet squared per day (ft^2/day).

The moisture content and dry unit weight of clay and silt samples tested varied from 17 to 39 percent and from 86 to 100 pounds per cubic foot (pcf), respectively. The clay layer has an average Atterberg Liquid Limit of 36 and an average Plasticity Index of 15.

Bulk samples from test pits T-25 and T-37 were tested to determine their maximum density when compacted according to the American Society for Testing and Materials (ASTM) D-1557 Test Procedure. The results indicate a maximum density of 113 pcf at an optimum moisture content of 15.5 percent. A sample of clay recompacted at 90 percent of maximum D1557 density at a moisture content of optimum plus 7.5 percent was tested to determine its shear strength and permeability. In an unconsolidated, undrained triaxial shear test the sample had a shear strength of 6,880 psf. A similarly recompacted sample had a permeability of 3 x 10^{-8} centimeters per second (cm/sec).

Silty Sand Layer

The surficial clay layer is generally underlain by fine-grained silty sand to at least 36 feet below grade. The silty sand varies from loose to very dense. SPTs in the sand gave results of 6 to 90 blows per foot (bpf). Blow counts for California and Modified California Sampler drives were converted to SPT values using equivalent-energy-imparted-to the sample conversion techniques. Based on the lowest recorded blow count, EMCON estimates a conservative angle of internal friction of 30 degrees and a dry unit weight of 110 pcf (EMCON, 1991).

When recompacted, a typical sample of silty sand from test pit T-37 had a maximum D1557 dry density of 114 pcf at an optimum moisture content of 14.2 percent. Samples compacted at 90 percent of maximum density and optimum moisture content plus 6.6 percent had an unconsolidated, undrained triaxial shear strength of 3,450 psf and a permeability of 2×10^{-5} cm/sec.

4.3 LOCAL GROUNDWATER CONDITIONS

4.3.1 Shallow Groundwater Depth and Gradient

The piezometric surface of the uppermost water-bearing zone surrounding the active landfill cell ranged from 7.82 to 17.67 feet below ground surface in November 2004. Corresponding groundwater elevations ranged from approximately 4,211 feet msl to 4,221 feet msl.

Groundwater elevation contours for November 2004 are shown on Figure 10, Appendix A. The groundwater contours indicate overall gradient of approximately 0.0016 foot/foot to the north/northwest during November 2004.

4.3.2 Shallow Groundwater Quality

Shallow groundwater around the active cell is relatively high in total dissolved solids (TDS). Historical data indicate that upgradient wells have had TDS concentrations ranging from 3,000 to 32,000 mg/l, while TDS in downgradient wells has typically ranged from 7,000 to 16,000 mg/l (Table 3). These relatively high TDS concentrations are typical of the region around the Great Salt Lake, where even the deeper regional groundwater typically has TDS concentrations of 1,000 to 3,600 mg/l and is classified as a high salinity hazard (Utah Geological And Mineral Survey, 1964; Price, 1988). Shallow groundwater in this area is also high in TDS due to contribution from precipitation percolating through saline surface sediments and agriculture runoff.

The water is a sodium chloride type, with calcium and sulfate being the next most abundant cation and anion, respectively.

Analytical data collected to date in the nine existing monitoring wells are presented in Table 3.

4.3.3 Local Groundwater Use and Groundwater Rights

According to the Utah Department of Natural Resources Division of Water Rights, there are nine registered groundwater rights on or within one mile of the center of the landfill. The point of diversion plot map and well information are included in Appendix F.

4.4 LOCAL SURFACE WATER CONDITIONS

4.4.1 Presence of Surface Water

Lee Drain carries runoff and stormwater discharges from the area around Centennial Industrial Park on Pioneer Road (2400 West) to the Great Salt Lake. It probably also receives contributions from shallow groundwater and agricultural runoff. Lee Drain flows east to west along the south side of the active landfill cell through a series of flood control ponds and joins the natural course of Lee Creek just southwest of the active cell (see Figure 1, Appendix A).

Surface water run-on from an adjacent agricultural property historically occurred along the east side of the active cell, but is now controlled by perimeter berms. SLVSWMF has also installed a drain to direct this run-on into the landfill perimeter drain, where it is carried south to the flood control ponds (see Figure 5, Appendix A).

4.4.2 Local Surface Water Quality

The SLVSWMF collects surface water samples from Lee Drain where it enters and exits the area from the east face of the active cell, from the public tipping area, and from dewatering ditches on the Facility. These samples are analyzed to assess surface water quality and to confirm that landfill operations are not affecting Lee Drain. [For more details on sampling and historical results, see the Surface Water Monitoring Plan, Addendum 2 of Part II, General Report in Support of Permit Application, or the Stormwater Pollution Prevention Plan and Kleinfelder (1994)].

Analytical results from October 2004 are presented in Table 4. These results indicate that the water in Lee Drain has generally slightly higher metals and minerals concentrations downstream relative to upstream. This may be due to the discharge of groundwater into Lee Drain from the dewatering trench. Nitrates, phosphates, and Chemical Oxygen Demand (COD) decrease slightly from upstream to downstream. No Volatile Organic Compounds or Oil and Grease were reported.

4.4.3 Local Surface Water Use and Surface Water Rights

According to the Utah Department of Natural Resources, Division of Water Rights, there are four registered surface water rights on or within one mile of the center of the landfill. The point-of-diversion plot map and surface water diversion information are included in Appendix F.

4.5 SITE WATER BALANCE

Kleinfelder, Inc. (Kleinfelder, 1997) used the HELP-3 model (Schroeder et al.,) to calculate the site water balance and evaluate potential leachate production after landfill operations at the active cell. They used the Salt Lake City climatological database and specific design features of the SLVSWMF as model inputs. Model inputs are described in detail in Kleinfelder's Site Water Balance report, included in Appendix G.

4.6 GROUNDWATER AND SURFACE WATER MONITORING SYSTEM DESIGN

4.6.1 Groundwater Monitoring System

The groundwater gradient at the landfill is typically toward the northwest. A network of monitoring wells around the active landfill cell will monitor groundwater quality both upgradient and downgradient of the cell during development, operation, closure and post closure.

Ten monitoring wells will eventually monitor water quality around the active cell; three upgradient and eight downgradient. Currently, with landfill operations restricted to the north portion of the cell, eight of the detection monitoring wells (and one temporary well, "F") are installed and in use at the site (MW-1A through MW-8A, and F). The remaining two wells (MW-9A and MW-10A) will be installed, and temporary well "F" will be properly abandoned, as development moves west and south. The locations of the existing monitoring wells are shown on Figure 3. Construction details for the existing wells are shown in Table 1.

Monitoring under the Solid Waste Permitting and Management Rules includes semi-annual sampling. The groundwater around the active landfill cell is, therefore, monitored semi-annually, in the spring and fall. Table 3 contains historic monitoring results.

The list of analytes in the Quality Assurance Project Plan is similar to the constituents for detection monitoring contained in Section R315-308 of the new Solid Waste Permitting and Management Rules. To be consistent with monitoring under these rules, the groundwater samples from the wells around the Active SLVSWMF will be analyzed for the list of constituents shown on Table 5, "Laboratory Analysis for Groundwater Monitoring." Note that dissolved, rather than total, metals are being analyzed due to the natural turbidity of water from the wells. This deviation from the Solid Waste Rules was approved by the UDSHW in 1996.

For additional information about groundwater monitoring at SLVSWMF, including sampling protocol, data analysis and reporting, see the Groundwater Monitoring Plan, included in Addendum 2 of Part II, General Report in Support of Permit Application.

4.6.2 Surface Water Monitoring System

Surface water samples will be collected from six locations, as follows:

- S-1, Lee Drain where flow enters the landfill;
- S-2, Lee Drain where flow exits the landfill;
- S-3, Runoff from the public drop-off area;
- S-5, Runoff from active landfill area (if any);
- S-6, East end of de-watering trench; and
- S-7, West end of de-watering trench.

The surface water sample locations are shown on Figure 11. Sample location S-5 is in the perimeter drain around the module where the active tipping face is located at the time of sampling. This location will vary depending on storm volumes and active tipping face location.

To satisfy requirements of Storm Water Permit #UTR000074 and City-County Health Regulation #1, surface water will be monitored semi-annually, in the spring and fall. The samples will be collected during or immediately after a significant storm event, where "significant" is defined as a storm that results in 0.1 inch or more of rainfall and that occurs at least 72 hours after a previous rainfall event of 0.1 inches magnitude or greater.

Based on the requirements of City-County Health Department Regulation #1 and Storm Water Permit #UTR000074, the surface water samples will be analyzed for the compounds and constituents listed in Table 6. Summary of the analytical results for the Fall 2004 monitoring event is included in Table 4.

For additional information on surface water monitoring, including sampling protocol, data analysis, and reporting, see the Surface Water Monitoring Plan included in Addendum 2 of Part II, General Report in Support of Permit Application.

5. ENGINEERING ASSESSMENT

5.1 SOLID WASTE SITE LOCATION STANDARD

The SLVSWMF is sited to comply with provisions in R315-302-1 regarding land use compatibility, geology, surface water, wetlands, and groundwater. Compliance with siting criteria was reported by EMCON in Section 2 of their Draft Implementation Plan (EMCON, 1993), included in Appendix H of this report, Site Conditions and Compliance with Location Standards.

5.2 SALT LAKE COUNTY SOLID WASTE MANAGEMENT PLAN

The SLVSWMF plays a significant role in Salt Lake County's Solid Waste Management Plan. Conclusions and recommendations of the Plan depend on the continued operation of SLVSWMF and encourage increased cooperative community agreements, consistent county-wide record keeping, increased solid waste diversions through recycling and composting, and possible operation of a construction/demolition area at SLVSWMF. The currently projected waste capacity and lifespan of SLVSWMF is integral to the Plan's goal for assuring 30 years of disposal capacity in Salt Lake County (Roy F. Weston, 1993).

5.3 LANDFILL DESIGN AND OPERATION

5.3.1 Landfill Design

Landfill design is discussed in Section 3.1, with accompanying design drawings in Appendix B. The landfill design and construction is developed in Section 5 of the SLVSWMF's Master Plan (EMCON, 1991).

5.3.2 Landfill Operations

A detailed description of daily landfill operation is presented in Section 2 of Part II, *General Report in Support of Permit Application.*

5.3.3 Sources of Daily and Final Cover, and Soil Liners

Soils used for daily and final cover will be obtained largely from excavations associated with landfill construction and existing soil stockpiles. For instance, soils excavated during the construction of Module 8 will be used to provide daily cover for Modules 6 and 7. Excess soils are stockpiled for future use, such as final cover.

Based on estimates in the SLVSWMF's Master Plan (EMCON, 1991), along with changes in the liner design, it is estimated that, at a refuse to soil ratio of 10:1, approximately 9,000,000 cubic yards of soil will be required to meet the soil needs of the landfill expansion, as detailed in Table I-1, Appendix I. Approximately 5,000,000 cubic yards will come from on-site excavation. This assumes that daily cover needs are met, to the extent possible, by alternatives to soil such as shredder fluff, compost, mulch, foam and geosynthetic blankets (see Section 2.2.3 of Part II, *General Reports*).

5.3.4 Equipment Needs and Availability

The SLVSWMF maintains a complete inventory of equipment on site in order to insure smooth day-to-day landfilling, composting, and recycling operations. A complete list of current on-site equipment is included in Section 2.2.4 of Part II, *General Report*. Equipment needs are reviewed annually and new equipment is added as dictated by changes or growth in landfill operations.

5.4 LEACHATE COLLECTION, REMOVAL, TREATMENT AND DISPOSAL

Leachate that percolates through the waste is captured in a leachate collection and removal system (LCRS) consisting of perforated pipes and a granular drainage blanket over the composite liner system (see Drawings 3 and 7, Appendix B). Whenever routine inspections of the LCRS (see Section 2.4 and 2.5, Part II, *General Report*) indicate the presence of 1 foot or more of standing leachate on any part of the composite liner, the leachate will be pumped out of leachate sumps located at the lowest part(s) of the liner. The removed leachate will either be 1) sprayed back on a lined cell of the landfill, 2) pumped into treatment ponds where it is treated either by evaporation/infiltration or by enhanced macrophyte treatment, or 3) reinjected into the waste to enhance degradation and methane production. During the closure and post-closure period, removed leachate (if any) will be treated if necessary and properly disposed. Appropriate disposal options will be reviewed at the time of closure and the chosen option for treatment and/or disposal will be properly permitted.

A 1995 letter to the Division of Water Quality, describing current leachate handling procedures, is included in Appendix J.

5.5 SURFACE WATER RUN-ON/RUN-OFF CONTROLS

The run-on/run-off system design is described in Section 3.3. This system is included in the Stormwater Pollution Prevention Plan (Kleinfelder, 1994) submitted to the Division of Water Quality for review. The letter transmitting the plan to the Division is included in Appendix J.

5.6 CLOSURE AND POST-CLOSURE

Closure and post-closure design, construction maintenance and land use are described in detail in Sections 4 (Closure) and 5 (Post-Closure), Part II, *General Permit*. The final proposed end use design is shown on Drawing 8, Appendix B.

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TABLES

TABLE 1
WELL CONSTRUCTION DETAILS
ACTIVE SALT LAKE VALLEY LANDFILL

OLD WELL NUMBER	NEW WELL NO.	YEAR INSTALLED	X COORDINATE (EASTINGS)	Y COORDINATE (NORTHINGS)	CASING ELEVATION (FT, MSL)	TOTAL WELL DEPTH (FEET)	SCREEN INTERVAL (FT, BGS)	CASING DIAMETER (INCHES)	SCREEN SLOT SIZE (INCHES)	SAND PACK
F		~1982	1849447.18	878223.51	4228.65	19.7	NA	4	NA	NA
ET-0	MW-1A		1849769.2	877224.18	4227.85					
EE	MW-2A	1993	1852069.38	879167.89	4229.73	25	15-25	4	0.01	#20/40
2	MW-3A	Nov. 1992	1852073.88	879924.18	4231.46	25	15-25	4	0.02	#10/20
1A	MW-4A	Aug. 1993	1850784.48	880847.13	4226.82	25	15-25	4	0.01	#20/40
	MW-5A	Sep. 1995	1849702.95	880890.46	4226.16	29	24-29	4	0.02	#10/20
E-26	MW-6A	Jul-90	1848587.03	880947.68	4225.9	29	24-29	4	0.02	#10/20
E-25	MW-7A	Jul-90	1846925.26	880957.42	4222.34	24.5	19.5-24.5	4	0.02	#10/20
E-27	MW-8A	Jul-90	1846909.13	879719.65	4226.09	23	13-23	4	0.02	#10/20

TABLE 2
Results of Chemical Analysis
of Soil Samples from Parcels VII and VIII

Analyte	E-25 @ (4.5-6.0')	E-25 @ (3-4.5')	E-29 @ (5-6.5')
pH (units)	8.1	7.96	8.21
Arsenic (mg/kg)	5	3	8
Aluminum (mg/kg)	13,000	4,420	8,290
Barium (mg/kg)	55	42	713
Cadmium (mg/kg)	<1	<1	<1
Calcium (mg/kg)	20,300	31,400	76,200
Total Chromium (mg/kg)	19	8	11
Copper (mg/kg)	9	5	24
Iron (mg/kg)	12,000	6,070	13,500
Lead (mg/kg)	<20	<20	19
Magnesium (mg/kg)	9,740	5,720	13,500
Manganese (mg/kg)	250	100	1,020
Mercury (mg/kg)	<0.2	<0.2	<0.2
Nickel (mg/kg)	11	<10	11
Potassium (mg/kg)	3,300	1,100	3,000
Selenium (mg/kg)	<1	<1	<1
Silver (mg/kg)	<2	<2	<2
Sodium (mg/KG)	2,700	1,800	1,800
Zinc (mg/kg)	42	20	38
Volatile Organic			
Compounds (µg/kg)	NA	NA	20

NA = Not Analyzed

1 Certified analytical laboratory reports are presented in attachment II, Appendix B, Salt Lake Valley Landfill Master Plan (1991). Samples were collected by chen Northern and analyzed by Columbia Analytical Services, Incorporated, Kelso, Washington.

2 Volatile organic compounds were not detected (at various method reporting limits), except for methylene chloride.

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

ANALYTE	DATE	DOWNGRADIENT WELLS[1] MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	UPGRADIENT WELLS MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
DISSOLVED METALS											
Antimony	05 25 90										
	06 04 92										
	09 30 92										
	04 28 93										
	12 03 93	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	01 07 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	02 04 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	03 10 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 19 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	05 31 94	< 0.005	< 0.005	(10 9 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 22 94	< 0.005	< 0.005	(11 8 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	07 27 94	< 0.005	< 0.005	(12 11 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 10 94	< 0.005	< 0.005	(1 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 13 95	< 0.005	< 0.005	(4 29 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 04 95	< 0.005	< 0.1	(6 10 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 29 96	< 0.005	< 0.005	(7 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	11 08 96	< 0.005	< 0.005	(11 8 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 09 97	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 21 97	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 04 98	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 07 98	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 27 99	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 13 99	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 17 00	< 0.005	< 0.005		< 0.005	<	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 19 00	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0053
	04 27 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 11 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	06 06 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 18 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<
	04 24 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 14 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 20 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	11 18 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	% detects	-3	-4		-3	-3	-3	-3	-3	-3	0.000
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND
Arsenic	05/25/90				< 0.005	< 0.005	0.007				
	05 28 92							0.010			
	06 04/92								0.184		0.020
	09 30/92								0.029		0.019
	11 19 92							0.005			
	04/28/93	0.006							< 0.005	< 0.005	< 0.005
	12/03/93	< 0.005			< 0.005	< 0.005	0.005	< 0.005	< 0.005	< 0.005	
	01 07/94	< 0.005			< 0.005	< 0.005	< 0.005	0.011	< 0.005	< 0.005	
	02 04/94	< 0.005			< 0.005	< 0.005	0.005	0.011	< 0.005	< 0.005	
	03 10 94	< 0.005			< 0.005	< 0.005	< 0.005	0.009	< 0.005	< 0.005	
	04 19 94	< 0.005			< 0.005	< 0.005	< 0.005	0.009	< 0.005	< 0.005	
	05 31 94	< 0.005	< 0.005	(10 9 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 22 94	< 0.005	< 0.005	(11 8 95)	< 0.005	< 0.005	0.005	< 0.005	< 0.005	< 0.005	
	07 27 94	< 0.005	< 0.005	(12 11 95)	< 0.005	< 0.005	< 0.005	0.008	< 0.005	< 0.005	
	10 10 94	< 0.005	< 0.005	(1 2 96)	< 0.005	< 0.005	< 0.005	0.007	< 0.005	< 0.005	
	06 13 95	< 0.005	< 0.005	(4 29 96)	< 0.005	< 0.005	< 0.005	0.009	< 0.005	< 0.005	
	10 04 95	< 0.005	< 0.005	(6 10 96)	< 0.005	< 0.005	< 0.005	0.006	< 0.005	< 0.005	
	04 29 96	< 0.005	< 0.005	(7 2 96)	< 0.005	< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005
	11 08 96	< 0.005	< 0.005	(11 8 96)	< 0.005	< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005
	05 09 97	< 0.005	< 0.005		0.005	< 0.005	< 0.005	0.014	< 0.005	< 0.005	< 0.005
	10 21 97	< 0.005	< 0.005		< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005	0.006
	05 04 98	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.006	0.009	< 0.005	< 0.005
	10 07 98	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.007	< 0.005	< 0.005	0.017
	05 27 99	< 0.005	0.013		0.011	0.012	< 0.005	0.012	0.013	0.009	0.012
	10 13 99	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.006	< 0.005	< 0.005	0.008
	04 17 00	< 0.005	< 0.005		< 0.005		< 0.005	0.009	< 0.005	< 0.005	0.008
	10 19 00	< 0.005	< 0.005		< 0.005	0.008	< 0.005	0.008	< 0.005	< 0.005	0.008
	04 27 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.014	< 0.005	< 0.005	0.0063
	10 11 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.012	< 0.005	< 0.005	0.0071
	06 06 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.0094	< 0.005	< 0.005	0.0060
	10 18 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.0130	< 0.005	< 0.005	
	04 24 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.0110	< 0.005	< 0.005	< 0.005
	10 14 03	< 0.005	< 0.005		< 0.005	0.0071	< 0.005	0.014	< 0.005	< 0.005	< 0.005
	04 20 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	0.009	< 0.005	< 0.005	< 0.005
	11 18 04	< 0.005	< 0.005		< 0.005	0.0099	< 0.005	0.015	< 0.005	< 0.005	< 0.005
	% detects	-3	0		0	14	7	83	3	0	50
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	0.348	ND	ND	0.458

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS[1]						UPGRADIENT WELLS			
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Barium	05 25 90				0.078	0.088	0.140				
	05 28 92							0.095			
	06 04 92								0.110		0.070
	09 30 92								0.108		0.075
	11 19 92							0.056			
	04 28 93	0.098							0.099	0.075	0.057
	12 03 93	0.14			0.008	0.086	0.073	0.096	0.13	0.062	
	01 07 94	0.13			0.074	0.076	0.058	0.095	0.110	0.060	
	02 04 94	0.14			0.082	0.082	0.068	0.096	0.073	0.11	
	03 10 94	0.13			0.073	0.740	0.065	0.091	0.11	0.071	
	04 19 94	0.14			0.077	0.075	0.059	0.11	0.12	0.032	
	05 31 94	0.14	0.10	(10 9 95)	0.081	0.080	0.065	0.10	0.11	0.044	
	06 22 94	0.14	0.11	(11 8 95)	0.076	0.079	0.062	0.093	0.11	0.045	
	07 27 94	0.15	0.08	(12 11 95)	0.760	0.077	0.060	0.093	0.11	0.051	
	10 10 94	0.14	0.093	(1 2 96)	0.077	0.071	0.060	0.089	0.092	0.048	
	06 13 95	0.150	0.13	(4 29 96)	0.071	0.067	0.058	0.120	0.089	0.032	
	10 04 95	0.13	0.12	(6 10 96)	0.086	0.100	0.085	0.085	0.076	0.033	
	04 29 96	0.18	0.13	(7 2 96)	0.087	0.088	0.064	0.14	0.084	0.058	0.057
	11 08 96	0.17	0.092	(11 8 96)	0.073	0.076	0.063	0.16	0.084	0.053	0.051
	05 09 97	0.16	0.17		0.076	0.079	0.08	0.14	0.062	0.06	0.043
	10 21 97	0.18	0.10		0.081	0.510	0.07	0.11	0.095	0.07	0.069
	05 04 98	0.13	0.19		0.060	0.240	0.05	0.13	0.034	0.02	0.036
	10 07 98	0.14	0.09		0.051	0.190	0.04	0.13	0.066	0.09	0.014
	05 27 99	0.110	0.075		0.010	0.120	0.003	0.096	< 0.002	0.099	0.050
	10 13 99	0.180	0.099		0.080	0.190	0.066	0.12	0.081	0.097	0.100
	04 17 00	0.190	0.130		0.098		0.051	0.088	0.053	0.110	0.064
	10 19 00	0.17	0.098		0.080	0.25	0.065	0.11	0.068	0.086	0.077
	04 27 01	0.16	0.130		0.082	0.32	0.070	0.077	0.061	0.093	0.071
	10 11 01	0.17	0.100		0.081	0.28	0.068	0.097	0.076	0.089	0.081
	06 06 02	0.17	0.11		0.091	0.23	0.067	0.100	0.058	0.086	0.073
	10 18 02	0.15	0.094		0.078	0.17	0.064	0.091	0.050	0.082	
	04 24 03	0.14	0.100		0.078	0.16	0.061	0.110	0.050	0.092	0.092
	10 14 03	0.14	0.097		0.080	0.15	0.063	0.120	0.054	0.100	0.110
	04 20 04	0.13	0.11		0.086	0.17	0.063	0.09	0.047	0.13	0.091
	11 18 04	0.11	0.085		0.077	0.15	0.092	0.13	0.043	0.092	0.12
	% detects	97	96		97	97	97	97	93	97	94
	Coeff. of Var(s.d./mean)	0.140	0.245		1.330	0.851	0.247	0.186	0.386	0.385	0.390
Beryllium	05 25 90										
	06 04 92										
	09 30 92										
	04 28 93										
	12 03 93	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	01 07 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	02 04 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	03 10 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 19 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	05 31 94	< 0.005	< 0.005	(10 9 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 22 94	0.005	< 0.005	(11 8 95)	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	07 27 94	< 0.005	< 0.005	(12 11 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 10 94	< 0.005	< 0.005	(1 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 13 95	< 0.005	< 0.005	(4 29 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 04 95	< 0.005	< 0.005	(6 10 96)	0.009	0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 29 96	< 0.004	0.004	(7 2 96)	< 0.004	0.004	< 0.004	< 0.004	0.004	< 0.004	< 0.004
	11 08 96	< 0.001	< 0.001	(11 8 96)	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	05 09 97	< 0.001	< 0.001		< 0.001	0.002	0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 21 97	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001
	05 04 98	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 07 98	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001
	05 27 99	0.002	< 0.001		0.001	0.001	0.003	0.002	0.001	< 0.001	0.002
	10 13 99	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001
	04 17 00	< 0.001	< 0.001		< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 19 00	< 0.001	0.002		0.002	< 0.001	0.002	< 0.001	0.002	< 0.001	< 0.001
	04 27 01	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 11 01	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	06 06 02	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 18 02	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	04 24 03	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 14 03	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	04 20 04	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	11 18 04	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	% detects	0	0		7	14	7	3	10	-3	6
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS [1]						UPGRADIENT WELLS				
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Cadmium	05 25 90				0.003	< 0.002	< 0.002				
	05 28 92							< 0.004			
	06 04 92								< 0.001		< 0.001
	09 30 92								< 0.003		< 0.003
	11 19 92							< 0.004			
	04 28 93	< 0.004							< 0.004	< 0.004	< 0.004
	12 03 93	0.011			< 0.004	0.021	0.016	< 0.004	0.018	0.006	
	01 07 94	0.006			0.012	0.010	0.007	< 0.004	0.011	< 0.004	
	02 04 94	< 0.004			0.004	< 0.004	< 0.004	< 0.004	< 0.004	0.004	
	03 10 94	< 0.004			< 0.004	< 0.004	< 0.004	< 0.004	0.005	0.004	
	04 19 94	< 0.004			< 0.004	0.005	< 0.004	< 0.004	0.010	0.013	
	05 31 94	< 0.004	< 0.004	(10 9 95)	0.007	0.008	0.007	< 0.004	0.009	< 0.004	
	06 22 94	< 0.004	0.004	(11 8 95)	0.004	0.004	< 0.004	< 0.004	0.009	< 0.004	
	07 27 94	< 0.004	< 0.004	(12 11 95)	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	
	10 10 94	< 0.004	< 0.004	(1 2 96)	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	
	06 13 95	< 0.004	< 0.004	(4 29 96)	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	
	10 04 95	< 0.004	< 0.004	(6 10 96)	0.008	0.005	< 0.004	< 0.004	< 0.004	< 0.004	
	04 29 96	< 0.004	0.004	(7 2 96)	0.005	0.005	< 0.004	< 0.004	0.006	< 0.004	< 0.004
	11 08 96	< 0.004	< 0.004	(11 8 96)	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	05 09 97	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	10 21 97	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	05 04 98	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	0.004	< 0.004
	10 07 98	0.006	0.004		0.005	0.008	0.012	< 0.004	< 0.004	0.006	0.011
	05 27 99	< 0.004	0.006		< 0.004	0.005	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	10 13 99	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	0.005
	04 17 00	< 0.004	< 0.004		< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	10 19 00	0.012	0.016		0.015	0.008	0.013	0.007	0.006	0.006	0.015
	04 27 01	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	10 11 01	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	06 06 02	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	10 18 02	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	
	04 24 03	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	10 14 03	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	04 20 04	< 0.004	0.0048		0.0050	0.0048	0.0041	< 0.004	0.0047	0.0053	0.0052
	11 18 04	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	% detects	10	21		28	38	17	0	28	24	22
	Coeff. of Var(s.d./mean)	ND	ND		0.513	0.636	ND	ND	0.575	ND	ND
Calcium	05 25 90				297	657	421				
	06 04 92								611.8		287.1
	09 30 92								668		342
	04 28 93	450							840	220	380
	12 03 93	450			740	700	520	190	880	230	
	01 07 94	530			760	780	580	180	960	220	
	02 04 94	430			680	700	490	170	200	890	
	03 10 94	410			710	720	520	170	1100	270	
	04 19 94	430			860	860	630	240	1400	400	
	05 31 94	470	780	(10 9 95)	820	820	580	200	820	270	
	06 22 94	430	750	(11 8 95)	780	820	600	160	1300	230	
	07 27 94	500	710	(12 11 95)	790	770	560	210	1300	280	
	10 10 94	550	720	(1 2 96)	760	820	580	190	950	190	
	06 13 95	490	830	(4 29 96)	740	770	610	180	1100	340	
	10 04 95	430	710	(6 10 96)	710	720	590	190	950	240	
	04 29 96	510	800	(7 2 96)	820	820	680	240	1000	300	430
	11 08 96	500	730	(11 8 96)	720	730	610	290	1300	210	350
	05 09 97	450	650		620	620	560	240	920	270	290
	10 21 97	470	680		710	650	560	210	1200	220	440
	05 04 98	480	760		690	700	580	280	560	360	310
	10 07 98	420	660		620	650	540	380	930	350	74
	05 27 99	440	690		630	670	570	260	780	500	350
	10 13 99	410	610		620	800	530	320	1200	250	370
	04 17 00	380	640		590		540	260	760	240	320
	10 19 00	400	690		680	140	660	290	1200	250	320
	04 27 01	470	780		750	800	1100	210	1500	360	370
	10 11 01	400	670		680	610	560	270	1200	260	400
	06 06 02	370	660		640	620	550	240	890	290	370
	10 18 02	380	730		690	710	530	220	880	230	
	04 24 03	370	690		650	670	520	270	610	240	480
	10 14 03	350	650		630	650	550	310	610	250	540
	04 20 04	340	660		640	640	480	220	570	500	510
	11 18 04	380	730		710	730	520	190	660	330	490
	% detects	97	96		97	97	97	97	97	97	94
	Coeff. of Var(s.d./mean)	0.125	0.078		0.098	0.187	0.188	0.225	0.309	0.440	0.286

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS [1]					UPGRADIENT WELLS					
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Chromium	05 25 90				< 0.005	< 0.005	< 0.005				
	05 28 92							< 0.01			
	06 04 92								< 0.007		< 0.007
	09 30 92								< 0.030		< 0.030
	11 19 92							0.010			
	04 28 93	0.03							0.05	0.020	0.020
	12 03 93	0.04			< 0.01	0.07	0.06	0.02	0.07	0.02	
	01 07 94	0.03			0.04	0.05	0.03	0.02	0.05	< 0.01	
	02 04 94	0.02			0.03	0.03	0.03	< 0.01	< 0.01	0.04	
	03 10 94	< 0.01			0.01	0.01	< 0.01	< 0.01	0.01	0.01	
	04 19 94	< 0.01			< 0.01	0.01	0.01	< 0.01	0.01	< 0.01	
	05 31 94	0.02	< 0.01	(10 9 95)	0.04	0.04	0.03	0.02	0.05	0.02	
	06 22 94	0.01	0.02	(11 8 95)	0.01	0.02	0.01	< 0.01	0.01	< 0.01	
	07 27 94	< 0.01	< 0.01	(12 11 95)	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	10 10 94	< 0.01	< 0.01	(1 2 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	06 13 95	< 0.01	0.03	(4 29 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	10 04 95	< 0.01	0.01	(6 10 96)	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 29 96	0.02	0.01	(7 2 96)	0.03	0.03	0.03	0.02	0.05	0.02	0.02
	11 08 96	0.01	< 0.01	(11 8 96)	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	0.01
	05 09 97	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 21 97	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	0.22	0.02	< 0.01
	05 04 98	0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01
	10 07 98	0.03	0.03		0.04	0.05	0.05	0.02	0.04	0.03	0.03
	05 27 99	0.02	0.04		0.04	0.04	0.02	< 0.01	0.03	0.03	0.01
	10 13 99	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	04 17 00	< 0.01	< 0.01		< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 19 00	0.03	0.04		0.04	0.04	0.04	0.02	0.02	0.03	0.04
	04 27 01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 11 01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	06 06 02	< 0.01	< 0.01		< 0.01	< 0.01	0.023	< 0.01	< 0.01	< 0.01	0.02
	10 18 02	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 24 03	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 14 03	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	04 20 04	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	11 18 04	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	% detects	34	25		34	45	38	21	34	31	33
	Coeff. of Var(s.d./mean)	0.571	0.670		0.723	0.839	0.767	ND	1.604	0.559	0.616
Cobalt	05 25 90										
	06 04 92										
	09 30 92										
	04 28 93										
	12 03 93	0.01			< 0.01	0.03	0.03	< 0.01	0.03	< 0.01	
	01 07 94	< 0.01			0.02	0.02	< 0.01	< 0.01	0.02	< 0.01	
	02 04 94	< 0.01			< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	
	03 10 94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 19 94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	
	05 31 94	< 0.01	< 0.01	(10 9 95)	0.01	0.01	0.01	< 0.01	0.01	< 0.01	
	06 22 94	< 0.01	< 0.01	(11 8 95)	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	
	07 27 94	< 0.01	< 0.01	(12 11 95)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	10 10 94	< 0.01	< 0.01	(1 2 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	06 13 95	< 0.01	< 0.01	(4 29 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	10 04 95	< 0.01	< 0.01	(6 10 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 29 96	< 0.01	< 0.01	(7 2 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	11 08 96	< 0.01	< 0.01	(11 8 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	05 09 97	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 21 97	0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.01
	05 04 98	0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 07 98	< 0.01	< 0.01		< 0.01	0.02	0.02	0.02	< 0.01	0.01	0.02
	05 27 99	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 13 99	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01
	04 17 00	< 0.01	< 0.01		< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 19 00	< 0.01	0.01		0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.01
	04 27 01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 11 01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	06 06 02	0.014	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 18 02	< 0.010	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 24 03	< 0.010	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 14 03	< 0.010	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	04 20 04	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	11 18 04	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	% detects	10	0		7	21	10	0	21	3	11
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

DOWNGRADIENT WELLS[1]								UPGRADIENT WELLS			
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Copper	05 25 90				<0.01	<0.01	<0.01				
	05 28 92							<0.004			
	06 04 92								<0.01		< 0.010
	09 30 92								0.040		< 0.050
	11 19 92							<0.004			
	04 28 93	0.008							0.019	0.018	0.009
	12 03 93	0.019			0.005	0.029	0.024	< 0.004	0.027	0.010	
	01 07 94	0.010			0.020	0.020	0.010	0.007	0.019	< 0.004	
	02 04 94	0.013			0.023	0.022	0.018	0.005	0.006	0.022	
	03 10 94	0.006			0.010	0.013	0.007	< 0.004	0.023	0.012	
	04 19 94	0.007			0.007	0.014	0.007	< 0.004	0.020	0.014	
	05 31 94	0.009	< 0.004	(10 9 95)	0.019	0.021	0.019	0.009	0.022	0.009	
	06 22 94	0.011	0.017	(11 8 95)	0.016	0.032	0.015	0.009	0.023	0.006	
	07 27 94	< 0.004	< 0.004	(12 11 95)	0.006	0.009	0.004	< 0.004	< 0.004	< 0.004	
	10 10 94	< 0.004	< 0.004	(1 2 96)	0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	
	06 13 95	< 0.004	< 0.004	(4 29 96)	0.012	0.008	0.012	< 0.004	< 0.004	< 0.004	
	10 04 95	< 0.004	< 0.004	(6 10 96)	0.004	0.005	< 0.004	< 0.004	0.005	< 0.004	
	04 29 96	< 0.004	< 0.004	(7 2 96)	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	11 08 96	< 0.004	< 0.004	(11 8 96)	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	05 09 97	0.016	0.019		0.015	0.016	0.01	< 0.004	0.015	0.006	< 0.004
	10 21 97	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	05 04 98	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
	10 07 98	0.008	0.008		0.010	0.016	0.021	< 0.004	0.010	0.009	0.018
	05 27 99	0.005	0.005		< 0.004	0.004	0.006	< 0.004	< 0.004	< 0.004	0.005
	10 13 99	0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	0.005
	04 17 00	< 0.004	< 0.004		< 0.004		< 0.004	< 0.004	0.009	< 0.004	< 0.004
	10 19 00	0.010	0.016		0.010	0.010	0.016	0.005	0.010	0.007	0.014
	04 27 01	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	< 0.004	0.0061	< 0.004	< 0.004
	10 11 01	0.0088	0.0092		0.009	0.0084	0.0061	0.0056	0.0150	0.0076	0.0056
	06 06 02	0.0042	0.0059		< 0.004	0.0048	0.0110	< 0.0040	0.0170	0.0047	0.0350
	10 18 02	0.0068	0.0110		0.0066	0.0330	0.0069	< 0.0040	0.0110	< 0.0040	
	04 24 03	0.0048	0.0059		0.0055	0.0054	0.0068	0.0058	0.0120	0.0056	< 0.004
	10 14 03	0.0088	0.0110		0.0090	0.0071	< 0.0040	< 0.0040	< 0.0040	0.0073	< 0.004
	04 20 04	0.0061	0.0074		0.0091	0.012	0.0054	0.0076	0.019	0.015	0.0064
	11 18 04	0.0068	0.011		< 0.004	< 0.004	0.0048	0.0079	0.04	< 0.004	0.0051
	% detects	62	46		62	69	62	28	62	45	44
	Coeff. of Var(s.d./mean)	0.552	0.636		0.664	0.784	0.688	0.327	0.758	0.642	1.054
Iron	05 25 90				0.140	3.12	0.53				
	05 28 92							0.850			
	06 04 92								1.960		0.250
	09 30 92								2.020		0.420
	11 19 92							0.590			
	04 28 93	0.70							0.25	0.300	0.210
	12 03 93	0.08			0.84	2.3	0.68	0.02	1.2	0.29	
	01 07 94	0.02			0.21	0.19	0.03	< 0.01	0.48	0.01	
	02 04 94	0.02			0.21	0.30	0.04	0.02	0.02	0.19	
	03 10 94	0.04			0.21	0.16	0.02	0.01	0.05	0.03	
	04 19 94	0.02			0.03	0.11	0.03	0.02	0.05	0.05	
	05 31 94	0.03	0.01	(10 9 95)	0.78	0.45	0.05	0.04	0.51	0.03	
	06 22 94	0.02	0.04	(11 8 95)	0.91	0.66	0.02		0.56	0.02	
	07 27 94	< 0.01	0.67	(12 11 95)	0.42	0.30	< 0.01	< 0.01	< 0.01	< 0.01	
	10 10 94	< 0.01	< 0.01	(1 2 96)	< 0.01	0.35	< 0.01	0.01	0.21	< 0.01	
	06 13 95	< 0.01	0.06	(4 29 96)	0.180	0.520	0.030	< 0.01	0.010	0.010	
	10 04 95	0.01	0.04	(6 10 96)	1.3	1.6	0.47	< 0.01	0.03	0.02	
	04 29 96	0.07	0.07	(7 2 96)	0.26	0.88	0.09	0.02	0.07	0.03	0.03
	11 08 96	< 0.01	0.15	(11 8 96)	0.07	1.10	0.47	< 0.01	0.11	< 0.01	< 0.01
	05 09 97	0.03	0.03		0.26	0.32	0.05	0.02	0.04	0.02	0.02
	10 21 97	< 0.01	< 0.01		0.82	< 0.01	0.19	< 0.01	< 0.01	< 0.01	0.07
	05 04 98	< 0.01	< 0.01		0.53	0.13	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 07 98	< 0.01	< 0.01		0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	05 27 99	0.02	0.03		0.58	0.51	0.03	0.01	0.05	0.03	0.02
	10 13 99	0.02	0.02		0.03	0.02	0.02	< 0.01	0.02	0.02	0.02
	04 17 00	< 0.01	< 0.01		0.01		0.01	0.01	0.01	< 0.01	< 0.01
	10 19 00	0.01	< 0.01		0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	0.02
	04 27 01	< 0.01	0.019		0.45	0.019	0.053	0.043	< 0.01	0.03	< 0.01
	10 11 01	0.011	0.036		0.95	0.49	0.099	0.013	0.81	0.018	0.016
	06 06 02	< 0.01	< 0.01		0.7	0.047	< 0.01	010	< 0.01	< 0.01	< 0.01
	10 18 02	< 0.01	< 0.01		0.21	0.47	0.063	0.018	0.026	< 0.01	
	04 24 03	< 0.01	< 0.01		0.34	1.9	0.012	0.018	< 0.01	0.01	< 0.01
	10 14 03	0.012	0.09		0.86	1.3	< 0.01	0.092	< 0.01	< 0.01	0.16
	04 20 04	0.13	< 0.01		0.034	0.8	0.013	0.021	< 0.01	< 0.01	< 0.01
	11 18 04	< 0.01	0.011		0.38	0.74	0.073	< 0.01	< 0.01	< 0.01	0.01
	% detects	48	50		93	90	72	55	59	55	50
	Coeff. of Var(s.d./mean)	1.156	2.350		0.893	1.067	1.817	0.927	1.910	1.851	1.428

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS[1]				UPGRADIENT WELLS						
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Lead	05 25 90				< 0.002	0.004	< 0.002				
	05 28 92							< 0.050			
	06 04 92								0.004		< 0.001
	09 30 92								0.002		< 0.001
	11 19 92							< 0.050			
	04 28 93	< 0.05							< 0.05	< 0.05	< 0.05
	12 03 93	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	01 07 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	02 04 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	03 10 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 19 94	< 0.005			0.007	< 0.005	< 0.005	< 0.005	0.009	< 0.005	
	05 31 94	< 0.005	< 0.005	(10 9 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 22 94	< 0.005	< 0.005	(11 8 95)	< 0.005	0.007	< 0.005	< 0.005	< 0.005	< 0.005	
	07 27 94	< 0.005	< 0.005	(12 11 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 10 94	< 0.005	< 0.005	(1 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 13 95	< 0.005	0.007	(4 29 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 04 95	< 0.005	< 0.050	(6 10 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 29 96	0.009	< 0.005	(7 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.013	< 0.005
	11 08 96	< 0.005	< 0.005	(11 8 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 09 97	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 21 97	< 0.005	0.014		0.010	< 0.005	< 0.005	< 0.005	0.007	< 0.005	0.005
	05 04 98	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 07 98	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 27 99	< 0.005	< 0.005		< 0.005	< 0.005	0.007	< 0.005	< 0.005	< 0.005	< 0.005
	10 13 99	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 17 00	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 19 00	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 27 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 11 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	06 06 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 18 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 24 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 14 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 20 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	11 18 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	% detects	0	4		3	0	0	-3	3	0	6
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND
Magnesium	05 25 90				99	201	142				
	05 28 92							100			
	06 04 92								184.6		145.3
	09 30 92								194		157.0
	11 19/92							52			
	04/28/93	170							300	100	170
	12 03 93	180			230	230	160	100	290	110	
	01 07 94	190			240	240	190	98	330	100	
	02 04 94	160			210	230	170	93	99	340	
	03 10 94	160			220	220	170	91	380	230	
	04 19 94	170			250	250	200	130	510	550	
	05 31 94	170	240	(10 9 95)	230	240	190	110	560	220	
	06 22 94	160	230	(11 8 95)	230	240	180	85	480	150	
	07 27 94	190	220	(12 11 95)	250	240	190	110	460	230	
	10 10 94	170	220	(1 2 96)	240	260	190	98	330	81	
	6 13 1995	190	250	(4 29 96)	230	240	200	130	500	400	
	10 04 95	170	220	(6 10 96)	220	220	190	100	370	210	
	04 29 96	200	250	(7 2 96)	240	240	220	170	510	230	210
	11 08 96	190	230	(11 8 96)	220	230	200	180	670	89	170
	05 09 97	170	200		210	220	180	170	470	150	140
	10 21 97	160	210		200	200	190	110	580	81	170
	05 04 98	190	220		220	230	200	210	290	190	180
	10 07 98	170	200		200	210	190	270	500	160	40
	05 27 99	170	220		200	220	190	190	470	240	140
	10 13 99	170	210		200	210	190	210	810	100	160
	04 17 00	140	200		180		180	180	480	90	130
	10 19 00	150	200		200	44	190	190	690	92	130
	04 27 01	160	200		200	200	230	130	890	140	150
	10 11 01	170	220		210	180	190	180	600	94	160
	06 06 02	130	200		190	190	190	160	420	210	140
	10 18 02	150	230		220	230	190	160	400	99	
	04 24 03	140	200		210	210	170	190	230	98	170
	10 14 03	130	200		200	200	180	220	240	99	190
	04 20 04	130	210		210	200	170	160	270	490	190
	11 18 04	140	230		230	230	180	150	270	150	180
	% detects	97	96		97	97	97	97	97	97	94
	Coeff. of Var(s.d./mean)	0.120	0.074		0.083	0.179	0.077	0.313	0.390	0.650	0.241

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS[1]						UPGRADIENT WELLS				
ANALYTE	**DATE**	**MW-4A (1A(1))**	**MW-5A**		**MW-6A (E-26)**	**MW-7A (E-25)**	**MW-8A (E27)**	**MW-1A (ET-O)**	**MW-2A (EE(E))**	**MW-3A (2)**	**F**
Manganese	05/25/90				0.326	0.731	0.972				
	05/28/92							0.380			
	06/04/92								0.750		0.340
	09/30/92								0.720		0.530
	11/19/92							0.190			
	04/28/93	0.640							0.530	0.330	0.150
	12/03/93	0.74			0.64	0.79	0.83	0.35	0.96	0.28	
	01/07/94	0.65			0.69	0.74	0.74	0.34	0.87	0.23	
	02/04/94	0.60			0.72	0.77	0.79	0.37	0.28	0.96	
	03/10/94	0.53			0.68	0.72	0.73	0.35	0.94	0.42	
	04/19/94	0.62			0.73	0.76	0.80	0.41	1.10	0.41	
	05/31/94	0.57	0.76	(10/9/95)	0.71	0.73	0.78	0.38	0.98	0.30	
	06/22/94	0.58	0.75	(11/8/95)	0.71	0.77	0.80	0.39	1.10	0.24	
	07/27/94	0.57	0.64	(12/11/95)	0.71	0.75	0.76	0.36	1.10	0.34	
	10/10/94	0.52	0.65	(1/2/96)	0.71	0.76	0.75	0.37	0.93	0.22	
	06/13/95	0.48	0.84	(4/29/96)	0.60	0.61	0.71	0.35	0.71	0.17	
	10/04/95	0.44	0.76	(6/10/96)	0.67	0.69	0.81	0.33	0.77	0.22	
	04/29/96	0.62	0.71	(7/2/96)	0.74	0.97	0.86	0.56	0.74	0.30	0.074
	11/08/96	0.59	0.77	(11/8/96)	0.68	0.78	0.91	0.67	1.20	0.20	0.35
	05/09/97	0.55	0.68		0.68	0.74	0.86	0.66	0.76	0.30	0.14
	10/21/97	0.57	0.76		0.72	1.10	0.87	0.49	1.20	0.25	0.73
	05/04/98	0.45	0.66		0.71	0.95	0.83	0.66	0.56	0.084	0.006
	10/07/98	0.51	0.63		0.62	0.80	0.71	0.90	0.88	0.430	0.066
	05/27/99	0.5	0.66		0.68	0.87	0.79	0.67	0.74	0.61	0.61
	10/13/99	0.55	0.72		0.68	0.86	0.88	0.61	1.2	0.34	0.94
	04/17/00	0.57	0.85		0.82		0.7	0.56	0.74	0.36	0.59
	10/19/00	0.56	0.78		0.77	0.77	0.92	0.77	0.78	0.30	0.91
	04/27/01	0.51	0.71		0.72	0.93	0.84	0.43	1.0	0.30	0.56
	10/11/01	0.52	0.74		0.73	1.0	0.88	0.62	1.4	0.27	0.91
	06/06/02	0.44	0.64		0.66	0.81	0.85	0.57	0.61	0.30	0.4
	10/18/02	0.47	0.7		0.71	0.87	0.83	0.55	2.50	0.27	
	04/24/03	0.48	0.72		0.75	0.96	0.84	0.75	0.63	0.31	0.89
	10/14/03	0.49	0.74		0.76	0.92	0.88	0.91	0.58	0.34	1.5
	04/20/04	0.42	0.67		0.72	0.96	0.77	0.56	0.34	0.45	0.57
	11/18/04	0.35	0.56		0.62	0.79	0.88	0.64	0.28	0.29	1
	% detects	97	96		97	97	97	97	97	97	94
	Coeff. of Var(s.d./mean)	0.147	0.095		0.067	0.134	0.076	0.317	0.466	0.477	0.670
Mercury	05/25/90				< 0.0005	< 0.0005	< 0.0005				
	05/28/92							< 0.001			
	06/04/92								< 0.0005		< 0.0005
	09/30/92								< 0.0005		< 0.0005
	11/19/92							< 0.001			
	04/28/93	< 0.001							< 0.001	< 0.001	< 0.001
	12/03/93	< 0.001			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	01/07/94	< 0.001			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	02/04/94	< 0.001			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	03/10/94	< 0.001			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	04/19/94	< 0.001			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	05/31/94	< 0.001	< 0.001	(10/9/95)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	06/22/94	< 0.001	< 0.001	(11/8/95)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	07/27/94	< 0.001	< 0.001	(12/11/95)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	10/10/94	< 0.001	< 0.001	(1/2/96)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	06/13/95	< 0.001	< 0.001	(4/29/96)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
	10/04/95	< 0.001	< 0.001	(6/10/96)	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	
	04/29/96	< 0.001	0.001	(7/2/96)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	11/08/96	< 0.001	< 0.001	(11/8/96)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	05/09/97	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10/21/97	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	05/04/98	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10/07/98	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	05/27/99	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10/13/99	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	04/17/00	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10/19/00	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	04/27/01	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10/11/01	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	06/06/02	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10/18/02	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<
	04/24/03	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10/14/03	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	04/20/04	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	11/18/04	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	% detects	-3	-4		-3	-3	-3	-3	-3	-3	-6
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

		DOWNGRADIENT WELLS [1]						UPGRADIENT WELLS			
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Nickel	05 25 90				< 0.020	< 0.020	< 0.020				
	05 28 92							< 0.005			
	06 04 92								< 0.010		< 0.010
	09 30 92								< 0.030		< 0.030
	11 19 92							< 0.005			
	04 28 93	< 0.005							0.013	< 0.005	< 0.005
	12 03 93	0.027			< 0.005	0.062	0.052	0.009	0.055	0.012	
	01 07 94	0.012			0.034	0.029	0.014	0.012	0.035	< 0.005	
	02 04 94	< 0.005			0.012	0.010	0.009	< 0.005	< 0.005	0.017	
	03 10 94	< 0.005			< 0.005	0.006	< 0.005	< 0.005	0.019	0.017	
	04 19 94	< 0.005			< 0.005	0.015	0.007	< 0.005	0.031	0.043	
	05 31 94	0.006	< 0.005	(10 9 95)	0.024	0.025	0.022	0.005	0.034	0.012	
	06 22 94	0.007	< 0.005	(11 8 95)	0.011	0.015	0.011	< 0.005	0.031	< 0.005	
	07 27 94	< 0.005	0.008	(12 11 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 10 94	< 0.005	< 0.005	(1 2 96)	0.019	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 13 95	< 0.005	0.014	(4 29 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 04 95	< 0.005	< 0.005	(6 10 96)	0.008	0.005	< 0.005	< 0.005	0.008	< 0.005	
	04 29 96	< 0.005	< 0.005	(7 2 96)	0.013	0.017	0.013	0.007	0.022	0.011	0.01
	11 08 96	0.014	0.011	(11 8 96)	0.005	0.010	0.008	0.016	0.014	< 0.005	0.011
	05 09 97	0.032	0.034		0.029	0.033	0.02	0.012	0.049	0.019	0.012
	10 21 97	0.019	0.011		0.011	0.013	0.02	0.022	0.040	0.009	0.015
	05 04 98	0.009	0.011		0.008	< 0.005	0.012	< 0.005	< 0.005	0.010	0.006
	10 07 98	0.020	0.013		0.018	0.036	0.049	0.013	0.013	0.021	0.052
	05 27 99	0.006	0.012		0.008	0.016	0.011	< 0.005	0.007	0.007	0.011
	10 13 99	0.007	0.013			0.008	< 0.005	< 0.005	0.007	< 0.005	0.009
	04 17 00	0.005	< 0.005		< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 19 00	0.020	0.040		0.034	0.035	0.023	0.009	0.010	0.010	0.025
	04 27 01	< 0.005	< 0.005		< 0.005	0.0054	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 11 01	0.005	0.0056		0.0058	0.006	< 0.005	< 0.005	0.0081	< 0.005	0.013
	06 06 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 18 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<
	04 24 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 14 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 20 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	11 18 04	0.015	0.025		0.027	0.021	0.027	0.015	0.026	0.012	0.036
	% detects	48	46		55	66	48	31	55	41	56
	Coeff. of Var(s.d./mean)	0.785	0.880		0.814	0.930	0.979	0.592	0.924	0.832	0.953
Potassium	05 25 90				24	49	40				
	06 04 92								56		54
	09 30 92								57		56
	04 28 93	57							68	44	57
	12 03 93	59			60	67	45	30	74	56	
	01 07 94	59			67	69	56	32	78	52	
	02 04 94	59			69	64	57	36	53	80	
	03 10 94	46			68	58	47	26	63	67	
	04 19 94	61			130	130	120	44	140	150	
	05 31 94	48	70	(10 9 95)	61	58	47	36	120	61	
	06 22 94	53	63	(11 8 95)	61	61	57	33	83	57	
	07 27 94	46	60	(12 11 95)	59	55	47	31	77	61	
	10 10 94	47	61	(1 2 96)	64	57	47	38	78	44	
	06 13 95	63	69	(4 29 96)	85	74	71	75	110	120	
	10 04 95	56	58	(6 10 96)	67	65	59	35	89	80	
	04 29 96	59	60	(7 2 96)	67	64	52	69	98	79	67
	11 08 96	50	58	(11 8 96)	64	60	51	54	100	44	60
	05 09 97	52	59		59	56	55	69	84	56	54
	10 21 97	50	56		56	55	50	43	84	42	56
	05 04 98	49	66		62	59	54	88	67	65	62
	10 07 98	49	58		60	56	46	77	86	56	35
	05 27 99	46	53		53	50	49	75	70	62	50
	10 13 99	47	53		57	54	49	68	120	43	54
	04 17 00	48	49		48		45	66	80	37	46
	10 19 00	47	56		59	28	56	67	120	45	52
	04 27 01	49	59		61	67	69	62	150	54	48
	10 11 01	45	54		57	49	49	57	110	41	50
	06 06 02	32	51		49	57	64	54	84	66	38
	10 18 02	27	59		45	29	13	29	57	25	
	04 24 03	53	67		64	61	57	85	110	53	56
	10 14 03	44	55		57	54	54	79	61	44	52
	04 20 04	44	57		61	55	50.0	78	68	130	52
	11 18 04	48	61		63	61	48	80	74	55	46
	% detects	97	96		97	97	97	97	97	97	94
	Coeff. of Var(s.d./mean)	0.158	0.091		0.235	0.283	0.299	0.360	0.275	0.441	0.154

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

DOWNGRADIENT WELLS[1]						UPGRADIENT WELLS					
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Selenium	05 25 90				< 0.005	< 0.005	< 0.005				
	05 28 92							< 0.005			
	06 04 92								< 0.002		0.004
	09 30 92								< 0.002		< 0.002
	11 19 92							< 0.005			
	04 28 93	< 0.005							< 0.005	< 0.005	< 0.005
	12 03 93	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	01 07 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	02 04 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	03 10 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 19 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	05 31 94	< 0.005	< 0.005	(10 9 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 22 94	< 0.005	< 0.005	(11 8 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	07 27 94	< 0.005	< 0.005	(12 11 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 10 94	< 0.005	< 0.005	(1 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 13 95	< 0.005	< 0.005	(4 29 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 04 95	< 0.005	< 0.005	(6 10 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 29 96	< 0.005	< 0.005	(7 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.006
	11 08 96	< 0.005	< 0.005	(11 8 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 09 97	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 21 97	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 04 98	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.016
	10 07 98	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 27 99	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 13 99	< 0.005	0.030		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.029
	04 17 00	< 0.005	< 0.005		< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 19 00	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 27 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	0.008	< 0.005	< 0.005
	10 11 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	06 06 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 18 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 24 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 14 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04/20/04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.029	< 0.005
	11 18 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	% detects	-3	0		-3	0	-3	-3	0	0	17
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND
Silver	05 25 90				< 0.01	< 0.01	< 0.01				
	05 28 92							< 0.01			
	06 04 92								0.010		< 0.001
	09 30 92								< 0.01		< 0.010
	11 19 92							< 0.01			
	04 28 93	< 0.01							0.03	< 0.01	0.010
	12 03 93	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	01 07 94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	02 04 94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	03 10 94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 19 94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	05 31 94	0.02	< 0.01	(10 9 95)	0.03	< 0.01	< 0.01	< 0.01	0.05	0.02	
	06 22 94	< 0.01	< 0.01	(11 8 95)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	07 27 94	< 0.01	< 0.01	(12 11 95)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	10 10 94	< 0.01	< 0.01	(1 2 96)	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	
	06 13 95	< 0.01	< 0.01	(4 29 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	10 04 95	< 0.01	< 0.01	(6 10 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 29 96	< 0.01	< 0.01	(7 2 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	11 08 96	< 0.01	< 0.01	(11 8 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	05 09 97	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 21 97	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	05 04 98	0.03	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01
	10 07 98	< 0.01	< 0.01		< 0.01	0.02	0.03	0.01	< 0.01	< 0.01	0.03
	05 27 99	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 13 99										
	04 17 00	< 0.01	< 0.01		< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	0.01
	10 19 00	< 0.01	0.02		0.01	0.01	0.03	0.01	< 0.01	< 0.01	0.03
	04 27 01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 11 01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	06 06 02	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 18 02	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 24 03	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 14 03	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	04 20 04	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	11 18 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	% detects	7	4		7	10	7	7	3	7	22
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

ANALYTE	DATE	DOWNGRADIENT WELLS [1] MW-4A (1A(1))	MW-5A		UPGRADIENT WELLS MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Sodium	05 25 90				1490	3080	2300				
	05 28 92							930			
	06 04 92								3244.9		3691.4
	09 30 92								3620		3020.0
	11 19 92							590			
	04 28 93	2700							5100	1800	3200
	12 03 93	2600			4100	3800	2900	880	4000	1800	
	01 07 94	2600			3900	3900	2900	1100	4600	1600	
	02 04 94	1700			2500	2600	1900	590	1100	3300	
	03 10 94	2300			3700	3600	2700	900	5500	2600	
	04 19 94	2600			3900	3900	2900	1100	6300	6200	
	05 31 94	2500	3900	(10 9 95)	4100	4000	3000	980	7300	2800	
	06 22 94	2400	3800	(11 8 95)	3900	4000	3000	930	6900	2100	
	07 27 94	2700	3800	(12 11 95)	4100	4100	3300	980	6300	2900	
	10 10 94	2500	3800	(1 2 96)	4200	4400	3200	920	5100	1600	
	06 13 95	2700	4200	(4 29 96)	4000	4200	3300	1600	6400	4500	
	10 04 95	2300	3700	(6 10 96)	3700	3600	3000	910	5100	2700	
	04 29 96	2800	3800	(7 2 96)	4200	4100	3300	1600	7100	3000	4200
	11 08 96	2600	3600	(11 8 96)	3700	3500	2900	1400	7400	1500	3100
	05 09 97	2100	3300		3300	3000	2800	1500	5600	2200	3000
	10 21 97	2100	3100		3200	2800	2500	960	6300	1300	2700
	05 04 98	2400	3700		3500	3400	2900	1900	3700	2300	3900
	10 07 98	2200	3400		3200	3200	2900	1700	6000	1900	2000
	05 27 99	2200	3400		3200	3300	2900	1900	5300	2300	2800
	10 13 99	2200	3400		3400	3400	2900	1900	8900	1500	3100
	04 17 00	2000	3200		2900		2700	1600	5400	1400	2900
	10 19 00	2100	3300		3100	710	2800	1600	7600	1400	2700
	04 27 01	2200	3400		3300	2800	2800	1500	5900	1700	2500
	10 11 01	2200	3400		3300	2700	2700	1300	7000	1400	2400
	06 06 02	2100	3400		3200	3100	2800	1500	5300	2600	2400
	10 18 02	2000	3500		3300	3200	2600	1500	5100	1400	
	04 24 03	2100	3400		3200	3200	2700	1800	3,700	1600	2400
	10 14 03	2000	3400		3100	3300	2700	1900	3,900	1500	2500
	04/20/04	2000	3400		3200	3100	2500	1900	3900	4600	2300
	11 18/04	2300	3800		3600	3500	2800	1800	4300	1800	2200
	% detects	97	96		97	97	97	97	97	97	94
	Coeff. of Var(s.d./mean)	0.117	0.073		0.124	0.211	0.098	0.288	0.282	0.490	0.208
Thallium	05 25 90										
	06 04 92										
	09 30 92										
	04 28 93										
	12 03/93	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	01 07/94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	02 04 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	03 10 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 19 94	< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	05 31 94	< 0.005	< 0.005	(10 9 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 22 94	< 0.005	< 0.005	(11 8 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	07 27 94	< 0.005	< 0.005	(12 11 95)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 10 94	< 0.005	< 0.005	(1 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 13 95	< 0.005	< 0.005	(4 29 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 04 95	< 0.005	< 0.5	(6 10 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 29 96	< 0.002	< 0.002	(7 2 96)	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
	11 08 96	< 0.001	< 0.001	(11 8 96)	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	05 09 97	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 21 97	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	05 04 98	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 07 98	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	05 27 99	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 13 99	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	04 17 00	< 0.001	< 0.001		< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 19 00	< 0.0012	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	04 27 01	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 11 01	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	06 06 02	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10 18 02	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	
	04 24 03	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
	10 14 03	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
	04 20 04	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
	11 18 04	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	% detects	-3	-4		-3	0	-3	-3	-3	-3	0
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS[1]						UPGRADIENT WELLS				
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Vanadium	05 25 90										
	06 04 92										
	09 30 92										
	04 28 93										
	12 03 93	0.024			0.005	0.036	0.031	0.009	0.038	0.013	
	01 07 94	0.019			0.027	0.026	0.018	0.009	0.027	< 0.005	
	02 04 94	0.013			0.020	0.019	0.018	0.006	0.007	0.026	
	03 10 94	0.008			0.012	0.015	0.010	< 0.005	0.024	0.017	
	04 19 94	0.011			0.014	0.015	0.012	< 0.005	0.026	0.027	
	05 31 94	0.012	0.010	(10 9 95)	0.020	0.019	0.018	0.008	0.027	0.013	
	06 22 94	0.012	0.017	(11 8 95)	0.016	0.018	0.014	< 0.005	0.026	0.007	
	07 27 94	< 0.005	0.012	(12 11 95)	0.007	0.008	0.005	< 0.005	0.015	< 0.005	
	10 10 94	< 0.005	< 0.005	(1 2 96)	0.009	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	06 13 95	< 0.005	0.019	(4 29 96)	0.007	0.005	0.007	< 0.005	0.011	0.010	
	10 04 95	0.008	0.014	(6 10 96)	0.019	0.016	0.010	< 0.005	0.016	0.009	
	04 29 96	0.01	0.016	(7 2 96)	0.018	0.018	0.012	< 0.005	0.023	0.011	0.012
	11 08 96	0.016	0.016	(11 8 96)	0.013	0.016	0.014	< 0.005	0.022	< 0.005	0.014
	05 09 97	0.021	0.024		0.020	0.024	0.019	< 0.005	0.029	0.012	0.01
	10 21 97	0.006	< 0.005		< 0.005	< 0.005	0.006	0.009	0.010	< 0.005	< 0.005
	05 04 98	0.012	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.013	< 0.005
	10 07 98	0.016	0.017		0.015	0.025	0.026	0.011	0.017	0.016	0.026
	05 27 99	0.012	0.024		0.020	0.022	0.017	0.005	0.017	0.016	0.011
	10 13 99	0.011	0.016		0.013	0.014	0.012	< 0.005	0.016	0.008	0.011
	04 17 00	< 0.005	< 0.005		< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 19 00	0.012	0.025		0.025	0.025	0.020	0.010	0.014	0.011	0.020
	04 27 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 11 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	06 06 02	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 18 02	0.0067	< 0.005		< 0.005	< 0.005	< 0.005	0.0072	0.009	< 0.005	
	04 24 03	0.0066	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 14 03	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 20 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	11 18 04	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	% detects	62	46		59	59	59	28	62	52	39
	Coeff. of Var(s.d./mean)	0.540	0.638		0.614	0.661	0.644	0.306	0.659	0.672	0.683
Zinc	05 25 90				0.030	0.010	0.040				
	05 28 92							< 0.005			
	06 04 92								< 0.001		< 0.001
	09 30 92								0.007		< 0.005
	11 19 92							0.031			
	04 28 93	0.029							0.040	0.031	0.027
	12/03/93	0.011			0.064	0.022	0.016	< 0.005	0.011	0.010	
	01 07 94	< 0.005			0.005	< 0.005	< 0.005	0.007	< 0.005	< 0.005	
	02 04 94	0.007			0.009	0.007	0.008	0.008	0.009	0.015	
	03 10 94	0.008			0.010	0.009	0.007	0.010	0.015	0.017	
	04 19 94	0.012			0.009	0.010	0.022	0.008	0.024	0.032	
	05 31 94	0.010	< 0.005	(10 9 95)	0.009	0.016	0.019	0.019	0.024	0.008	
	06 22 94	< 0.005	< 0.005	(11 8 95)	< 0.005	0.008	< 0.005	< 0.005	< 0.005	< 0.005	
	07 27 94	0.034	< 0.005	(12 11 95)	< 0.005	0.031	0.007	0.060	0.020	0.007	
	10 10 94	0.017	< 0.005	(1 2 96)	0.081	0.006	< 0.005	< 0.005	< 0.005	< 0.005	
	06 13 95	< 0.005	0.006	(4 29 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	10 04 95	< 0.005	0.022	(6 10 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	04 29 96	< 0.005	< 0.005	(7 2 96)	< 0.005	< 0.005	< 0.005	< 0.005	0.006	0.009	< 0.005
	11 08 96	< 0.005	< 0.005	(11 8 96)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	05 09 97	< 0.005	< 0.005		< 0.005	< 0.005	0.005	0.005	< 0.005	< 0.005	< 0.005
	10 21 97	0.008	0.026		0.016	0.038	0.013	0.013	0.020	0.007	0.012
	05 04 98	< 0.005	0.008		< 0.005	0.006	0.008	0.006	< 0.005	< 0.005	0.009
	10 07 98	0.008	< 0.005		< 0.005	< 0.005	< 0.005	0.009	< 0.005	0.013	0.008
	05 27 99	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 13 99	< 0.005	< 0.005		0.011	0.014	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 17 00	0.028	0.033		0.032		0.027	0.022	0.050	0.025	0.029
	10 19 00	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	04 27 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	10 11 01	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	06 06 02	0.032	0.040		0.035	0.040	0.031	0.030	0.048	0.031	0.034
	10 18 02	0.025	0.029		0.031	0.045	0.031	0.020	0.050	0.023	
	04 24 03	0.035	0.041		0.041	0.044	0.037	0.036	0.053	0.031	0.033
	10 14 03	0.046	0.050		0.055	0.055	0.050	0.042	0.065	0.035	0.053
	04 20 04	0.06	0.08		0.075	0.099	0.077	0.056	0.084	0.091	0.072
	11 18 04	0.017	0.017		0.01	0.022	0.033	0.11	0.037	0.016	0.043
	% detects	55	46		55	62	52	55	52	55	56
	Coeff. of Var(s.d./mean)	0.993	1.122		1.188	1.185	1.089	1.313	1.094	1.174	1.060

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

DOWNGRADIENT WELLS[1]					UPGRADIENT WELLS						
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
MINERALS											
Alkalinity	05 25 90				95	60	66				
	05 28 92							160			
	06 04 92								126		173
	09 30 92								134		154
	11 19 92							180			
	04 28 93	170							140	200	140
	12 03 93	190			120	110	130	180	220	240	
	01 07 94	140			120	120	120	150	170	200	
	02 04 94	150			120	130	120	140	190	170	
	03 10 94	150			110	110	100	150	190	190	
	04 19 94	140			140	130	140	220	210	200	
	05 31 94	120	120	(10 9 95)	110	100	110	150	230	180	
	06 22 94	160	130	(11 8 95)	120	120	120	160	220	210	
	07 27 94	160	120	(12 11 95)	120	120	120	160	200	200	
	10 10 94	160	130	(1 2 96)	120	120	120	240	170	200	
	06 13 95	150	120	(4 29 96)	130	130	95	290	330	200	
	10 04 95	150	120	(6 10 96)	120	120	120	160	210	200	
	04 29 96	150	110	(7 2 96)	120	120	130	290	310	200	240
	11 08 96	140	130	(11 8 96)	120	120	120	200	200	200	200
	05 09 97	140	130		120	120	120	290	320	210	190
	10 21 97	150	120		120	120	120	190	210	200	160
	05 04 98	150	120		120	120	120	360	290	200	260
	10 07 98	150	130		120	130	120	250	260	190	390
	05 27 99	140	98		110	120	120	430	330	170	230
	10 13 99	140	120		120	120	110	320	290	190	170
	04 17 00	140	120		120		120	460	260	200	190
	10 19 00	160	130		120	160	120	480	310	210	190
	04 27 01	150	130		130	140	140	600	320	210	180
	10 11 01	160	140		130	140	130	480	280	210	160
	06 06 02	160	120		130	120	120	500	300	220	140
	10 18 02	140	130		130	120	120	540	270	200	
	04 24 03	160	140		140	140	130	480	220	220	120
	10 14 03	160	130		120	120	120	420	220	200	120
	04 20 04	160	130		130	130	130.0	530	400	220	130
	11 18 04	150	120		110	120	140	470	310	200	120
	% detects	100	100		100	100	100	100	100	100	100
	Coeff. of Var(s.d./mean)	0.081	0.073		0.063	0.091	0.083	0.463	0.228	0.071	0.358
Ammonia	05 25 90				0.73	2.17	1.92				
	05 28 92							2.1			
	06 04 92								0.840		0.060
	09 30 92								2.000		0.320
	11 19 92							1.1			
	04 28 93	1.40							1.40	1.200	0.130
	12 03 93	1.4			1.8	1.8	1.2	1.0	1.5	1.2	
	01 07 94	1.5			1.8	1.8	1.2	0.97	1.2	1.2	
	02 04 94	1.6			2.0	1.8	1.4	0.97	0.66	1.2	
	03 10 94	1.5			2.0	1.9	1.3	1.1	1.2	1.3	
	04 19 94	1.4			1.9	1.8	1.3	1.0	1.2	0.84	
	05 31 94	1.4	2.0	(10 9 95)	1.9	1.8	1.3	1.0	1.1	0.98	
	06 22 94	1.6	1.9	(11 8 95)	2.0	1.8	1.3	1.0	1.2	1.2	
	07 27 94	1.5	0.84	(12 11 95)	1.9	1.8	1.4	1.1	1.4	1.2	
	06 13 95	1.6	1.9	(4 29 96)	1.9	1.8	1.4	0.86	1.2	0.98	
	10 04 95	1.6	1.9	(6 10 96)	2.0	1.9	1.6	1.2	1.6	1.3	
	04 29 96	1.5	1.8	(7 2 96)	1.8	1.7	1.5	0.88	0.5	1.1	< 0.05
	11 08 96	1.5	1.8	(11 8 96)	1.7	1.7	1.4	1.1	1.4	1.2	< 0.05
	05 09 97	1.5	1.7		1.8	1.6	1.5	0.98	0.87	1.3	0.07
	10 21 97	1.6	1.9		1.8	1.7	1.5	0.95	1.40	1.3	0.46
	05 04 98	1.5	1.8		1.8	1.7	1.5	0.92	0.88	1.3	< 0.05
	10 07 98	1.6	1.8		1.6	1.8	1.8	1.30	1.60	1.7	< 0.05
	05 27 99	1.3	1.5		1.8	1.6	1.5	0.85	1	1.5	0.26
	10 13 99	1.7	2.0		1.9	1.8	1.6	1.2	1.5	1.6	0.62
	04 17 00	1.5	1.6		1.7		1.4	0.45	0.93	1.4	0.3
	10 19 00	2.9	1.7		1.7	0.86	1.4	1.4	0.78	1.3	0.39
	04 27 01	1.1	1.3		1.3	1.3	1.2	0.62	0.83	1.0	0.098
	10 11 01	1.5	1.9		1.8	1.7	1.5	1.1	1.5	1.4	0.6
	06 06 02	1.3	1.9		1.7	1.2	1.6	0.96	1	1.2	0.2
	10 18 02	1.4	1.9		1.7	1.6	1.5	1.2	1.5	1.5	
	04 24 03	1.4	1.9		1.9	1.8	1.2	1.3	0.86	1.4	0.80
	10 14 03	1.3	1.7		1.7	1.6	1.2	1.1	1.1	1.5	0.75
	04 20 04	1.10	1.50		1.40	1.30	1.4	0.78	0.74	0.94	0.39
	11 18 04	1.10	1.30		1.60	1.50	1.10	0.75	0.88	1.40	0.68
	% detects	97	96		97	97	97	97	97	97	83
	Coeff. of Var(s.d./mean)	0.209	0.157		0.093	0.142	0.112	0.201	0.275	0.159	0.821

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS [1]						UPGRADIENT WELLS			
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Bicarbonate	05/25/90				95	60	66				
(as CaCO3)	05/28/92							160			
(as CaCO3)	06/04/92								126		172.5
	09/30/92								134		153.6
	11/19/92							180			
	04/28/93	170							140	200	140
	12/03/93	190			120	110	130	180	220	240	
	01/07/94	140			120	120	120	150	170	200	
	02/04/94	150			120	130	120	140	190	170	
	03/10/94	150			110	110	100	150	190	190	
	04/19/94	140			140	130	140	220	210	200	
	05/31/94	120	120	(10/9/95)	110	100	110	150	230	180	
	06/22/94	160	130	(11/8/95)	120	120	120	160	220	210	
	07/27/94	160	120	(12/11/95)	120	120	120	160	200	200	
	10/10/94	160	130	(1/2/96)	120	120	120	240	170	200	
	06/13/95	150	120	(4/29/96)	130	130	95	290	330	200	
	10/04/95	150	120	(6/10/96)	120	120	120	160	210	200	
	04/29/96	150	110	(7/2/96)	120	120	130	290	310	200	240
	11/08/96	140	130	(11/8/96)	120	120	120	200	200	200	200
	05/09/97	140	130		120	120	120	290	320	210	190
	10/21/97	150	120		120	120	120	190	210	200	160
	05/04/98	150	120		120	120	120	360	290	200	260
	10/07/98	150	130		120	130	120	250	260	190	390
	05/27/99	140	98		110	120	120	430	330	170	230
	10/13/99	140	120		120	120	110	320	290	190	170
	04/17/00	140	120		120		120	460	260	200	190
	10/19/00	160	130		120	160	120	480	310	210	190
	04/27/01	150	130		130	140	140	600	320	210	180
	10/11/01	160	140		130	140	130	480	280	210	160
	06/06/02	160	120		130	120	120	500	300	220	140
	10/18/02	140	130		130	120	120	540	270	200	
	04/24/03	160	140		140	140	130	480	220	220	120
	10/14/03	160	130		120	120	120	420	220	200	120
	04/20/04	160	130		130	130	130	530	400	220	130
	11/18/04	180	140		140	140	170	580	380	240	150
	% detects	100	100		100	100	100	100	100	100	100
	Coeff. of Var(s.d./mean)	0.088	0.076		0.066	0.094	0.107	0.474	0.240	0.079	0.346
Carbonate	05/25/90										
(as CaCO3)	05/28/92							< 10			
	06/04/92								< 0.01		0.5
	09/30/92								0.3		0.5
	11/19/92							< 10			
	04/28/93	< 10	0						< 10		< 10
	12/03/93	< 10	0		< 10	< 10	< 10	< 10	< 10	< 10	0
	01/07/94	< 10	0		< 10	< 10	< 10	< 10	< 10	< 10	0
	02/04/94	< 10	0		< 10	< 10	< 10	< 10	< 10	< 10	0
	03/10/94	< 10	0		< 10	< 10	< 10	< 10	< 10	< 10	0
	04/19/94	< 10	0		< 10	< 10	< 10	< 10	< 10	< 10	0
	05/31/94	< 10	< 10	(10/9/95)	< 10	< 10	< 10	< 10	< 10	< 10	0
	06/22/94	< 10	< 10	(11/8/95)	< 10	< 10	< 10	< 10	< 10	< 10	0
	07/27/94	< 10	< 10	(12/11/95)	< 10	< 10	< 10	< 10	< 10	< 10	0
	10/10/94	< 10	< 10	(1/2/96)	< 10	< 10	< 10	< 10	< 10	< 10	0
	06/13/95	< 10	< 10	(4/29/96)	< 10	< 10	< 10	< 10	< 10	< 10	0
	10/04/95	< 10	< 10	(6/10/96)	< 10	< 10	< 10	< 10	< 10	< 10	0
	04/29/96	< 10	< 10	(7/2/96)	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	11/08/96	< 10	< 10	(11/8/96)	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	05/09/97	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/21/97	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	05/04/98	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/07/98	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	05/27/99	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/13/99	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	04/17/00	< 10	< 10		< 10	0	< 10	< 10	< 10	< 10	< 10
	10/19/00	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	04/27/01	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/11/01	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	06/06/02	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/18/02	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	0
	04/24/03	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/14/03	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	04/20/04	< 10	< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10
	11/18/04	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1
	% detects	0	0		0	3	0	0	0	0	6
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS [1]						UPGRADIENT WELLS			
ANALYTE	**DATE**	**MW-4A (1A(1))**	**MW-5A**		**MW-6A (E-26)**	**MW-7A (E-25)**	**MW-8A (E27)**	**MW-1A (ET-O)**	**MW-2A (EE(E))**	**MW-3A (2)**	**F**
Chloride	05/25/90				2670	6580	5280				
	05/28/92							1900			
	06/04/92								6875		5340
	09/30/92								7080		5180
	11/19/92							1700			
	04/28/93	4600							8600	2800	5100
	12/03/93	4100			6700	6400	4800	1500	6400	2700	
	01/07/94	4100			6100	6600	4500	1600	7300	2300	
	02/04/94	3400			5400	6100	4300	1500	2300	7900	
	03/10/94	4800			7300	7300	4700	1400	13000	4100	
	04/19/94	4000			6600	6400	4500	1800	15000	7900	
	05/31/94	3900	6300	(10/9/95)	6400	6400	4500	1500	10000	3600	
	06/22/94	3800	6600	(11/8/95)	6600	6700	4900	1500	11000	2900	
	07/27/94	4300	6400	(12/11/95)	6400	6600	4800	1500	10000	3900	
	10/10/94	3800	6500	(1/2/96)	6600	6600	4600	1400	8200	2200	
	06/13/95	4000	7400	(4/29/96)	6200	6300	5100	2100	9400	5700	
	10/04/95	3900	7000	(6/10/96)	6200	6200	5000	1500	8300	3800	
	04/29/96	5000	7700	(7/2/96)	7400	7300	6100	3100	9400	5200	6300
	11/08/96	4600	6800	(11/8/96)	7000	6800	5800	2700	14000	2600	5600
	05/09/97	4900	7200		7000	7100	5900	3200	11000	3800	5300
	10/21/97	4500	7000		7000	7000	5700	2100	13000	2600	5100
	05/04/98	4600	7600		7500	6700	5500	3100	7200	3600	6000
	10/07/98	4700	7500		6900	6900	6000	3900	12000	3900	2800
	05/27/99	3700	7500		6400	6500	5500	3400	9900	4600	4100
	10/13/99	3500	5800		6000	6000	5000	2600	14000	2300	4900
	04/17/00	5000	7300		6100		6700	3600	12000	3500	6000
	10/19/00	4200	7000		6500	1900	5600	2700	15000	2400	4700
	04/27/01	5600	8900		8200	7400	7000	2900	18000	4000	5900
	10/11/01	5700	9200		8600	7400	8500	4400	17000	3800	6500
	06/06/02	4100	6400		6600	7000	5200	2800	9400	4700	4300
	10/18/02	3700	5700		5500	5500	5700	2000	9500	2600	
	04/24/03	4200	7000		7100	6400	5200	2800	6900	2600	5000
	10/14/03	3600	6400		6100	6300	5100	3300	6500	2500	5100
	04/20/04	4000	7000		6800	6500	5800	3400	6700	8300	5200
	11/18/04	4900	7800		6400	7400	4400	2600	9500	3900	4600
	% detects	97	96		97	97	97	97	97	97	94
	Coeff. of Var(s.d./mean)	0.138	0.117		0.104	0.156	0.167	0.349	0.338	0.428	0.177
COD	06/04/92										225
	09/30/92										35
	04/28/93										< 5.0
	05/09/97	< 5.0	100		120	99	45	< 5.0	250	31	< 5.0
	10/21/97	100.0	260		240	230	150	88.0	520	70	120
	05/05/98	160	360		290	390	230	140	330	140	260
	10/07/98	38	120		110	110	89	40	88	34	62
	05/28/99	130	99		150	100	740	120	< 5	54	790
	10/13/99	52	400		97	93	100	34	1500	29	110
	04/17/00	680	960		2600		1500	630	2800	300	1400
	10/19/00	1000	1100		1400	250	1400	150	3000	110	540
	04/27/01	130	360		300	440	390	95	1600	96	130
	10/11/01	170	440		390	310	76	43	1000	100	45
	06/06/02	89	310		300	280	280	67	770	110	< 10
	10/18/02	40	560		300	280	71	35	940	19	
	04/24/03	150	360		310	330	60	110	330	110	35
	10/14/03	36	120		120	110	70	33	360	28	78
	04/20/04	38	97		120	120	83	38	330	520	70
	11/18/04	15	130		120	140	69	24	140	20	54
	% detects	100	100		100	100	100	100	93	100	93

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS[1]						UPGRADIENT WELLS				
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Nitrate	05 25 90				3	< 1.0	<				
	05 28 92							< 0.01			
	06 04 92								< 0.1		< 0.100
	09 30 92								< 0.1		< 0.100
	11 19 92							< 0.01			
	04 28 93	0.24							0.24	0.11	0.18
	12 03 93	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	0.09	< 0.01	
	01 07 94	0.04			0.02	< 0.01	0.03	0.02	< 0.01	0.02	
	02 04 94	0.04			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	03 10 94	0.02			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 19 94	0.02			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	05 31 94	< 0.01	0.02	(10 9 95)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	06 22 94	< 0.01	< 0.01	(11 8 95)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	07 27 94	0.03	0.76	(12 11 95)	< 0.01	< 0.01	0.03	< 0.01	0.03	< 0.01	
	10 10 94	0.02	< 0.01	(1 2 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	06 13 95	< 0.01	0.02	(4 29 96)	< 0.01	< 0.01	< 0.01	< 0.01	0.18	< 0.01	
	10 04 95	0.02	0.02	(6 10 96)	0.03	0.03	0.03	0.02	0.02	0.03	
	04 29 96	0.03	0.02	(7 2 96)	< 0.01	< 0.01	0.02	< 0.01	0.22	0.02	0.25
	11 08 96	0.02	0.01	(11 8 96)	0.03	0.02	< 0.01	0.02	0.06	0.02	0.03
	05 09 97	0.02	0.02		< 0.01	< 0.01	< 0.01	0.02	0.80	< 0.01	0.05
	10 21 97	0.03	0.01		0.02	0.02	0.03	0.02	0.15	0.03	0.02
	05 04 98	0.03	0.04		0.34	0.02	0.01	0.03	0.06	0.04	3.20
	10 07 98	< 0.01	< 0.01		0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	0.52
	05 27 99	0.02	0.06		0.02	< 0.01	< 0.01	< 0.01	0.01	0.12	0.17
	10 13 99	0.01	0.02		0.05	0.02	0.03	< 0.01	0.05	< 0.01	0.07
	04 17 00	0.093	0.056		0.11		0.018	0.49	0.068	0.05	0.13
	10 19 00	0.10	0.099		0.19	0.08	0.14	0.092	< 0.010	0.072	0.26
	04 27 01	0.034	0.017		0.07	0.14	0.03	< 0.01	0.071	0.027	0.34
	10 11 01	0.020	0.022		0.013	0.014	< 0.01	< 0.01	0.029	0.022	0.016
	06 06 02	0.050	< 0.01		< 0.01	0.16	0.02	0.06	0.100	0.030	0.300
	10 18 02	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 24 03	< 0.01	< 0.01		< 0.010	0.020	0.030	< 0.01	< 0.010	< 0.01	0.090
	10/14/03	< 0.01	0.04		< 0.01	< 0.01	0.013	0.01	0.020	< 0.01	0.060
	04/20/04	0.17	0.10		0.23	0.02	< 0.01	0.02	0.27	0.08	0.24
	11/18/04	0.093	0.14		0.063	0.053	< 0.01	< 0.01	0.1	0.082	0.12
	% detects	69	71		45	41	41	34	62	45	94
	Coeff. of Var(s.d./mean)	1.064	2.381		1.681	1.406	1.204	2.642	1.820	1.019	2.169
Nitrite	05/25/90										
	05/28/92							< 0.01			
	06/04/92								0.05		0.05
	09/30/92								0.020		< 0.01
	11/19/92							< 0.01			
	04/28/93	< 0.01							< 0.01	< 0.01	< 0.01
	12/03/93	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	01/07/94	0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	02/04/94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	03 10 94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 19 94	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	05 31 94	< 0.01	< 0.01	(10 9 95)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	06 22 94	< 0.01	< 0.01	(11 8 95)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	07 27 94	< 0.01	< 0.01	(12 11 95)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	10 10 94	0.01	0.01	(1 2 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	06 13 95	< 0.01	< 0.01	(4 29 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	10 04 95	0.02	< 0.01	(6 10 96)	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 29 96	< 0.01	< 0.01	(7 2 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	11 08 96	0.02	0.02	(11 8 96)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01
	05 09 97	0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	10 21 97	0.02	0.01		< 0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01	< 0.01
	05 04 98	0.03	0.01		0.02	< 0.01	0.02	< 0.01	< 0.01	0.01	< 0.01
	10 07 98	0.04	0.03		0.02	0.01	0.04	0.02	0.04	0.07	0.09
	05 27 99	0.02	< 0.01		< 0.01	0.02	0.04	0.01	0.09	< 0.01	< 0.01
	10 13 99	0.02	0.01		0.03	0.01	0.01	< 0.01	< 0.01	0.03	0.02
	04 17 00	0.03	0.08		< 0.01		< 0.01	< 0.01	0.02	0.09	< 0.01
	10 19 00	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	04 27 01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01
	10 11 01	0.015	0.012		< 0.01	< 0.01	0.015	< 0.01	< 0.01	< 0.01	0.022
	06 06 02	< 0.01	< 0.01		< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.012
	10 18 02	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
	04 24 03	< 0.01	< 0.01		< 0.010	< 0.01	< 0.01	< 0.01	< 0.010	< 0.01	0.010
	10 14 03	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.60	0.060
	04 20 04	< 0.01	< 0.01		< 0.01	0.01	0.023	0.01	< 0.01	< 0.01	0.052
	11 18 04	< 0.01	< 0.01		< 0.01	0.01	0.065	0.034	< 0.01	< 0.01	0.083
	% detects	38	29		7	21	21	14	10	17	44
	Coeff. of Var(s.d./mean)	0.535	0.978		ND	ND	ND	ND	ND	ND	1.060

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

DOWNGRADIENT WELLS[1]					UPGRADIENT WELLS						
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Phenolics	05 25 90				< 0.01	< 0.01	< 0.01				
	05 28 92							< 0.05			
	06 04 92								< 0.02		< 0.020
	09 30 92								0.180		0.610
	11 19 92							< 0.05			
	04 28 93	< 0.05							< 0.05	< 0.05	< 0.05
	12 03 93	< 0.05				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
	01 07 94										
	02 04 94										
	03 10 94										
	04 19 94	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
	05 31 94		< 0.05	(10 9 95)							
	06 22 94		< 0.05	(11 8 95)							
	07 27 94			(12 11 95)							
	10 10 94	< 0.05		(1 2 96)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
	06 13 95	< 0.05		(4 29 96)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
	10 04 95	< 0.05		(6 10 96)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
	04 29 96	< 0.05		(7 2 96)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	11 08 96	< 0.05	< 0.05	(11 8 96)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	05 09 97	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	10 21 97	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	05 04 98	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	10 07 98	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05
	05 27 99	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	10 13 99	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	04 17 00	< 0.05	< 0.05		< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	10 19 00	0.33	0.26		< 0.05	< 0.05	0.25	0.052	< 0.05	< 0.05	0.22
	04 27 01	< 0.05	< 0.05		0.41	0.07	< 0.05	< 0.047	0.06	< 0.05	< 0.052
	10 11 01	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	06 06 02	< 0.05	< 0.05		< 0.05	0.078	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	10 18 02	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
	04 24 03	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	10 14 03	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	04/20/04	< 0.05	< 0.05		0.095	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	11/18/04	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	% detects	4	5		5	9	4	4	4	0	6
	Coeff. of Var(s.d./mean)	ND	ND		ND	ND	ND	ND	ND	ND	ND
Sulfate	05 25 90				198	346	248				
	05 28 92							66			
	06 04 92								360		475
	09 30 92								358		533
	11 19 92							180			
	04/28/93	300							680	290	510
	12/03/93	230			480	430	350	160	700	200	
	01/07/94	330			400	450	360	150	680	170	
	02/04/94	340			400	390	330	130	360	900	
	03/10/94	230			360	340	280	130	1200	830	
	04 19 94	290			430	390	340	330	3400	2600	
	05 31 94	300	350	(10 9 95)	450	450	350	190	1800	880	
	06 22 94	300	430	(11 8 95)	400	450	310	150	1600	580	
	07 27 94	260	450	(12 11 95)	350	400	350	150	1200	900	
	10 10 94	350	430	(1 2 96)	450	450	450	160	880	200	
	06 13 95	350	480	(4 29 96)	430	400	400	480	1600	1800	
	10 04 95	330	210	(6 10 96)	350	380	380	140	1100	730	
	04 29 96	350	380	(7 2 96)	430	430	380	550	2600	890	1300
	11 08 96	160	210	(11 8 96)	230	260	180	220	1100	95	460
	05 09 97	230	280		310	310	280	350	1600	430	600
	10 21 97	240	330		300	300	290	180	1600	200	550
	05 04 98	300	430		450	430	380	700	1500	630	1500
	10/07 98	300	350		330	330	330	380	1700	350	750
	05 27 99	300	350		350	380	330	750	2000	700	630
	10 13 99	300	380		350	350	330	580	2300	280	600
	04 17 00	280	380		350		320	620	2200	250	720
	10 19 00	240	320		320	150	600	580	2200	220	560
	04 27 01	240	300		300	300	340	520	2500	420	520
	10 11 01	260	410		400	320	380	500	2200	250	550
	06 06 02	270	350		390	340	250	420	1800	750	380
	10 18 02	250	420		340	340	300	600	1,600	300	
	04 24 03	260	380		380	380	320	680	1,000	380	350
	10 14 03	250	380		360	310	310	700	1,100	370	370
	04 20 04	180	300		240	240	220	550	1600	2000	270
	11 18 04	260	360		360	320	360	570	1400	480	290
	% detects	97	96		97	97	97	97	97	97	94
	Coeff. of Var(s.d./mean)	0.176	0.189		0.165	0.201	0.219	0.535	0.409	0.900	0.539

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS[1]						UPGRADIENT WELLS			
ANALYTE	DATE	MW-4A (1A(I))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
TDS	05 28 92				5910	12900	9300				
	06 04 92							3000			9440
	09 30 92								12478		9320
	11 19 92								12500		
	04 28 93	8500							16000	5500	8900
	12 03 93	8100			13000	13000	9500	3300	15000	5100	
	01 07 94	8600			13000	13000	9500	3400	16000	5000	
	02 04 94	8300			13000	12000	9500	3100	5100	18000	
	03 10 94	7500			12000	12000	9100	3200	18000	8600	
	04 19 94	7800			13000	12000	9300	3700	20000	18000	
	05 31 94	7600	12000	(10 9 95)	12000	12000	9100	3100	21000	7600	
	06 22 94	7400	12000	(11 8 95)	12000	12000	9000	3300	20000	5800	
	07 27 94	8600	11000	(12 11 95)	13000	13000	9800	3400	21000	8500	
	10 10 94	7400	12000	(1 2 96)	13000	12000	9200	3100	16000	4500	
	06 13 95	8200	13000	(4 29 96)	12000	13000	10000	4600	20000	12000	
	10 04 95	7700	14000	(6 10 96)	12000	12000	9900	3100	17000	8300	
	04 29 96	8300	13000	(7 2 96)	13000	12000	11000	5200	21000	8500	12000
	11 08 96	8400	13000	(11 8 96)	12000	12000	10000	5300	25000	4500	10000
	05 09 97	8100	13000		12000	12000	10000	6000	21000	6900	10000
	10 21 97	8000	13000		12000	12000	10000	4300	25000	4600	9400
	05 04 98	7900	13000		12000	12000	9600	6500	13000	7100	11000
	10 07 98	7700	12000		11000	12000	10000	7100	20000	6600	5700
	05 27 99	8300	12000		12000	12000	11000	6700	19000	9300	8900
	10 13 99	8500	13000		11000	12000	10000	6200	29000	5000	10000
	04 17 00	8500	11000		10000		9600	5800	20000	4500	9300
	10 19 00	8200	11000		11000	4400	11000	5800	29000	4400	8000
	04 27 01	8900	13000		13000	13000	12000	5600	31000	7000	9200
	10 11 01	7900	15000		13000	12000	11000	5900	32000	5000	9400
	06 06 02	8800	11000		11000	10000	9200	5900	18000	9600	1100
	10 18 02	7900	13000		13000	12000	10000	6600	20000	5400	
	04 24 03	8100	13000		13000	13000	11000	6600	14000	5300	11000
	10 14 03	7600	16000		16000	14000	13000	7400	16000	5600	12000
	04 20 04	7900	15000		15000	13000	12000	7700	13000	19000	10000
	11 18 04	7000	13000		13000	12000	9900	5400	13000	5700	8800
	% detects	97	96		97	97	97	97	97	97	94
	Coeff. of Var(s.d./mean)	0.056	0.100		0.095	0.137	0.097	0.299	0.301	0.529	0.279
TOC	05 25 90				2.4	1.2	0.6				
	05 28 92							30			
	06 04 92								0.53		1.270
	09 30 92								0.390		1.210
	11 19 92							< 1.0			
	04/28/93	5.1							10.0	8.0	< 1.0
	12 03/93	< 1.0			< 1.0	< 1.0	< 1.0	1.0	< 1.0	< 1.0	
	01/07/94	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
	02/04/94	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
	03/10/94	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.3	
	04 19 94	< 1.0			< 1.0	< 1.0	< 1.0	1.7	< 1.0	1.5	
	05 31 94	< 1.0	< 1.0	(10 9 95)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
	06 22 94	< 1.0	< 1.0	(11 8 95)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
	07 27 94	< 1.0	< 1.0	(12 11 95)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
	10 10 94	< 1.0	< 1.0	(1 2 96)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
	06 13 95	< 1.0	< 1.0	(4 29 96)	< 1.0	< 1.0	< 1.0	2.8	2.7	1.8	
	10 04 95	< 1.0	< 1.0	(6 10 96)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
	04 29 96	< 1.0	< 1.0	(7 2 96)	< 1.0	< 1.0	< 1.0	1.0	8.0	< 1.0	4.1
	11 08 96	< 1.0	< 1.0	(11 8 96)	50	2.0	< 1.0	2.3	< 1.0	1.0	3.2
	05 09 97	< 1.0	< 1.0		1.2	1.4	< 1.0	2.6	3.8	< 1.0	3.9
	10 21 97	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	2.4	< 1.0	1.9
	05 04 98	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	6.0	40.7	< 1.0	2.1
	10 07 98	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	1.4	3.5	< 1.0	18.0
	05 27 99	1	2***		< 1***	1***	4***	13***	6***	2***	5.0
	10 13 99	10.0	2.0		15.0	2.0	< 1.0	6.0	5.0	1.0	4.0
	04 17 00	< 1.0	1.8		2.5	1.4	< 1.0	5.4	3.6	< 1.0	3.1
	10 19 00	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	1.1	< 1.0	< 1.0	2.0
	04 27 01	1.2	< 1.0		< 1.0	1.7	1.4	9.3	9.3	1.2	3.1
	10 11 01	5.8	< 1.0		< 1.0	1.5	< 1.0	2.9	2.2	6.4	5.9
	06 06 02	7.5	< 1.0		< 1.0	< 1.0	< 1.0	1.2	5.7	7.0	1.3
	10 18 02	4.1	1.1		< 1.0	1.1	< 1.0	4.6	2.6	< 1.0	
	04 24 03	7.6	1.9		1.9	1.9	1.2	9.1	7.3	9.0	1.2
	10 14 03	2.8	< 1.0		< 1.0	< 1.0	1.9	14.0	13.0	10.0	1.8
	04 20 04	4.2	1.5		< 1.0	2.8	< 1.0	12	6.5	8.9	3.9
	11 18 04	1.1	< 1		< 1	< 1	< 1	2.9	3.3	< 1	< 1
	% detects	31	21		14	31	10	66	55	34	89
	Coeff. of Var(s.d./mean)	1.111	ND		ND	0.415	ND	1.090	1.676	1.250	1.013

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

ANALYTE	DATE	DOWNGRADIENT WELLS[1] MW-4A (1A(1))	MW-5A		UPGRADIENT WELLS MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
VOCs	05/25/90	all ND			all ND	all ND	all ND				
	05/28/92							all ND			
	06/04/92								all ND		all ND
	09/30/92								all ND		all ND
	11/19/92							all ND			
	04/28/93								all ND	all ND	all ND
	12/03/93	all ND				all ND	all ND	all ND	all ND	all ND	
	01/07/94										
	02/04/94										
	03/10/94										
	04/19/94	all ND			all ND	all ND	all ND	all ND	all ND	all ND	
	05/31/94		all ND	(10/9/95)							
	06/22/94			(11/8/95)							
	07/27/94			(12/11/95)							
	10/10/94	all ND		(1/2/96)	all ND	all ND	all ND	all ND	all ND	all ND	
	06/13/95	all ND		(4/29/96)	all ND	all ND	all ND	all ND	all ND	all ND	
	10/04/95	all ND		(6/10/96)	all ND	all ND	all ND	all ND	all ND	all ND	
	04/29/96	all ND		(7/2/96)	all ND	all ND	all ND	all ND	all ND	all ND	all ND
	11/08/96	all ND	all ND	(11/8/96)	all ND	all ND	all ND	all ND	all ND	all ND	all ND
	05/09/97	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	10/21/97	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	05/04/98	all ND	all ND		all ND	all ND	all ND	all ND	all ND	**	all ND
	10/07/98	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	05/27/99	all ND	all ND		all ND	all ND	all ND	all ND	all ND****	all ND	all ND
	10/13/99	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	04/17/00	all ND	all ND		all ND		all ND	all ND	all ND	all ND	all ND
	10/19/00	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	04/27/01	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	10/11/01	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	06/06/02	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	10/18/02	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	NA
	04/24/03	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	toluene
	10/14/03	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
	04/20/04	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	toluene
	11/18/04	all ND	all ND		all ND	all ND	all ND	all ND	all ND	all ND	all ND
FIELD MEASUREMENTS											
pH	05/25/90				7.18	7.10	7.08				
	05/28/92							7.5			
	06/04/92								7.2		7.500
	09/30/92								7.5		7.500
	11/19/92							7.8			
	04/28/93	7.5							7.4	7.5	7.5
	12/03/93	7.6			7.1*	7.5	7.5	7.5	7.0	7.4	
	01/07/94	7.6			6.9	7.2	7.2	7.6	6.8	7.4	
	02/04/94	7.5			7.3	7.4	7.4	7.6	6.9	7.6	
	03/10/94	7.6			7.6	7.5	7.5	7.6	6.9	7.5	
	04/19/94	7.3			7.3	7.4	7.4	7.3	6.9	7.3	
	05/31/94	7.5	7.3	(10/9/95)	7.2	7.3	7.4	7.5	6.4	7.4	
	06/22/94	7.3	7.4	(11/8/95)	7.4	7.1	7.4	7.4	6.8	7.5	
	07/27/94	7.4	7.2	(12/11/95)	7.3	7.4	7.4	7.6	6.9	7.5	
	10/10/94	7.4	7.5	(1/2/96)	7.1	7.4	7.3	6.6	6.6	7.1	
	06/13/95	NA	7.3	(4/29/96)	7.3	7.4	7.4	7.4	NA	NA	
	10/04/95	7.5	7.3	(6/10/96)	7.4	7.4	7.4	7.4	6.8	7.5	
	04/29/96	7.5	7.4	(7/2/96)	7.3	7.2	7.3	7.4	6.8	7.4	7.2
	11/08/96	7.6	7.5	(11/8/96)	7.6	7.3	7.3	7.5	6.7	7.7	7.3
	05/09/97	7.5	7.5		7.2	7.2	7.1	7.4	6.9	7.2	7.3
	10/21/97	7.3	6.7		6.9	7.0	7.1	7.2	6.6	7.2	7.1
	05/04/98	6.7	6.9		6.7	6.9	6.9	7.1	6.5	6.8	6.9
	10/07/98	7.0	7.1		6.6	6.8	6.9	6.9	6.6	6.8	7.3
	05/27/99	7.62	7.82		7.33	7.28	7.22	7.42	7.04	7.34	7.49
	10/13/99	7.82	7.6		7.62	7.44	7.39	7.25	7.02	7.72	7.31
	04/17/00	7.64	7.42		6.91		7.09	7.11	6.88	6.84	6.89
	10/19/00	7.5	7.32		7.27	7.37	7.39	7.43	6.63	7.56	7.35
	04/27/01	7.1	6.8		6.8	6.7	6.7	6.6	6.5	7.0	6.7
	10/11/01	8.53	7.75		8.11	8.44	8.69	8.74	7.52	8.75	8.84
	06/06/02	5.89	7.38		7.38	7.29	7.57	5.81	5.41	6.02	6.31
	10/18/02	7.87	7.8		7.77	7.72	7.91	7.95	7.39	7.91	
	04/24/03	7.5	7.37		7.33	7.25	7.2	7.57	7.11	7.64	7.33
	10/14/03	7.32	7.24		7.22	7.37	7.34	7.2	6.81	7.39	6.62
	04/20/04	8.43	8.24		8.12	8.13	8.25	7.56	6.89	7.33	7.93
	11/18/04	8.01	7.74		7.8	8.09	7.18	7.37	7.43	8.12	7.01

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS [1]				UPGRADIENT WELLS						
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Temperature	05 25 90				14.0	14.0	16.0				
	04 28 93	11.8							13.9	14.4	11.1
	12 03 93	13.0			16.9*	12.0	12.0	12.6	15.8	13.9	
	01 07 94	12.7			11.4	12.3	11.2	12.1	16.0	13.9	
	02 04 94	13.0			11.5	11.8	10.7	11.3	14.6	14.0	
	03 10 94	14.1			10.6	11.1	10.4	12.1	16.0	15.8	
	04 19 94	15.9			16.6	15.4	14.2	14.8	19.1	16.7	
	05 31 94	15.0	15.0	(10 9 95)	14.4	15.0	14.8	14.3	16.4	15.3	
	06 22 94	16.9	14.7	(11 8 95)	16.2	15.4	15.0	14.6	19.3	18.4	
	07 27 94	16.2	13.7	(12 11 95)	16.5	16.9	16.6	15.3	18.8	16.7	
	10 10 94	15.8	12.8	(1 2 96)	14.8	15.8	16.9	15.2	17.3	16.1	
	06 13 95	NA	13.6	(4 29 96)	16.0	15.9	16.3	14.7	NA	NA	
	10 04 95	13.0	16.1	(6 10 96)	12.9	13.7	13.4	14.3	17.1	14.8	
	04 29 96	14.7	18.4	(7 2 96)	13.7	13.3	14.6	12.9	17.4	16.0	12.5
	11 08 96	15.8	14.4	(11 8 96)	14.0	14.6	13.6	14.1	17.2	15.3	14.1
	05 09 97	15.8	14.8		14.6	13.5	13.8	13.1	16.6	16.7	13.0
	10 21 97	15.8	14.4		15.1	15.9	15.5	14.7	19.2	17.2	14.6
	05 04 98	14.9	13.2		13.2	14.3	14.0	11.7	16.4	15.6	11.1
	10 07 98	15.4	15.3		15.2	16.0	15.1	13.8	17.6	14.8	14.6
	05 27 99	16.7	16.3		16.6	14.9	15.3	13	17	16.5	14.4
	10 13 99	18.1	16.6		15.4	16.6	15.5	14.7	21.2	19.6	15.0
	04 17 00	12.9	12.2		14.8		12.3	12.9	14.6	15	13.7
	10 19 00	15.3	17.1		18.7	16.9	18.7	17.7	16.1	17.1	18.4
	04 27 01	20.14	18.02		18.12	17.76	16.84	13.12	20.14	18.58	15.25
	10 11 01	13.6	14.6			14.4	14.7	14.2	16.4	14.7	13.7
	06 06 02	20.9	17.8		18.6	18.1	19.1	16.5	21	20.2	17.9
	10 18 02	19.2	17.7		16.9	19.6	21.9	17.3	22	18.3	
	04 24 03	19.6	16.6		16.7	14.6	16.4	13.6	16.6	17.1	12.2
	10 14 03	17.9	17.9		17.0	16.5	18.4	17.0	20.5	18.3	15.3
	04 20 04	17.4	16.3		15.4	13.1	13.1	13.5	16.4	17.0	15.0
	11 18 04	15.81	13.13		14.65	8.60	15.80	16.35	16.69	17.16	15.91
Conductivity	05 25/90				20223	20358	15408				
	05 28/92							5500			
	11/19/92							5300			
	04 28/93	15400							26000	8800	16200
	12/03 93	14.0			22.4*	22.0	17.0	5.6	24.0	9.8	
	01 07 94	15.4			22.3	22.9	17.1	5.7	24.7	9.8	
	02 04/94	14.1			21.8	21.9	16.9	5.5	28.1	9.6	
	03 10 94	13.7			21.9	21.8	16.7	5.6	31.6	16.0	
	04/19/94	14.9			22.1	22.4	16.8	6.4	35.2	29.9	
	05/31/94	15.2	23.8	(10/9 95)	22.7	21.8	16.6	5.5	36.2	15.1	
	06/22/94	14.4	23.9	(11 8 95)	22.8	22.7	16.8	5.4	35.1	12.1	
	07/27/94	15.3	21.2	(12 11 95)	22.7	22.6	17.3	5.6	32.5	14.4	
	10/10/94	14.1	21.4	(1 2 96)	22.4	22.3	16.9	5.6	27.4	8.0	
	06 13/95	NA	21.5	(4 29 96)	22.9	22.8	19.5	8.0	NA	NA	
	10 04/95	14.7	22.1	(6 10 96)	22.1	21.9	18.5	5.7	29.7	15.4	
	04 29/96	14.5	21.6	(7 2 96)	21.1	21.0	17.7	9.8	29.0	14.3	19.9
	11 08 96	14.7	21.6	(11 8 96)	20.7	20.9	17.4	9.4	39.9	7.6	17.9
	05 09 97	12.4	18.3		17.6	17.8	15.1	7.7	26.9	10.6	14.3
	10 21 97	17.2	25.4		25.0	24.1	20.8	6.5	44.4	10.5	19.7
	05 04 98	16.7	26.2		23.6	24.5	20.8	14.0	26.7	15.5	23.6
	10 07 98	21.1	31.1		29.4	30.1	26.2	18.0	47.6	18.4	15.4
	05 27 99	20.8	29.3		28.2	29.2	26.9	17.7	41.2	22.8	24
	10 13 99	19.9	29.6		28.8	29.7	25.6	17.0	63.4	13.8	25.1
	04 17 00	21.4	31.7		12.62		36.7	46.1	49	8.43	19.7
	10 19 00	20.6	30		28.4	0.016	25.3	15.6	63.7	13	22.3
	04 27 01	15.5	23.5		22.6	18.8	19.9	9.24	46.4	12.4	17.3
	10 11 01	20.3	30.1		28.8	25.9	25.1	14.3	54.5	13.2	21.4
	06 06/02	13.8	29.7		28.5	28.2	24.7	8.91	30.9	17.3	21.2
	10 18 02	14.6	23.5		20.6	21.5	19.5	11.2	29.9	9.06	
	04 24 03	14.5	23.2		22.3	21.7	18	12.2	23.3	10.2	15.4
	10 14 03	14.8	23.6		22.5	21.0	17.9	13.6	23.4	10.9	17.1
	04 20 04	13.6	21.7		21.0	20.8	17.5	11.8	22.9	30.8	16.5
	11 18 04	14.1	23.1		22.4	23	20.3	12.7	23.9	11.7	15.4

TABLE 3
SUMMARY OF RECENT ANALYTICAL RESULTS (mg/L)
May 1990 through November 2004

	DOWNGRADIENT WELLS [1]				UPGRADIENT WELLS						
ANALYTE	DATE	MW-4A (1A(1))	MW-5A		MW-6A (E-26)	MW-7A (E-25)	MW-8A (E27)	MW-1A (ET-O)	MW-2A (EE(E))	MW-3A (2)	F
Turbidity	05/25/90				5.2	3.8	11.5				
	06/04/92								34.6		1.91
	09/30/92								30.1		3.19
	04/28/93	>999					311.0		450.0	110.0	70.0
	12/03/93	>999			800*	940	490	466	>999	>999	
	01/07/94	475			155	970	655	456	>999	>999	
	02/04/94	110			860	240		240	>999	675	
	03/10/94	10			185	558	822	342	>999	624	
	04/19/94	230			300	220	650	700	>999	750	
	05/31/94	50	311	(10/9/95)	350	697	795	880	>999	800	
	06/22/94	720	160	(11/8/95)	470	>999	>999	>999	>999	870	
	07/27/94	108	519	(12/11/95)	60	102	318	481	875	888	
	10/10/94	150	20	(1/2/96)	81	542	450	370	540	350	
	06/13/95	NA	255	(4/29/96)	600	219	>999	400	NA	NA	
	10/04/95	10	685	(6/10/96)	20	133	400	70	170	600	
	04/29/96	40	347	(7/2/96)	285	783	530	723	275	200	315
	11/08/96	4	200	(11/8/96)	134	92	129	315	59	369	8
	05/09/97	598	560		476	422	554	9	702	931	409
	10/21/97	228	49		140	999	999	147	197	257	220
	05/04/98	157	297		40	305	467	350	351	386	59
	10/07/98	23	58		7	143	205	153	23	66	7
	05/27/99	126	281		121	189	784	219	156	160	43
	10/13/99	10	5		69	8	95	25	2	3	10
	04/17/00	36	30		660		475	23	41	32	88
	10/19/00	2	7		70	2	303	6	96	213	1
	04/27/01	**260**	**65**		**25**	**>990**	**>990**	**218**	**150**	**990**	**150**
	10/11/01	5	15		0	-10	148	40	7	61	90
	06/06/02	15.8	7.98		27.1	47.8	134	5.59	3.96	13.6	7.29
	10/18/02	1.9	2.95		9.08	10	26.2	53.9	63.3	5.6	
	04/24/03	22.1	12		5.5	21.7	204	3.3	14.8	10.9	9
	10/14/03	61	0		2.0	20	360	0	0	0	44
	04/20/04	**40.7**	**30.4**		**58.2**	**119**	**305**	**199**	**86.1**	**46.2**	**72.2**
	11/18/04	51.1	13		50	1.4	390	10	34	21	1.4
D.O.	05/25/90										
	04/28/93	11.4							10.8	7.9	9.9
	12/03/93	6.0			1.6*	3.0	2.6	1.1	2.3	8.0	
	01/07/94	6.5			3.1	3.2	3.2	1.9	1.8	8.0	
	02/04/94	6.0			1.2	9.4	2.2	2.1	6.5	2.0	
	03/10/94	5.3			4.5	6.0	3.1	1.0	1.9	1.9	
	04/19/94	5.9			2.0	0.9	1.6	2.4	2.0	1.6	
	05/31/94	5.6	1.4	(10/9/95)	1.3	2.4	2.8	2.3	0.9	1.5	
	06/22/94	6.6	1.7	(11/8/95)	1.7	2.0	1.4		1.4	1.4	
	07/27/94	5.2	1.6	(12/11/95)	2.5	2.5	2.3	1.6	1.7	2.1	
	10/10/94	3.8	1.5	(1/2/96)	1.7	1.5	2.0	2.1	1.6	0.9	
	06/13/95	NA	1.4	(4/29/96)	1.3	0.5	1.5	1.7	NA	NA	
	10/04/95	5.6	2.0	(6/10/96)	1.5	1.5	2.0	0.8	2.2	1.8	
	04/29/96	4.5	2.4	(7/2/96)	0.7	2.0	1.6	1.8	1.8	1.4	4.2
	11/08/96	4.5	3.3	(11/8/96)	3.9	1.3	0.9	1.3	1.5	2.3	2.1
	05/09/97	5.1	2.4		1.4	1.5	2.1	2.0	2.3	1.9	3.4
	10/21/97	4.8	1.7		1.6	1.1	1.4	1.0	2.2	1.0	1.4
	05/04/98	5.7	2.8		2.5	2.4	1.6	2.1	2.9	1.8	5.6
	05/27/99	7.55	2.47		2.5	1.57	0.74	2.87	1.47	2.41	3.46
	10/13/99	7.25	1.65		1.89	1.78	5.15	1.24	5.75	5.85	1.66
	04/17/00	6.2	2		1.2		3.1	2.3	2.8	7.7	1.9
	10/19/00	0.94	0.86		0.8	0.88	0.79	0.84	0.89	0.86	0.81
	04/27/01	8.7	2.4		1.8	3.8	2.0	3.8	4.0	2.5	2.5
	10/11/01	8.98	9.66		10.6	11	10.82	11.05	7.73	8.44	11.44
	06/06/02	1.4	11.48		10.91	11.37	8.65	1.7	3.00	2.4	12.23
	10/18/02	2.41	1.04		1.07	1.30	1.48	1.96	1.63	2.19	
	04/24/03	2.46	2.41		2.47	3.56	1.98	5.75	5.69	5.24	6.37
	10/14/03	0.0	6.09		5.89	2.84	0.0	8.65	0.21	5.26	5.26
	04/20/04	0.71	5.21		6.31	1.78	0.0	0.0	4.09	2.67	3.57
	11/18/04	3.06	2.75		2.84	2.34	2.93	2.85	3.51	2.26	8.24

*Well MW-6A was not accessible on 12/03/93. Because eight samples were required to establish the naturally-occuring concentrations of several parameters in each well, a sample was collected from Well MW-6A on 08/26/94.

**Well MW-3: The following volatile organic compounds were detected: Acetone (22 ug/l) and 2-Butanone (13 ug/l).

***Sample was analyzed outside of holding times.

****Well MW-2A - Benzene was detected at concentration of 2 ug/l.

[1] Well MW-7A: Spring 2000 data are not representative due to possible surface water contamination and are therefore not included.

[2] Well MW-5A: Toluene was detected at the reporting limite of 2 ug/LA1142

Table 4
Summary of Analytical Results for Surface Water Samples
October 20, 2004
Salt Lake Valley Solid Waste Management Facility

ANALYTE	Lee Drain East of Landfill (S-1)*	Lee Drain West of Landfill (S-2)*	Public Drop-off Area (S-3)	Run-on Area East of Active Cell (S-4)	Active Cell Module Drain (S-5)	East end of De-Watering Trench (S-6)	West end of De-Watering Trench (S-7)
Sample I.D.	LF-102004-05	LF102004-04	LF-102004-01	NS	NS	LF-102004-03	LF-102004-02
Dissolved Metals (mg/L)							
Arsenic	0.018	0.047	0.019	NA	NA	0.007	0.005
Barium	0.046	0.17	0.11	NA	NA	0.15	0.12
Boron	0.38	1.5	0.33	NA	NA	0.92	0.98
Cadmium	< 0.004	< 0.004	< 0.004	NA	NA	< 0.004	< 0.004
Chromium	< 0.01	< 0.01	< 0.01	NA	NA	< 0.01	< 0.01
Copper	0.007	0.007	0.038	NA	NA	0.005	0.004
Iron	0.046	0.02	0.31	NA	NA	0.015	0.025
Iron[n]	11	0.48	1.7	NA	NA	0.37	0.34
Lead	< 0.005	< 0.005	< 0.005	NA	NA	< 0.005	< 0.005
Magnesium[n]	20	130	16	NA	NA	140	180
Manganese	0.055	0.006	0.093	NA	NA	0.16	0.21
Mercury	< 0.0002	< 0.0002	< 0.0002	NA	NA	< 0.0002	< 0.0002
Selenium	< 0.005	< 0.005	< 0.005	NA	NA	< 0.005	< 0.005
Silver	< 0.0050	<0.005	< 0.005	NA	NA	< 0.005	0.005
Sodium[n]	230	2200	270	NA	NA	2600	3100
Zinc	0.017	0.013	0.03	NA	NA	0.011	0.02
Minerals (mg/L)							
Alkalinity[#]	110	200	200	NA	NA	140	120
Ammonia	0.29	412	0.32	NA	NA	0.2	0.46
Bicarbonate[#]	110	200	200	NA	NA	140	120
Carbonate[#]	< 10	< 10	< 10	NA	NA	<10	< 10
Chloride	360	4500	420	NA	NA	4700	5800
COD	94	68	170	NA	NA	43	95
Cyanide	<0.0050	< 0.005	0.025	NA	NA	< 0.005	< 0.005
Nitrate	0.3	<0.010	1.1	NA	NA	0.12	0.39
Nitrite	0.068	0.013	0.12	NA	NA	0.012	0.1
Oil and Grease	4.8	3.7	4.9	NA	NA	3.5	3.8
Phosphate	0.22	< 0.05	0.37	NA	NA	< 0.050	< 0.050
Sulfate	170	800	180	NA	NA	300	280
TDS	640	6800	1100	NA	NA	8900	11,000
TOC	8.1	9.2	28	NA	NA	1.8	1.6
TOX	0.11	0.24	0.24	NA	NA	0.17	0.15
TSS	500	25	30	NA	NA	16	6
Volatile Organics	all ND	all ND	all ND	NA	NA	all ND	all ND
Field Measurements							
pH	8.32	8.46	6.99	NA	NA	7.65	7.33
Temperature (°C)	11.1	10.9	12.6	NA	NA	12.8	12

* Lee Drain east of the Landfill is upstream; west of the Landfill is downstream.
[n] Analyzed for total metal content.
[#] Alkalinity, bicarbonate, and carbonate all analyzed as $CaCO_3$.
ND – None Detected, NA – Not Analyzed, NS – Not Sampled

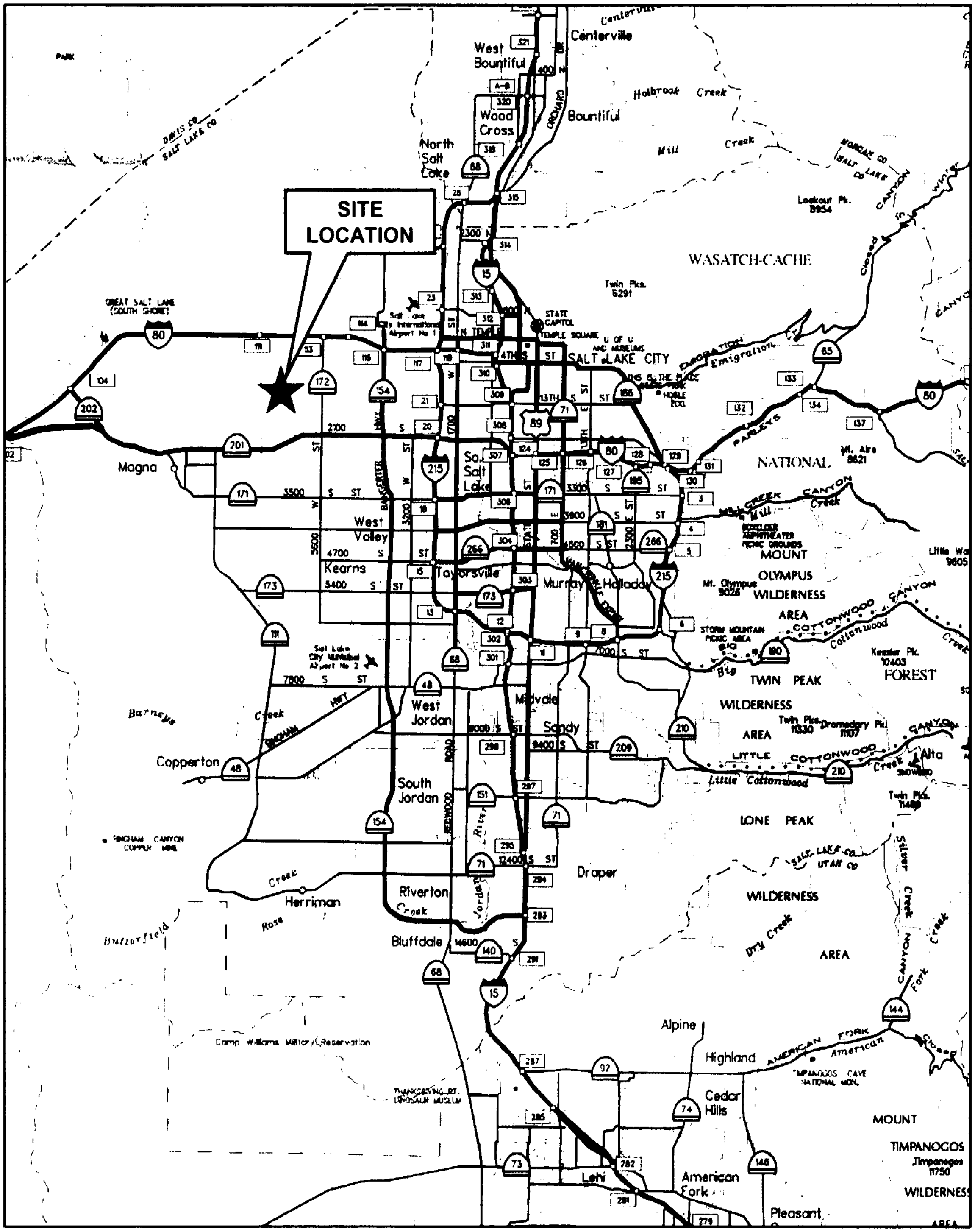
Table 5
Laboratory Analysis for Groundwater Monitoring

General Minerals
Alkalinity as $CaCO_3$ Bicarbonate as $CaCO_3$ Carbonate as $CaCO_3$ Sulfate Chloride Calcium Potassium Sodium Magnesium
Metals
Antimony (Dissolved) Arsenic (Dissolved) Barium (Dissolved) Beryllium (Dissolved) Cadmium (Dissolved) Chromium (Dissolved) Cobalt (Dissolved) Copper (Dissolved) Iron (Dissolved) Iron (Total) Lead (Dissolved) Manganese (Dissolved) Mercury (Dissolved) Nickel (Dissolved) Selenium (Dissolved) Silver (Dissolved) Thallium (Dissolved) Vanadium (Dissolved) Zinc (Dissolved)
Other
Total Organic Carbon (TOC) Ammonia as N Nitrate as N Nitrite as N Phenols Sulfate Total Dissolved Solids (TDS) Chemical Oxygen Demand (COD) (Active Landfill Only)
Organics
Volatile Organics (EPA 8260 and EPA 504 for EDB and DBCP)

Table 6
Laboratory Analysis for
Surface Water Monitoring
Active Salt Lake Valley Landfill

General Minerals
Alkalinity as $CaCO_3$
Bicarbonate as $CaCO_3$
Carbonate as $CaCO_3$
Sulfate
Chloride
Sodium
Metals
Arsenic (Dissolved)
Barium (Dissolved)
Boron (Dissolved)
Cadmium (Dissolved)
Chromium (Dissolved)
Copper (Dissolved)
Iron (Dissolved)
Iron (Total)
Lead (Dissolved)
Magnesium (Dissolved)
Manganese (Dissolved)
Mercury (Dissolved)
Selenium (Dissolved)
Silver (Dissolved)
Zinc (Dissolved)
Other
Total Organic Carbon (TOC)
Ammonia as N
Nitrate as N
Nitrite as N
Ortho-Phosphate
Total Dissolved Solids (TDS)
Total Suspended Solids (TSS)
Total Organic Halides (TOX)
Oil and Grease
Chemical Oxygen Demand (COD)
Cyanide (CN)
Organics
Volatile Organics (EPA 8260)

APPENDIX
A



BASE MAP:
Utah Atlas & Gazetteer
DeLorme 2002

0' 2 4
APPROX. SCALE: 1" = 4 MILES

SLC5Q058.ppt

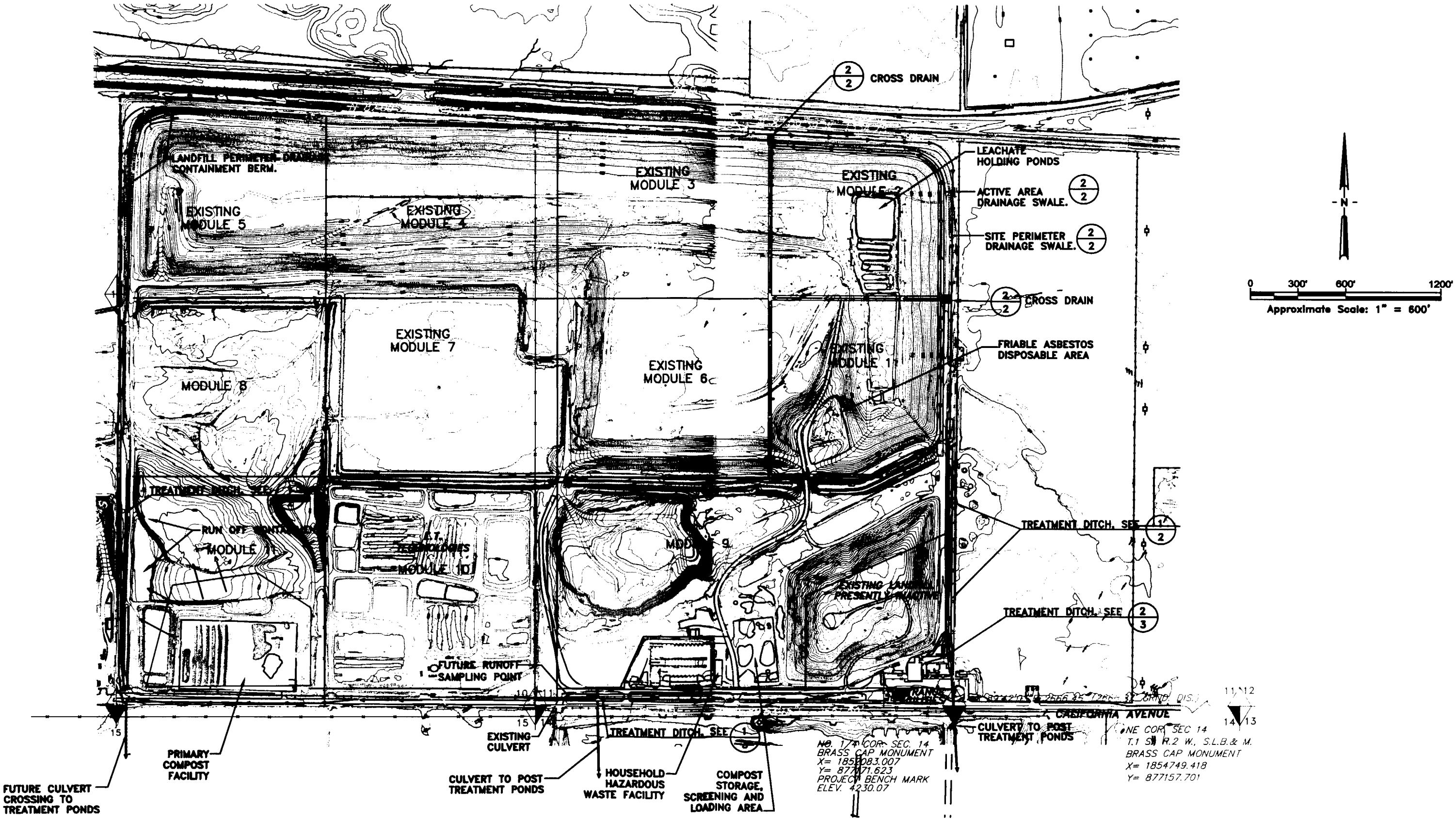
KLEINFELDER

Date: 02/10/2005
Project Number 17677.009

Salt Lake Valley Landfill
Salt Lake City, Utah

SITE MAP

FIGURE
1



SLC5d066.dwg

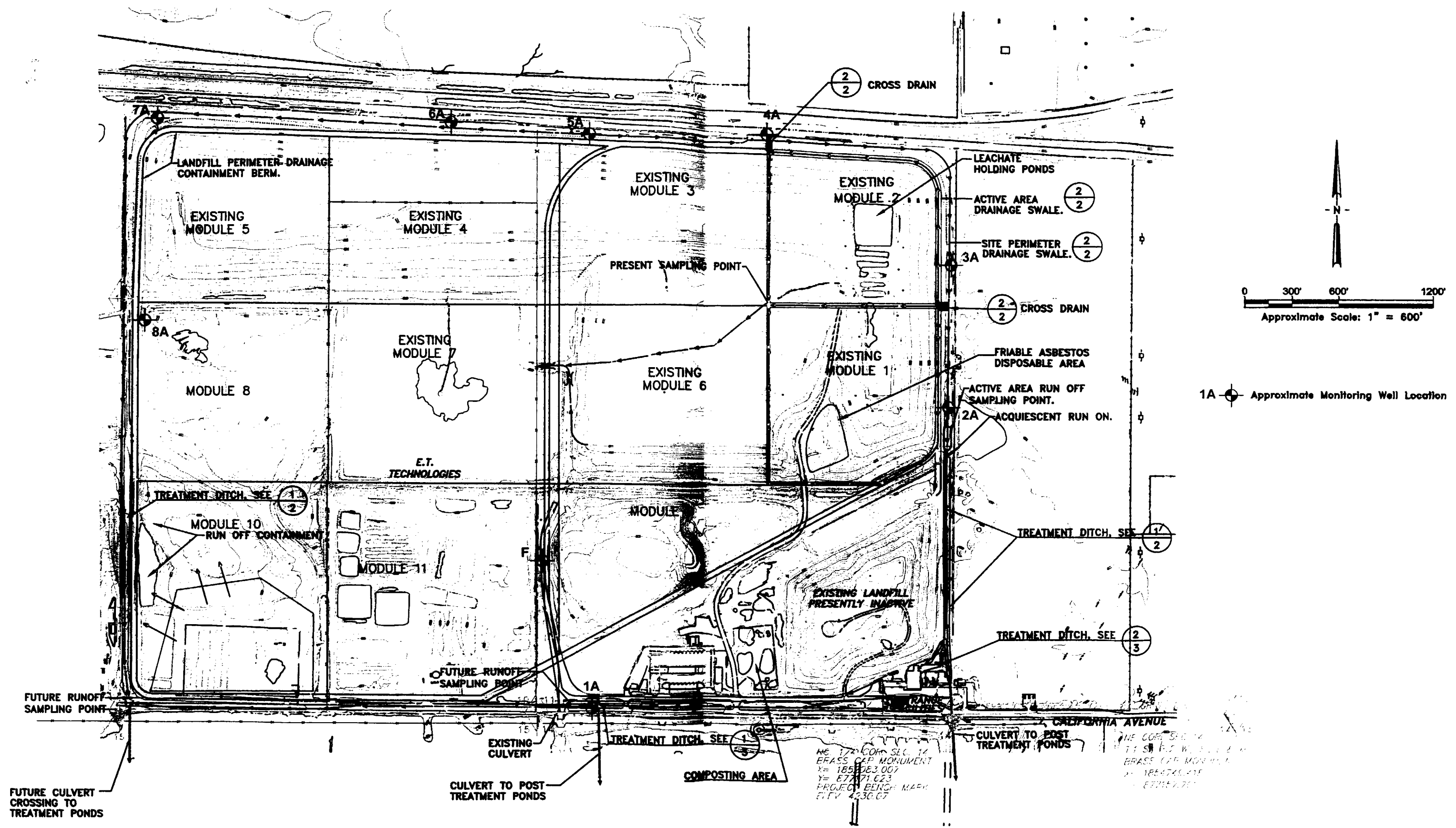
KLEINFELDER

Date: 02/07/2005
Project Number 17677.009

Salt Lake Valley Solid Waste Management Facility
Salt Lake City, Utah

ACTIVE LANDFILL CELLS

FIGURE 2



SLC5d066.dwg

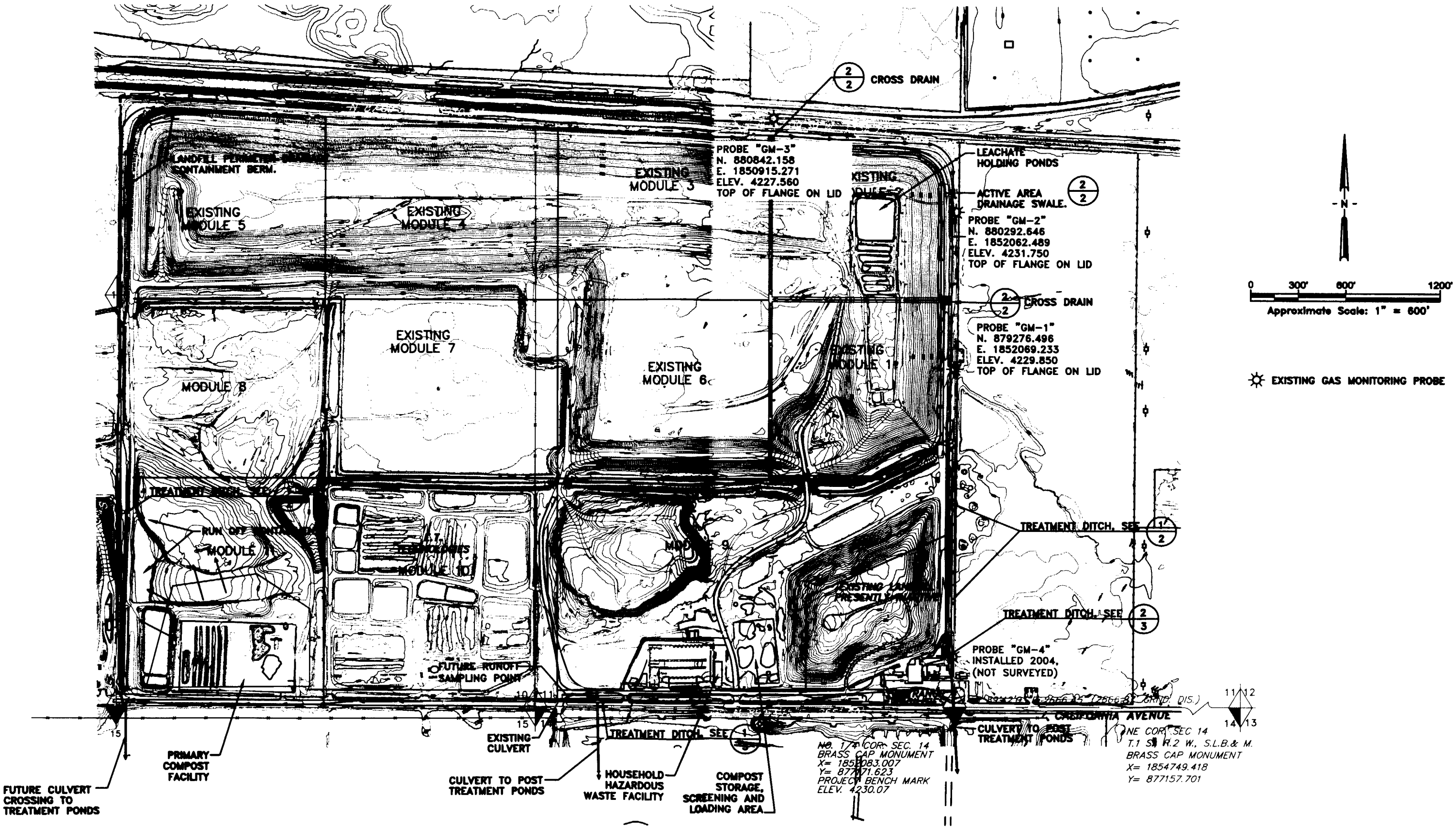
KLEINFELDER

Date: 02/07/2005
Project Number 17677.009

Salt Lake Valley Landfill
Salt Lake City, Utah

MONITORING WELL LOCATIONS

FIGURE
3



SLC5d066.dwg

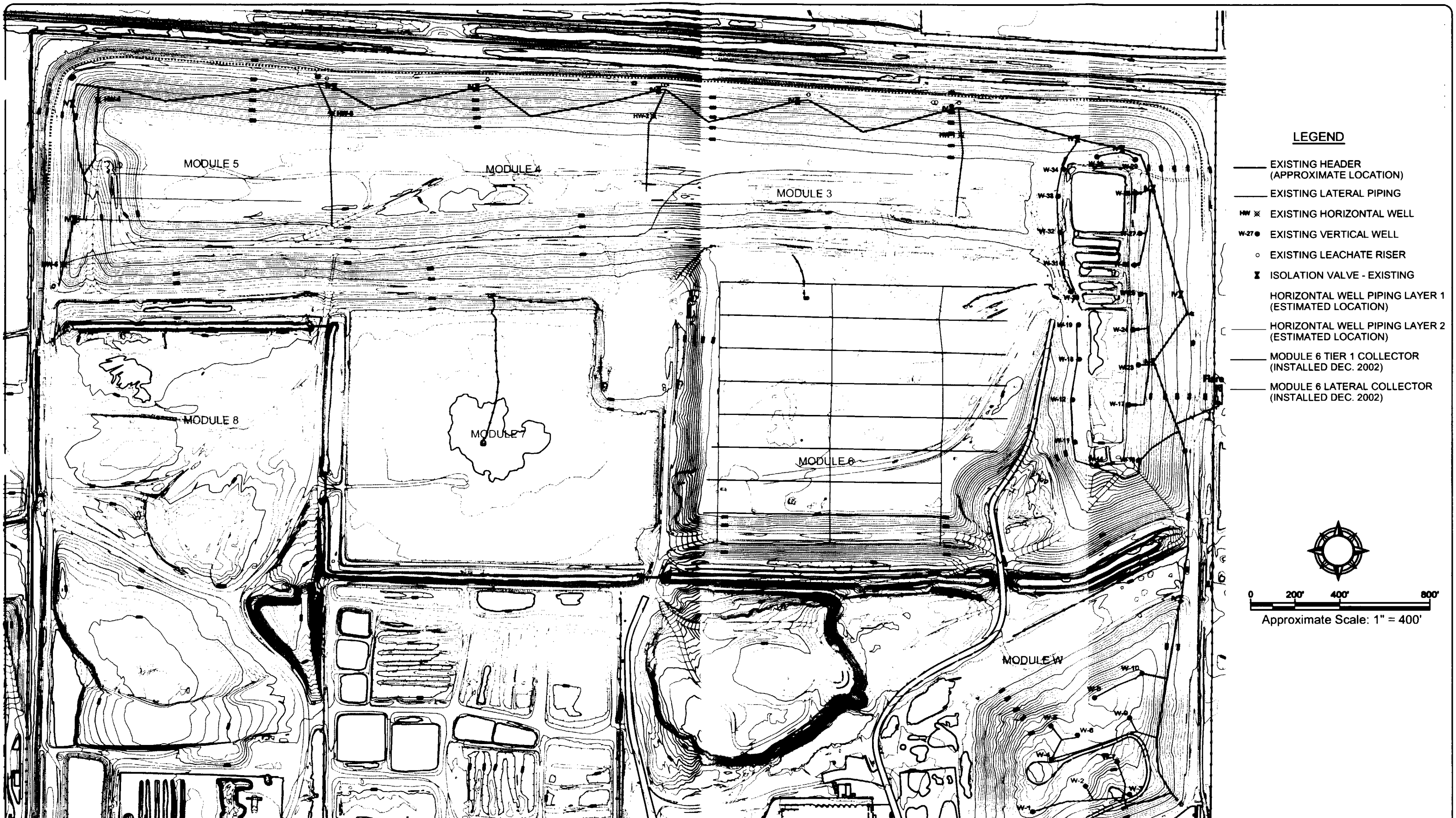
KLEINFELDER

Date: 02/07/2005
Project Number 17677.009

Salt Lake Valley Solid Waste Management Facility
Salt Lake City, Utah

LANDFILL GAS MONITORING PROBES

FIGURE 4



SLC5d067.dwg

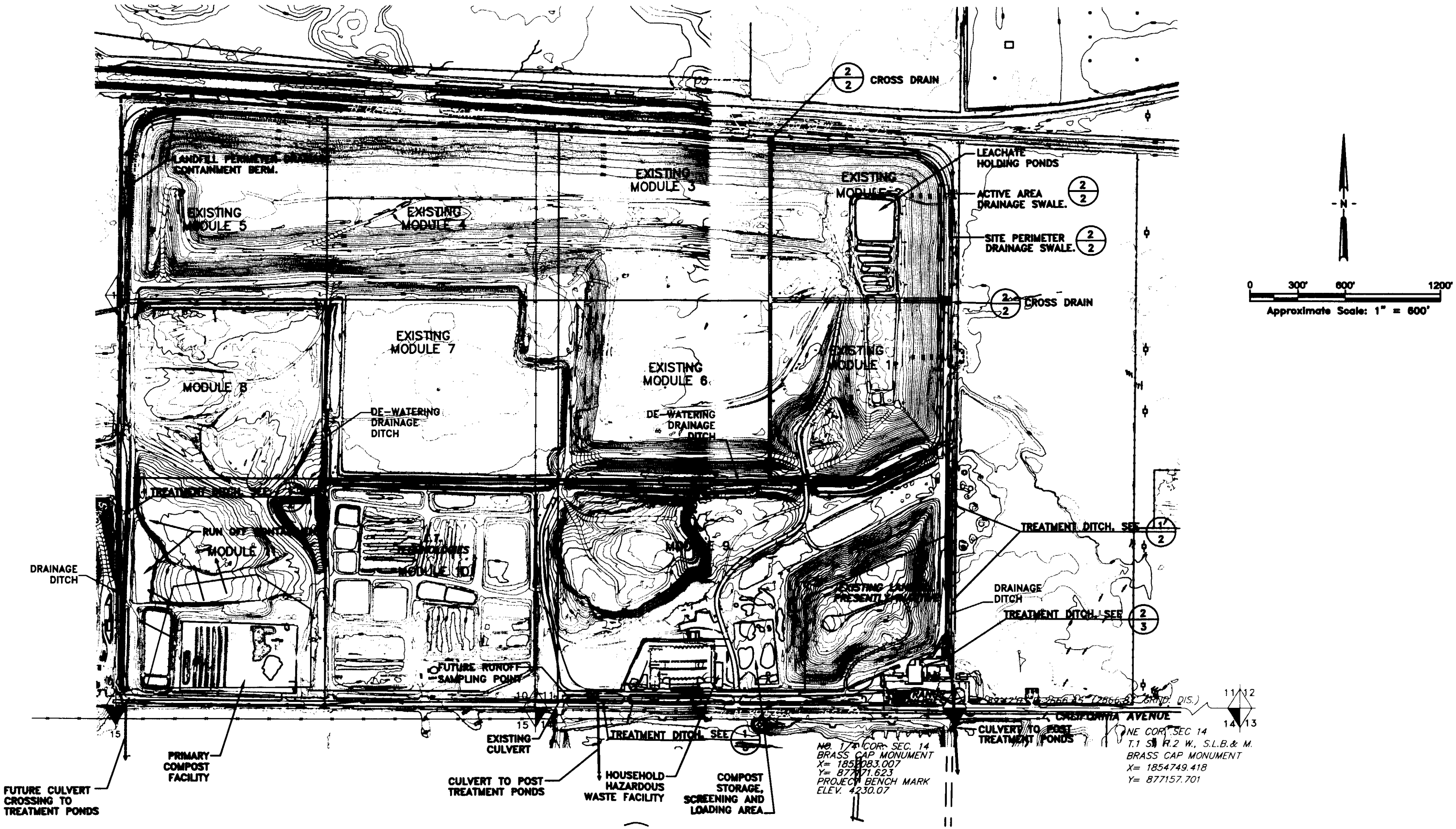
KLEINFELDER

Date: 02/07/2005
Project Number 17677.009

Salt Lake Valley Landfill
Salt Lake City, Utah

LANDFILL GAS COLLECTION SYSTEM

FIGURE 5



SLC5d066.dwg

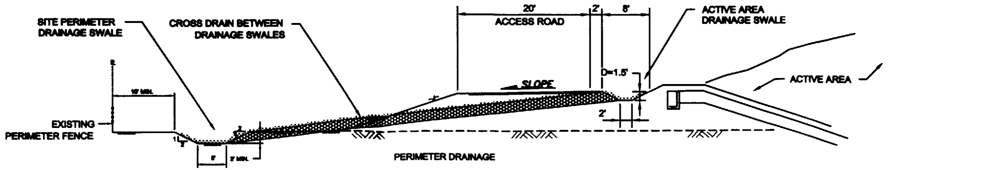
KLEINFELDER

Date: 02/07/2005
Project Number 17677.009

Salt Lake Valley Solid Waste Management Facility
Salt Lake City, Utah

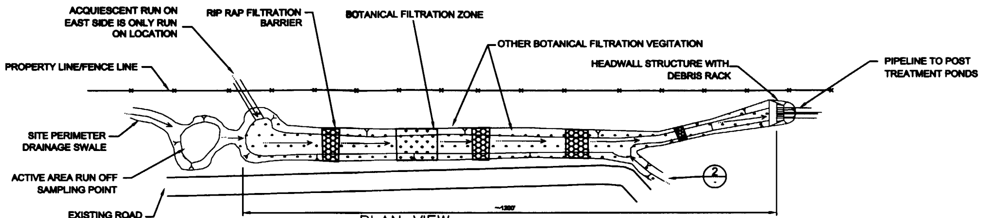
LANDFILL DRAINAGE PLAN

FIGURE 6

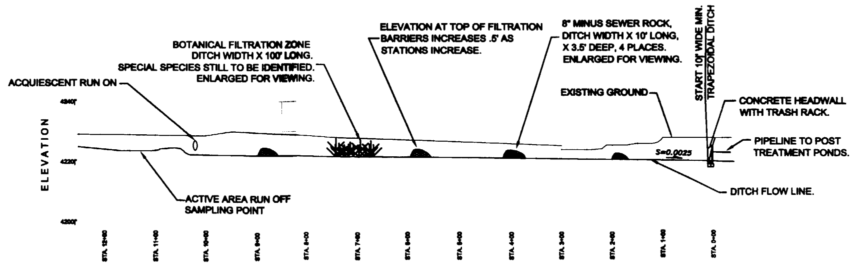


PERIMETER DRAINAGE

DETAIL 2
NO SCALE



PLAN VIEW
NO SCALE



PROFILE
NO SCALE

SITE DRAINAGE TREATMENT DITCH

DETAIL 1
NO SCALE

SLC5d068.dwg

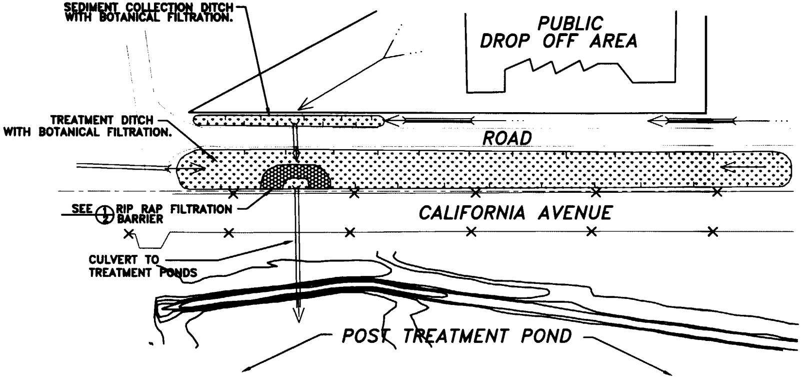
KLEINFELDER

Date: 02/07/2005
Project Number 17677.009

Salt Lake Valley Landfill
Salt Lake City, Utah

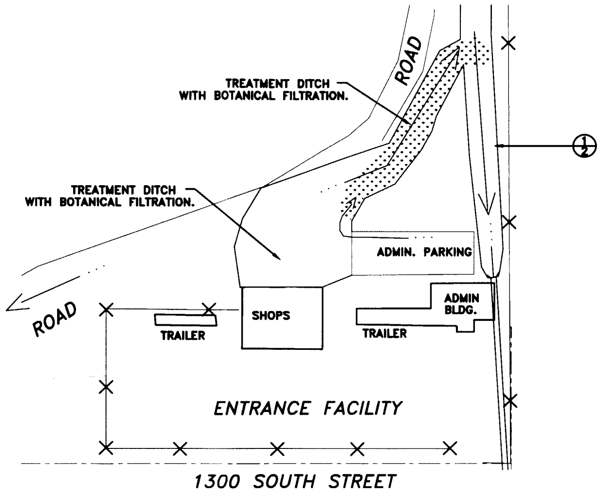
LANDFILL DRAINAGE PLAN DETAILS (1 OF 2)

FIGURE 7



SITE DRAINAGE TREATMENT DITCH

DETAIL 1
NO SCALE



FACILITIES DRAINAGE TREATMENT DITCH

DETAIL 2
NO SCALE

SLC5d069.dwg

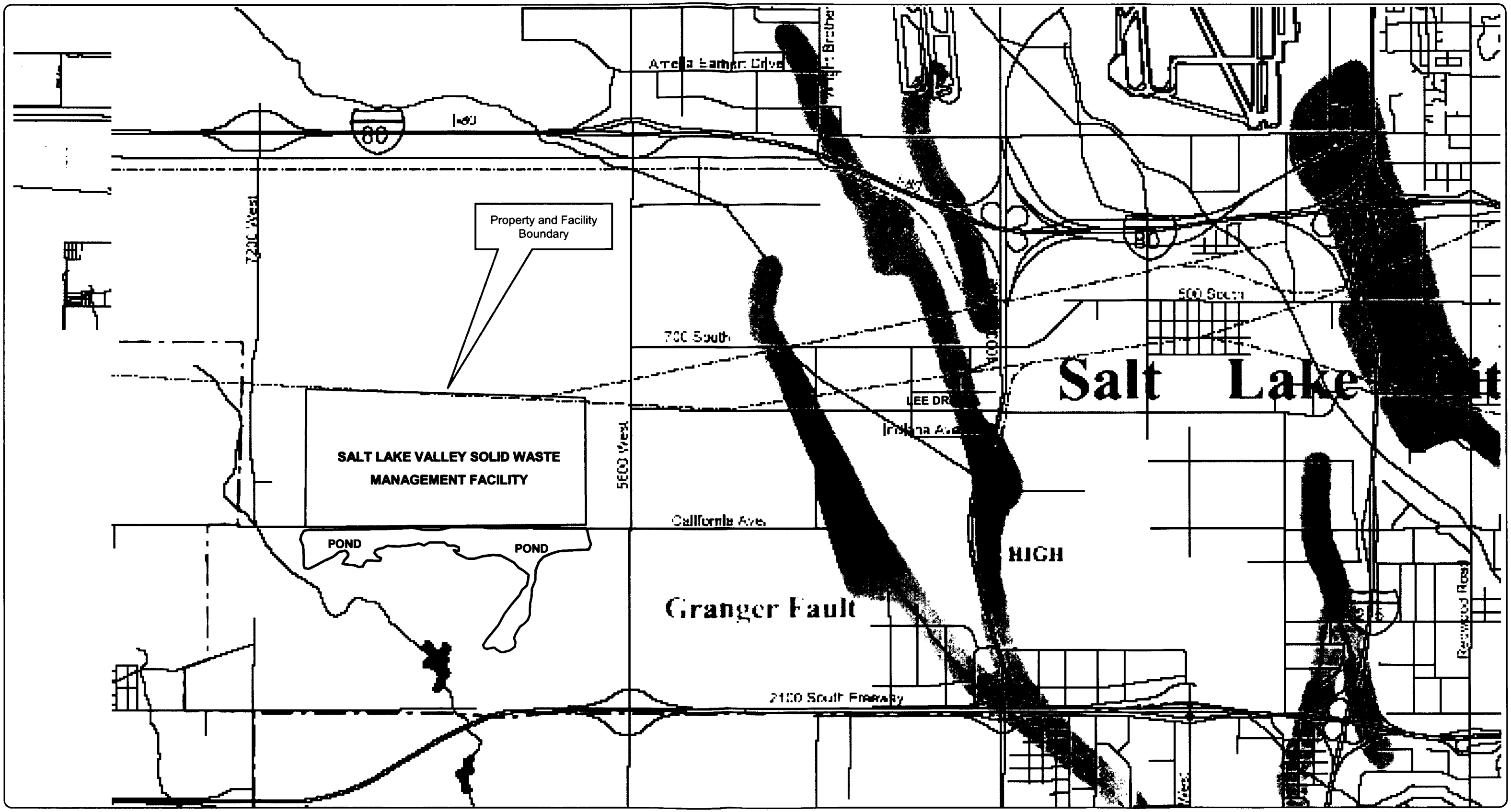
KLEINFELDER

Date: 02/07/2005
Project Number 17677.009

Salt Lake Valley Landfill
Salt Lake City, Utah

LANDFILL DRAINAGE PLAN
DETAILS (2 OF 2)

FIGURE
8



BASE MAP:
SURFACE RUPTURE AND LIQUEFACTION
POTENTIAL SPECIAL STUDY AREAS
SALT LAKE CITY COUNTY, UATH

0' 1305' 2610'
APPROXIMATE SCALE: 1" = 2610'

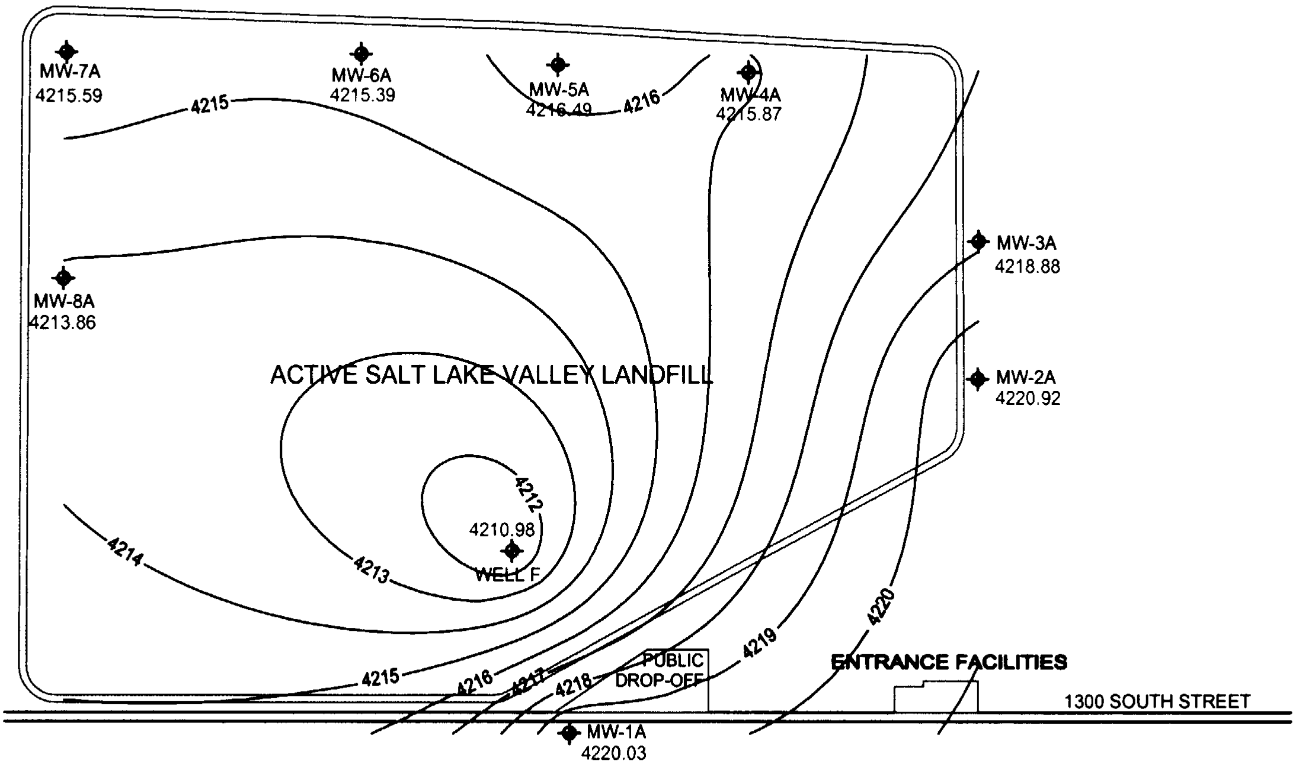
SLC5Q070.ppt

KLEINFELDER
Date: 02/10/2005
Project Number 17677.009

Salt Lake Valley Landfill
Salt Lake City, Utah

FAULT MAP

FIGURE
9



NOTE: All elevations are feet above mean sea level.

N

0 500' 1000' 2000'

Approximate Scale: 1" = 1000'

SLC5d071.dwg

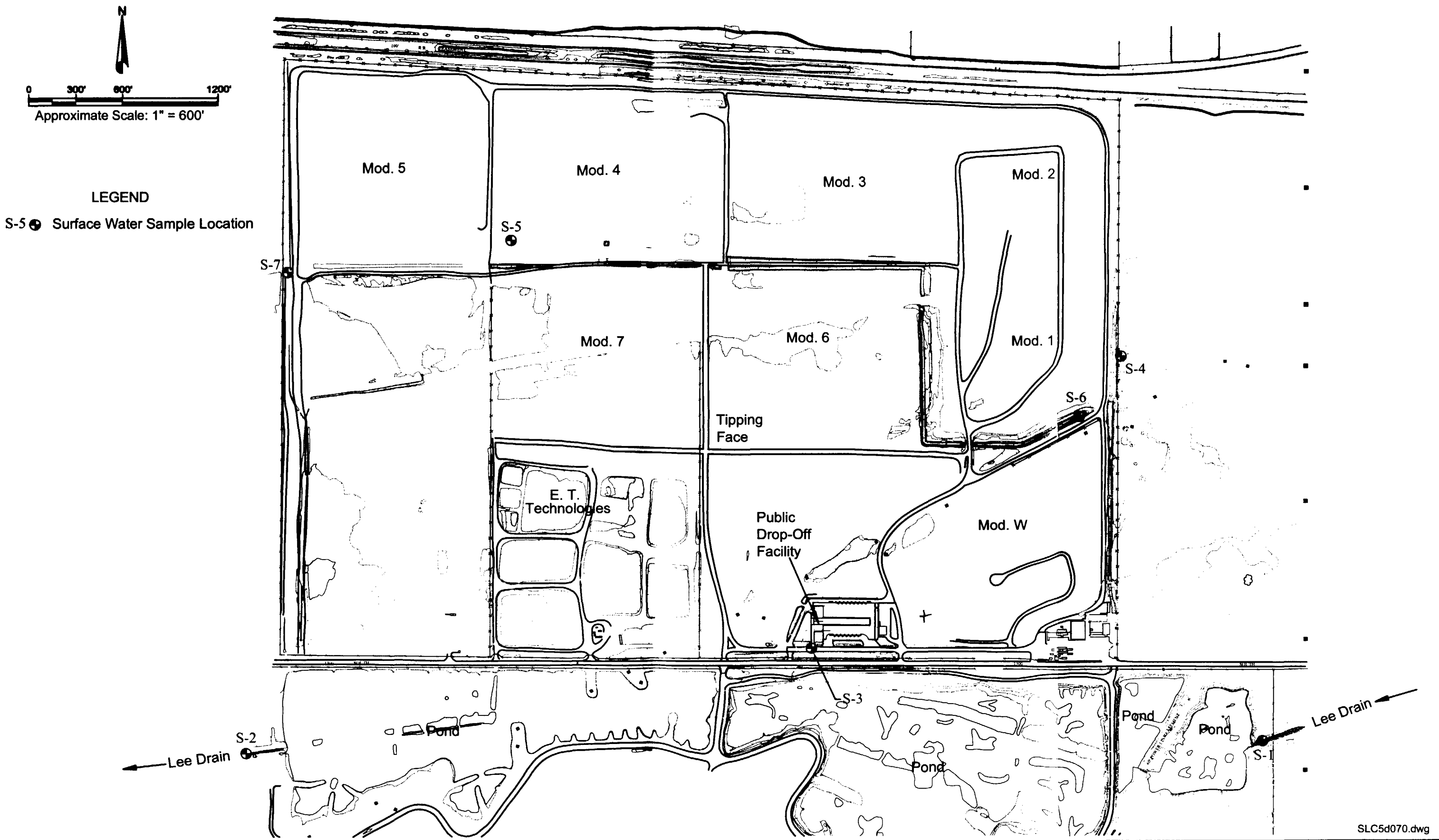
KLEINFELDER

Date: 02/10/2005
Project Number 17677.009

Salt Lake Valley Landfill
Salt Lake City, Utah

NOVEMBER 1, 2004
GROUNDWATER ELEVATIONS

FIGURE
10



KLEINFELDER

Date: 02/10/2005
Project Number 17677.009

Salt Lake Valley Solid Waste Management Facility
Salt Lake City, Utah

SURFACE WATER SAMPLE LOCATIONS

FIGURE
11

APPENDIX
B

LANDFILL DEVELOPMENT PLAN

SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

NOVEMBER 1991

PREPARED FOR:

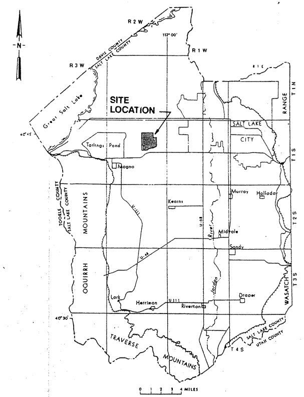
SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL

SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL

PREPARED BY:

EMCON Associates

1921 RINGWOOD AVENUE
SAN JOSE, CALIFORNIA 95131
(408) 453-7300



VICINITY MAP

DRAWING INDEX

DRAWING NO.	TITLE	REVISION NO.	DATE
	COVER		
1	LANDFILL GRADING AND DRAINAGE PLAN	0	11/21/91
2	EXCAVATION AND BASE PREPARATION PLAN	0	11/21/91
3	LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS) PLAN	0	11/21/91
4	FILL SEQUENCE PLAN	0	11/21/91
5	LANDFILL SECTIONS	0	11/21/91
6	DETAILS (SHEET 1 OF 2)	0	11/21/91
7	DETAILS (SHEET 2 OF 2)	0	11/21/91
8	END USE PLAN SITE (SHEET 1 OF 2)	0	11/21/91
9	END USE PLAN OVERVIEW (SHEET 2 OF 2)	0	11/21/91

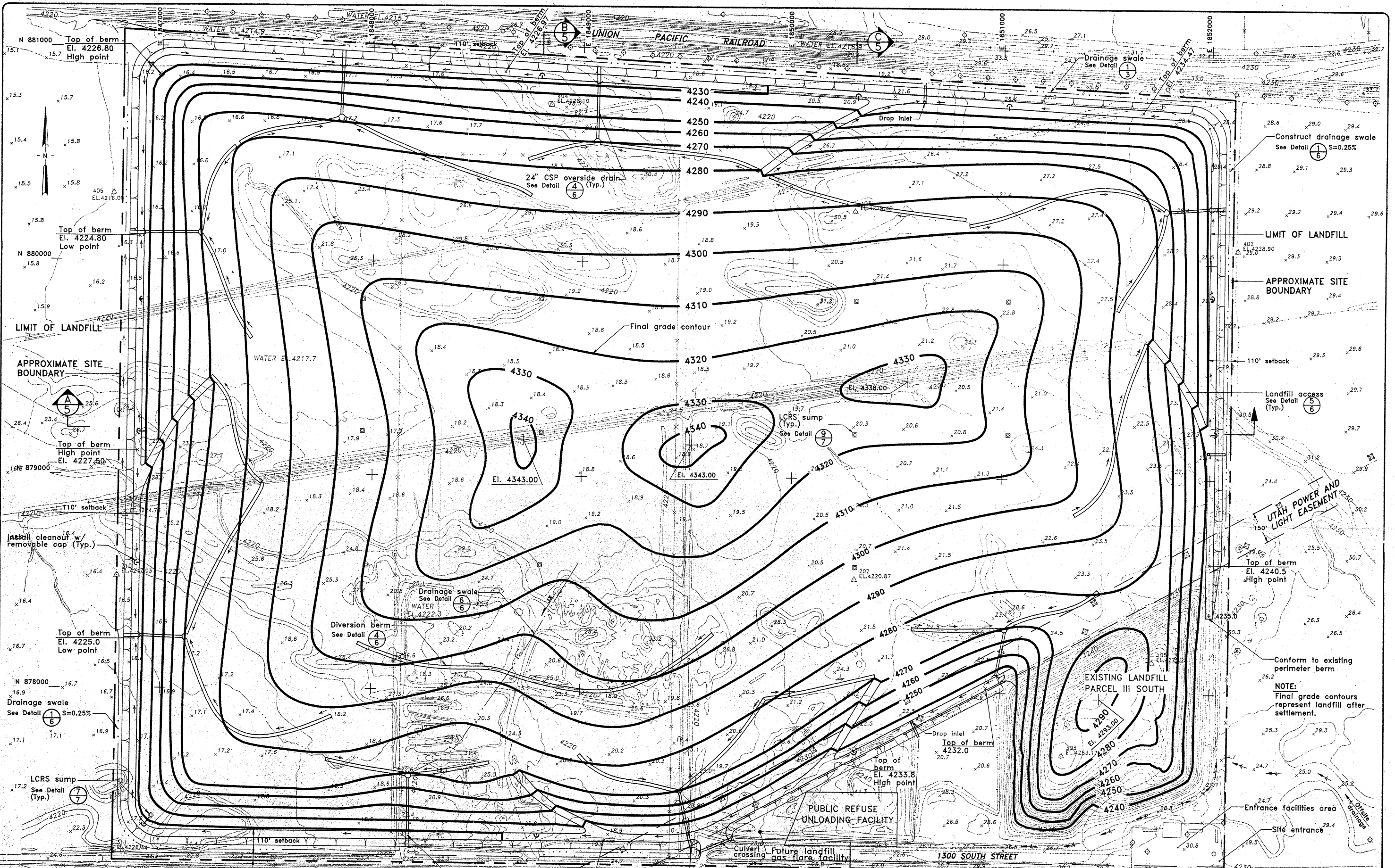
REGISTERED PROFESSIONAL ENGINEER No. 4579 STATE OF UTAH

APPROVED:

Emmet C. San Agustin	11/21/91
Richard D. Haughey	11-21-91
[signature]	11/21/91
	DATE

I:\3440\3440206A REV 0 11/20/91 17:21:40 00

NOT FOR CONSTRUCTION



Topographic base compiled using photogrammetric methods by Olympus Aerial Survey, Salt Lake City, Utah.
Date of photography: June 1990.

SCALE: 0 200 400 600 1000 FEET

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
0	11/21/91	Issued for Master Plan				

DATE OF ISSUE: NOV. 1991 — DWN BY — DES BY E. San Agustin — CHK BY — APP BY

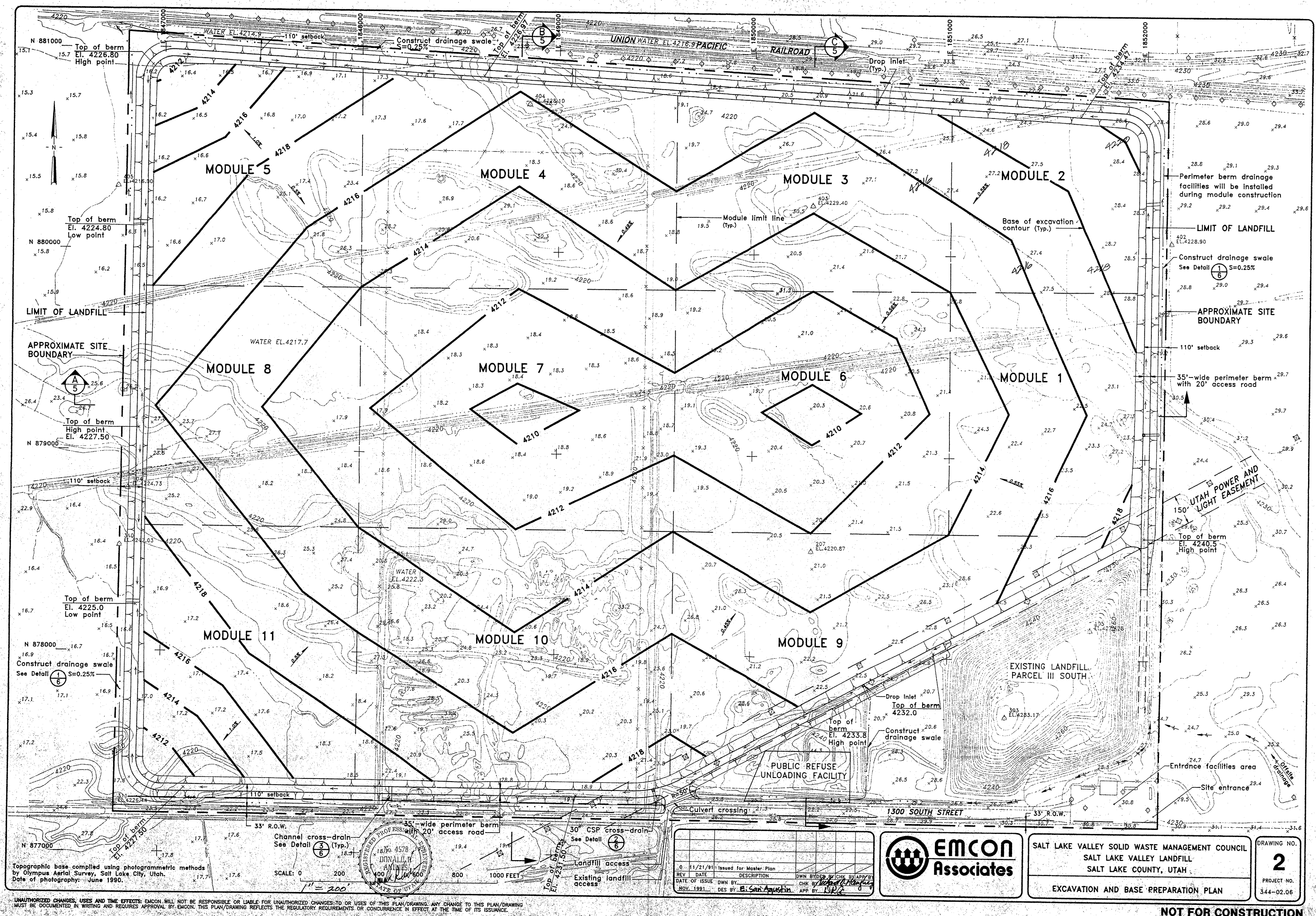
EMCON Associates

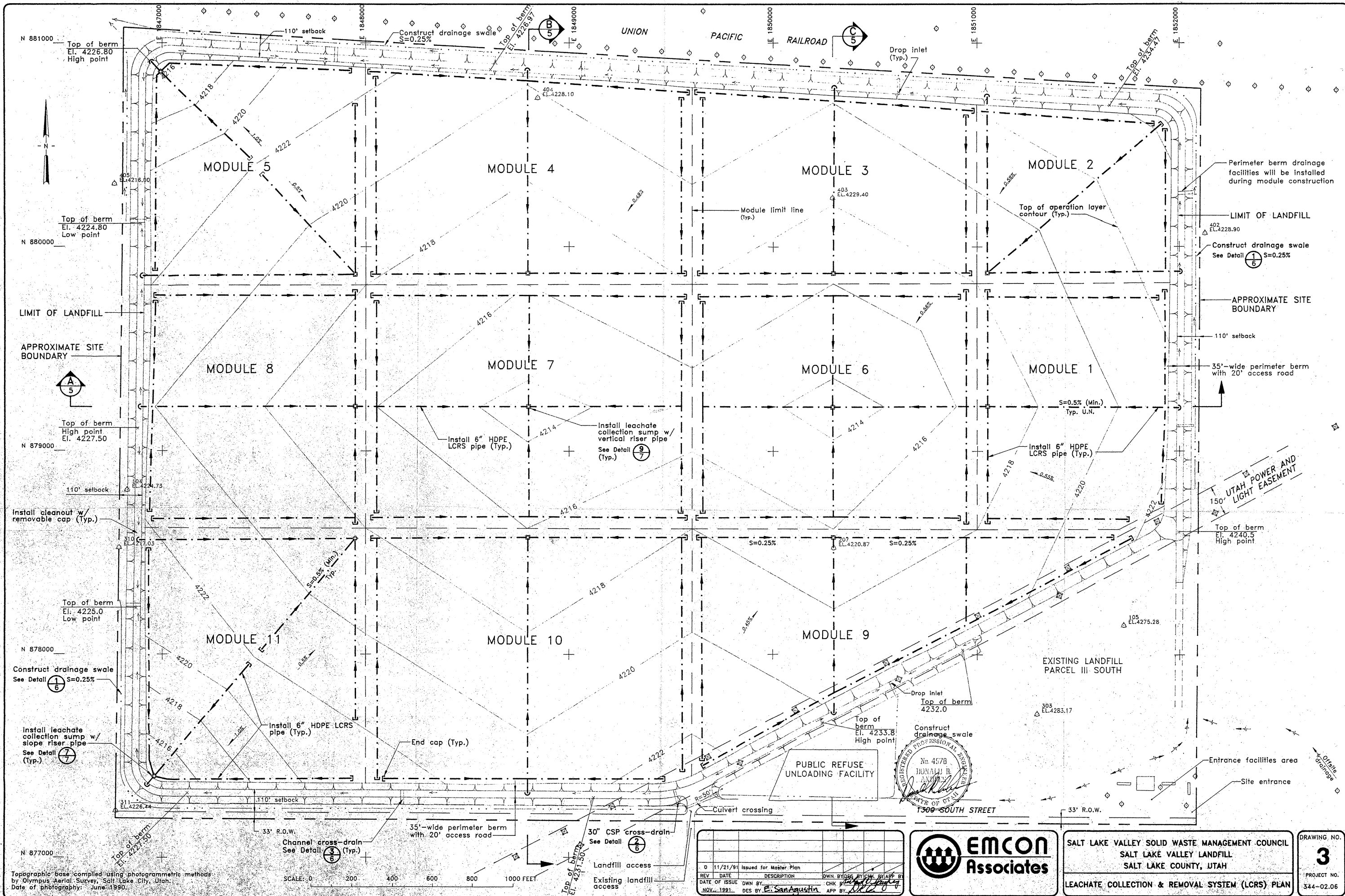
SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

LANDFILL GRADING AND DRAINAGE PLAN

DRAWING NO. 1
PROJECT NO. 344-02.06

NOT FOR CONSTRUCTION


MODULE 1
MODULE 2
MODULE 3
MODULE 4
MODULE 5
MODULE 6
MODULE 7
MODULE 8
MODULE 9
MODULE 10
MODULE 11
UNION PACIFIC RAILROAD
WATER EL. 4214.9
WATER EL. 4216.9
WATER EL. 4217.7
WATER EL. 4222.3
110' setback
Construct drainage swale S=0.25%
Top of berm El. 4226.80 High point
Top of berm El. 4224.80 Low point
Top of berm High point El. 4227.50
Top of berm El. 4225.0 Low point
Top of berm El. 4240.5 High point
Top of berm El. 4232.0
Top of berm El. 4233.8 High point
LIMIT OF LANDFILL
APPROXIMATE SITE BOUNDARY
Construct drainage swale See Detail 1/6 S=0.25%
Drop inlet (Typ.)
Drop inlet
Module limit line (Typ.)
Base of excavation contour (Typ.)
Perimeter berm drainage facilities will be installed during module construction
35'-wide perimeter berm with 20' access road
150' UTAH POWER AND LIGHT EASEMENT
EXISTING LANDFILL PARCEL III SOUTH
PUBLIC REFUSE UNLOADING FACILITY
Construct drainage swale
Entrance facilities area
Site entrance
Offsite drainage
1300 SOUTH STREET
33' R.O.W.
Culvert crossing
Channel cross-drain See Detail 3/6 (Typ.)
30" CSP cross-drain See Detail 2/6
Landfill access
Existing landfill access
N 881000
N 880000
N 879000
N 878000
N 877000
E 1847000
E 1848000
E 1849000
E 1850000
E 1851000
E 1852000
Topographic base compiled using photogrammetric methods by Olympus Aerial Survey, Salt Lake City, Utah. Date of photography: June 1990.
SCALE: 0 200 400 800 1000 FEET
1" = 200'
0 | 11/21/91 | Issued for Master Plan
REV | DATE | DESCRIPTION | DWN BY | DES BY | CHK BY | APP BY
DATE OF ISSUE NOV. 1991
EMCON Associates
SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH
EXCAVATION AND BASE PREPARATION PLAN
DRAWING NO. 2
PROJECT NO. 344-02.06
UNAUTHORIZED CHANGES, USES AND THEIR EFFECTS: EMCON WILL NOT BE RESPONSIBLE OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THIS PLAN/DRAWING. ANY CHANGE TO THIS PLAN/DRAWING MUST BE DOCUMENTED IN WRITING AND REQUIRES APPROVAL BY EMCON. THIS PLAN/DRAWING REFLECTS THE REGULATORY REQUIREMENTS OR CONCURRENCE IN EFFECT AT THE TIME OF ITS ISSUANCE.
NOT FOR CONSTRUCTION



UNAUTHORIZED CHANGES, USES AND TIME EFFECTS: EMCON WILL NOT BE RESPONSIBLE OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THIS PLAN/DRAWING. ANY CHANGE TO THIS PLAN/DRAWING MUST BE DOCUMENTED IN WRITING AND REQUIRES APPROVAL BY EMCON. THIS PLAN/DRAWING REFLECTS THE REGULATORY REQUIREMENTS OR CONCURRENCE IN EFFECT AT THE TIME OF ITS ISSUANCE.

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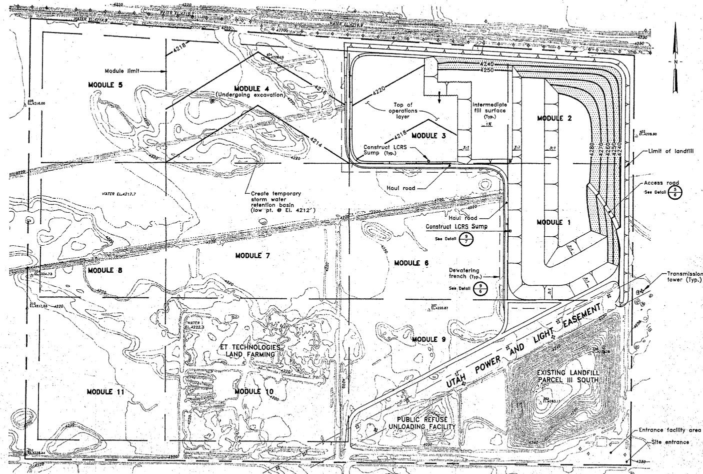
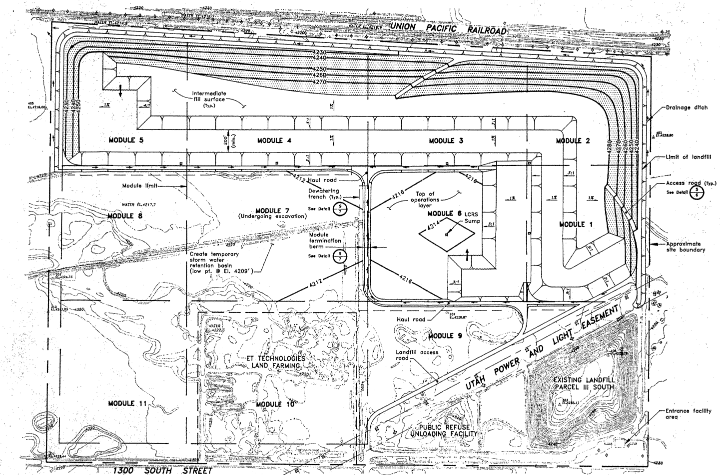
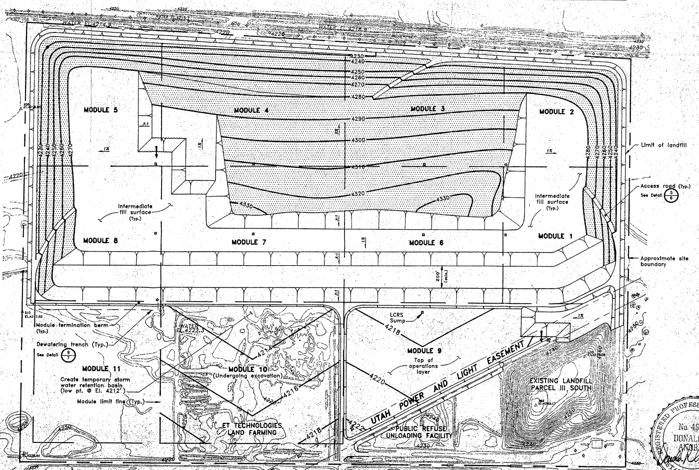


MODULES 1 - 3



MODULES 1 - 6



MODULES 1 - 9

Earthwork Requirements

Item	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Module 7	Module 8	Module 9	Module 10	Module 11	Total
Development												
Soil Requirements (cy)												
Flood protection berm	44,000	60,000	44,000	51,000	69,000			30,000	90,000	54,000	35,700	**490,000**
Module termination berm	35,000	14,000	38,000	45,000	19,000	42,000	45,000	19,000	21,000	21,000		**300,000**
Low permeability layer, 2' thk.	89,000	67,000	98,000	125,000	86,000	125,000	142,000	97,000	107,000	152,000	104,000	**1,190,000**
Operations layer, 1' thk.	44,000	33,000	49,000	62,000	43,000	62,000	71,000	48,000	53,000	76,000	52,000	**590,000**
Subtotal	212,000	174,000	229,000	283,000	217,000	229,000	258,000	202,000	271,000	303,000	192,000	**2,570,000**
Drainage layer, 1' thk.	44,000	33,000	49,000	62,000	43,000	62,000	71,000	48,000	53,000	76,000	52,000	**590,000**
Operations												
Soil Requirements (cy)												
D & I, 10 to 1 ratio	160,000	160,000	210,000	270,000	190,000	610,000	700,000	440,000	440,000	770,000	560,000	**4,510,000**
Final Cover Requirements												
Foundation layer, 1' thk.	8,000	17,000	17,000	25,000	19,000	73,000	71,000	81,000	99,000	106,000	98,000	**610,000**
Low permeability layer, 1.5' thk.	11,000	26,000	25,000	38,000	29,000	110,000	107,000	122,000	148,000	159,000	147,000	**920,000**
Vegetative layer, 1' thk.	8,000	17,000	17,000	25,000	19,400	73,000	70,800	80,800	98,600	106,000	98,000	**610,000**
Subtotal	27,000	60,000	59,000	88,000	67,000	256,000	249,000	284,000	346,000	371,000	343,000	**2,140,000**
Excavation (cy)	353,000	327,000	375,000	352,000	120,000	590,000	626,000	303,000	444,000	453,000	245,000	**4,180,000**
Material Import(cy)												
Drainage material	44,000	33,000	49,000	62,000	43,000	62,000	71,000	48,000	53,000	76,000	52,000	**590,000**
Earthfill needed from existing stockpile and/or import	46,000	67,000	123,000	289,000	354,000	515,000	581,000	623,000	613,000	991,000	850,000	**5,040,000**
Waste Capacity (tons)	973,000	966,000	1,268,000	1,610,000	1,138,000	3,659,000	4,224,000	2,633,000	2,614,000	4,630,000	3,374,000	**27,090,000**
Service Life (yr)	1.5	1.5	1.5	2.0	1.0	3.5	3.0	1.5	1.5	2.5	1.5	21

Notes:

1. Landfilling on Parcels III, VI, VII and VIII begins on January 1, 1993 and operates 310 days per year.
2. Waste stream based on 622,000 tons placed in 1990 and a 5.7% growth rate with no waste diversion.
3. In place refuse density is approximately 1200 pounds per cubic yard based on a waste compaction study completed June 1991.
5. Begining refuse capacity is based on final grade contours as shown on the Master Plan drawings plus 25% overfill.
6. Module service life is rounded to the nearest half year.

SCALE: 0 400 800 1200 1600 2000 FEET

Topographic base compiled using photogrammetric methods by Olympus Aerial Survey, Salt Lake City, Utah. Date of photography: June 1990.

LEGEND

→ Advancing working face

▒ Area filled to final grade

REGISTERED PROFESSIONAL ENGINEER No. 4578 DONALD R. AKARIS STATE OF UTAH

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
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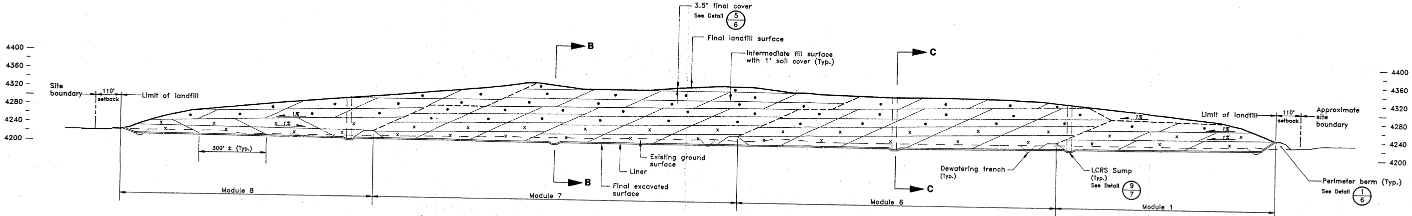
SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

FILL SEQUENCE PLAN

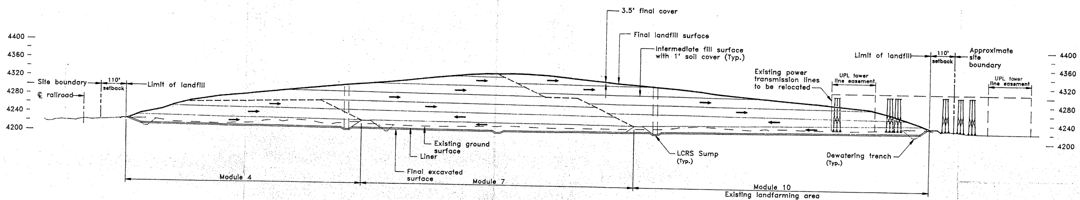
DRAWING NO. 4

PROJECT NO. 344-02.06

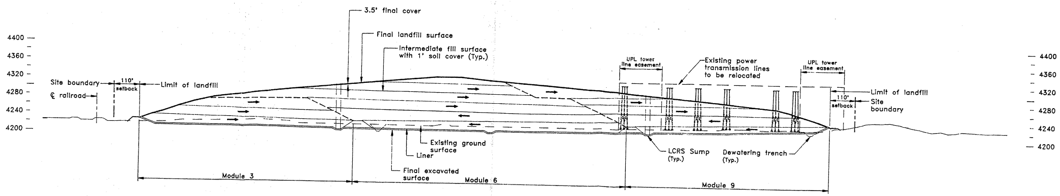
NOT FOR CONSTRUCTION



SECTION A-A



SECTION B-B



SECTION C-C

SCALE:
Horizontal: 1" = 200'
Vertical: 1" = 100'

REGISTERED PROFESSIONAL ENGINEER No. 4570 DONALD R. ANDRUS STATE OF UTAH

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
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SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

LANDFILL SECTIONS

DRAWING NO. 5
PROJECT NO. 344-02.06

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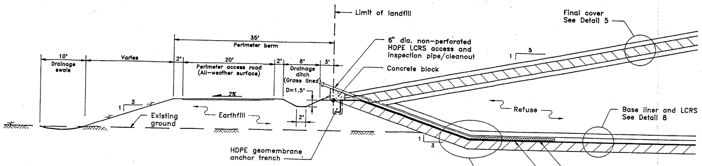
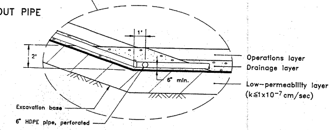
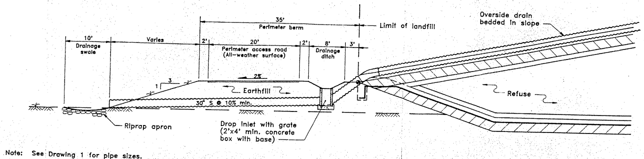




LANDFILL PERIMETER BERM WITH LCRS INSPECTION/CLEANOUT PIPE

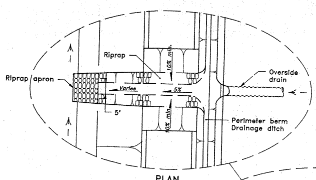
DETAIL 1
N.T.S.



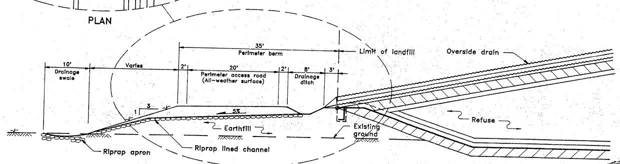
Note: See Drawing 1 for pipe sizes.

LANDFILL PERIMETER BERM WITH DROP INLET AND PIPE CROSS-DRAIN

DETAIL 2
N.T.S.

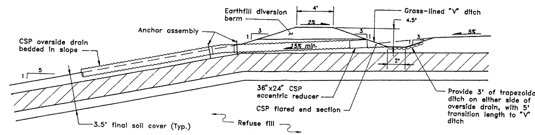


PLAN



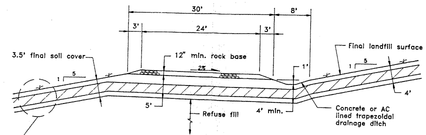
LANDFILL PERIMETER BERM WITH CHANNEL CROSS-DRAIN

DETAIL 3
N.T.S.



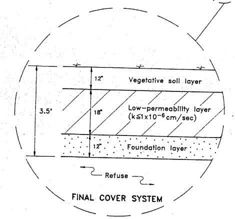
OVERSIDE DRAIN – TOP OF LANDFILL

DETAIL 4
N.T.S.

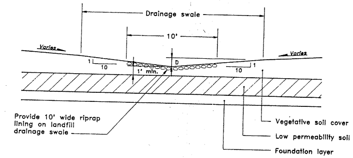


ACCESS ROAD ON REFUSE FILL

DETAIL 5
SCALE: 1"=10'



FINAL COVER SYSTEM



DRAINAGE SWALE

DETAIL 6
N.T.S.

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0	11/21/91	Issued for Master Plan				

DATE OF ISSUE: NOV. 1991
DWN BY D. Duan
DES BY E. San Agustin
CHK BY [signature]
APP BY [signature]

EMCON Associates

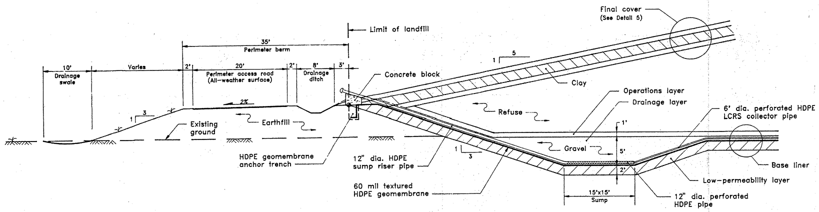
SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

DETAILS (SHEET 1 OF 2)

DRAWING NO. 6
PROJECT NO. 344-02.06

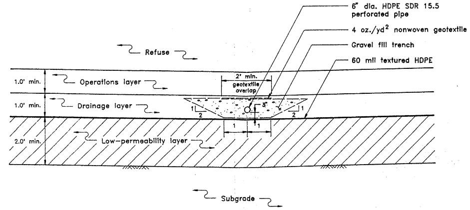
I:\34402\SHT6 REV 0 11/20/91 17:57:28 DD

NOT FOR CONSTRUCTION



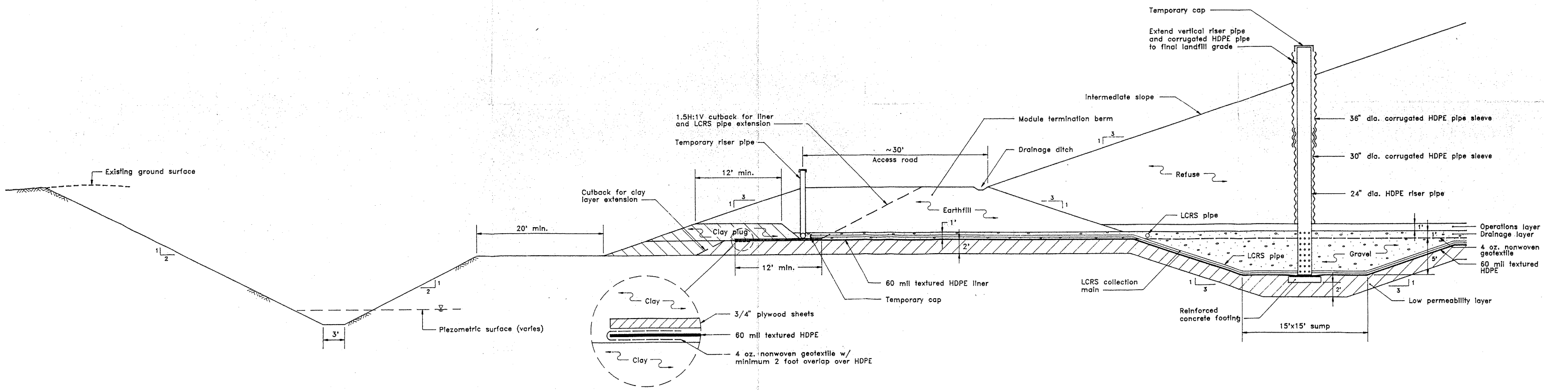
LANDFILL PERIMETER BERM WITH LCRS SUMP

DETAIL 7
N.T.S.



BASE LINER AND LEACHATE COLLECTION SYSTEM (TYPICAL)

SECTION 8
N.T.S.



MODULE TERMINATION BERM

DETAIL 9
N.T.S.

REGISTERED PROFESSIONAL ENGINEER No. 4570 STATE OF UTAH

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
0	11/21/91	Issued for Master Plan				

DATE OF ISSUE NOV. 1991 — DWN BY D. Duan — DES BY E. San Agustin — CHK BY — APP BY

EMCON Associates

SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

DETAILS (SHEET 2 OF 2)

DRAWING NO. 7
PROJECT NO. 344-02.06

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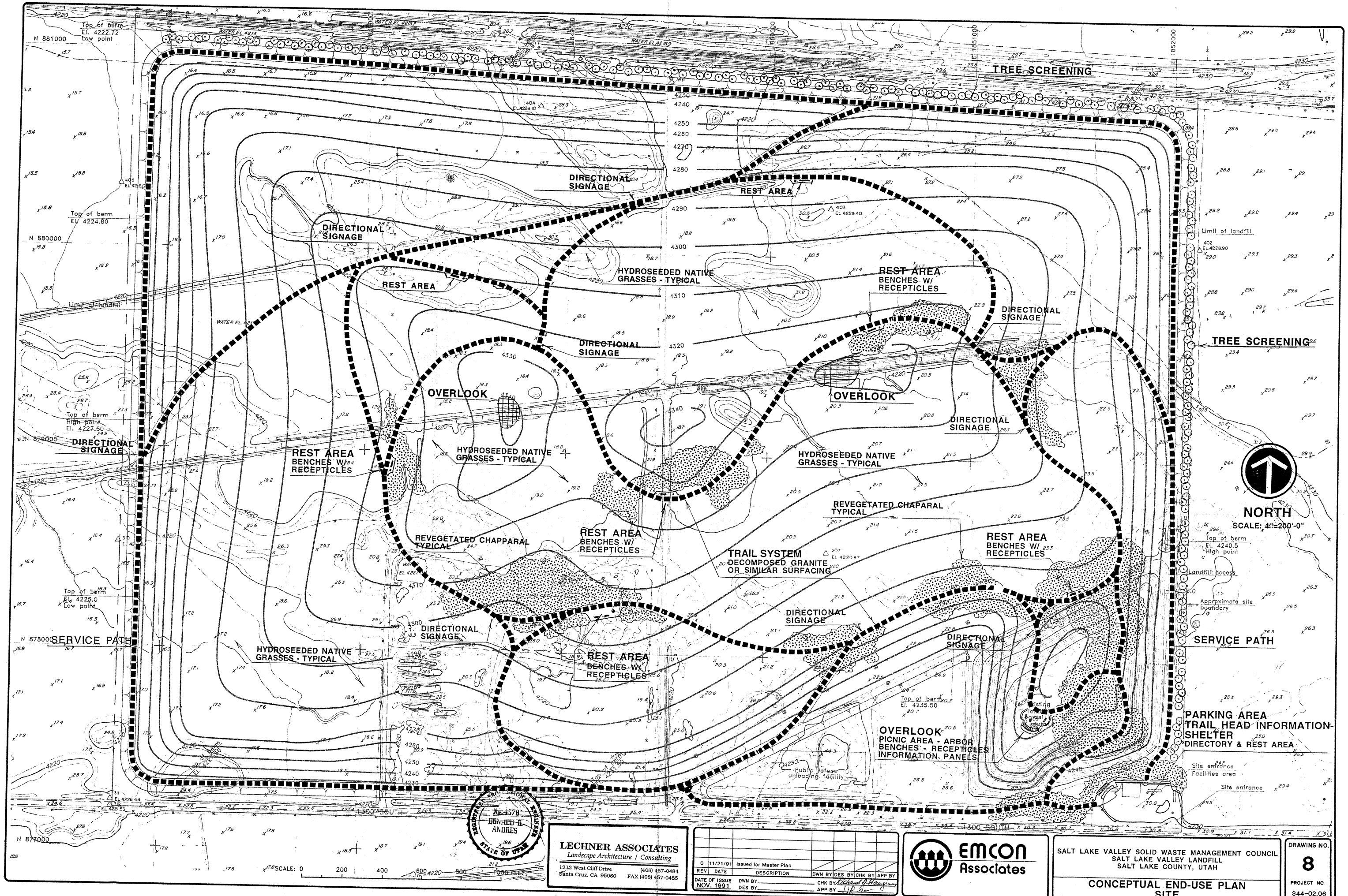
NOT FOR CONSTRUCTION



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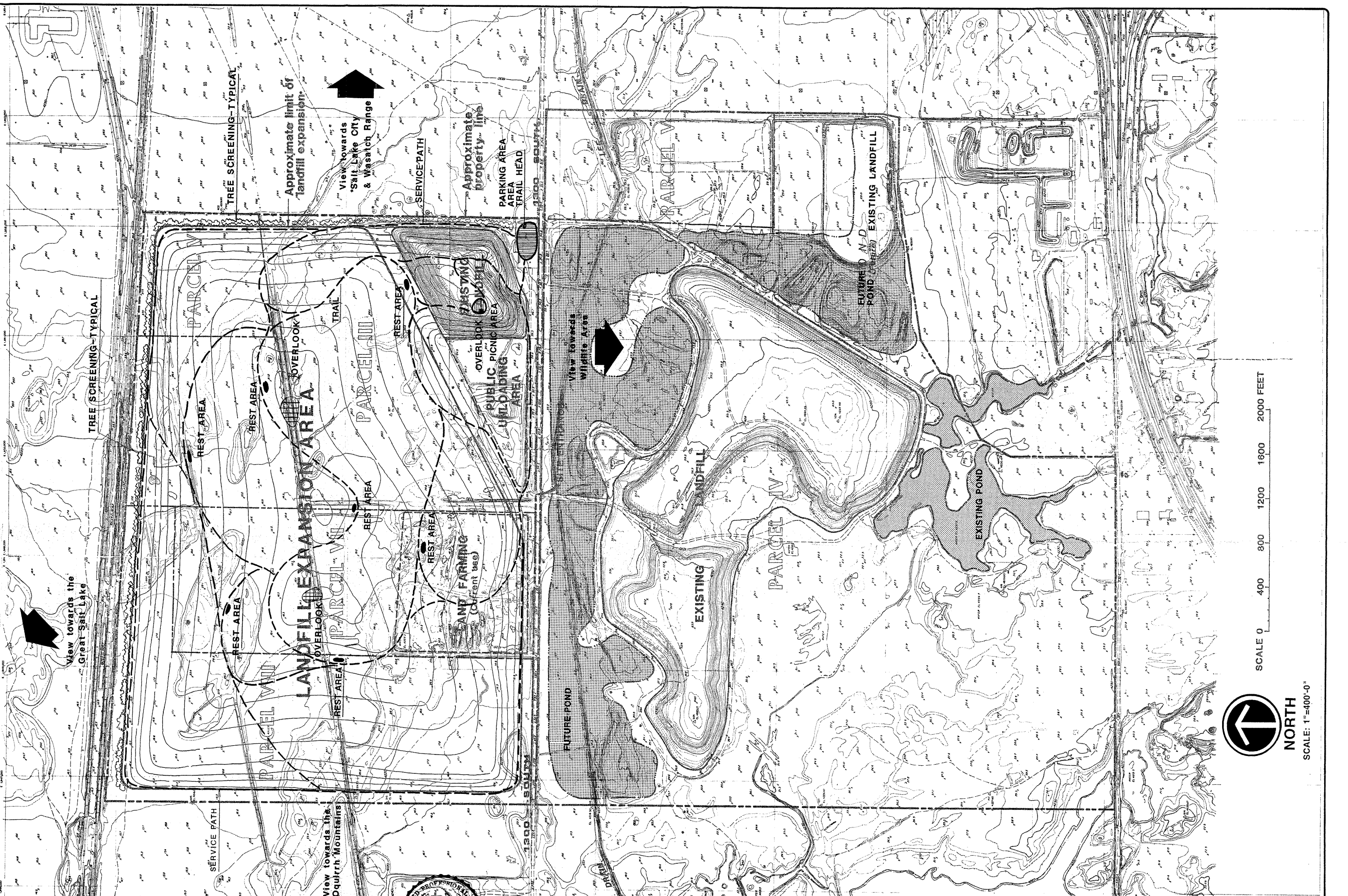

No. 4578 DONALD R. ANDRES
REGISTERED PROFESSIONAL ENGINEER
STATE OF UTAH

LECHNER ASSOCIATES
Landscape Architecture / Consulting
1212 West Cliff Drive (408) 457-0484
Santa Cruz, CA 95060 FAX (408) 457-0485

REV	DATE	DESCRIPTION	DWN BY	DES. BY	CHK BY	APP BY
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SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

CONCEPTUAL END-USE PLAN OVERVIEW

DRAWING NO. 9
PROJECT NO. 344-02.06

NOT FOR CONSTRUCTION

APPENDIX C

APPENDIX C

SECTION 02650
WATER MONITORING WELL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water monitoring well materials and installation requirements.

1.02 REFERENCES

A. ASTM D 5092: Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers.

1.03 SUBMITTALS

A. Well driller's progress record at completion of drilling operations.

B. Copy of monitoring well permit if well is deeper than 30 feet. Secure permit from State of Utah, Department of Water Rights. Telephone No. 538-7240.

C. Copy of the Monitoring Well Construction Worksheet. The worksheet is available from State of Utah, Division of Water Resources, Appropriation Section, 1636 West North Temple Street, Salt Lake City, Utah 84116. Telephone No. 538-7240.

D. Approved copy of geologist professional's monitoring well log. Secure approval from Bureau of Water Quality and Hazardous Waste, Salt Lake City-County Health Department, 610 South 200 East, Salt Lake City, Utah 84111. Telephone No. 538-7240.

E. Dimensions of screen including length, slot opening size, and filter pack gradation analysis.

1.04 QUALITY ASSURANCE

A. Driller Qualification: Thoroughly experienced and competent.

B. Geologist professional: Person who is licensed in accordance with Utah law; to provide monitoring well logs.

C. Abandoning Existing Monitoring Wells: Conform to the State of Utah regulations for Water Well Drillers and the Supplemental rules and regulations for Permanent Abandonment of Wells adopted by the State Engineer.

PART 2 PRODUCTS

2.01 DRILLING EQUIPMENT

A. Drilling rig equipped with hollow or solid stem auger.

B. Tools, bits, and all other necessary equipment.

2.02 MATERIALS

A. Riser Pipe: New, clean, 4-inch nominal diameter schedule 40 APWA 16065 PVC. All joints threaded. Do NOT use solvent weld.

B. **Screen:** New, clean, machine slotted schedule 40 PVC.

1. Nominal Diameter: 4-inches.
2. Length: 10-feet minimum. *(The length of the slotted area should reflect the interval to be monitored.)*
3. Slot Opening: Sized by CONTRACTOR to retail 90 to 99% of the filter pack.
4. End Fitting: Threaded PVC cap.

C. **Filter Pack (Sand):** Uniformly graded, comprised of hard durable siliceous particles washed and screened with a particle size distribution determined by CONTRACTOR to comply with ASTM D 5092.

D. **Bentonite Seal:** Coarse ground bentonite slurry.

1. Set to a Plastic Consistency: Approximately 20 minutes.
2. Non-toxic, non-fermenting, anionic polymer to control the time of set.
3. Dry uncompacted bulk density of 71 pounds per cubic foot.
4. Mixed with fresh water in the proportion and manner recommended by the manufacturer.

E. **Grout:** Cement-bentonite mix for sealing the annular space between riser pipe and the bore hole above the bentonite seal.

PART 3 EXECUTION

3.01 PREPARATION

A. Stake the locations of the monitoring wells as shown on the Drawings prior to drilling. Well locations may be adjusted by the ENGINEER.

B. Coordinate the start of drilling with the ENGINEER.

3.02 INSTALLATION

A. **Monitoring Well:** Follow drilling and installation methods specified in ASTM D 5092.

B. **Head Assemblies:** Secure all joints and fittings. Repair any damage which result from construction repairs.

C. **Grading:** Grade benches or platforms to drain away from well.

D. **Vault:**

1. Non-reinforced concrete annular ring supporting a steel casing cover and a lockable lid.
2. Stamp or braze on each cover in letters not less than 1-inch high the words: "WATER MONITOR WELL No. _____". ENGINEER to provide number of well.
3. Paint casing cover and lid (inside and outside) with a rust-inhibitive primer and two BLUE scuff resistant enamel surface coats.

3.03 CLEANING

A. Develop well in accordance with ASTM D 5092.

END OF SECTION

APPENDIX C

SECTION 02651
GAS MONITORING WELL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gas monitoring well materials and installation requirements.

1.02 SUBMITTALS

A. Well driller's progress record at completion of drilling operations.

1.03 QUALITY ASSURANCE

A. Driller Qualifications: Thoroughly experienced and competent.

B. Comply with Laws and Regulations related to the construction of monitoring wells in the State of Utah, the County of Salt Lake, and the City of Salt Lake.

C. Provide a geologist professional who is licensed in accordance with Utah law; to provide monitoring well logs.

PART 2 PRODUCTS

2.01 DRILLING EQUIPMENT

A. Drilling rig equipped with hollow or solid stem auger.

B. Tools, bits, and all other necessary equipment.

2.02 MATERIALS

A. **Pipe:** New, clean, 1/2-inch nominal diameter schedule 40 APWA 15065 PVC. All joints threaded. Do <u>NOT</u> use solvent weld.

B. **Probe:**

1. Tygon® Micro-bore Tubing: Manufacturer is Cole-Parmer Instruments Company, 7425 North Oak Park Avenue, Chicago, Illinois 60648. Fax: 1-312-647-9660.

C. Screen: New, clean, polyethylene smooth pipe.

1. Nominal Diameter: 1/2-inch.

2. Slot Opening: 0.040-inch.

PART 3 EXECUTION

3.01 PREPARATION

A. Stake the locations of the monitoring wells as shown on the Drawings prior to drilling. Well locations may be adjusted by the ENGINEER.

B. Coordinate the start of drilling with the ENGINEER.

3.02 INSTALLATION

A. **General:**

1. Do not introduce drilling mud, additives, or fluids including water into the bore hole unless authorized in writing by ENGINEER.
2. Diameter of monitoring well bore hole: ≥ 6-inches diameter.
3. Continue drilling in each bore hole until the bottom or refusal.
4. If ground water is reached during drilling, abandon and backfill the location. Shift well location and re-drill to a shorter depth.
5. Prevent contaminated water, gasoline, or other deleterious substances from entering the monitoring well, either through the open standpipe or by seepage through the ground surface. Prevent during and after construction of the well.
6. Daily Drilling Record: Keep the records up-to-date with the progress of drilling.

B. **Monitoring Well Casing Placement**

1. Install stand pipe straight and plumb in the bore hole.
2. Place a cap over the top of each stand pipe to prevent introduction of dirt and debris.
3. Depth of Casing: Total buried depth is 7'-6" or to phreatic surface whichever is less.

C. **Monitoring Well Head Assemblies:** Secure all joints and fittings. Repair any damage which result from construction operations, at no additional cost to the OWNER.

D. **Grading Area Surrounding Monitoring Well Head:** Grade benches or platforms to drain.

E. **Vault:**

1. Non-reinforced concrete annular ring supporting a steel casing cover and a lockable lid.
2. Stamp or braze on each cover in letters not less than 1-inch high the words: "GAS MONITOR WELL No. _____". ENGINEER to provide number of well.
3. Paint casing cover and lid (inside and outside) with a GREEN rust inhibitive primer and two scuff resistant enamel surface coats.

END OF SECTION

APPENDIX D

Appendix D
Drainage Report

(From EMCON Associates, 1991)

Appendix D
Drainage Report

Introduction

This report summarizes the drainage analysis used in designing the stormwater drainage control systems proposed for the expansion of the Salt Lake Valley Landfill, Salt Lake County, Utah. The objective of this report is to meet the requirements of the Salt Lake City-County Health Department, Health Regulations #1 (October 1989), and the U.S. Environmental Protection Agency (EPA) Subtitle D criteria (September 1991).

Site Characteristics

The proposed landfill expansion area lies north of the existing landfill operation in the undeveloped portion of the property owned by Salt Lake Valley Solid Waste Management Council. Except for the E.T. Technologies landfarming area and the existing landfill at the southeast corner of Parcel III, the natural topography of the site and surrounding areas gently slopes towards the northwest. Ground elevations at the site are highest at the southeast corner, at approximately 4,230 feet mean sea level (MSL), and lowest in the west and northwest, at approximately 4,216 feet MSL. Vegetative cover is low to moderately dense, dominated by saltgrass, greasewood, and pickleweed.

The area immediately east of the expansion area is undeveloped with medium to dense vegetation. Drainage tributary areas north and south of the landfill expansion area are minimal due to a railroad embankment near the northern perimeter, and a major drainage ditch, Lee Drain, near the southerly limit. West of the proposed expansion are low lying areas where most of the surface runoff from the landfill development drains.

A shallow pond exists in the northwesterly portion of the expansion area. This low spot was created by an earth berm built across the existing drainage course. This earth berm currently serves no purpose and should be removed to allow surface water to freely drain away from the site. Improvement in the surface drainage in this area should result in an increase in the strength of overburden soils, increasing trafficability over existing ground for future landfill development.

Run-on enters the expansion area at approximately the midpoint of the eastern boundary. From this point, surface run-on travels westerly along the toe of the earth berm constructed across the midsection of the expansion area. Ponded water due to artificial barriers in the expansion area either evaporates or infiltrates through the ground surface.

Design Criteria

The design criteria utilized in designing the surface drainage control facilities for the landfill expansion area are based on the minimum standards prescribed by the Salt Lake City - County Health Department, Health Regulations #1 and the EPA Subtitle D criteria. The drainage system analyzed for this report is for the fully developed landfill when all drainage collection and conveyance structures are in place.

Health Regulations #1 require surface water run-on and runoff to be controlled by the following:

- Surface water run-on and runoff shall be prevented from flowing onto the active portion of the landfill during peak water discharges from a 25-year storm.

- The landfill shall be constructed to adequately control runoff from the active portion of the landfill resulting from a 25-year, 24-hour storm.

- The landfill shall be equipped with suitable channeling devices, including, but not limited to, ditches, berms, or dikes, to divert surface-water runoff from the land area contiguous to the landfill.

- Runoff not contaminated by solid waste or leachate shall be routed to a settling basin or shall be controlled by other equally effective measures to remove sediment before being discharged to a receiving stream.

EPA Subtitle D criteria require owners or operators of landfills to design, construct, and maintain

- a run-on control system to prevent flow onto the active portion of the landfill during the peak discharge from a 25-year storm

- a run-off control system from the active portion of the landfill to collect and control at least the water volume resulting from a 25-year, 24-hour storm

EPA Subtitle D criteria also require owners or operators

- not to cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements, pursuant to section 402

- not to cause the discharge of a nonpoint source of pollution to waters of the United States, including wetlands, that violates any requirement of an area-wide or statewide water quality management plan that has been approved under section 208 or 319 of the Clean Water Act, as amended

Design Approach

The design approach used in determining the peak flows and runoff volumes were based on procedures and design data prescribed by the following documents:

- *Manual of Instruction*, Part 4 - "Roadway Drainage." Utah State Department of Transportation. Adopted 1965. Revised 1984.

- *Westside Master Drainage Plan*, Volume I - "Master Plan." Salt Lake City Corporation Department of Public Works. October 1986.

Rational Method

The Rational Method was used to determine peak discharge rates for the design of the permanent storm-water drainage systems. The Rational Method is based on the following equation:

$$Q = CIA$$

where

- Q = peak rate of discharge (cubic feet per second [cfs])
- C = runoff coefficient
- I = rainfall intensity (inches per hour[in./hr])
- A = drainage area (acres)

Runoff quantity was estimated using the 25-year design storm event. The parameters for determining peak flows are tributary drainage area (A), runoff coefficient (C), time of concentration (Tc), and rainfall intensity (I). These parameters are described in the following sections.

The Heasted Methods *Flow Master* computer program, based on Manning's equation, was used to calculate open channel flow characteristics such as flow capacity, flow velocity, and depth of flow. Material presented in *The Utah State Department of Transportation (UDOT) Manual of Instruction,* Part 4 "Roadway Drainage" (1984), and the *Westside Master Drainage Master Plan* (1986), were used as reference materials in developing peak flow rates.

Drainage area. Total drainage area is approximately 600 acres, which includes a portion of the existing landfill (Parcel III south) and 223 acres of run-on drainage. The landfill drainage area is approximately 380 acres and is contained within a flood protection berm that prevents run-on onto the landfill. The landfill drainage area was divided into 24 subdrainage areas for estimating peak flows for hydraulic design of the storm-water control structures. Landfill subdrainage areas are shown on Figure D-4. The off-site run-on drainage area was delineated using the *Magra and Saltair Quadrangles,* United States Geological Survey (USGS) 7 1/2 minute series topographic maps.

Time of Concentration (Tc). The time of concentration for each subdrainage area is based on the aggregate of overland flow time and open channel flow time. Overland flow time is determined from the Kirpich equation for small drainage basins:

$$Tc = 0.0078(L^{3/2} / H^{1/2})^{0.77}$$

where

L = the maximum length of travel (feet)

H = the difference in elevation along the effective slope line (feet)

Tc = the time of concentration (minutes)

A nomograph of the Kirpich equation is shown in Figure D-1.

Open channel flow travel time is calculated based on flow velocities developed from Manning's Equation. Roughness coefficients (n) for the various storm-water structure linings are based on recommended design values published in the *Handbook of Hydraulics*, 6th Edition, King 1976.

The Tc calculated for the landfill subdrainage area with the longest flow path was less than 10 minutes. The UDOT manual recommends using a minimum Tc of 10 minutes for storm-water drainage system design. This minimum was therefore used to determine the storm intensity for all drainage structures.

An approximate Tc for the off-site drainage area was developed from topographic features on available USGS maps. Based on available information, the Tc ranges from 30 minutes to 1 hour.

Runoff coefficient. The runoff coefficients (C) used in the analysis are based on the selection criteria prescribed in the UDOT manual (Figure D-2). The manual provides a table listing various surface covers with corresponding runoff coefficients. Based on field observation of the surface cover at the existing landfill and the surrounding area, the following C values have been selected:

Drainage Area	C Values
Landfill top deck	0.45
Landfill side slope	0.55
Rural turf meadows	0.40

Intensity duration-frequency curves. Intensity duration-frequency (IDF) curves contained in the Westside Master Drainage Plan were used to determine rainfall intensities (Figure D-3). The site of the Salt Lake Valley Landfill is within the study area covered by the *Westside Master Drainage Plan*; the IDF curves provided were therefore used with no adjustment. Intensities are based on the 25-year frequency storm. The rainfall intensity for a Tc of 10 minutes is approximately 3.0 inches per hour and the rainfall intensity for the off-site area ranges from 1.8 inches per hour to 1.2 inches per hour for Tcs between 30 minutes and 1 hour.

Proposed Storm-Water Control Facilities

The storm-water control facilities are described below and a summary of the storm-water control facilities is presented in Table D-1.

Drainage on the landfill is primarily controlled by diversion berms with V-ditches and riprap-lined swale. The V-ditches are designed to have a minimum slope of 2 percent. The riprap-lined swale, designed also as a V-ditch with 10 to 1 side slopes (horizontal to vertical), has a maximum slope of 5 percent.

Landfill overside drains are primarily corrugated steel pipe (CSP) that function under inlet control flow conditions. Pipe sizes are generally 24 inches in diameter with a 36-inch x 24-inch eccentric reducer at the entrance. The overside drains are generally installed at a 10 percent slope or steeper for conveying peak flow rates resulting from a design storm event.

Landfill roadside ditches are concrete-lined V-ditches with 1.5 to 1 side slopes. The roadside ditches collect drainage flow from landfill diversion berms and sheet flow from the landfill surface. Roadside ditches will be lined with concrete in areas where velocities may erode soil cover.

The perimeter channel on top of the perimeter flood protection berm is a grass-lined trapezoidal ditch with a base width of 2 feet and side slopes of 2 to 1 (horizontal to vertical [h:v]). Channel slopes are relatively flat with a minimum gradient of 0.2 percent.

Pipe culverts or riprap channels convey storm-water flow to the natural drainage ways or to drainage swales at the base of the perimeter berm. Peak flows range from 30 to 100 cfs. The perimeter cross channels have a trapezoidal section with a 5-foot base and 10 to 1 (h:v) side slopes designed to allow through traffic on the perimeter berm. The cross channels have minimum slopes of 10 percent across the top of the berm and are lined with rock riprap. Riprap aprons are designed for energy dissipation and scour protection of the perimeter berm.

Postdevelopment Condition

Construction of the landfill expansion will cause run-on drainage to be redirected to the northern perimeter of the site. From this point, the diverted flow will rejoin its natural drainage path at the northwest corner of the site. Drainage flow along the south and portions of the southwest perimeter will retain its existing drainage pattern. Run-on and runoff discharges from the landfill are shown on Table D-1 and Figure D-4. Most of the drainage facilities are designed to produce nonerosive velocities at the outfalls so that storm-water runoff from the site can be released without harm to adjacent property. Run-on/runoff control facilities, such as perimeter channels and drainage swales, will be routinely monitored for siltation and properly maintained to prevent erosion damage.

Protection of Facilities from 100-year Storm

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for Salt Lake County, Utah, was used to evaluate whether the landfill expansion is located in the 100-year flood boundary. The proposed landfill expansion is outside Zone A, which delineates the 100-year flood boundary. The expansion area is, however, located within Zone C, an area characterized with minimal flooding (see Figure D-5).

The *Westside Master Drainage Plan* contains information that influenced the design of the perimeter flood protection berm. It reported that in 1987, the Great Salt Lake rose to its peak elevation of 4,211.85 feet MSL. Four major outfall systems in the study area are several feet below this elevation, indicating a reduced carrying capacity for these systems. State and federal agencies have recommended that development in the study area not be allowed below an elevation of 4,217 feet MSL. Most of the land in the expansion area, except for the northwest sector, is above the minimum development elevation. The perimeter berm was designed at a much higher elevation to prevent inundation of waste by flood waters, create a balanced drainage system around the landfill, and provide additional refuse capacity for the site.

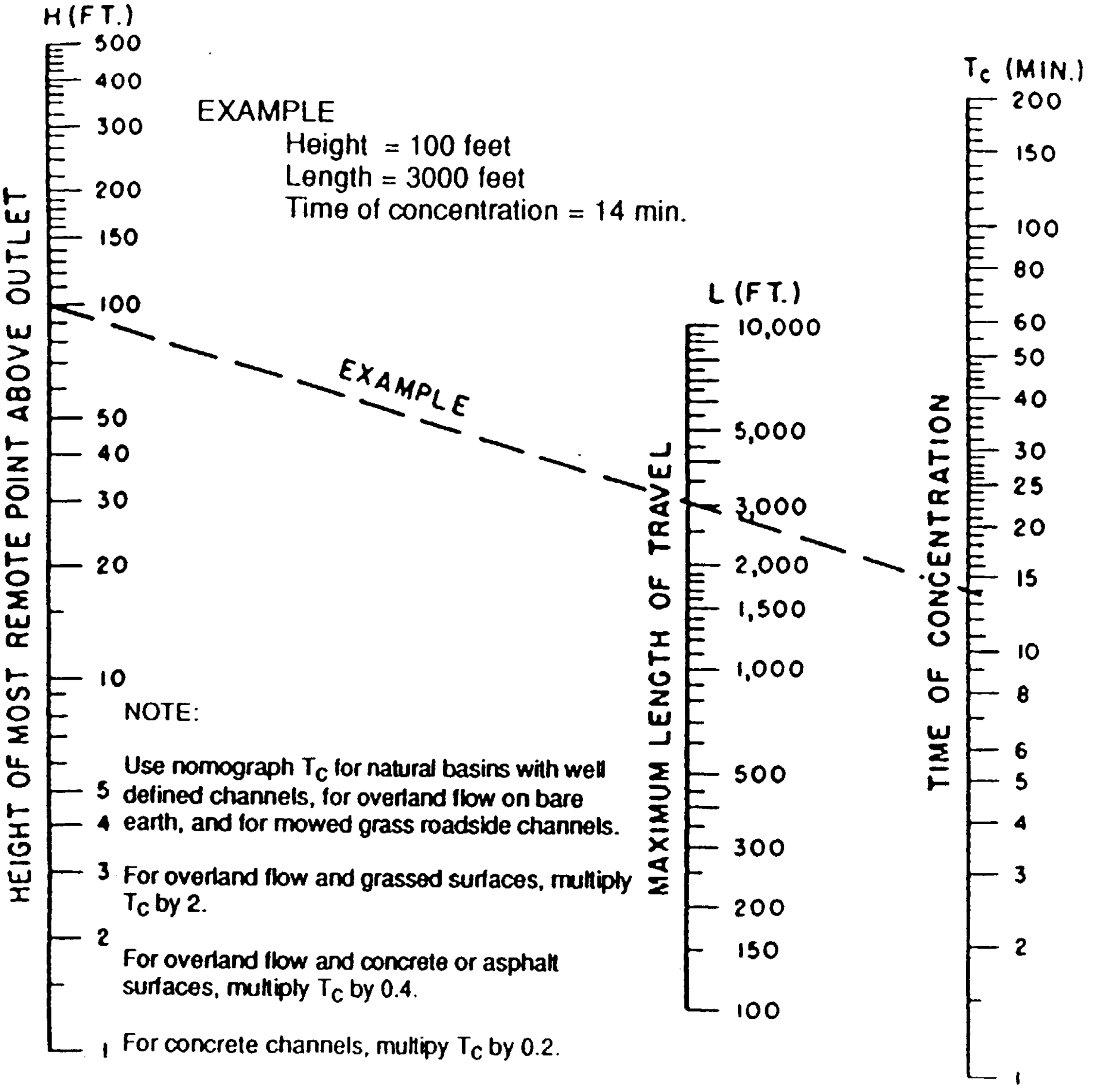
Table D-1

Summary of Storm Water Facilities

Design Point (3)	Design Q cfs	Drainage Structure	Type	Channel Lining	Mannings Coefficient	Slope Percent
20	14	Overside drain (2)	24" CSP		0.024	20
2	66	Cross Drain	30" CSP		0.024	10
41	49	Landfill swale	V-ditch	Riprap	0.030	
40	63	Overside drain	24" CSP	-	0.024	20
4	72	Cross channel	Trapezoidal ditch	Riprap	0.030	5
60	32	Overside drain	24" CSP		0.024	20
7	32	Roadside Ditch/	V-ditch	Asphalt	0.015	8
		Perimeter berm Drainage Ditch	Trapezoidal ditch	Grass	0.025	0.25
6	100	Cross channel	Trapezoidal ditch	Riprap	0.030	5
100	21	Overside drain	24" CSP		0.024	20
10	46	Cross channel	Trapezoidal ditch	Riprap	0.030	5
140	34	Overside drain	24" CSP		0.024	20
14	62	Cross channel	Trapezoidal ditch	Riprap	0.030	5
160	58	Overside drain	24" CSP		0.024	20
16	73	Cross channel	Trapezoidal ditch	Riprap	0.030	5
19	29	Roadside Ditch	V-ditch	Asphalt	0.015	8
18	64	Cross Drain	30" CSP		0.024	10
200	17	Overside drain	24" CSP		0.024	20
20	29	Cross channel	Trapezoidal ditch	Riprap	0.030	5
25	21	Roadside Ditch	V-ditch	Asphalt	0.015	8
24	37	Cross Drain	30" CSP		0.024	10
260	47	Overside drain	24" CSP		0.024	20
26	70	Cross channel	Trapezoidal ditch	Riprap	0.030	5

Note:

1. Drainage facilities are designed based on peak flows developed from the 25- year design storm.
2. 24" overside drains have 24 inch X 36 inch eccentric reducer at their inlets
3. Design points are referenced from the Drainage Area Map, Figure D-4.



EXAMPLE
Height = 100 feet
Length = 3000 feet
Time of concentration = 14 min.

NOTE:

Use nomograph T_c for natural basins with well defined channels, for overland flow on bare earth, and for mowed grass roadside channels.

For overland flow and grassed surfaces, multiply T_c by 2.

For overland flow and concrete or asphalt surfaces, multiply T_c by 0.4.

For concrete channels, multipy T_c by 0.2.

Based on study by Z.P. Kirpich,
Civil Engineering, Vol. 10, No. 6, June 1940, p. 362

10/91

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SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

TIME OF CONCENTRATION

FIGURE
D-1
PROJECT NO.
344-02.07

140789

VALUES OF RUNOFF COEFFICIENTS FOR USE IN THE RATIONAL FORMULA

RURAL AREAS	Concrete or sheet asphalt pavement	0.8 — 0.9
	Asphalt macadam pavement	0.6 — 0.8
	Gravel roadways or shoulders	0.4 — 0.6
	Bare earth	0.2 — 0.9
	Steep grassed areas (2:1 slopes)	0.5 — 0.7
	Turf meadows	0.1 — 0.4
	Forested areas	0.1 — 0.3
	Cultivated fields	0.2 — 0.4
URBAN AREAS	Flat residential, with about 30 percent of area impervious	0.4
	Moderately steep residential, with about 50 percent of area impervious	0.65
	Moderately steep built up area, with about 70 percent of area impervious	0.8

*For flat slopes or permeable soil, use the lower values; for steep slopes or impermeable soil, use the higher values.

SOURCE: **Utah State Department of Highways, Manual of Instruction, Part 4 - Drainage.**

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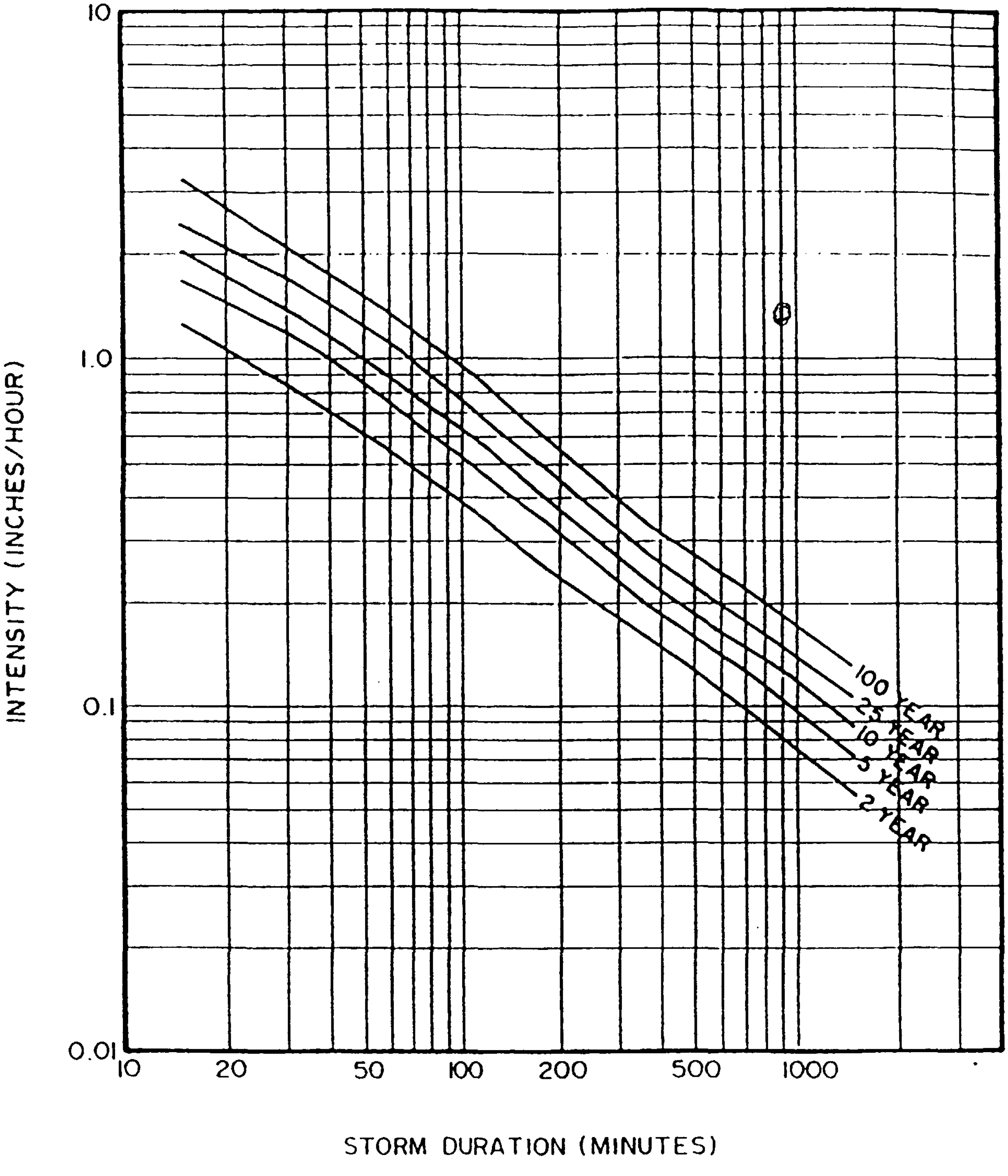
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

RUNOFF COEFFICIENTS

FIGURE **D-2**

PROJECT NO. 344-02.07

140789



SOURCE: Salt Lake City Corporation, Department of Public Works
Westside Master Drainage Plan, Figure IV-2 (October 1986).

10/91

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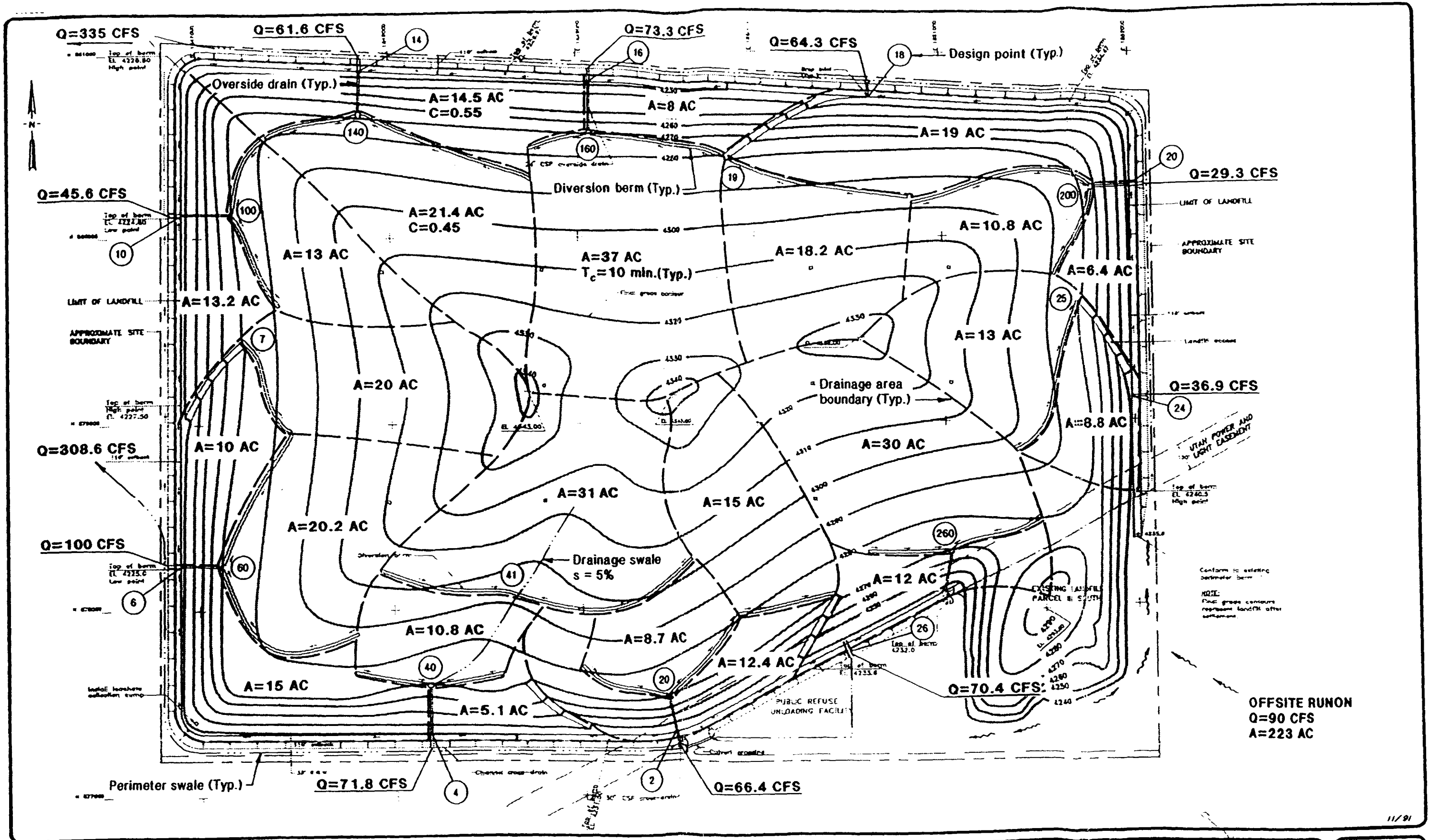
SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

RAINFALL I-D-F CURVES

FIGURE
D-3

PROJECT NO.
344-02.07



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Scale: 0 500 1000 1500 2000 Feet

SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

DRAINAGE AREA MAP

FIGURE
D-4
PROJECT NO.
344-02.07

APPENDIX
E

KLEINFELDER

An employee owned company

April 16, 1997

Kleinfelder File No. 30-8018-06.018

Mr. Ed McDonald
Salt Lake City Corporation
324 South State Street, Suite 310
Salt Lake City, Utah 84116

Subject: Limited Settlement Evaluation of Waste Cells
Salt Lake Valley Solid Waste Management Facility

Dear Mr. McDonald

In response to a request made by the Salt Lake Valley Landfill and during the permit revision process, Kleinfelder drilled one soil boring near the central portion of the landfill to obtain information on soil types and characteristics in the upper 200 feet of soils underlying the Salt Lake Valley Solid Waste Management Facility. These data were collected in response to comments made by the State Division of Solid and Hazardous Waste.

Field Activities

Drilling was accomplished with a truck-mounted hollow-stem auger drill rig equipped for soil sampling. The boring was completed to 198 feet below existing grade and samples were collected at 5-foot intervals for the first 50 feet and at 10-foot intervals from 50 feet to 198 feet. Disturbed and undisturbed samples were obtained alternately using a standard split-spoon sampler (SPT) and thin walled Shelby tubes, respectively. The SPT was driven by a 140-pound hammer free-falling through a distance of 30 inches. SPT driving resistance, expressed as "blows per foot of penetration", is presented on the attached boring log at the respective sampling depths. The 3-inch by 30-inch Shelby tubes were pushed approximately 24 inches using the drill rig hydraulics. The samples were classified by a field engineer and representative portions of each sample were packaged and transported to our laboratory for testing.

Laboratory Testing

Laboratory testing of the samples included moisture content, density, percent of material passing the No. 200 sieve, plasticity index and consolidation tests. Moisture

KLEINFELDER 2749 East Parley's Way, Suite 100, Salt Lake City, UT 84109 1660 (801) 466-6769

content and density tests were performed to aid in calculation of overburden pressures. Percent passing the No. 200 sieve and plasticity index tests were performed to aid in classifying and characterizing the soil. Consolidation tests were performed on the undisturbed samples of the clay soils throughout the 198 foot profile to evaluate the settlement characteristics of the soils. The results of all laboratory tests and the boring summary log are presented as attachments to this letter.

General Lithology

Based on the one boring log completed for this investigation, the subsurface profile near the center of the completed landfill is summarized as follows:

0 to 56 feet	Predominantly medium stiff Lean CLAY with interbedded sandy silt layers/lenses and a few small sand layers/lenses
56 to 65 feet	Fine to medium grained SAND with silt
65 to 108 feet	Stiff SILT with interbedded layers/lenses of stiff lean clay and some small sand layers
108 to 127 feet	Medium to fine grained SAND with silt
127 to 160 feet	Very stiff Lean CLAY with seams and layers/lenses of silty sand
160 to 192 feet	Medium grained SAND with some silt
192 to 198 feet	Very stiff Lean CLAY

Based on this one boring, the initial 198 feet of native soil beneath the landfill consists of approximately 140 feet of lean clay/silt soils and approximately 60 feet of sandy soils.

Moisture Content and Density

Based on the laboratory test results, moisture contents of the silt and clay soils typically range from 23 to 30 percent of dry weight. Typical natural dry densities of these soils range from 85 to 97 pounds per cubic foot.

Consolidation Results

The results of the consolidation tests indicate that the clay/silt soils are overconsolidated with overconsolidation ratios ranging from 2.0 near the surface to typically around 1.5 at deeper depths. The consolidation tests further indicate that the clay/silt soils are

KLEINFELDER 2749 East Parley's Way, Suite 100, Salt Lake City, UT 84109-1660 (801) 466-6769 (801) 466-6788 fax

moderately compressible. As a basis for analysis, the sandy soils were assumed to be non-compressible.

Evaluation of the potential settlement as a result of the proposed final loads associated with the filling of the landfill was performed using parameters provided by the Salt Lake Valley Landfill facility and documents produced by EMCON Associates regarding landfill design. Pertinent parameters included a unit weight for the refuse of 1200 pounds per cubic yard (44.4 pounds per cubic foot) and a completed refuse thickness of 160 feet. As the waste compacts the unit weight and thickness will decrease by approximately 25 percent, but for modeling purposes the values presented above are equally representative of the downward force. Consideration as to the thicknesses and unit weights of the bottom liner and final cover were also incorporated into the model. The modeled section of the landfill was derived from section B-B' as shown on EMCON's Drawing No. 5.

Based on these parameters and our consolidation test data, the total estimated primary consolidation settlement within the initial 198 feet of soil under the center of the landfill was 62 inches (approximately 5 feet). Additional analysis regarding the settlement contribution of soils deeper than 200 feet was estimated using the consolidation test data from the 194 foot sample and assuming the clay/silt soils continued for another 200 feet without significant sand layers. Results from this analysis showed an additional 4 to 6 inches could occur in this depth range. Additional primary settlement beyond depths of 400 feet as well as secondary consolidation settlement could also contribute an estimated additional 6 to 12 inches of settlement over the years following completion of the landfill, however it should be noted that no data was obtained to substantiate the potential settlement associated with secondary consolidation.

It should be noted that these settlement estimates are based on assumptions of soil stratigraphy and characteristics below 200 feet. Furthermore, these estimates are based on data obtained from one boring near the center of the landfill. Soil stratigraphy and consolidation characteristics may vary at other locations within the site. For the purposes of modeling, we have assumed that the profile remains the same across the site.

The settlement profile based on the model is shown on the attached drawing. The actual settlement profile will differ slightly due to the variation in soil stratigraphy across the actual soil profile and the inaccuracies associated with the model. However, in general the settlement profile will follow a similar trend to that shown on the drawing. The vertical scale on the lower portion of the attached drawing is exaggerated to 40 times the rest of the section for clarity of settlement values. Since the settlement profile does not exactly follow a straight line as assumed by EMCON, consideration should be given to evaluating the performance of the liner with respect to the indicated profile.

KLEINFELDER 2749 East Parley's Way, Suite 100, Salt Lake City, UT 84109-1660 (801) 466-6769 (801) 466-6788 fax

Sincerely,

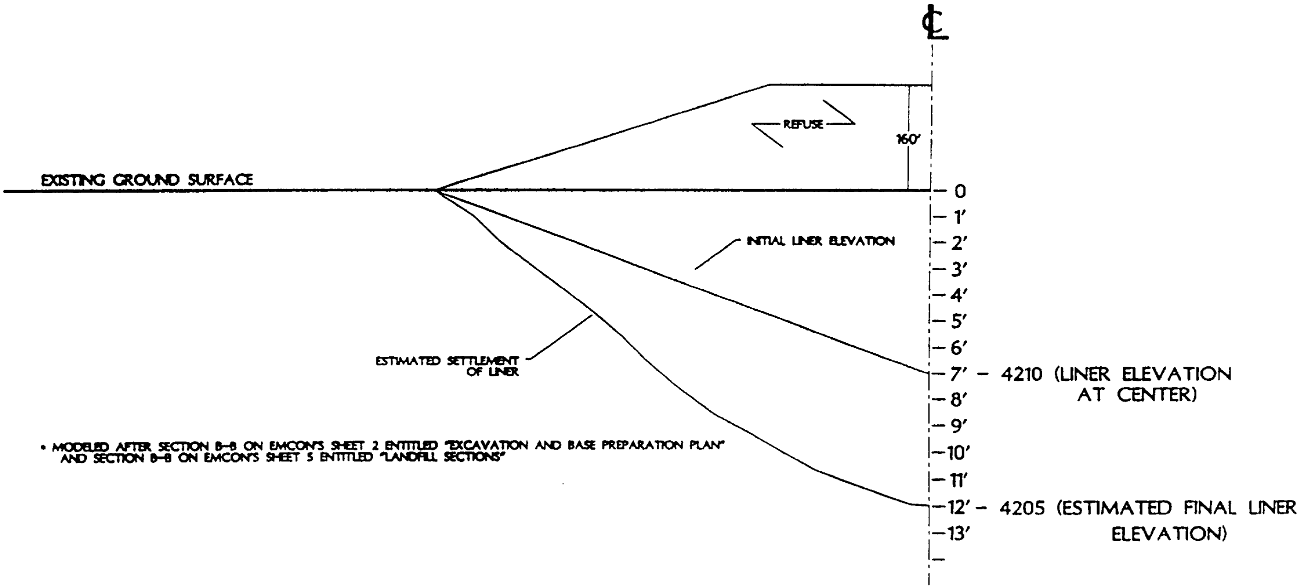
KLEINFELDER, INC.

Kent A. Hartley, P.E.
Project Engineer

Scott W. Davis, P.E.
Geotechnical Division Manager

cc: Mr. Dave Lore, Salt Lake Valley Solid Waste Management Facility

 (user\Khartley\8018sett.doc)



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KLEINFELDER

Project Number 30-8018-06.018

Salt Lake Valley Solid Waste Managment Facility

SETTLEMENT PROFILE

Percent Passing #200	Dry Density (lb/ft^3)	Moisture Content (%)	Other Tests	Blows/Ft.	USCS	SOIL DESCRIPTION
					CL	Lean CLAY - brown, very moist, soft to medium stiff
100						
					ML	Sandy SILT - gray-brown, moist, medium stiff, with seams of silty sand
70				7		
					CL	Lean CLAY - gray-brown, moist to very moist, medium stiff
					SM	Silty SAND - gray, very moist, loose to medium dense
	90	28.2				
					CL	Lean CLAY - brown mottled gray, moist to very moist, stiff, with seams of silt and silty sand
				7		
						- greenish gray below 18-1/2 feet
	85	32.1				
					ML	Sandy SILT - olive-gray, very moist, stiff, with seams of lean clay
65				11		
					CL	Lean CLAY - olive-gray, very moist, medium stiff, with lenses of silty sand
92						
	100	21.0			SM	Silty SAND - olive-gray, very moist to wet, medium dense, fine to medium grained
					CL	Lean CLAY - olive-gray mottled rust, very moist, stiff to

DE N FEET: 0, 2, 4, 6, 8, 10, 12, 14, 16, 3, 20, 22, 24, 26, 28, 30, 32, 34

DATE DRILLED: 2-4-97
TOTAL DEPTH: 198.0 feet
DIAMETER OF BORING: 6 inches

LOGGED BY: K. Hartley
EQUIPMENT: Deidrick D-120 Hollow Stem Auger
ELEVATION: Not Meas.

KLEINFELDER

LOG OF BORING LF- 1

Salt Lake County Landfill

PLATE
1 of 6

?ROJECT NO. 30-8018-06.018

Percent Passing #200	Dry Density (lb/ft^3)	Moisture Content (%)	Other Tests	Blows/Ft.	Sample	USCS	SOIL DESCRIPTION
				10			very stiff, with lenses of sandy silt
						SM	Silty SAND - olive-gray, very moist to wet, medium dense
						CL	Lean CLAY - olive-gray, moist, stiff, with seams and lenses of silt and silty sand
	92	26.8					
				15			
						SP SM	Poorly Graded SAND with silt - gray, wet, medium dense, medium grained
4				13			
						ML	SILT with sand - gray-brown, very moist, stiff to very stiff, with lenses of olive lean clay

DEPTH IN FEET: 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68

DATE DRILLED: 2-4-97
TOTAL DEPTH: 198.0 feet
DIAMETER OF BORING: 6 inches

LOGGED BY: K. Hartley
EQUIPMENT: Deldrick D-120 Hollow Stem Auger
ELEVATION: Not Meas.

KLEINFELDER

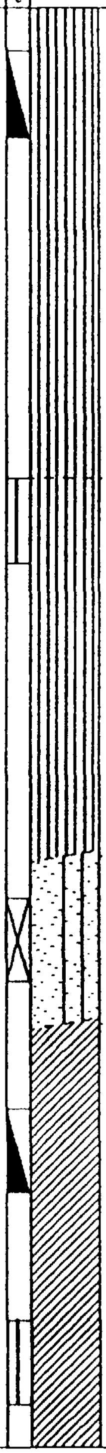
LOG OF BORING LF- 1

Salt Lake County Landfill

PLATE

PROJECT NO. 30-8018-06.018

Depth (feet)	Percent Passing #200	Dry Density (lb/ft^3)	Moisture Content (%)	Other Tests	Blows/Ft.	USCS	SOIL DESCRIPTION
68–70	87				12		
79–80	98					ML	SILT - olive, very moist, stiff to very stiff, with lenses and seams of lean clay
81		94	25.5				
88–90	9					SP SM	Poorly Graded SAND with silt - olive-gray, wet, medium dense, fine to medium grained
92						CL	Lean CLAY - olive-gray, moist, very stiff, with interbedded layers of silt
94–95					45		
99							- could only push shelby 1 foot, very stiff



DATE DRILLED: 2-4-97
TOTAL DEPTH: 198.0 feet
DIAMETER OF BORING: 6 inches

LOGGED BY: K. Hartley
EQUIPMENT: Deldrick D-120 Hollow Stem Auger
ELEVATION: Not Meas.

KLEINFELDER

LOG OF BORING LF- 1
Salt Lake County Landfill

PLATE

PROJECT NO. 30-8018-06.018

DEPTH, FEET	Percent Passing #200	Dry Density (lb/ft^3)	Moisture Content (%)	Other Tests	Blows/Ft.	USCS	SOIL DESCRIPTION
102							
104							
106							
108						SP SM	Poorly Graded SAND with silt - gray, wet, medium dense
	5						
110							
112							
114							
116							
118							
120							
122							
124	13				49		- fine grained below 124-1/2 feet
126						CL	Lean CLAY - olive, moist, stiff, with some seams and layers of silty sand
128							
130							
		89	29.5				
132							
							- with layers of poorly graded sand with silt at 133 feet
134							
136							

DATE DRILLED: 2-4-97
TOTAL DEPTH: 198.0 feet
DIAMETER OF BORING: 6 inches

LOGGED BY: K. Hartley
EQUIPMENT: Deidrick D-120 Hollow Stem Auger
ELEVATION: Not Meas.

KLEINFELDER

LOG OF BORING LF- 1

Salt Lake County Landfill

PLATE

4 of 6

PROJECT NO. 30-8018-06.018

Depth (feet)	Percent Passing #200	Dry Density (lb/ft^3)	Moisture Content (%)	Other Tests	Blows/Ft.	USCS	SOIL DESCRIPTION
136							
138							- very stiff to hard below 138 feet
139					50/4"		
140							
141							- with layers of sand from 141 to 145 feet
149		97	24.3				
159	86				50/5"		
160						ML	Sandy SILT - dark gray, very moist to wet, stiff, with lenses and seams of silty sand and lean clay
166						SP SM	Poorly Graded SAND with silt - olive gray, wet, dense, fine to medium grained
170							

DATE DRILLED: 2-4-97
TOTAL DEPTH: 198.0 feet
DIAMETER OF BORING: 6 inches

LOGGED BY: K. Hartley
EQUIPMENT: Deidrick D-120 Hollow Stem Auger
ELEVATION: Not Meas.

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LOG OF BORING LF- 1

Salt Lake County Landfill

PLATE

PROJECT NO. 30-8018-06.018

Depth (feet)	Percent Passing #200	Dry Density (lb/ft^3)	Moisture Content (%)	Other Tests	Blows/Ft.	Sample	USCS	SOIL DESCRIPTION
170								
172								
174								
176								
178	79							
180								
182								
184								
186								
188								
190								
192							CL	Lean CLAY - olive-gray, very moist, very stiff
194		99	22.8					
196					39			
198								
200								
202								
204								

DATE DRILLED: 2-4-97
TOTAL DEPTH: 198.0 feet
DIAMETER OF BORING: 6 inches

LOGGED BY: K. Hartley
EQUIPMENT: Deidrick D-120 Hollow Stem Auger
ELEVATION: Not Meas.

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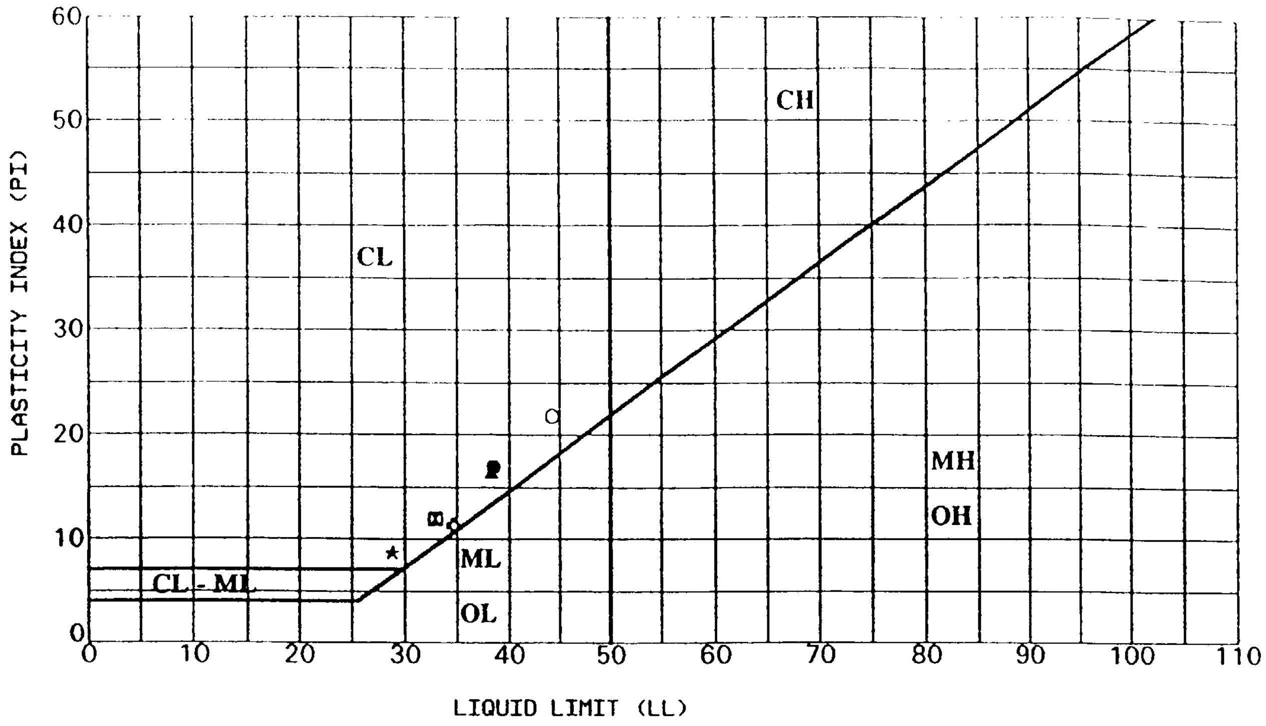
LOG OF BORING LF- 1

Salt Lake County Landfill

PLATE

PROJECT NO. 30-8018-06.018



	Sample	Depth (ft)	LL (%)	PL (%)	PI (%)	LI (-)	Description
●	LF- 1	9.0	38.5	21.6	16.9		Lean CLAY
⊠	LF- 1	19.0	32.9	21.0	11.9		Lean CLAY
▲	LF- 1	34.0	38.3	22.0	16.4		Lean CLAY
★	LF- 1	69.0	28.8	20.1	8.7		Lean CLAY
⊙	LF- 1	79.0	44.3	22.5	21.8		Lean CLAY
✿	LF- 1	94.0	34.6	23.3	11.3		Lean CLAY

LL - Liquid Limit　　PI - Plasticity Index
PL - Plasticity Limit　　LI - Liquidity Index

Unified Soil Classification
Fine Grained Soil Groups

	LL < 50
ML	Inorganic clayey silts to very fine sands of slight plasticity
CL	Inorganic clays of low to medium plasticity
OL	Organic silts and organic silty clays of low plasticity

	LL > 50
MH	Inorganic silts and clayey silts of high plasticity
CH	Inorganic clays of high plasticity
OH	Organic clays of medium to high plasticity, organic silts

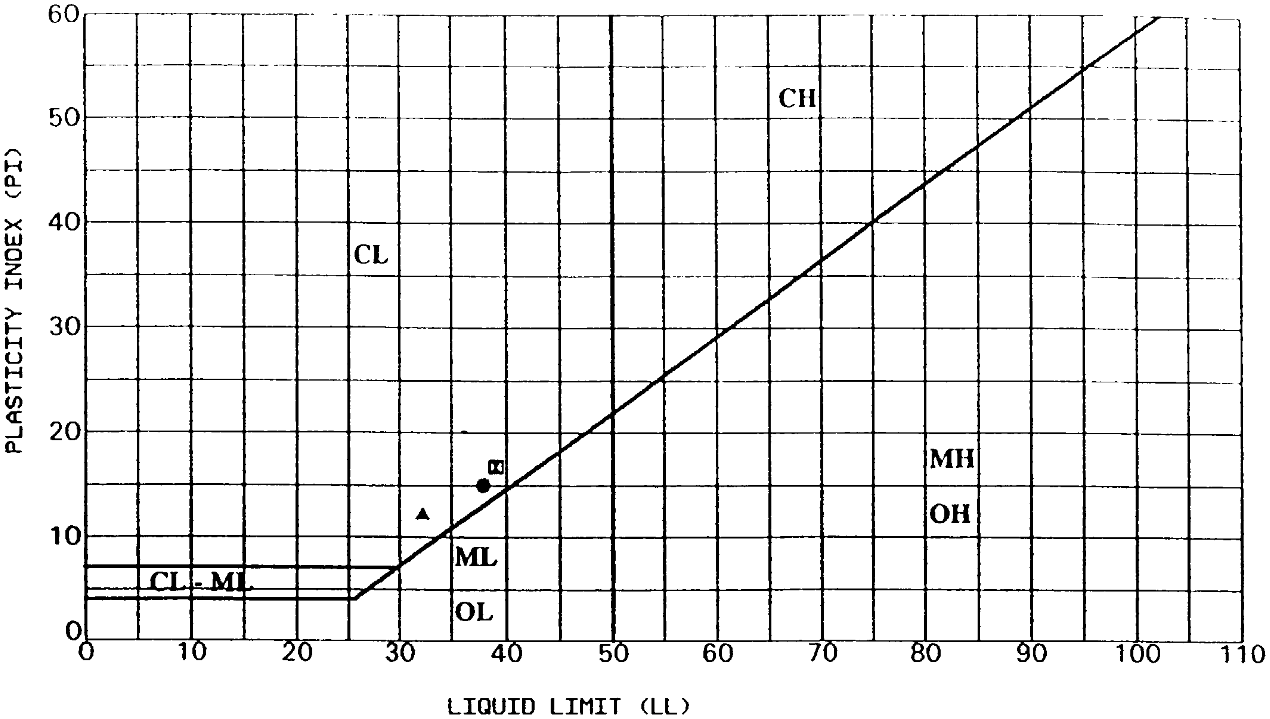
KLEINFELDER

PROJECT NO. 30-8018-06.018

Salt Lake County Landfill

PLASTICITY CHART

FIGURE



	Sample	Depth (ft)	LL (%)	PL (%)	PI (%)	LI (-)	Description
●	LF- 1	129.0	37.9	22.9	15.0		Lean CLAY
⊠	LF- 1	149.0	39.1	22.2	16.8		Lean CLAY
▲	LF- 1	194.0	32.2	19.8	12.3		Lean CLAY

LL - Liquid Limit
PL - Plasticity Limit
PI - Plasticity Index
LI - Liquidity Index

Unified Soil Classification
Fine Grained Soil Groups

	LL < 50
ML	Inorganic clayey silts to very fine sands of slight plasticity
CL	Inorganic clays of low to medium plasticity
OL	Organic silts and organic silty clays of low plasticity

	LL > 50
MH	Inorganic silts and clayey silts of high plasticity
CH	Inorganic clays of high plasticity
OH	Organic clays of medium to high plasticity, organic silts

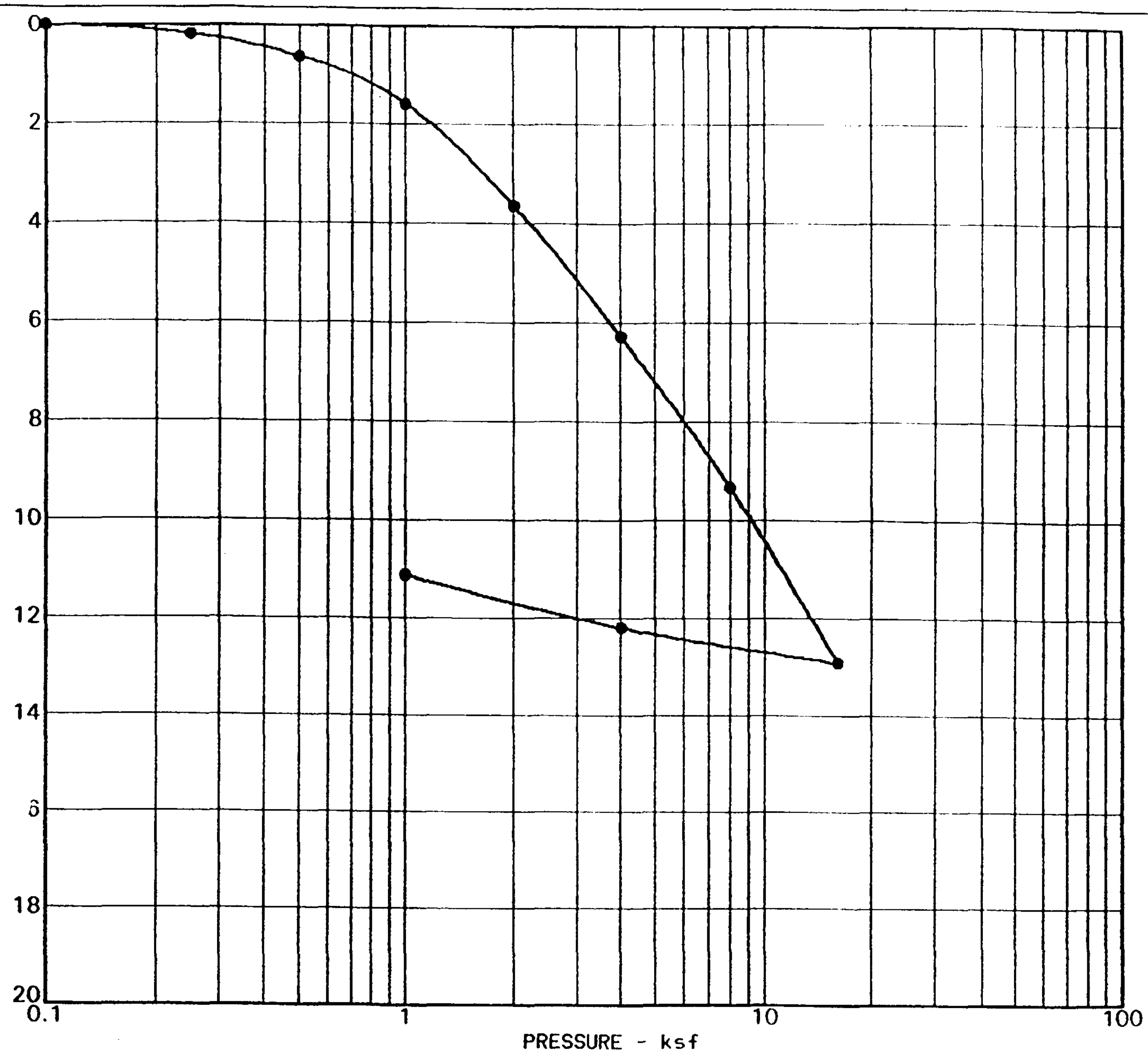
KLEINFELDER

Salt Lake County Landfill

PLASTICITY CHART

FIGURE

ROJECT NO. 30-8018-06.018



Sample	LF- 1
Depth	11.0 ft
Description	Lean CLAY w/ sand seams
Classification	CL
Overburden Pressure	1.00 ksf
Preconsolidation Pressure	2.00 ksf
Compression Index	0.115
Recompression Index	0.015
Overconsolidation Ratio	2.0

	Initial	Final
Dry density, pcf	89.6	109.6
Water content, %	28.2	26.7
Sample height, in.	25.4	22.57

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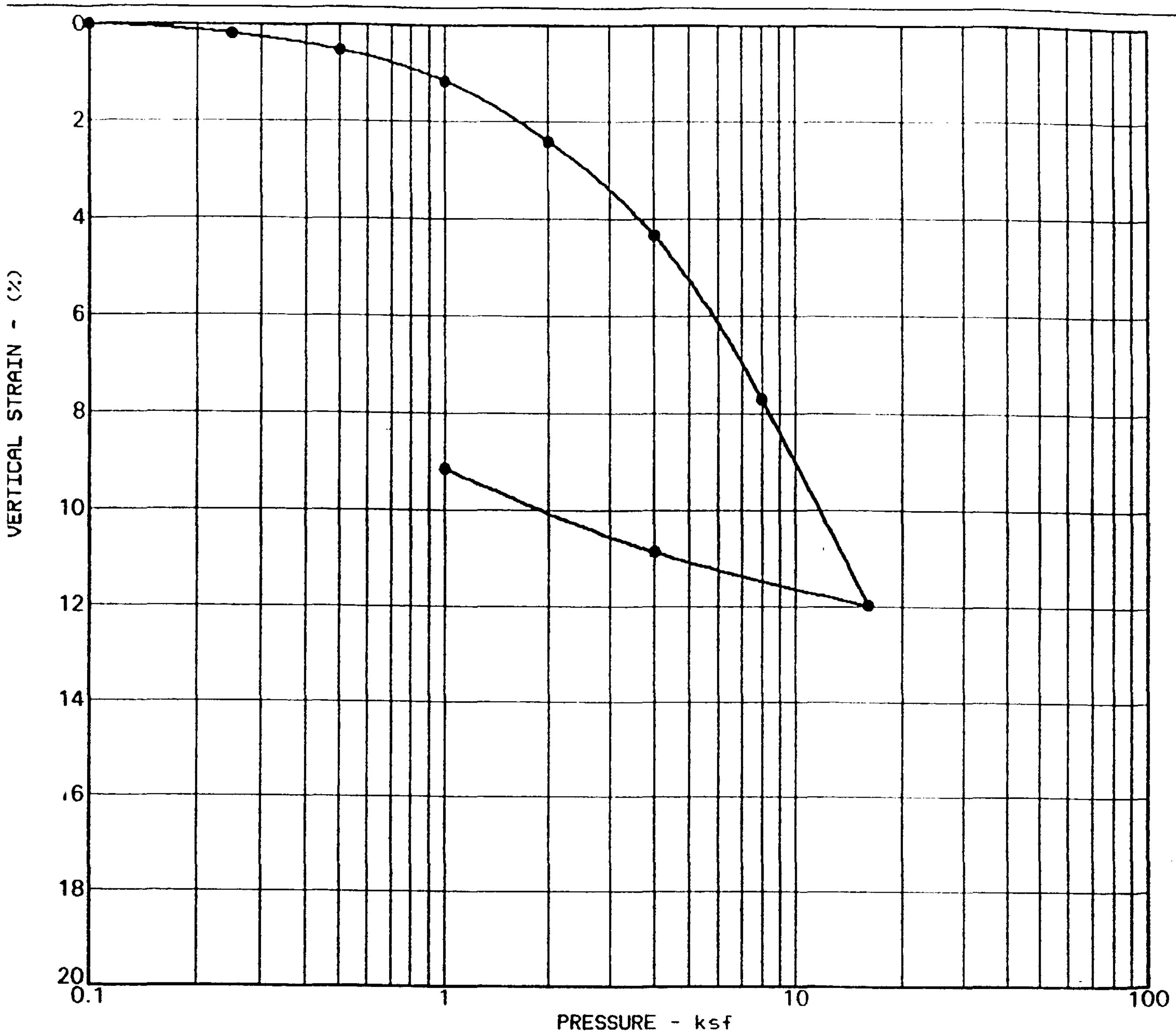
OJECT NO. 30-8018-06.018

Salt Lake County Landfill

CONSOLIDATION TEST RESULTS

PLATE



Sample	LF- 1
Depth	21.0 ft
Description	Lean CLAY w/ sand seams
Classification	CL
Overburden Pressure	1.80 ksf
Preconsolidation Pressure	3.00 ksf
Compression Index	0.140
Recompression Index	0.022
Overconsolidation Ratio	1.7

	Initial	Final
Dry density, pcf	85.4	100.7
Water content, %	32.1	30.7
Sample height, in.	25.4	23.07

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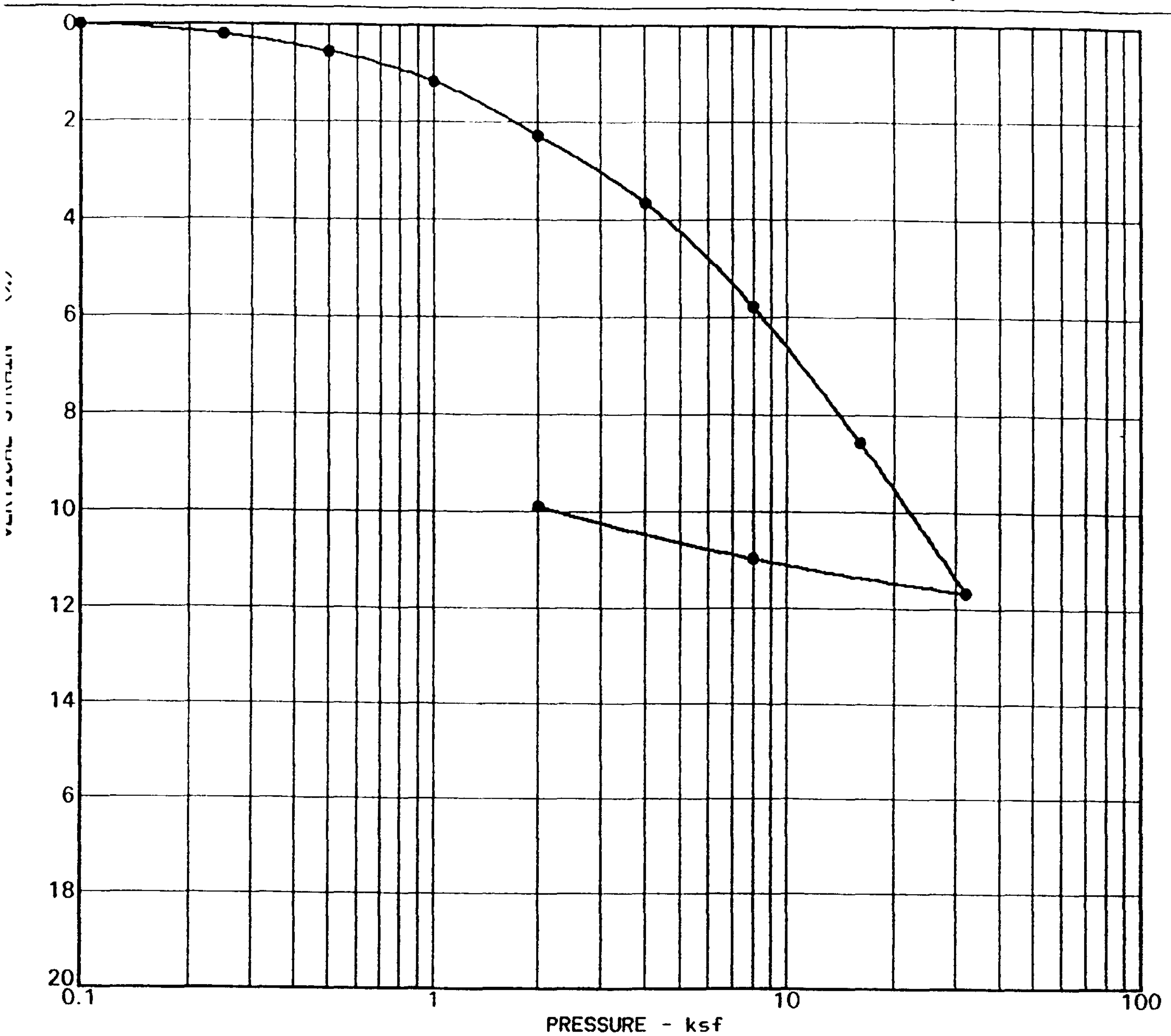
ROJECT NO. 30-8018-06.018

Salt Lake County Landfill

CONSOLIDATION TEST RESULTS

PLATE



Sample	LF- 1
Depth	30.0 ft
Description	Lean CLAY w/ silt nodules
Classification	CL
Overburden Pressure	2.00 ksf
Preconsolidation Pressure	3.80 ksf
Compression Index	0.101
Recompression Index	0.014
Overconsolidation Ratio	1.9

	Initial	Final
Dry density, pcf	100.2	120.1
Water content, %	21.0	19.9
Sample height, in.	25.4	22.89

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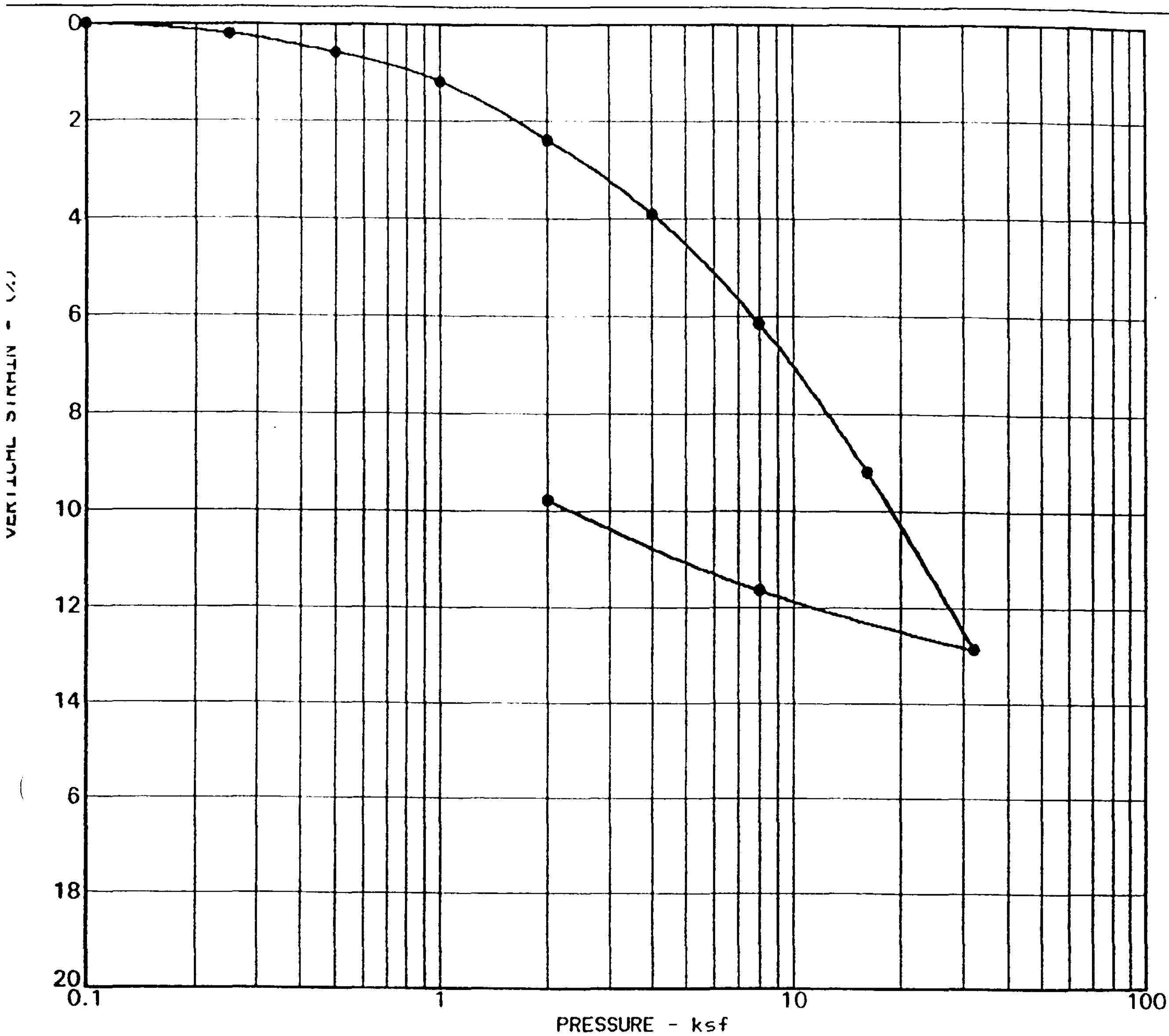
OJECT NO. 30-8018-06.018

Salt Lake County Landfill

CONSOLIDATION TEST RESULTS

PLATE



Sample	LF- 1
Depth	41.0 ft
Description	Lean CLAY w/ sand seams
Classification	CL
Overburden Pressure	2.50 ksf
Preconsolidation Pressure	4.00 ksf
Compression Index	0.116
Recompression Index	0.022
Overconsolidation Ratio	1.6

	Initial	Final
Dry density, pcf	91.8	109.8
Water content, %	26.8	25.5
Sample height, in.	25.4	22.92

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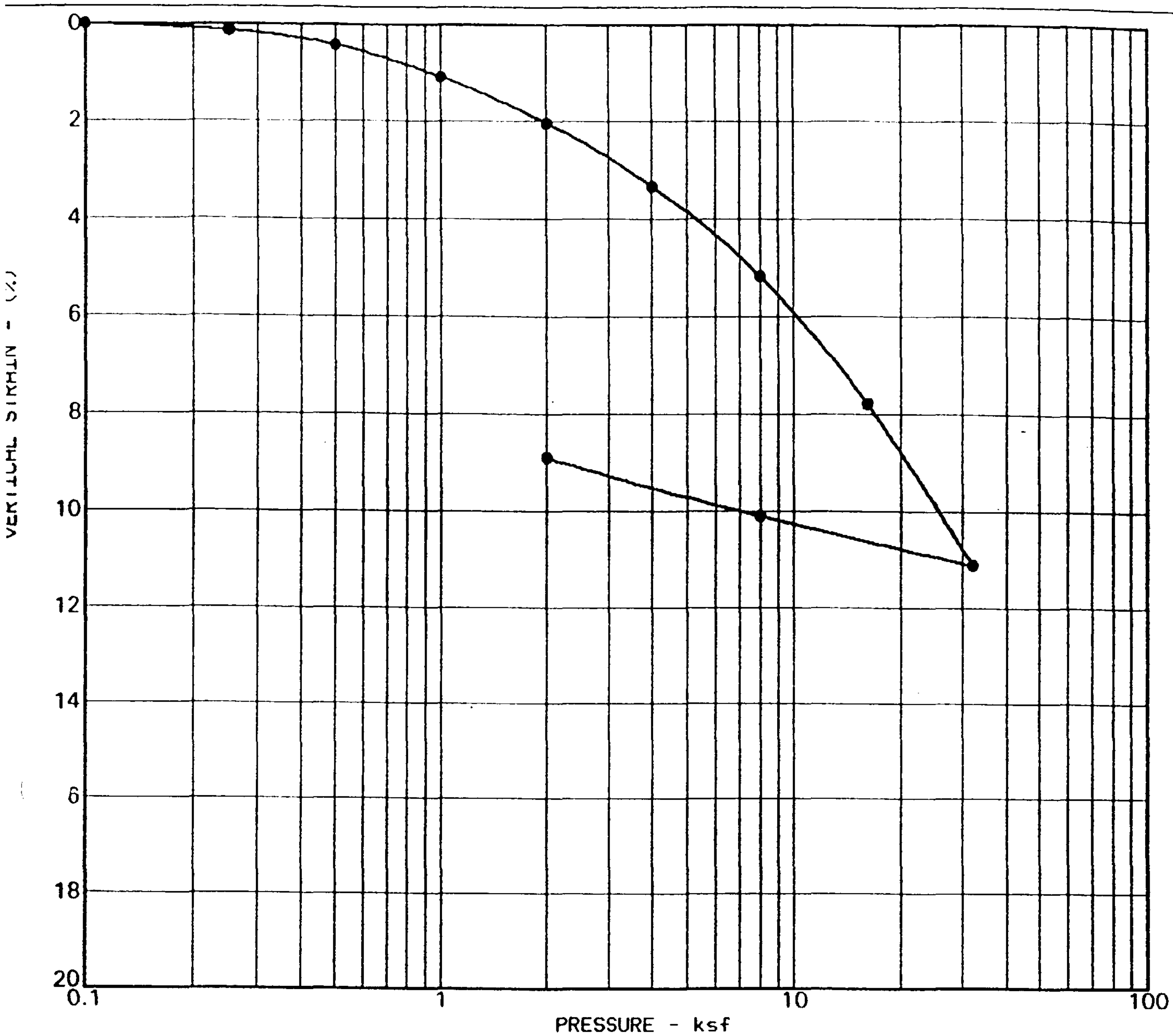
ROJECT NO. 30-8018-06.018

Salt Lake County Landfill

CONSOLIDATION TEST RESULTS

PLATE



Sample	LF- 1
Depth	81.0 ft
Description	Lean CLAY
Classification	CL
Overburden Pressure	4.80 ksf
Preconsolidation Pressure	7.30 ksf
Compression Index	0.110
Recompression Index	0.017
Overconsolidation Ratio	1.5

	Initial	Final
Dry density, pcf	94.1	110.9
Water content, %	25.5	24.3
Sample height, in.	25.4	23.14

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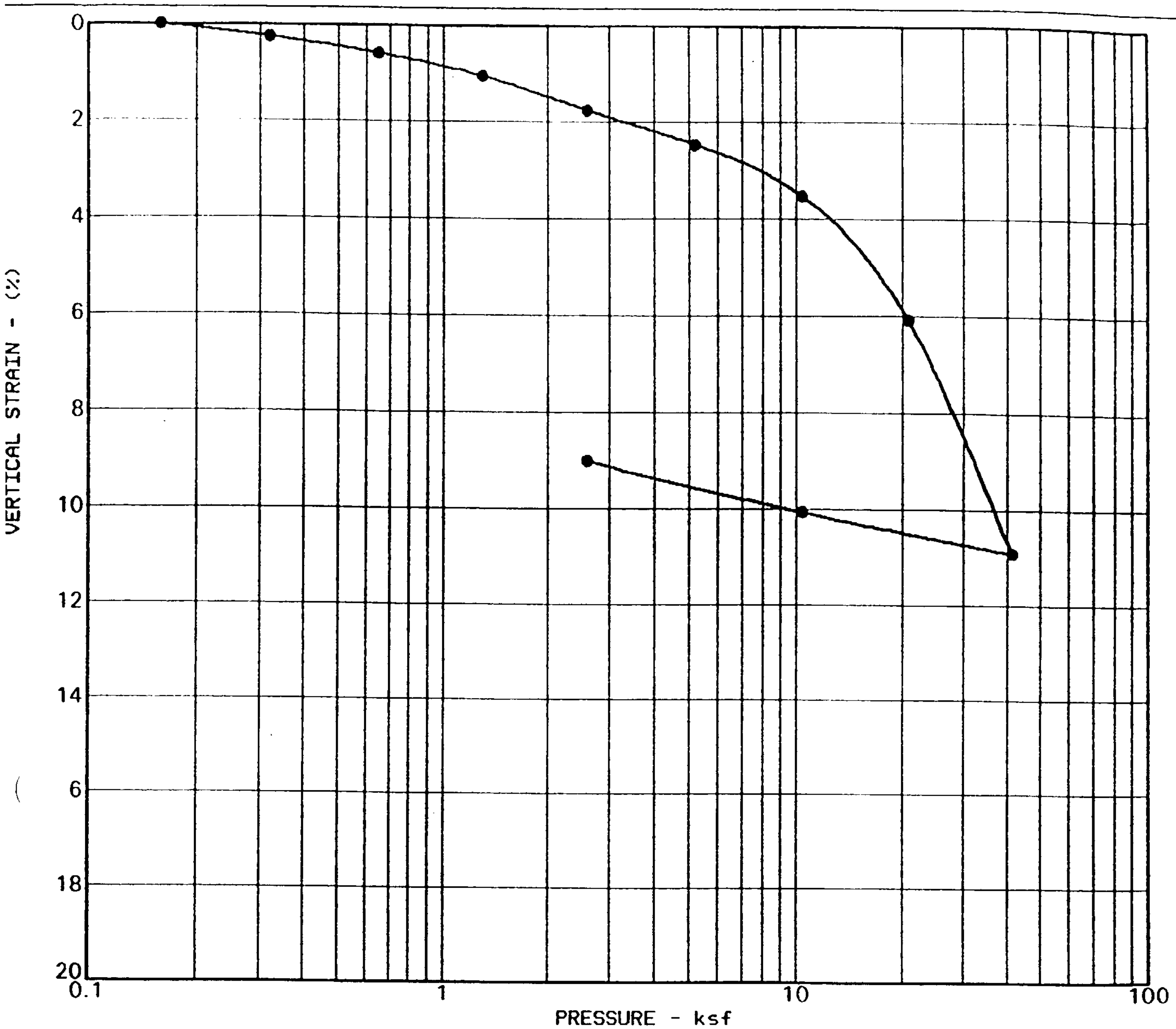
Salt Lake County Landfill

PLATE

CONSOLIDATION TEST RESULTS

ROJECT NO. 30-8018-06.018



Sample	LF- 1
Depth	131.0 ft
Description	Lean CLAY
Classification	CL
Overburden Pressure	7.40 ksf
Preconsolidation Pressure	14.00 ksf
Compression Index	0.157
Recompression Index	0.020
Overconsolidation Ratio	1.9

	Initial	Final
Dry density, pcf	89.0	105.2
Water content, %	29.5	28.2
Sample height, in.	25.4	23.11

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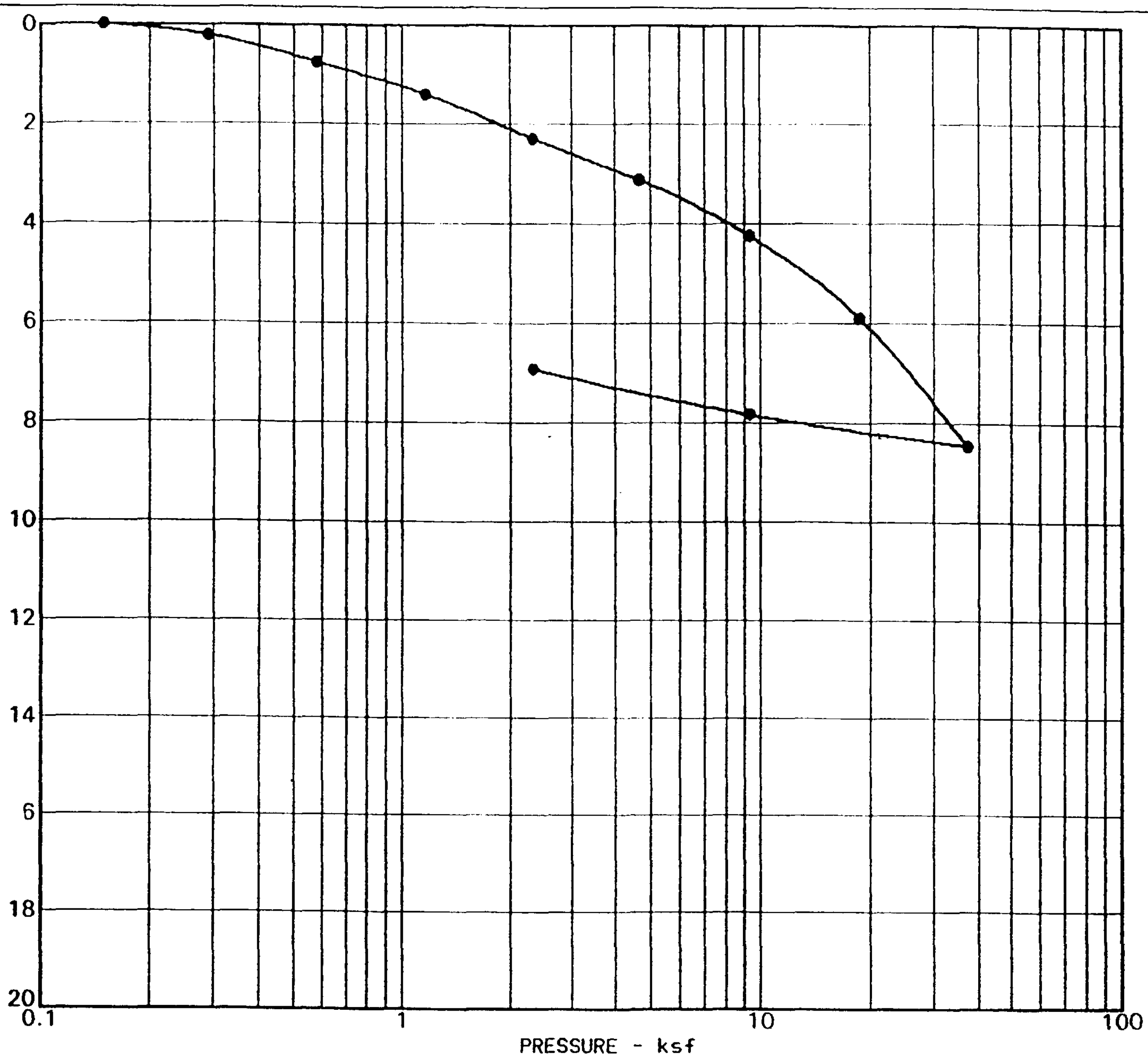
ROJECT NO. 30-8018-06.018

Salt Lake County Landfill

CONSOLIDATION TEST RESULTS

PLATE



Sample	LF- 1
Depth	149.0 ft
Description	Lean CLAY
Classification	CL
Overburden Pressure	8.00 ksf
Preconsolidation Pressure	12.00 ksf
Compression Index	0.087
Recompression Index	0.012
Overconsolidation Ratio	1.5

	Initial	Final
Dry density, pcf	97.5	138.1
Water content, %	24.3	111.9
Sample height, in.	25.4	23.64

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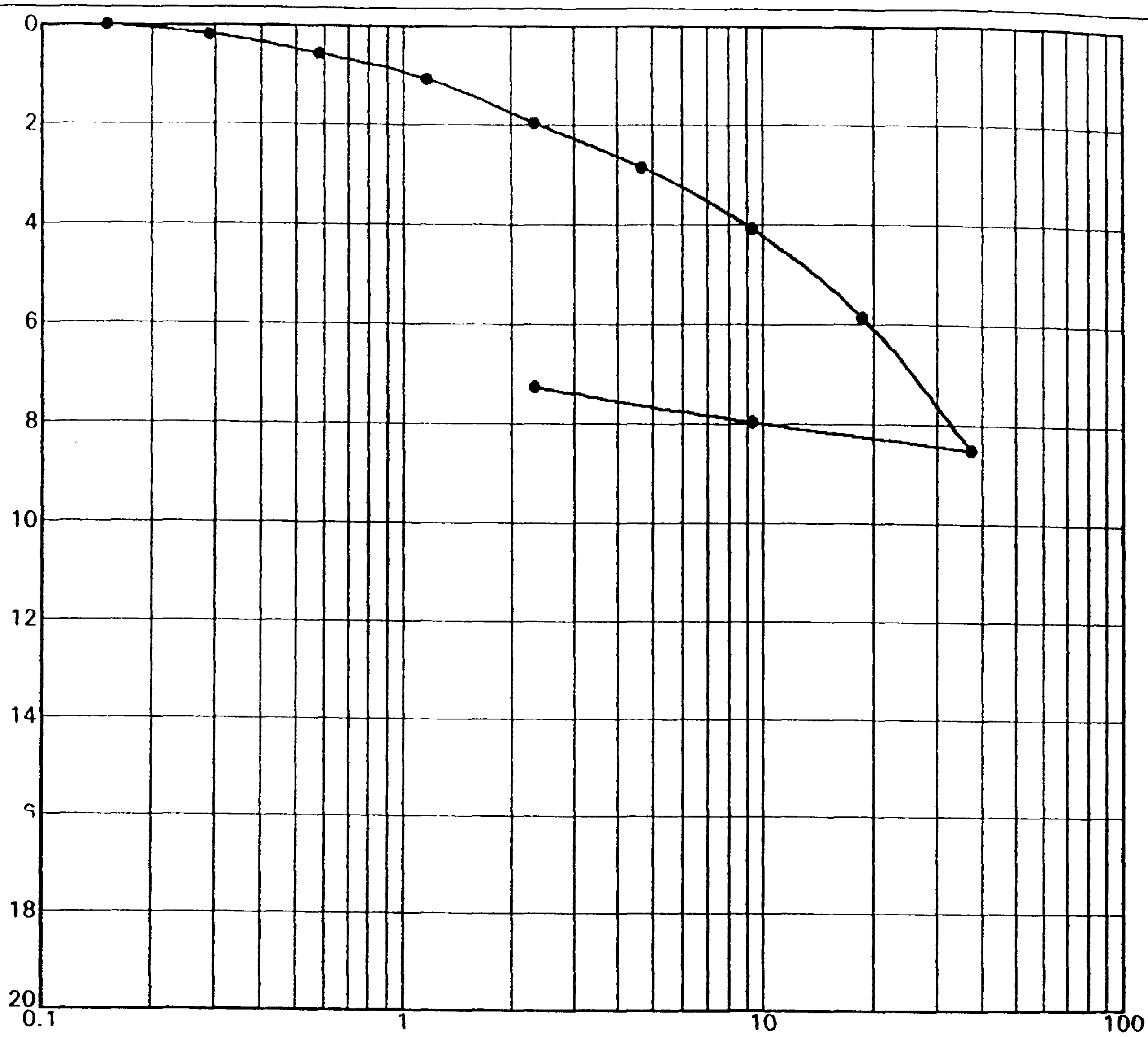
'OJECT NO. 30-8018-06.018

Salt Lake County Landfill

CONSOLIDATION TEST RESULTS

PLATE



Sample	LF- 1
Depth	194.0 ft
Description	Lean CLAY
Classification	CL
Overburden Pressure	11.00 ksf
Preconsolidation Pressure	21.00 ksf
Compression Index	0.125
Recompression Index	0.011
Overconsolidation Ratio	1.9

	Initial	Final
Dry density, pcf	98.7	112.7
Water content, %	22.8	21.9
Sample height, in.	25.4	23.56

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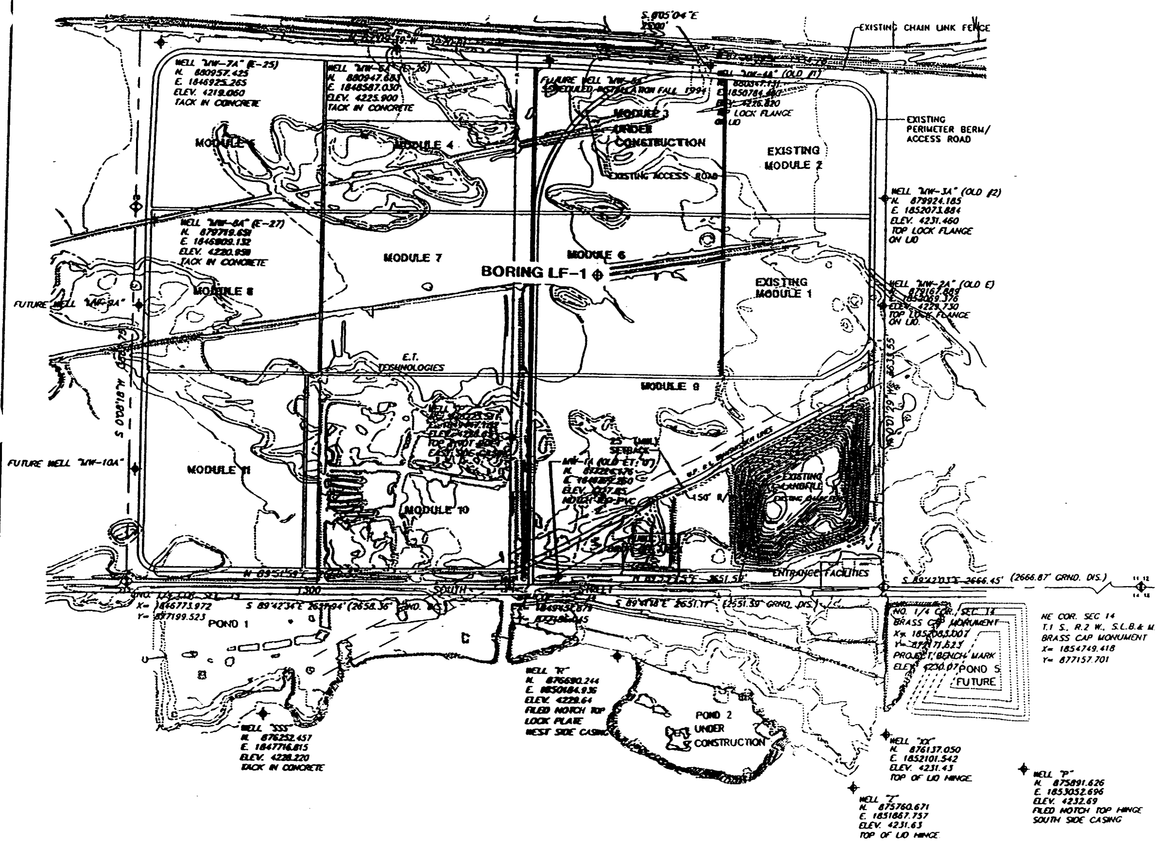
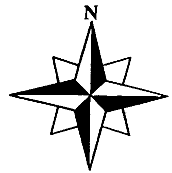
ͻJECT NO. 30-8018-06.018

Salt Lake County Landfill

CONSOLIDATION TEST RESULTS

PLATE





[redacted]

LEGEND

EXISTING GROUNDWATER MONITORING WELL

PROPOSED FUTURE GROUNDWATER MONITORING WELL

NO.	AUTHORIZED BY	REVISIONS	MADE BY	DATE

KLEINFELDER

SALT LAKE CITY CORPORATION

BORING LOCATION MAP

Salt Lake Valley Solid Waste Management Facility

DESIGNED BY	ED McDONALD
DRAWN BY	ED McDONALD
CHECKED BY	MARK MORRISON
SCALE HORIZ	N/A
VERT	N/A
DATE	12/22/93
VAULT NO.	
SHEET 1 OF 1 SHEETS	
PROJECT NO.	40-8-71
DRAWING NO.	1

(From EMCON Associates, 1991)

Table E-1

Summary of Laboratory Test Results

Boring Ident.	Sample Ident.	Depth (feet)	Soil Class.[1]	Raw bpf[2]	Press. psi[3]	Dens. pcf[4]	Moist. %	Fines %	LL[5] %	PI[6] %	Perm. (cm/sec)[7]	Strength Parameters	Maximum Density (D1557) pcf	Optimum Moisture Content %
E-24		3	CL		50									
E-24		6	CL	5										
E-24	ST-2	8	CL		200				27	12				
E-24	ST-3	11.5	CL		150		30.2							
E-24		13	CL	5										
E-24		16.5	SM		200									
E-24		18	SM	11										
E-24	ST-5	21.5	ML		250	99.6	25.2	92.9				C = 500 psf ϕ = 35 (DS)[8]		
E-24		23	SM	14										
E-24		26.5	SM		500									
E-24		28	SM	35										
E-24		31.5	SM		550									
E-24		33.5	SM	90										
E-25	ST-1	3	ML		100		27.3		23	1	3×10^{-6}			
E-25	SS-1	4.5	CL	14							3×10^{-8}			
E-25		6	SM	20										
E-25		11	CL	8										
E-25	ST-2	16	CL	14			19.1							
E-25		18	CL		200									
E-25		21.5	SM		250									
E-25		26	SW	18										
E-26		3	CL		100									
E-26		4.5	CL	6										
E-26	ST-2	6.5	CL		250		24.0							

(From EMCON Associates, 1991)

Table E-1

Summary of Laboratory Test Results (Continued)

Boring Ident.	Sample Ident.	Depth (feet)	Soil Class.[1]	Raw bpf[2]	Press. psi[3]	Dens. pcf[4]	Moist. %	Fines %	LL[5] %	PI[6] %	Perm. (cm/sec)[7]	Strength Parameters	Maximum Density (D1557) pcf	Optimum Moisture Content %
E-26		8	CL	12										
E-26	ST-3	11.5	CL		100		38.7		47	26				
E-26		13	CL	17										
E-26	ST-4	16.5	CL		150		21.4	98.9	31	15				
E-26		18	CL	26										
E-26	ST-5	21.5	CL		250		25.4							
E-26	ST-6	26.5	SW		2000									
E-26		31.5	SW	28										
E-27	ST-1	11.5	ML		100		20.4	91.4	29	6		C=0 psf ϕ=35.5° (CU)[9]		
E-27		13	CL	7										
E-27	ST-2	16.5	CL		150	90.0	29.6		33	17				
E-27		18	SM	18										
E-27	ST-3	21.5	ML		150	90.8	29.4	99.5				C=0 psf ϕ=38° (DS)		
E-27		26.5	SW	28										
E-27		31	SW	72										
E-28	ST-1	3	ML		800		16.7							
E-28		6	CL	25										
E-28	ST-2	11.5	CL		150	95.0	25.8		32	13				
E-28	ST-3	16.5	CL		150		27.7	79.5	46	24				
E-28	ST-4	21.5	CL		150	94.8	27.9		35	18				
E-28	ST-5	26.5	CL		150	85.8	35.5		38	19				

(From EMCON Associates, 1991)

Table E-1

Summary of Laboratory Test Results
(Continued)

Boring Ident.	Sample Ident.	Depth (feet)	Soil Class.[1]	Raw bpf[2]	Press. psi[3]	Dens. pcf[4]	Moist. %	Fines %	LL[5] %	PI[6] %	Perm. (cm/sec)[7]	Strength Parameters	Maximum Density (D1557) pcf	Optimum Moisture Content %
E-28		31	SM	10										
E-28		36	SM	78										
E-29	ST-1	3	ML		350		32.5							
E-29		6.5	CL	6										
E-29	ST-2	8.5	CL		100	95.4	26.6	91.3	34	14		C=0 psf ϕ=37°(CU)		
E-29	ST-3	12	SM		100		31.2							
E-29		17.5	SM	14										
E-29		21.5	SM	20										
E-29		28.5	SM	24										
E-29		31.5	CL	26										
E-30	ST-1	3	CL		150		24.2	98.7	28	9	9×10^{-8}			
E-30	ST-2	6	CL	7			20.4							
E-30		11.5	SM		100									
E-30		16	SM	6										
E-30		21	SM	22										
E-30		26	SM	14										
E-30		31	SM	18										

(From EMCON Associates, 1991)

Table E-1

Summary of Laboratory Test Results (Continued)

Boring Ident.	Sample Ident.	Depth (feet)	Soil Class.[1]	Raw bpf[2]	Press. psi[3]	Dens. pcf[4]	Moist. %	Fines %	LL[5] %	PI[6] %	Perm. (cm/sec)[7]	Strength Parameters	Maximum Density (D1557) pcf	Optimum Moisture Content %
T-25	B-2	4	CL		101	22.9					3×10^{-8}	6880 (UU-REM)[10]	113	15.5
T-34	B-5	15	SM					50.0						
T-37	B-1	2.5	SM		102	20.8					2×10^{-5}	3450 psf (UU-REM)	114	14.2
T-39	B-4	14	SM					27.2						
T-41	B-5	15	SM					48.0						

1. Soil Class: Soil classification according to ASTM D2488, *Description and Identification of Soils* (Visual-Manual)
2. Raw bpf: Actual blows per foot to advance a soil sampler, using a 140-pound drop weight falling free for 30 inches
3. Press psi: Hydraulic down pressure required to press a 3-inch-diameter thin-walled Shelby tube 2 feet into undisturbed soil (per square inch)
4. pcf: Pounds per cubic foot
5. LL: Atterberg Liquid Limit
6. PI: Atterberg Plasticity Index
7. cm/sec: Centimeters per second
8. DS: Direct shear test
9. CU: Consolidated, undrained triaxial shear test
10. UU-REM: Unconsolidated, undrained triaxial shear test performed on remolded specimen

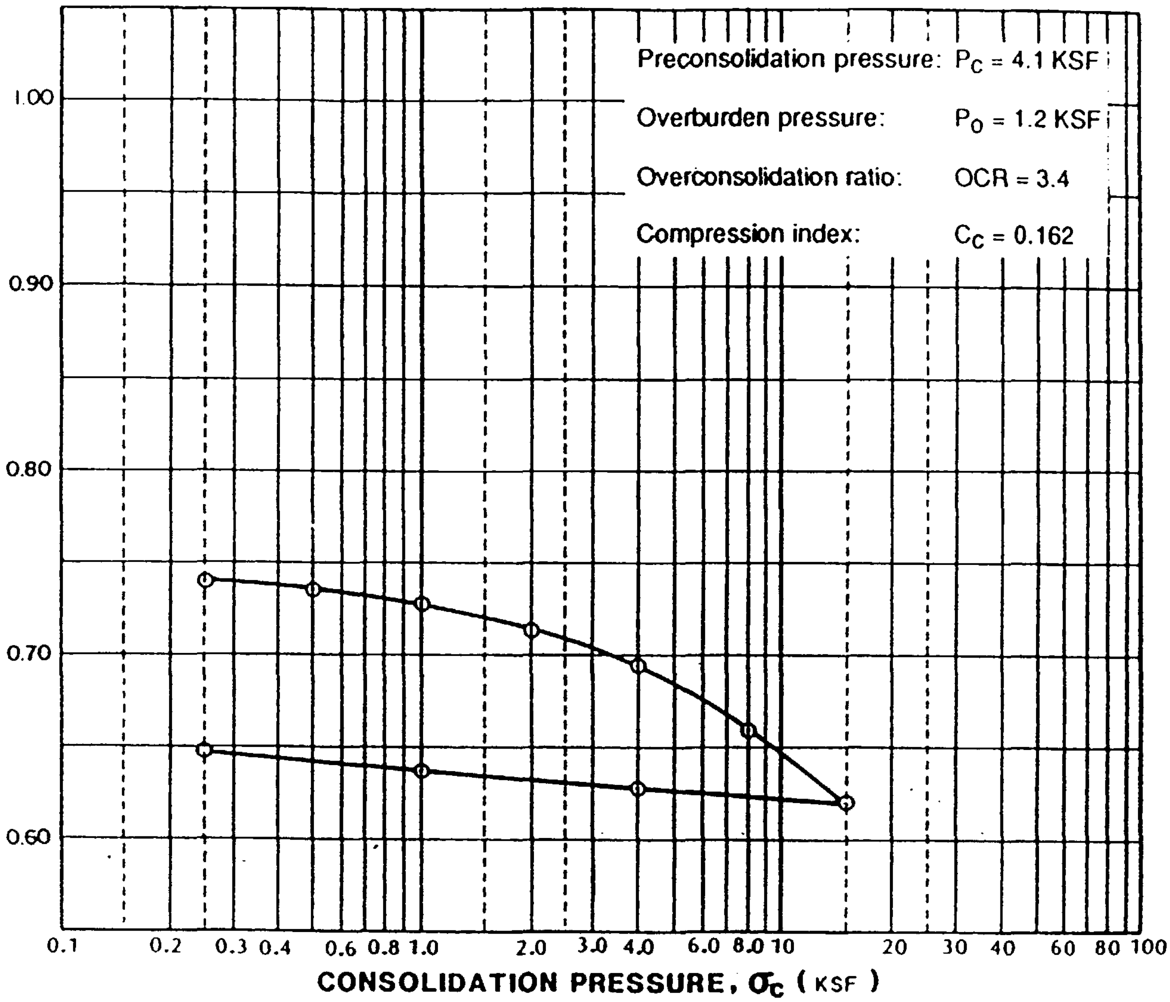
(From EMCON Associates, 1991)

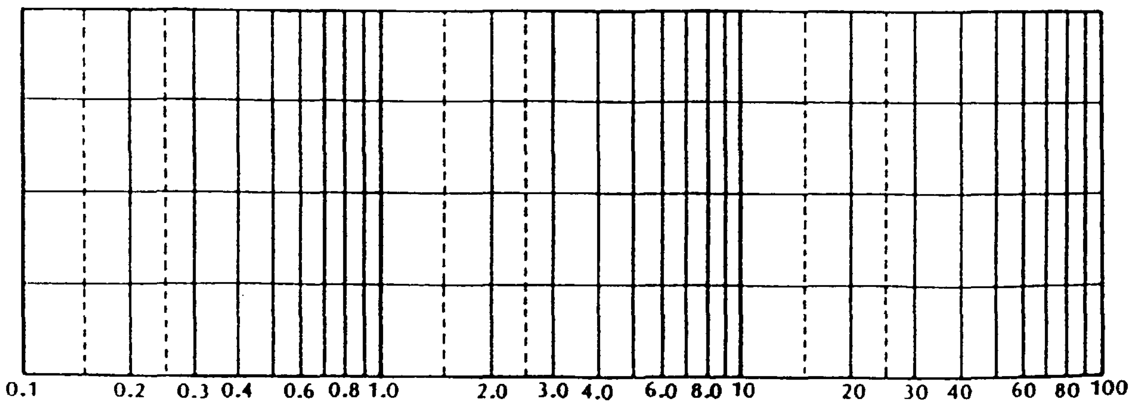
CONSOLIDATION TEST

EMCON ASSOCIATES

PROJECT NAME	SALT LAKE VALLEY LANDFILL	PROJECT NO.	344-02.01
DATE	11/16/90	BY	D. CANLAS
BORING NO.	E-28	SAMPLE NO.	ST-2
DEPTH	11.5'	MATERIAL	LEAN CLAY (CL)

$\gamma_{d,o}$ =	95.0	$W_{n,o}$ =	25.8 %
$\gamma_{d,f}$ =	102.3	$W_{n,f}$ =	25.1 %
LL =	32	PI =	13





2/91

FIGURE C-3

(From EMCON Associates, 1991)

EMCON ASSOCIATES

CONSOLIDATION TEST

PROJECT NAME SALT LAKE VALLEY LANDFILL PROJECT NO. 344-02.01

DATE 9/19/90 BY TERRATECH, INC.

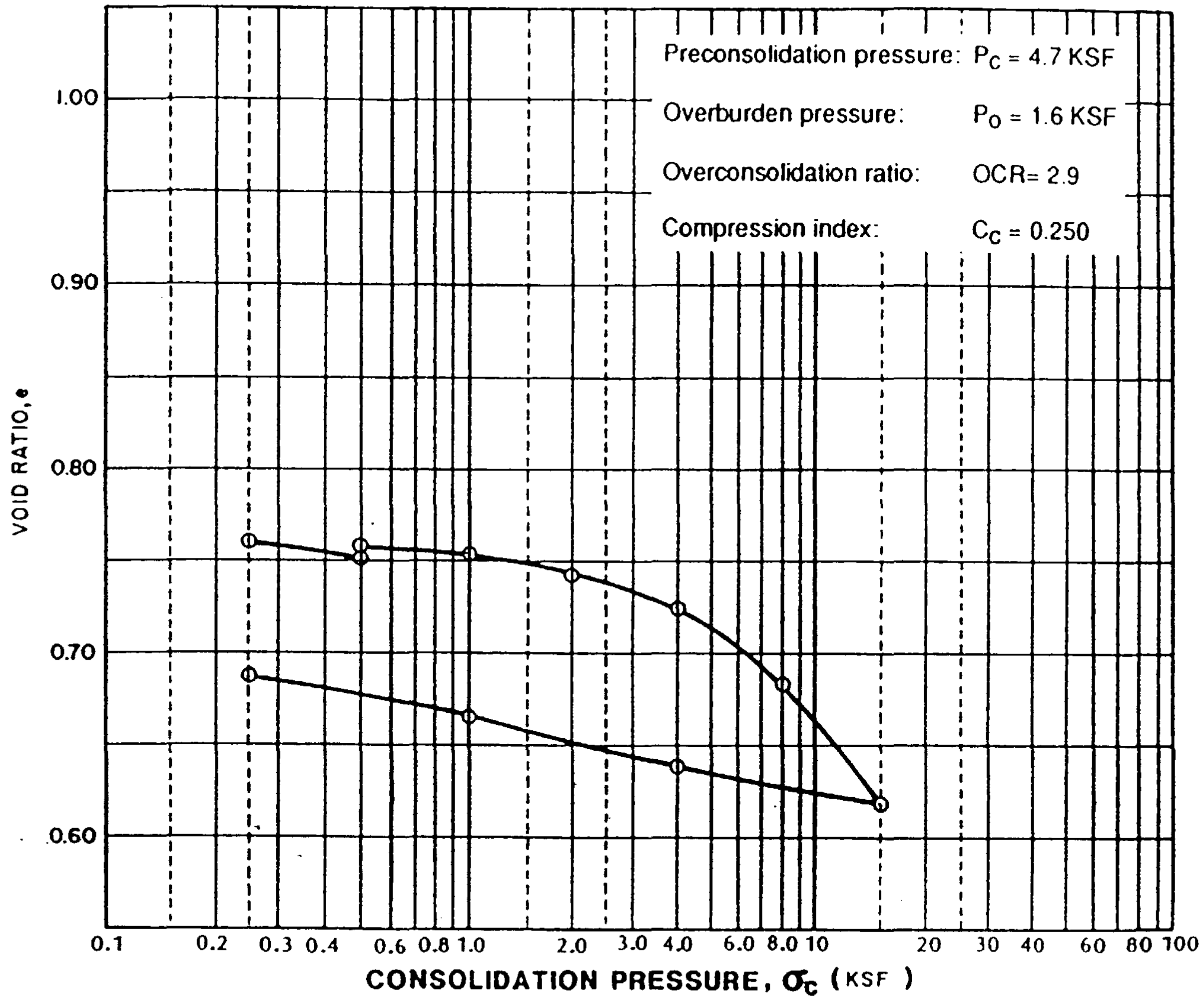
BORING NO. E-28 SAMPLE NO. ST-4

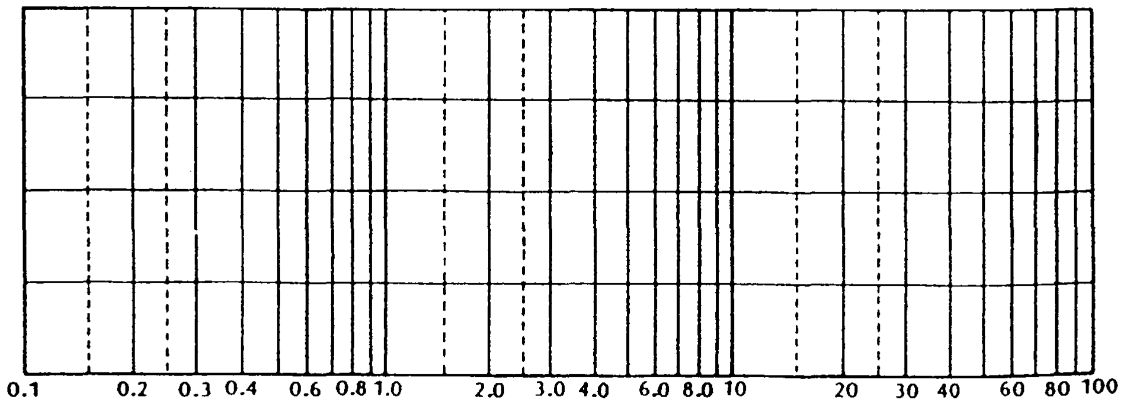
DEPTH 21.5' MATERIAL LEAN CLAY (CL)

$\gamma_{d,o}$ = 94.8 $W_{n,o}$ = 27.9 %

$\gamma_{d,f}$ = 98.0 $W_{n,f}$ = 26.6 %

LL = 35 PI = 18





2/91

FIGURE C-4

(From EMCON Associates, 1991)

CONSOLIDATION TEST

EMCON ASSOCIATES

PROJECT NAME SALT LAKE VALLEY LANDFILL PROJECT NO. 344-02.01

DATE 11/16/90 BY D. CANLAS

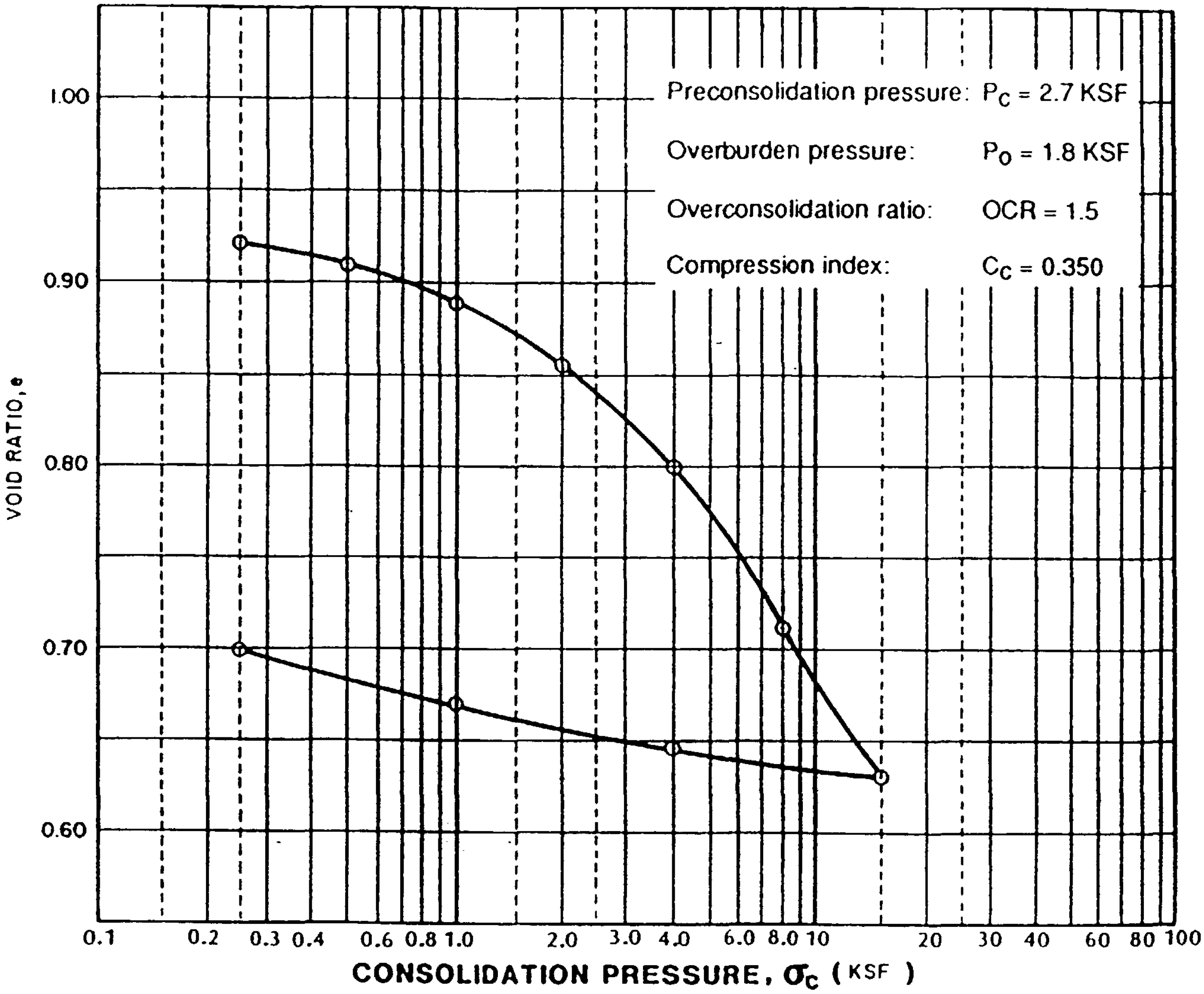
BORING NO. E-28 SAMPLE NO. ST-5

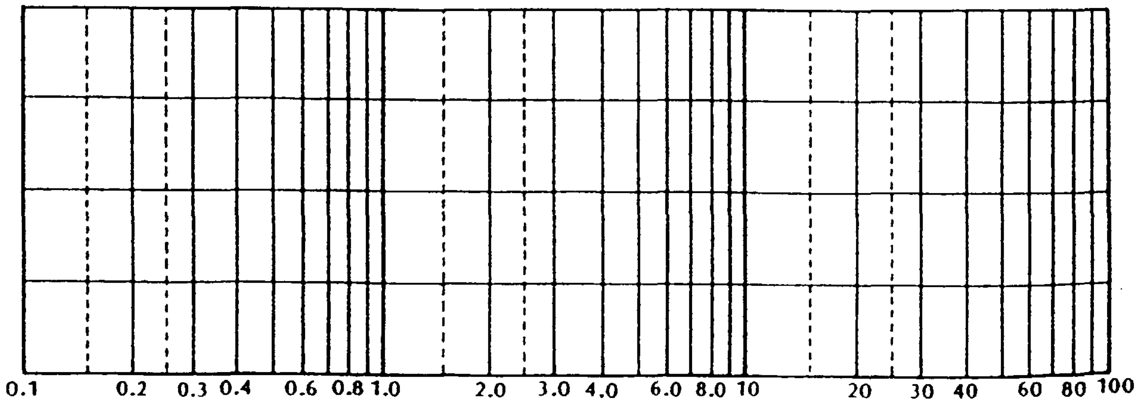
DEPTH 26.5' MATERIAL LEAN CLAY (CL)

$\gamma_{d,o}$ = 85.8 $W_{n,o}$ = 35.5 %

$\gamma_{d,f}$ = 99.2 $W_{n,f}$ = 27.1 %

LL = 38 PI = 19





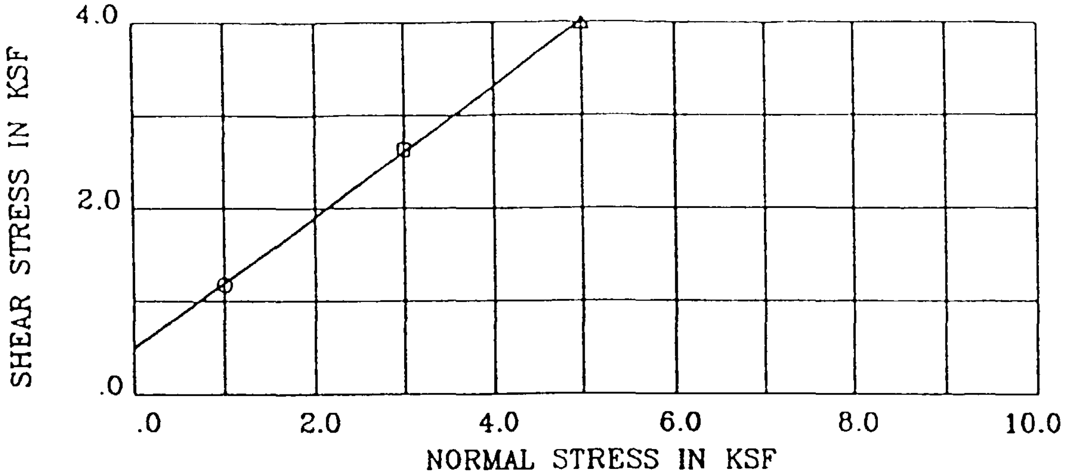
5 cycle

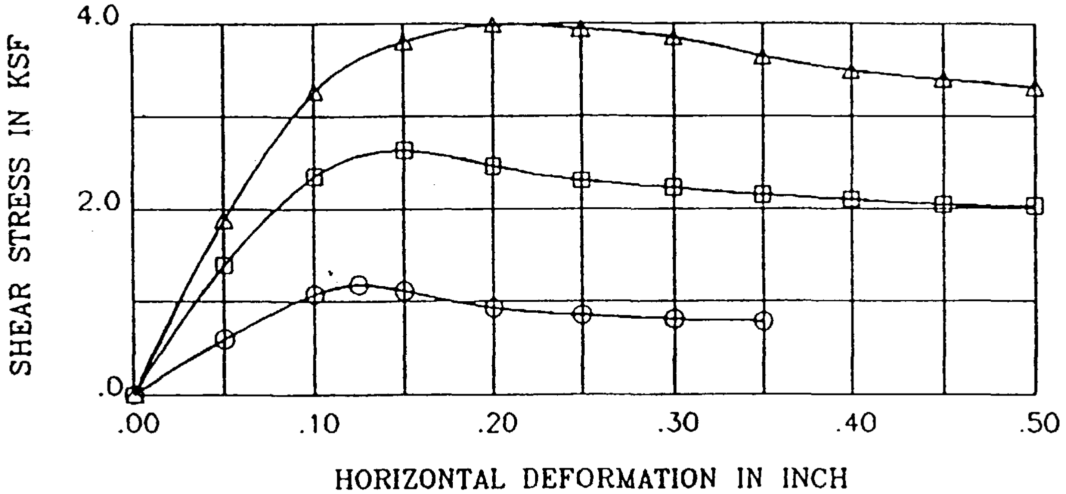
2/91

FIGURE C-5

140789

(From EMCON Associates, 1991)





BORING/SAMPLE : E-24, T-5 DEPTH (ft) : 19-21.5

DESCRIPTION : sandy SILT with interbedded silty SAND, gray

STRENGTH INTERCEPT (C) : .489 KSF

FRICTION ANGLE (PHI) : 35.1 DEG

(PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	25.8	98.6	.741	1.00	1.18	.78
□	26.4	97.5	.761	3.00	2.63	2.03
△	23.4	102.7	.671	5.00	3.99	3.32

2/91

EMCON Associates

SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

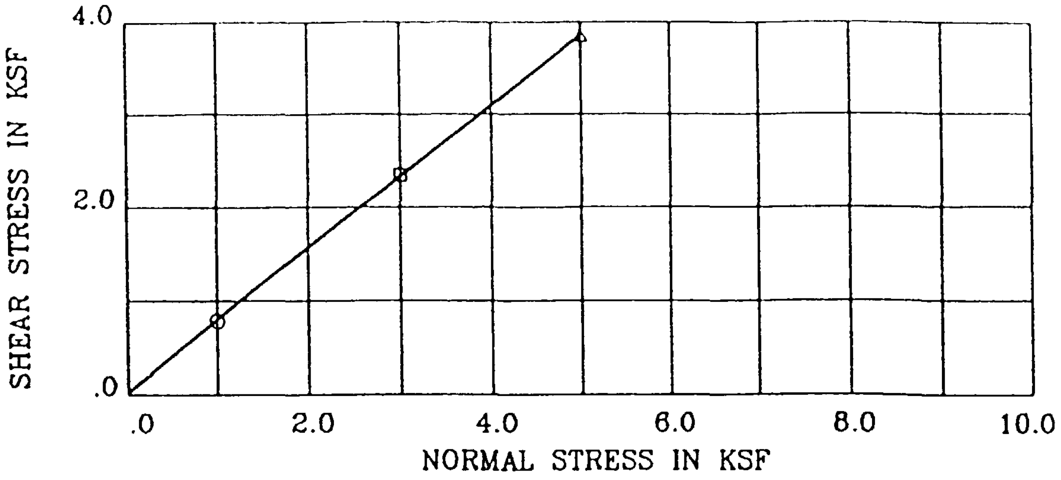
DIRECT SHEAR TEST RESULTS

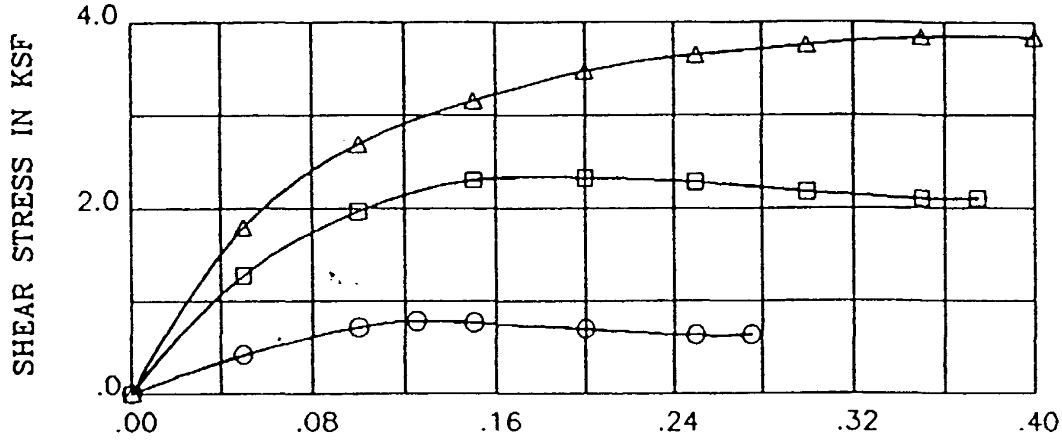
FIGURE C-6

PROJECT NO. 344-02.01

(From EMCON Associates, 1991)

140789





BORING/SAMPLE : E-27, T-3 DEPTH (ft) : 19.5-21.5

DESCRIPTION : silty SAND with interbedded clayey SILT, dark gray

STRENGTH INTERCEPT (C) : .027 KSF

FRICTION ANGLE (PHI) : 37.5 DEG

(PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	34.2	86.1	.992	1.00	.78	.62
□	23.9	94.7	.813	3.00	2.34	2.10
△	30.0	91.6	.873	5.00	3.85	3.83

2/91

EMCON Associates

SALT LAKE VALLEY SOLID WASTE MANAGEMENT COUNCIL
SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

DIRECT SHEAR TEST RESULTS

FIGURE C-7

PROJECT NO. 344-02.01

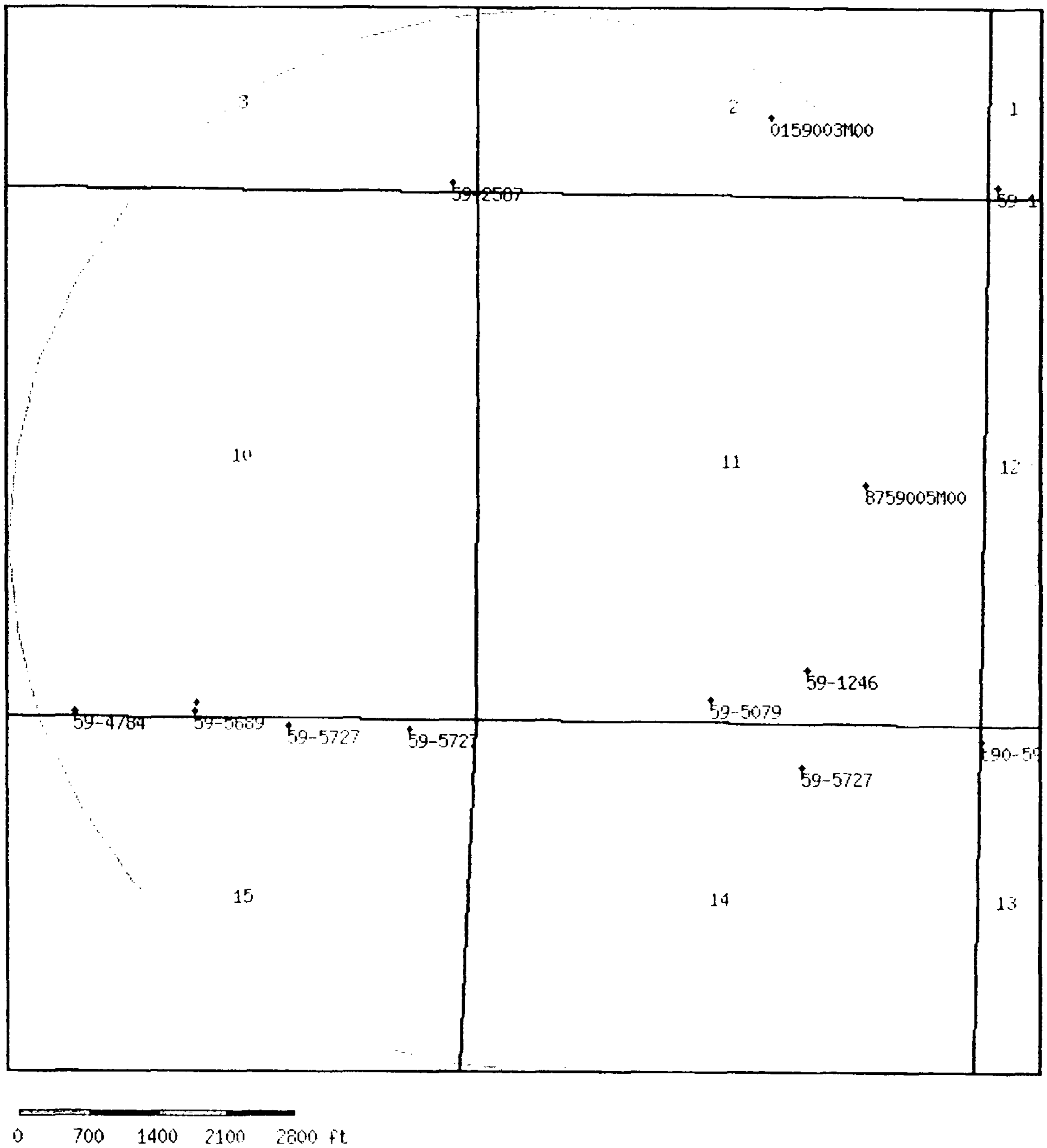
APPENDIX
F

UTAH DIVISION OF WATER RIGHTS

WRPLAT Program Output Listing

Version: 2004.12.30.00 Rundate: 02/09/2005 10:43 AM

Radius search of 5280 feet from a point N1800 E500 from the SW corner, section 11, Township 1S, Range 2W, SL b&m Criteria:wrtypes=all podtypes=all status=all usetypes=all



WR Number	Diversion Type/Location	Well Log	Status	Priority	Uses	CFS	ACFT	Owner Name
0159003M00	Underground	well info	A			0.000	0.000	URS CORPORATION
	N800 W2230 SE 02 1S 2W SL							8181 EAST TUFTS AVENUE
8759005M00	Underground	well info	A			0.000	0.000	SALT LAKE CITY CORPORATION
	N2400 W1200 SE 11 1S 2W SL							444 S. STATE
59-1246	Underground		P	19551222	S	0.015	0.000	JOSEPH K. KNORR
	N540 E800 S4 11 1S 2W SL							6302 SOUTH WESTRIDGE ST.
59-1540	Underground		T	19590821		0.100	0.000	FLOYD C. BUETER
	N125 E83 SW 01 1S 2W SL							140 NORTH 2ND WEST
59-2587	Underground	well info	A	19281201	D	0.111	0.000	KSL INCORPORATED
	N105 W260 SE 03 1S 2W SL							P.O. BOX 1160
59-4015	Underground		T	19740220	DIS	0.000	0.000	HALF CENTURY INVESTMENT
	N150 W150 S4 10 1S 2W SL							UT
59-4784	Underground		T	19801203	DIOS	0.200	0.000	BRIAN BLAND
	N50 E1345 SW 10 1S 2W SL							8630 SOUTH REDWOOD ROAD
59-4865	Surface		P	19811120	O	4.000	197.400	STATE OF UTAH DIVISION OF WILDLIFE RESOURCES
	S403 W1847 NE 14 1S 2W SL							1594 WEST NORTH TEMPLE, STE 2110
59-5079	Underground	well info	P	19951222	O	0.800	0.000	SALT LAKE CITY COUNTY LAND FILL
	N237 W187 S4 11 1S 2W SL							P.O. BOX 308
59-5689	Underground		P	19490615	IDO	0.015	0.000	WASTE MANAGEMENT OF UTAH INC.
	N75 W166 S4 10 1S 2W SL							6976 WEST CALIFORNIA AVE.
59-5727	Rediversion		U	20020809	O	4.000	0.000	STATE OF UTAH DIVISION OF WILDLIFE RESOURCES
	S75 E800 N4 15 1S 2W SL							1594 WEST NORTH TEMPLE
59-5727	Rediversion		U	20020809	O	4.000	0.000	STATE OF UTAH DIVISION OF WILDLIFE RESOURCES
	S75 W700 NE 15 1S 2W SL							1594 WEST NORTH TEMPLE
59-5727	Surface		U	20020809	O	4.000	0.000	STATE OF UTAH DIVISION OF WILDLIFE RESOURCES
	S403 W1847 NE 14 1S 2W SL							1594 WEST NORTH TEMPLE
t89-59-22	Surface		T	19890510	O	0.000	5.000	STATE OF UTAH DIVISION OF WILDLIFE RESOURCES
	S150 0 NE 14 1S 2W SL							1594 WEST NORTH TEMPLE, STE 2110
t90-59-26	Surface		T	19900417	O	0.000	5.000	STATE OF UTAH DIVISION OF WILDLIFE RESOURCES
	S150 0 NE 14 1S 2W SL							1594 WEST NORTH TEMPLE, STE 2110

APPENDIX
G

APPENDIX G

WATER BALANCE CALCULATIONS

Leachate (standing liquid on the base liner) at the SLVSWMF (Facility) is generated in two ways: 1) infiltration through the cover and subsequent percolation through the refuse and operations soil layer, and 2) infiltration through the bottom barrier soil and HDPE liner. The following sections discuss the methodology that was used to quantify the leachate production potential of each.

1. COVER INFILTRATION

1.1 HELP-3 Model

The EPA Hydrologic Evaluation of Landfill Performance, Version 3 (HELP-3) computer model was developed to conduct water balance analyses of landfills, cover systems, and solid waste disposal and containment facilities. It is a quasi-two dimensional hydrologic model of water movement across, into, through, and out of landfills. The model facilitates rapid estimation of the amounts of runoff, evapotranspiration, drainage, leachate collection, and liner leakage that may be expected to result from the operation of a wide variety of landfill designs. The program uses weather (climatological), soil, and design data to generate daily estimates of water movement. To compute a water balance, the model accounts for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, soil moisture storage, lateral subsurface drainage, leachate recirculation, unsaturated vertical drainage and leakage through soil, geomembrane or composite liners. The model performs a sequential daily accounting of rainfall, runoff, evapotranspiration, soil moisture storage, lateral drainage, and percolation quantities and determines the daily, monthly, and annual water budgets for a particular soil profile. Landfill systems including various combinations of vegetation, cover soils, waste cells, lateral drainage layers, low permeability barrier soils, and synthetic geomembrane liners may be modeled (Schroeder, et. al., 1993).

For the Facility, HELP-3 was used to estimate the amount of leachate which would be generated and either collected and removed by the leachate collection and removal system (LCRS) or which would pass through the LCRS during the post-closure period. This appendix describes the use of HELP-3 for the SLV SWMF, discusses model input parameters, and summarizes modeling results.

1.2 PROGRAM INPUT

1.2.1 Weather (Climatological) Data

The HELP-3 program can be used to estimate the magnitudes of various components of the water budget, including the volume of leachate produced and the thickness of water-saturated soil (head) above liners. To accomplish this and compute a water balance, daily precipitation is partitioned into surface storage (snow), snowmelt, interception, runoff, infiltration, surface evaporation, subsurface evaporation, subsurface moisture storage, liner leakage (percolation), and subsurface lateral drainage to collection, removal, and recirculation systems.

The model incorporates a synthetic weather generator that can generate daily rainfall and mean daily temperatures based on the climatological patterns of various cities throughout the United States. The HELP-3 model contains historical climatological data in its database that allow the user to select a station close to the site under consideration. The synthetic weather generator uses statistical coefficients to enable the user to generate daily rainfall and mean daily temperature values for a specific station (EMCON, 1995). The program generates a routine designed to preserve the dependence in time, the correlation between variables, and the seasonal characteristics in actual weather data at the specified location. The Salt Lake City default climatological station was selected for the water balance analysis. Based on its proximity to the site, the general rainfall distribution pattern experienced at this station is comparable to the rainfall distribution at the Salt Lake Valley SWMF. Mean monthly and annual precipitation and mean monthly temperatures for the Salt Lake City station are shown in Table F-1. Default evapotranspiration and solar radiation data are shown in Table F-2. The model was requested to generate twenty years of synthetic data.

1.2.2 Soil and Design Data

HELP-3 requires soil and vegetative cover type characteristics to perform the water balance. Default options for vegetative types and default characteristics for soil types are available for use when site-specific estimates are not available. Default soil textures are shown in Table F-3. Vegetation quality is input as numbers 1 through 5 corresponding to: 1) bare ground, 2) poor stand of grass, 3) fair stand of grass, 4) good stand of grass, and 5) excellent stand of grass.

Facility Profile

The Facility profile consists of, from top to bottom:

12-inch thick vegetative layer (poor stand of grass)
18-inch thick low-permeability soil layer (barrier soil)
12-inch thick foundation soil layer
360-inch thick refuse layer
12-inch thick intermediate soil cover
180-inch thick refuse layer
12-inch thick intermediate soil cover
180-inch thick refuse layer
12-inch thick intermediate soil cover
180-inch thick refuse layer
12-inch thick intermediate soil cover
180-inch thick refuse layer
12-inch thick intermediate soil cover
180-inch thick refuse layer
12-inch thick protective soil cover
0.25-inch thick geotextile drainage layer
12-inch thick leachate control and removal system (LCRS)
0.25-inch thick HDPE geomembrane liner
24-inch thick low-permeability soil layer

Table F-4 summarizes HELP-3 input parameters for the SLV SWMF. Layers shown are from top (vegetative cover) to bottom (barrier soil liner). Table F-5 shows the input screen for the landfill profile data. Table F-5 and Table F-6 detail default characteristics of the layers.

Vegetative Layer

The vegetative layer is recognized by HELP-3 as a vertical percolation layer. Onsite soil suitable for the vegetative layer has been classified as silty clay (CL) using the USCS and is similar to default soil texture No. 12. The soil parameters of the vegetative layer were automatically adjusted by the model to account for vegetative growth (root channels) in the top half of the evaporative zone. Cover vegetation quality was entered via the HELP-3 default input parameters as a "poor stand of grass". The model automatically defaults to the total thickness of the upper layer above the uppermost barrier soil layer for the evaporative zone depth. Therefore, the evaporative zone depth is 12 inches, equal to the vegetative layer thickness.

Low-Permeability (Barrier Soil) Layer

The model recognizes a low-permeability layer as a barrier layer. A low-permeability layer is used to restrict the vertical flow of moisture through the final soil profile and into the underlying wastes. The default soil type similar to onsite compacted soil is soil texture No. 26 which has a permeability of 1.9E-06 cm/sec. The model assumes the low permeability layer is always saturated, thus constantly building up a higher hydrostatic head that allows percolation to occur. The model does not allow evaporation to occur within the barrier layer, thereby underestimating the actual amount of evapotranspiration. Conversely, the model overestimates the percolation through the barrier layer of the final cover and tends to prematurely predict formation of leachate.

Foundation Soil Layer

HELP-3 recognizes the foundation soil layer as a vertical percolation layer. A 12-inch thick foundation soil layer will lie between the barrier soil layer and the refuse. Soil for the foundation layer will be onsite material with a hydraulic conductivity of 4.2E-05 uncompacted; the most representative default soil type is soil texture No. 12.

Refuse

The model recognizes refuse as a vertical percolation layer. Refuse lifts are 180 inches (15 ft) thick. Each 15-foot lift is overlain by a 12-inch intermediate soil cover. Due to limitations on the number of layers provided for simulation by the HELP-3 model (20 layers), the last two 15 ft layers were combined into one 360-inch (30 ft) layer.

Refuse has a large capacity to absorb moisture before leachate is produced. Each foot of refuse can absorb about 1.8 inches of water. The amount of water that can be absorbed before the refuse reaches field capacity depends on the moisture content at placement and the refuse composition and density. Average values for refuse moisture content are shown in Table F-7.

The default "soil texture" for the refuse layer is No. 18, which is a waste layer with an initial moisture content of approximately 15 percent and a permeability of 1×10^{-3} cm/sec. This is within the range of values established by EPA for in-place waste (Table F-7).

Intermediate Soil Layers

HELP-3 recognizes intermediate soil layers as vertical percolation layers. Twelve-inch thick intermediate soil layers will cover the refuse after each 180-inch (15 ft) lift. Soil for the intermediate layers will be onsite material with an uncompacted hydraulic conductivity of approximately 4.2E-05. The most representative default soil texture is No. 12.

Leachate Control and Removal System (LCRS)

The LCRS consists of a 12-inch thick operations soil layer, a geotextile liner, and a 12-inch thick drainage layer.

Operations Layer. The 12-inch thick operations layer is recognized by HELP-3 as a vertical percolation layer. Soil for the operations layer will be onsite material with an uncompacted hydraulic conductivity of approximately 4.2E-05. The most representative default soil texture is No. 12. This layer serves as a protective soil layer for the drainage layer and geomembrane liner system.

Geotextile Layer. The geotextile liner is recognized by the model as a lateral drainage layer. The most representative default "soil texture" is No. 20, a drainage net with a thickness of 0.5 cm and a hydraulic conductivity of 1.0E+01 cm/sec.

Drainage Layer. The 12-inch thick drainage layer is recognized by HELP-3 as a lateral drainage layer. The most representative default soil texture is No. 21, gravel with a hydraulic conductivity of 3.0E-01 cm/sec. The drainage layer was modeled with a maximum drainage distance of 100 ft and a slope of 0.6 percent.

Base Liner System

The Base Liner System consists of a high-density polyethylene (HDPE) geomembrane liner and a 24-inch thick low-permeability layer.

Geomembrane Liner. The geomembrane liner is recognized by the model as a flexible membrane liner. The most representative default "soil texture" is No. 35, an HDPE liner with a hydraulic conductivity of 2.0E-13 cm/sec. The geomembrane input screen is shown in Table F-8. Information on pinhole density, installation defect density, and placement quality is required.

The density of defects have been measured at a number of landfills and other facilities and reported in the literature. These findings provide guidance for estimating defect densities.

Pinhole Density. Typical geomembranes have 0.5 to 1 pinholes per acre from manufacturing defects such as polymerization deficiencies (Schroeder et. al., 1993). A pinhole is defined as the diameter of a hole which is less than or equal to the geomembrane thickness or 1 mm in diameter. The geomembrane liner for the SLV SWMF is conservatively assumed for the purposes of HELP-3 to have a density of one pinhole per acre.

Installation Density. Installation defect density is the number of defects with the hole diameter exceeding the geomembrane thickness or 1 cm^2 in area per acre which result primarily from seaming faults and punctures during installation. The density of installation defects is a function of the quality of installation, testing, materials, surface preparation, equipment, and the QA/QC program. Representative installation defect densities for "good" installation quality range from 1 to 4 defects per acre. The SLV SWMF is assumed to have "good" placement quality with a conservative three defects per acre.

Placement Quality. Placement quality options range from perfect to worst case. As discussed above, a "good" placement quality is assumed for the SLV SWMF.

<u>Low-permeability (Barrier Soil) Layer</u>. The 24-inch thick low-permeability soil layer is recognized by HELP-3 as a barrier soil layer. The most representative default soil texture is No. 16, a barrier soil with a hydraulic conductivity of 1.0E-07 cm/sec.

1.3 RESULTS OF THE WATER BALANCE ANALYSIS

The HELP-3 model was used to evaluate the potential leachate production rate after landfill closure. HELP-3 output for a 20-year period is summarized in Table F-9. Leachate production is estimated by the lateral drainage from the drainage layer. A maximum lateral drainage of 34,100,000 gallons per year (gals/yr) is estimated. The 20-year average annual lateral drainage is 16,972,968 gals/yr. Complete HELP-3 output is shown at the end of this section.

Significant results to be noted are as follows:

- No change in results occurs by varying the drainage length of the cell; and

- In the 20-year simulation, runoff varied from 0-9%, drainage from the lateral drainage layer varied from 19,600 gals/yr to 34,100,000 gals/yr. The annual water budget after twenty years was 135 gallons.

2. SUBSURFACE INFILTRATION

2.1 INFILTRATION RATE CALCULATIONS

Subsurface (groundwater) inflow through the liner into the LCRS was calculated by determining the upward vertical head on the geomembrane liner and applying the following equation for computing seepage rates:

$q = 0.21 h_w^{0.9} a^{0.1} k_s^{0.74}$ where...

q = leakage rate (gals/acre/day);
h_w = head above the liner (ft);
a = area of a hole (m)/acre in the geomembrane; and
k_s = hydraulic conductivity of the subsoil (m/sec).

(Giroud and Bonaparte (1989a) and Giroud et. al. (1989b)). The coefficient of 0.21 in this equation assumes a good hydraulic seal between the geomembrane and soil.

Total head on the liner was determined assuming a pumping rate that allows one foot of leachate to remain on top of the geomembrane, and using the average existing groundwater elevations to calculate the vertically upward gradient on the bottom of the geomembrane. Head on the liner varies from 0 in the southeastern portion of the Facility to 10 ft in the northwestern portion, as shown on Figure F-1.

A depiction of the SLV SWMF is shown in Figure F-1. Each cell represents 10 acres. The resulting head on the liner is shown in red at the corners of each cell.

The Giroud equation was applied to each 10-acre cell using an average value of h_w per cell. Leakage rates for each 10-acre cell were summed to obtain the leachate generation rate from infiltration for the SLV SWMF as a whole in gallons per day, gallons per month, and gallons per year.

Because natural ground water elevations are above the level of the geomembrane liner at the Facility, the calculated "q" is a subsurface infiltration rate through the base liner system and *into* the SLV SWMF.

2.2 SUBSURFACE INFILTRATION RESULTS

Figure F-1 shows calculated subsurface infiltration rates for the SLV SWMF of 200 gallons per day, 6,000 gallons per month, and 73,000 gallons per year. Subsurface infiltration rates for individual 10-acre cells varies from 1 gal/10-acre cell/day in the southeastern portion of the Facility to 11 gals/10-acre cell/day in the northwestern portion.

3. CONCLUSIONS

Based on the calculated water balance, the total volume of liquid that is expected to be produced by the entire 455-acre landfill will average approximately 9,500 gallons per day. Of this, an average of approximately 9,300 gallons/day is due to precipitation infiltration, and 200 gallons/day is due to upward migration of groundwater through the liner. By removing an average of 9,500 gallons of leachate per day, the Facility will be able to keep the leachate elevation below the groundwater elevation.

If the groundwater elevation is always higher than the leachate evaluation, the resulting head on the liner will be vertically upward, thereby minimizing the potential for leachate to migrate out of the landfill into groundwater.

REFERENCES

EMCON (1995). *Permit Application, Part III, Technical Report, SLVSWMF, Salt Lake County, Utah, Appendix F,* March 23.

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**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
*                HELP MODEL VERSION 3.04   (10 APRIL 1995)                  **
*                 DEVELOPED BY ENVIRONMENTAL LABORATORY                     **
*                   USAE WATERWAYS EXPERIMENT STATION                       **
*             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
*                                                                           **
*                                                                           **
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RECIPITATION DATA FILE:      U:\CCHULICK\PRECIP.D4
EMPERATURE DATA FILE:        U:\CCHULICK\TEMP.D7
OLAR RADIATION DATA FILE:    U:\CCHULICK\SOLAR.D13
VAPOTRANSPIRATION DATA:      U:\CCHULICK\EVAP.D11
OIL AND DESIGN DATA FILE:    U:\CCHULICK\SLVSOIL.D10
UTPUT DATA FILE:             U:\CCHULICK\slvhel3.OUT
```

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IME:  14:36     DATA:   6/10/1997
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*   **************************************************************************

    TITLE:  slv landfill

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

```
THICKNESS                   =     12.00   INCHES
POROSITY                    =      0.4710 VOL/VOL
FIELD CAPACITY              =      0.3420 VOL/VOL
WILTING POINT               =      0.2100 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3312 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.419999997000E-04 CM/SEC
```

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 1.80 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 26

THICKNESS	=	18.00 INCHES
POROSITY	=	0.4450 VOL/VOL
FIELD CAPACITY	=	0.3930 VOL/VOL
WILTING POINT	=	0.2770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4450 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000003000E-05 CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00 INCHES
POROSITY	=	0.4710 VOL/VOL
FIELD CAPACITY	=	0.3420 VOL/VOL
WILTING POINT	=	0.2100 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3420 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.419999997000E-04 CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	360.00 INCHES
POROSITY	=	0.6710 VOL/VOL
FIELD CAPACITY	=	0.2920 VOL/VOL
WILTING POINT	=	0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00 INCHES
POROSITY	=	0.4710 VOL/VOL
FIELD CAPACITY	=	0.3420 VOL/VOL
WILTING POINT	=	0.2100 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3420 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.419999997000E-04 CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	180.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4710	VOL/VOL
FIELD CAPACITY	=	0.3420	VOL/VOL
WILTING POINT	=	0.2100	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3420	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.419999997000E-04	CM/SEC

LAYER 8

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	180.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 9

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4710	VOL/VOL
FIELD CAPACITY	=	0.3420	VOL/VOL
WILTING POINT	=	0.2100	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3420	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.419999997000E-04	CM/SEC

LAYER 10

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	180.00 INCHES
POROSITY	=	0.6710 VOL/VOL
FIELD CAPACITY	=	0.2920 VOL/VOL
WILTING POINT	=	0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

LAYER 11

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00 INCHES
POROSITY	=	0.4710 VOL/VOL
FIELD CAPACITY	=	0.3420 VOL/VOL
WILTING POINT	=	0.2100 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3420 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.419999997000E-04 CM/SEC

LAYER 12

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	180.00 INCHES
POROSITY	=	0.6710 VOL/VOL
FIELD CAPACITY	=	0.2920 VOL/VOL
WILTING POINT	=	0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

LAYER 13

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00 INCHES
POROSITY	=	0.4710 VOL/VOL
FIELD CAPACITY	=	0.3420 VOL/VOL
WILTING POINT	=	0.2100 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3420 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.419999997000E-04 CM/SEC

LAYER 14

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	180.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 15

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4710	VOL/VOL
FIELD CAPACITY	=	0.3420	VOL/VOL
WILTING POINT	=	0.2100	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3420	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.419999997000E-04	CM/SEC

LAYER 16

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.25	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0335	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC

LAYER 17

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 21

THICKNESS	=	12.00	INCHES
POROSITY	=	0.3970	VOL/VOL
FIELD CAPACITY	=	0.0320	VOL/VOL
WILTING POINT	=	0.0130	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0320	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000012000	CM/SEC
SLOPE	=	0.60	PERCENT
DRAINAGE LENGTH	=	100.0	FEET

LAYER 18

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.25	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	3.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 19

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #12 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 1.% AND A SLOPE LENGTH OF 100. FEET.

SCS RUNOFF CURVE NUMBER	=	91.70	
FRACTION OF AREA ALLOWING RUNOFF	=	34.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	455.000	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.974	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.652	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.520	INCHES
INITIAL SNOW WATER	=	0.175	INCHES
INITIAL WATER IN LAYER MATERIALS	=	419.272	INCHES
TOTAL INITIAL WATER	=	419.447	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

SOIL AND DESIGN DATA - LANDFILL GENERAL INFORMATION

Project Title

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¤slv landfill                                                      ¤
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Landfill area = 455 ACRES

Percent of area where runoff is possible = 34 %

Do you want to specify initial moisture storage? (Y/N) N
(If No, the program will initialize moisture
contents to approximately steady-state.)

F1=Info F2=Help F3=Keys F9=Quit F10=End PgUp=Cycle PgDn=Proce

SOIL AND DESIGN DATA - RUNOFF CURVE NUMBER INFORMATION

Select Method For Computing Runoff Curve Number

User Specified Curve Number
Modified User's Curve Number
HELP Model Computed Curve Number

USER SPECIFIED CN	MODIFIED USER'S CN	HELP MODEL CN
SCS AMCII CN=	SCS AMCII CN=	Slope= .6 %
		Slope Length= 100 FT
	Slope= .6 %	Soil Texture= 12
	Slope Length= 100 FT	Vegetation= 2

Program will use a runoff curve number of 91.7

Cursor and press Enter to select method for computing runoff curve number
F1=Info F2=Help F3=Keys F9=Quit F10=End PgUp=Cycle PgDn=Proceed

The only valid entries for the vegetation are 1 through 5, esponding to the following qualities:

1. Bare Ground
2. Poor Stand of Grass
3. Fair Stand of Grass
4. Good Stand of Grass
5. Excellent Stand of Grass

to scroll up and down PgDn/PgUp Home End F9/ESC =Cancel

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM SALT LAKE CITY UTAH

STATION LATITUDE	=	40.76 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00
START OF GROWING SEASON (JULIAN DATE)	=	117
END OF GROWING SEASON (JULIAN DATE)	=	289
EVAPORATIVE ZONE DEPTH	=	12.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.80 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	67.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	48.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	39.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	65.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR SALT LAKE CITY UTAH

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.35	1.33	1.72	2.21	1.47	0.97
0.72	0.92	0.89	1.14	1.22	1.37

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR SALT LAKE CITY UTAH

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
28.60	34.10	40.70	49.20	58.80	68.30
77.50	74.90	65.00	53.00	39.70	30.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR SALT LAKE CITY UTAH AND STATION LATITUDE = 40.76 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
ECIPITATION	12.09	19968450.000	100.00
RUNOFF	0.044	72138.336	0.36

EVAPOTRANSPIRATION	11.750	19406172.000	97.18
PERC./LEAKAGE THROUGH LAYER 2	0.268188	442953.500	2.22
. HEAD ON TOP OF LAYER 2	0.0054		
DRAINAGE COLLECTED FROM LAYER 17	0.2680	442711.875	2.22
PERC./LEAKAGE THROUGH LAYER 19	0.000010	16.627	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0073		
CHANGE IN WATER STORAGE	0.029	47430.500	0.24
SOIL WATER AT START OF YEAR	419.272	692490880.000	
SOIL WATER AT END OF YEAR	419.301	692538368.000	
SNOW WATER AT START OF YEAR	0.175	288920.156	1.45
SNOW WATER AT END OF YEAR	0.175	288920.156	1.45
ANNUAL WATER BUDGET BALANCE	0.0000	-19.383	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.65	25848324.000	100.00
RUNOFF	0.734	1212013.870	4.69
EVAPOTRANSPIRATION	13.180	21768002.000	84.21
PERC./LEAKAGE THROUGH LAYER 2	2.066324	3412844.500	13.20
AVG. HEAD ON TOP OF LAYER 2	0.3478		
DRAINAGE COLLECTED FROM LAYER 17	2.0654	3411332.750	13.20
PERC./LEAKAGE THROUGH LAYER 19	0.000052	86.655	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0548		
CHANGE IN WATER STORAGE	-0.329	-543109.312	-2.10
SOIL WATER AT START OF YEAR	419.301	692538368.000	
L WATER AT END OF YEAR	419.147	692284160.000	
SNOW WATER AT START OF YEAR	0.175	288920.156	1.12
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	-2.853	0.00

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.33	17061544.000	100.00
RUNOFF	0.027	45142.043	0.26
EVAPOTRANSPIRATION	10.373	17132572.000	100.42
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
DRAINAGE COLLECTED FROM LAYER 17	0.0016	2615.725	0.02
PERC./LEAKAGE THROUGH LAYER 19	0.000003	4.245	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0000		
NGE IN WATER STORAGE	-0.072	-118810.852	-0.70
SOIL WATER AT START OF YEAR	419.147	692284160.000	
SOIL WATER AT END OF YEAR	418.130	690603648.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.946	1561720.870	9.15
ANNUAL WATER BUDGET BALANCE	0.0000	21.220	0.00

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.28	30192164.000	100.00
NOFF	1.111	1834446.370	6.08
EVAPOTRANSPIRATION	14.871	24561326.000	81.35
PERC./LEAKAGE THROUGH LAYER 2	1.945906	3213955.500	10.64

AVG. HEAD ON TOP OF LAYER 2	0.2725		
AINAGE COLLECTED FROM LAYER 17	1.9445	3211715.250	10.64
.C./LEAKAGE THROUGH LAYER 19	0.000049	81.033	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0518		
CHANGE IN WATER STORAGE	0.349	577194.062	1.91
SOIL WATER AT START OF YEAR	418.130	690603648.000	
SOIL WATER AT END OF YEAR	419.379	692667200.000	
SNOW WATER AT START OF YEAR	0.946	1561720.870	5.17
SNOW WATER AT END OF YEAR	0.046	75310.078	0.25
ANNUAL WATER BUDGET BALANCE	0.0045	7401.098	0.02

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.76	21075052.000	100.00
RUNOFF	0.554	914833.000	4.34
EVAPOTRANSPIRATION	11.144	18405596.000	87.33
PERC./LEAKAGE THROUGH LAYER 2	1.658587	2739406.000	13.00
AVG. HEAD ON TOP OF LAYER 2	0.2573		
DRAINAGE COLLECTED FROM LAYER 17	1.6585	2739256.250	13.00
PERC./LEAKAGE THROUGH LAYER 19	0.000043	70.224	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0440		
CHANGE IN WATER STORAGE	-0.596	-984755.937	-4.67
SOIL WATER AT START OF YEAR	419.379	692667200.000	
SOIL WATER AT END OF YEAR	418.828	691757760.000	
OW WATER AT START OF YEAR	0.046	75310.078	0.36
W WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	53.682	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.91	29581044.000	100.00
RUNOFF	0.596	983583.062	3.33
EVAPOTRANSPIRATION	15.349	25351932.000	85.70
PERC./LEAKAGE THROUGH LAYER 2	1.251774	2067493.000	6.99
AVG. HEAD ON TOP OF LAYER 2	0.1253		
DRAINAGE COLLECTED FROM LAYER 17	1.2518	2067607.370	6.99
PERC./LEAKAGE THROUGH LAYER 19	0.000034	55.576	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0334		
CHANGE IN WATER STORAGE	0.697	1151134.750	3.89
SOIL WATER AT START OF YEAR	418.828	691757760.000	
SOIL WATER AT END OF YEAR	419.525	692908928.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0162	26732.273	0.09

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.95	24692170.000	100.00
RUNOFF	0.239	394655.219	1.60
EVAPOTRANSPIRATION	14.809	24459352.000	99.06
PERC./LEAKAGE THROUGH LAYER 2	0.752855	1243452.250	5.04
AVG. HEAD ON TOP OF LAYER 2	0.0778		

DRAINAGE COLLECTED FROM LAYER 17	0.7530	1243645.500	5.04
PERC./LEAKAGE THROUGH LAYER 19	0.000021	35.304	0.00
'. HEAD ON TOP OF LAYER 18	0.0203		
CHANGE IN WATER STORAGE	-0.851	-1405531.500	-5.69
SOIL WATER AT START OF YEAR	419.525	692908928.000	
SOIL WATER AT END OF YEAR	418.127	690599360.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.547	903996.125	3.66
ANNUAL WATER BUDGET BALANCE	0.0000	14.781	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
CIPITATION	12.22	20183164.000	100.00
R OFF	0.271	447559.187	2.22
EVAPOTRANSPIRATION	10.736	17732544.000	87.86
PERC./LEAKAGE THROUGH LAYER 2	0.393126	649306.500	3.22
AVG. HEAD ON TOP OF LAYER 2	0.0041		
DRAINAGE COLLECTED FROM LAYER 17	0.3932	649360.375	3.22
PERC./LEAKAGE THROUGH LAYER 19	0.000014	22.321	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0105		
CHANGE IN WATER STORAGE	0.820	1353692.250	6.71
SOIL WATER AT START OF YEAR	418.127	690599360.000	
SOIL WATER AT END OF YEAR	419.371	692654336.000	
SNOW WATER AT START OF YEAR	0.547	903996.125	4.48
SNOW WATER AT END OF YEAR	0.123	202702.719	1.00
UAL WATER BUDGET BALANCE	0.0000	-15.208	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.05	28160634.000	100.00
RUNOFF	1.365	2254365.500	8.01
EVAPOTRANSPIRATION	13.013	21493098.000	76.32
PERC./LEAKAGE THROUGH LAYER 2	2.760484	4559354.000	16.19
AVG. HEAD ON TOP OF LAYER 2	0.2730		
DRAINAGE COLLECTED FROM LAYER 17	2.7599	4558375.000	16.19
PERC./LEAKAGE THROUGH LAYER 19	0.000068	112.473	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0734		
CHANGE IN WATER STORAGE	-0.088	-145342.562	-0.52
SOIL WATER AT START OF YEAR	419.371	692654336.000	
SOIL WATER AT END OF YEAR	419.406	692711744.000	
W WATER AT START OF YEAR	0.123	202702.719	0.72
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	24.982	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.16	23387366.000	100.00
RUNOFF	0.710	1172433.370	5.01
EVAPOTRANSPIRATION	12.269	20263562.000	86.64
PERC./LEAKAGE THROUGH LAYER 2	1.342920	2218034.500	9.48
. HEAD ON TOP OF LAYER 2	0.1781		
DRAINAGE COLLECTED FROM LAYER 17	1.3432	2218467.750	9.49
PERC./LEAKAGE THROUGH LAYER 19	0.000035	58.335	0.00

AVG. HEAD ON TOP OF LAYER 18	0.0356		
'ANGE IN WATER STORAGE	-0.164	-271175.437	-1.16
L WATER AT START OF YEAR	419.406	692711744.000	
SOIL WATER AT END OF YEAR	419.242	692440576.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0024	4021.366	0.02

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.61	27433910.000	100.00
RUNOFF	0.397	655153.062	2.39
POTRANSPIRATION	14.492	23936264.000	87.25
PERC./LEAKAGE THROUGH LAYER 2	1.650980	2726840.750	9.94
AVG. HEAD ON TOP OF LAYER 2	0.0900		
DRAINAGE COLLECTED FROM LAYER 17	1.4322	2365420.500	8.62
PERC./LEAKAGE THROUGH LAYER 19	0.000038	63.233	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0381		
CHANGE IN WATER STORAGE	0.286	472720.406	1.72
SOIL WATER AT START OF YEAR	419.242	692440576.000	
SOIL WATER AT END OF YEAR	419.475	692826176.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.053	87076.695	0.32
ANNUAL WATER BUDGET BALANCE	0.0026	4289.441	0.02

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ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
ECIPITATION	13.10	21636614.000	100.00
RUNOFF	0.466	768869.187	3.55
EVAPOTRANSPIRATION	12.760	21075674.000	97.41
PERC./LEAKAGE THROUGH LAYER 2	1.072820	1771922.500	8.19
AVG. HEAD ON TOP OF LAYER 2	0.1529		
DRAINAGE COLLECTED FROM LAYER 17	1.2917	2133441.000	9.86
PERC./LEAKAGE THROUGH LAYER 19	0.000035	57.867	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0349		
CHANGE IN WATER STORAGE	-1.420	-2345500.250	-10.84
SOIL WATER AT START OF YEAR	419.475	692826176.000	
SOIL WATER AT END OF YEAR	417.932	690276864.000	
SNOW WATER AT START OF YEAR	0.053	87076.695	0.40
OW WATER AT END OF YEAR	0.176	290928.000	1.34
JUAL WATER BUDGET BALANCE	0.0025	4072.848	0.02

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ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.47	22247732.000	100.00
RUNOFF	0.460	760428.562	3.42
EVAPOTRANSPIRATION	10.604	17513818.000	78.72
PERC./LEAKAGE THROUGH LAYER 2	1.193729	1971622.620	8.86
AVG. HEAD ON TOP OF LAYER 2	0.0768		
RAINAGE COLLECTED FROM LAYER 17	0.6011	992833.937	4.46
C./LEAKAGE THROUGH LAYER 19	0.000018	29.631	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0162		

CHANGE IN WATER STORAGE	1.803	2977492.750	13.38
SOIL WATER AT START OF YEAR	417.932	690276864.000	
L WATER AT END OF YEAR	419.866	693472000.000	
SNOW WATER AT START OF YEAR	0.176	290928.000	1.31
SNOW WATER AT END OF YEAR	0.044	73288.508	0.33
ANNUAL WATER BUDGET BALANCE	0.0019	3129.422	0.01

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ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.01	23139620.000	100.00
RUNOFF	0.397	655879.437	2.83
EVAPOTRANSPIRATION	12.176	20109760.000	86.91
RC./LEAKAGE THROUGH LAYER 2	1.449006	2393251.250	10.34
A.. HEAD ON TOP OF LAYER 2	0.1573		
DRAINAGE COLLECTED FROM LAYER 17	2.0389	3367521.000	14.55
PERC./LEAKAGE THROUGH LAYER 19	0.000053	87.489	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0541		
CHANGE IN WATER STORAGE	-0.602	-994432.375	-4.30
SOIL WATER AT START OF YEAR	419.866	693472000.000	
SOIL WATER AT END OF YEAR	418.717	691573696.000	
SNOW WATER AT START OF YEAR	0.044	73288.508	0.32
SNOW WATER AT END OF YEAR	0.592	977134.625	4.22
ANNUAL WATER BUDGET BALANCE	0.0005	803.921	0.00

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.68	22594578.000	100.00
RUNOFF	0.630	1039727.690	4.60
EVAPOTRANSPIRATION	11.699	19322482.000	85.52
PERC./LEAKAGE THROUGH LAYER 2	1.526094	2520573.250	11.16
AVG. HEAD ON TOP OF LAYER 2	0.2371		
DRAINAGE COLLECTED FROM LAYER 17	1.5284	2524451.000	11.17
PERC./LEAKAGE THROUGH LAYER 19	0.000040	65.439	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0405		
CHANGE IN WATER STORAGE	-0.178	-293651.562	-1.30
SOIL WATER AT START OF YEAR	418.717	691573696.000	
SOIL WATER AT END OF YEAR	419.131	692257152.000	
SNOW WATER AT START OF YEAR	0.592	977134.625	4.32
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0009	1502.511	0.01

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.35	23701176.000	100.00
RUNOFF	0.542	894414.500	3.77
EVAPOTRANSPIRATION	12.555	20736754.000	87.49
PERC./LEAKAGE THROUGH LAYER 2	1.008805	1666193.000	7.03
AVG. HEAD ON TOP OF LAYER 2	0.1389		
DRAINAGE COLLECTED FROM LAYER 17	1.0091	1666601.250	7.03
PERC./LEAKAGE THROUGH LAYER 19	0.000027	45.368	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0272		
CHANGE IN WATER STORAGE	0.242	399303.312	1.68
SOIL WATER AT START OF YEAR	419.131	692257152.000	

SOIL WATER AT END OF YEAR	419.372	692656512.000	
IOW WATER AT START OF YEAR	0.000	0.000	0.00
W WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0025	4057.665	0.02

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.02	23156142.000	100.00
RUNOFF	0.839	1386344.750	5.99
EVAPOTRANSPIRATION	10.726	17714958.000	76.50
PERC./LEAKAGE THROUGH LAYER 2	2.104688	3476208.250	15.01
AVG. HEAD ON TOP OF LAYER 2	0.2026		
INAGE COLLECTED FROM LAYER 17	1.5932	2631341.000	11.36
PERC./LEAKAGE THROUGH LAYER 19	0.000041	68.114	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0423		
CHANGE IN WATER STORAGE	0.862	1423226.500	6.15
SOIL WATER AT START OF YEAR	419.372	692656512.000	
SOIL WATER AT END OF YEAR	419.772	693317248.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.462	762475.750	3.29
ANNUAL WATER BUDGET BALANCE	0.0001	203.252	0.00

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.81	26112588.000	100.00

RUNOFF	1.360	2246146.750	8.60
VAPOTRANSPIRATION	12.191	20135274.000	77.11
RC./LEAKAGE THROUGH LAYER 2	1.750877	2891836.250	11.07
AVG. HEAD ON TOP OF LAYER 2	0.1803		
DRAINAGE COLLECTED FROM LAYER 17	2.2621	3736257.250	14.31
PERC./LEAKAGE THROUGH LAYER 19	0.000058	96.203	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0602		
CHANGE IN WATER STORAGE	-0.014	-22842.182	-0.09
SOIL WATER AT START OF YEAR	419.772	693317248.000	
SOIL WATER AT END OF YEAR	420.220	694056896.000	
SNOW WATER AT START OF YEAR	0.462	762475.750	2.92
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0107	17657.697	0.07

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ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.07	14980467.000	100.00
RUNOFF	0.801	1322369.370	8.83
EVAPOTRANSPIRATION	7.593	12540679.000	83.71
PERC./LEAKAGE THROUGH LAYER 2	2.124616	3509121.750	23.42
AVG. HEAD ON TOP OF LAYER 2	0.3134		
DRAINAGE COLLECTED FROM LAYER 17	2.1247	3509204.250	23.43
PERC./LEAKAGE THROUGH LAYER 19	0.000054	88.592	0.00
AVG. HEAD ON TOP OF LAYER 18	0.0570		
HANGE IN WATER STORAGE	-1.450	-2394974.000	-15.99
.L WATER AT START OF YEAR	420.220	694056896.000	
SOIL WATER AT END OF YEAR	418.491	691200448.000	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.279	461440.781	3.08
NUAL WATER BUDGET BALANCE	0.0019	3099.582	0.02

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ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.14	29960934.000	100.00
RUNOFF	0.893	1474252.870	4.92
EVAPOTRANSPIRATION	13.327	22011718.000	73.47
PERC./LEAKAGE THROUGH LAYER 2	2.130886	3519477.500	11.75
AVG. HEAD ON TOP OF LAYER 2	0.2273		
DRAINAGE COLLECTED FROM LAYER 17	1.1547	1907188.620	6.37
RC./LEAKAGE THROUGH LAYER 19	0.000031	51.002	0.00
. HEAD ON TOP OF LAYER 18	0.0305		
CHANGE IN WATER STORAGE	2.766	4567704.500	15.25
SOIL WATER AT START OF YEAR	418.491	691200448.000	
SOIL WATER AT END OF YEAR	421.536	696229568.000	
SNOW WATER AT START OF YEAR	0.279	461440.781	1.54
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	17.615	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						

TOTALS	1.16	1.15	1.90	2.09	1.32	0.99
	0.66	0.87	0.80	0.90	1.10	1.45
STD. DEVIATIONS	0.63	0.61	0.75	0.94	0.71	0.68
	0.47	0.86	0.67	0.63	0.53	0.63

RUNOFF

TOTALS	0.175	0.182	0.141	0.031	0.010	0.003
	0.003	0.010	0.001	0.010	0.009	0.047
STD. DEVIATIONS	0.186	0.180	0.157	0.049	0.021	0.009
	0.009	0.022	0.002	0.019	0.014	0.081

EVAPOTRANSPIRATION

TOTALS	0.401	0.612	2.118	2.219	1.497	1.138
	0.751	0.755	0.866	0.669	0.609	0.644
STD. DEVIATIONS	0.155	0.423	0.536	1.005	0.821	0.713
	0.514	0.863	0.667	0.572	0.289	0.225

PERCOLATION/LEAKAGE THROUGH LAYER 2

TOTALS	0.0267	0.2179	0.9078	0.1434	0.0052	0.0000
	0.0000	0.0000	0.0000	0.0040	0.0000	0.1175
STD. DEVIATIONS	0.0708	0.3606	0.5718	0.2602	0.0234	0.0000
	0.0000	0.0000	0.0000	0.0178	0.0000	0.2702

TERAL DRAINAGE COLLECTED FROM LAYER 17

TOTALS	0.0090	0.0145	0.0681	0.0921	0.1508	0.3233
	0.5319	0.1700	0.0064	0.0006	0.0015	0.0056
STD. DEVIATIONS	0.0231	0.0293	0.1202	0.0664	0.0994	0.2267
	0.3406	0.3091	0.0168	0.0003	0.0049	0.0131

PERCOLATION/LEAKAGE THROUGH LAYER 19

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

AVERAGES	0.0084	0.3329	1.4696	0.1241	0.0011	0.0000
	0.0000	0.0000	0.0000	0.0001	0.0000	0.0545
STD. DEVIATIONS	0.0259	0.6810	1.1128	0.2823	0.0051	0.0000
	0.0000	0.0000	0.0000	0.0004	0.0000	0.1506

DAILY AVERAGE HEAD ON TOP OF LAYER 18

AVERAGES	0.0028	0.0051	0.0215	0.0301	0.0477	0.1056
	0.1682	0.0537	0.0021	0.0002	0.0005	0.0018
STD. DEVIATIONS	0.0071	0.0102	0.0380	0.0217	0.0314	0.0740
	0.1077	0.0977	0.0055	0.0001	0.0016	0.0042

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.38 (2.495)	23755688.0	100.00
RUNOFF	0.622 (0.3720)	1026737.87	4.322
EVAPOTRANSPIRATION	12.281 (1.8541)	20283576.00	85.384
PERCOLATION/LEAKAGE THROUGH LAYER 2	1.42263 (0.70380)	2349692.500	9.89107
AVERAGE HEAD ON TOP OF LAYER 2	0.166 (0.103)		
LATERAL DRAINAGE COLLECTED FROM LAYER 17	1.37376 (0.72295)	2268967.250	9.55126
PERCOLATION/LEAKAGE THROUGH LAYER 19	0.00004 (0.00002)	59.786	0.00025
AVERAGE HEAD ON TOP OF LAYER 18	0.037 (0.019)		
CHANGE IN WATER STORAGE	0.104 (0.9890)	172488.64	0.726

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	1.66	2741739.000
RUNOFF	0.441	728253.4370
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.105628	174459.70300
AVERAGE HEAD ON TOP OF LAYER 2	11.419	
DRAINAGE COLLECTED FROM LAYER 17	0.07003	115665.10200
PERCOLATION/LEAKAGE THROUGH LAYER 19	0.000001	2.46750
AVERAGE HEAD ON TOP OF LAYER 18	0.686	
MAXIMUM HEAD ON TOP OF LAYER 18	1.640	
SNOW WATER	1.45	2400810.2500

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4710
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.2100

*** MAXIMUM HEADS ARE COMPUTED USING THE MOUND EQUATION. ***

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	5.2607	0.4384
2	8.0100	0.4450
3	4.5616	0.3801
4	105.1200	0.2920
5	4.4764	0.3730
6	52.5669	0.2920
7	4.1736	0.3478
8	52.5600	0.2920
9	4.1250	0.3437
10	52.5600	0.2920
11	4.1340	0.3445
12	52.5600	0.2920
13	4.1040	0.3420
14	52.5600	0.2920
15	4.1107	0.3426
16	0.0172	0.0687
17	0.3878	0.0323
18	0.0000	0.0000
19	10.2480	0.4270
SNOW WATER	0.000	

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APPENDIX
H

2 SITE CONDITIONS

The draft DEQ Subtitle D regulations location standards for solid waste facilities include location, topography, geologic/hydrogeologic setting, geotechnical considerations, surface-water hydrology, land and water use, and vegetation and wildlife restrictions. The SLVL site conditions, and their applicability to the draft DEQ Subtitle D regulations, are discussed in this section. Design and operating provisions, which are influenced by site conditions, are discussed in the following sections.

2.1 Land Use Compatibility

Development of the site should be compatible with surrounding land uses. Land uses that are incompatible with each other can precipitate a host of adverse effects including impacts to public health and safety, and vegetation and wildlife. The following items provide a discussion of the compatibility of the SLVL expansion to site and surrounding land uses.

2.1.1 Location and Topography

The SLVL is located approximately 9 miles west of the center of the City of Salt Lake, within the incorporated limits of Salt Lake City, as shown in Figure 1. The site lies adjacent to and north of 2100 South Street, west of 5600 West Street, south of and adjacent to the Union Pacific and Western Pacific Railroad right of way, and east of 8000 West Street, as shown in Figure 2. Parcels III through VIII occupy the southern two-thirds of Sections 10 and 11, and Sections 14 and 15, Township 1 South, Range 2 West, Salt Lake Base and Meridian.

Topography at the landfill site, before filling, was gentle with little relief. Base elevations decrease to the northwest toward the Great Salt Lake from a high of approximately 4, 235 feet mean sea level (MSL), to a low of 4,215 MSL. Grading on the site for streets, power transmission lines, and railroad grades, as well as landfilling and excavations, has altered the site's topography. Site elevations now reach approximately 4,283 feet MSL in Parcel III.

2.1.2 Vegetation and Wildlife

The draft DEQ Subtitle D regulations (R315-301-6(2)(a)(ii) prohibit a solid waste facility from being located in an ecologically and scientifically significant natural area including wildlife management areas and habitat for proposed or listed federal endangered species. The landfill site does not contain vegetation or wildlife that would prohibit its use as a solid waste disposal site.

Plant species occurring in the low-lying salt accumulation areas at the site include Russian thistle, bottlebrush, squirrel tail, saltgrass, alkali sacaton, and pickleweed. The most common plant species include saltgrass, greasewood, and pickleweed. Also occurring are saltcedar and rabbitbrush (Hely, et al., 1971).

Mammals occurring at the site are not documented. Those animals know to occur in the area in which the landfill is located include kit fox, striped and spotted skunk, badger, rock squirrel, blacktail jackrabbit, and desert cottontail.

The landfill Master Plan includes creating ponds in some areas of the site that are not designed to be used for refuse fill. Future pond areas will be developed in the northern and eastern portions of Parcel IV, adjacent to the landfill expansion area. Already, revegetation of the pond areas located to the south of the landfill area in Parcel IV, as directed by DWR, has been completed. Plant species used for the revegetating were based on DWR recommendations (May 1980). Revegetation of refuse fill areas is intended to enhance the site's habitat to attract wildlife to the site after closure.

2.1.3 Land and Water Use

Adjacent and site land and water use are described below. The SLVL site meets the location standards of the draft DEQ Subtitle D regulations for land use compatibility.

Adjacent Land Use. The draft DEQ Subtitle D regulations (R315-301-6(2)(i, iii-vi) prohibit a facility from being located within 1,000 feet of a national, state, or county park, or designated wilderness or wilderness study area, or archeological sites that may be adversely impacted, or within one quarter mile of existing dwellings or other incompatible structures. The facility must be located on a site that is compatible with locally adopted land use plans or zoning requirements.

Current zoning surrounding the site is shown in Figure 3. The surrounding lands north, east, and west of the site are zoned Agricultural (A-1), Industrial (M-1A), and Multi-Family Residential (R-2A) (Salt Lake City Planning Commission, 1989). West Valley City, south of the landfill, has designated land uses consisting of Agricultural (A), Manufacturing (M), and General Commercial (C-2) (West Valley City Community Development Department Zoning Map, 1989).

No residential areas, permanent dwellings, or other incompatible structures are located within one-fourth mile of the landfill expansion area. The site map (Figure 2) illustrates the absence of structures around the landfill expansion area. In addition, no parks, recreation areas, or wilderness study areas are within 1,000 feet of the site.

The Draft DEQ Subtitle D regulations (R315-301-6(2)(v)) prohibit the lateral expansion of a landfill if it is within 10,000 feet of an airport runway end serving turbojet aircraft, or within 5,000 feet of any airport runway end used by only piston-type aircraft. Additionally, an owner or operator must notify the affected airport and Federal Aviation Administration (FAA) if a lateral expansion is within five miles of an airport runway end. The portion of the landfill expansion closest to the Salt Lake City International Airport is approximately 16,000 feet from the runway end. Accordingly, the airport and the FAA will be notified of the expansion.

Site Land Use. The site is currently used for landfilling and soil reclamation. Parcel IV is also used as the Hunter Education Training facility for the DWR. Salt Lake City has designated Parcel VIII as Agricultural (A-1). The remainder of the site is designated as Industrial (M-1A) (Figure 3). The use of Parcels VII and VIII (the expansion area) as a landfill area is consistent with the City's Use District Map.

Water Use. Surface water near the site is used for agricultural, and industrial purposes. Groundwater from a supply well near the landfill equipment maintenance building is used for dust control on site. Groundwater in the vicinity, depending on the depth of the well, is used for domestic and industrial purposes. The majority of the wells in the vicinity of the landfill site are located west and southwest of the site, in Sections 16 and 22, Township 1 South, Range 2 West, Salt Lake Base and Meridian.

2.2 Geology

Landfill development in an area where geologic and soil characteristics are not suitable for the proposed project can result in environmental consequences such as landslides, public safety concerns, and water quality impacts. The seismicity in an area can also render a project incompatible with the proposed site. The draft DEQ Subtitle D regulations prohibit a facility from being developed within 200 feet of a Holocene fault, in a subsidence area a dam failure flood area, near an underground mine or salt dome or bed, or on, or adjacent to geologic features that may compromise the structural integrity of the facility. The following sections describe how the site geology and soils meet the criteria of the draft DEQ Subtitle D regulations. Information in this section is summarized from the Salt Lake Valley Master Plan (EMCON 1991).

2.2.1 Regional Geology

The landfill site is in an area known locally as the Jordan River Valley. The valley contains Quaternary and Tertiary sediments deposited under a variety of dispositional environments. The principal types of valley fill are clay, silt, sand, and gravel which reach a maximum thickness of about 2,000 feet in the northern portion of the county. The near-surface sediments in the vicinity of the landfill were deposited under the combined interaction of fluvial and lacustrine depositional environments. The most recent deposits are fluvial floodplain deposits of the Jordan River and its tributaries. Below these deposits occur earlier lake and terrace deposits that were formed during the Pleistocene epoch when ancient Lake Bonneville influenced the geologic development of the area.

The dominant structural feature within north-central Utah is the north-south trending Wasatch Line. The Wasatch Line divides the state into distinctly different western and eastern geologic provinces. The landfill site is located in the western province which is characterized by Paleozoic and late Cenozoic aged carbonate rocks and extrusive igneous rocks. Within Utah, the greatest vertical uplift has occurred along the Wasatch Line with the Wasatch Fault System. The Warm Springs Fault is the closest approach of the Wasatch Fault System to the landfill site, located approximately 8 miles east of the site. The closest faults to the landfill are the Taylorsville and Granger faults, which are part of the West Valley Fault System. These Holocene faults lie approximately 9,000 feet east of the landfill site. The site, therefore, is in compliance with the draft DEQ Subtitle D regulations criteria of no lateral expansion of an existing facility within 200 feet of a Holocene fault.

The landfill site is in a seismic impact zone. A seismic impact zone is defined in the draft DEQ Subtitle D regulations as "an area with a 10 percent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth's gravitational pull, will exceed 0.10g in 250 years." Accordingly, the site's containment structures including liners and leachate collection and removal systems, and surface water control systems have been designed to resist the probable horizontal acceleration estimated for the site. The design of the containment systems and surface water control systems is further discussed in Section 3. The site structures' ability to resist the horizontal acceleration must be demonstrated to the satisfaction of the Executive Secretary of the DEQ. The discussion in Section 3 provides this demonstration.

2.2.2 Site Geology

Silty clay covers most of the surface of Parcels VII and VIII (approximately 60 percent). There is a sandy area in the northwest corner of Parcel VIII, which accounts for approximately 10 percent of the total surface area, while the remaining area (30 percent) is covered by fill material. Native soils encountered at the surface of the site include both sandy and clayey soils that are locally covered by a thin layer of windblown very fine-grained sand and silt. The surface exposures of sands are typically restricted to the northwest corner of the parcel. Clay soils are more generally distributed over the site.

Subsurface soil conditions have been determined on the basis of the analysis of exploratory boring and trench log data. The three principal soil horizons beneath the site are (1) surface fine-grained layer, (2) intermediate silty sand horizon, and (3) lower sandy layer. The surface fine-grained layer consist of silt (ML) to clay (CH). The intermediate horizon and lower sand layer consists of variably well-graded, silty and poorly graded sands (SW, SM, and SP) at depths from about 3 to about 30 feet below the ground surface. The draft DEQ Subtitle D regulations prohibit a new facility from being located in areas of gravelly or sandy soils (GW or GP), karst areas, or areas of highly fractured, porous or permeable bedrock. The site is not located on any of these areas and, therefore, is consistent with the draft DEQ Subtitle D regulations.

2.3 Hydrogeology

Groundwater in the vicinity of the landfill site is used for domestic and industrial purposes, depending on the depth of the well. Surface water is used by agriculture and industry. Contamination of either water source is considered a significant environmental consequence of project development. The draft DEQ Subtitle D regulations (R315-301-6(2)(c-d)) prohibit a new or expanded solid waste facility from being located in a floodplain, within 1,000 feet of a lake or pond, in any wetland, nor on any public land used by a public water system for watershed control. Also, facilities are prohibited from being located where the bottom of the lowest liner is less than ten feet above the highest groundwater level, in designated drinking water source protection areas, in recharge zones of aquifers having a Total Dissolved Content (TDS) content of less than 3,000 mg/l, or above aquifers of varying TDS contents unless a specified separation between groundwater and waste is maintained. The Executive Secretary may exempt a facility from the above "groundwater" restrictions if the disposal site is located over an area where the groundwater has a TDS content greater than 10,000 mg/l, where there is an extreme depth to groundwater, where there is a natural impermeable barrier above the groundwater, or where there is no groundwater. The following items describe the consistency of the landfill site with the draft DEQ Subtitle D regulations for surface and groundwater location restrictions. Information in this section is summarized from the Salt Lake Valley Master Plan (EMCON 1991).

2.3.1 Surface Water

Surface water occurs intermittently within most areas of the landfill in response to the wet and dry seasons of the year. Surface water in the landfill area is conveyed by Lee Creek and Lee Drain and is locally ponded within the site boundaries. Water in Lee Creek and Lee Drain flows west-northwest across the site and eventually discharges into the Great Salt Lake. Because undeveloped portions of the landfill site are not well drained, ponded water accumulates in low areas. The water in these low areas either evaporates or percolates into the subsurface to recharge localized perched ground-water horizons beneath the site. A pond area currently located south of the landfill area in Parcel IV, like the others that will be constructed on the landfill site, is part of the overall plan to enhance wildlife habitat on the site.

The U.S. Army Corps of Engineers (COE) performed a site investigation of the landfill area north of 1300 South Street (including the expansion area) on July 15, 1988, to determine the presence of wetlands. Based on the absence of wetlands vegetation and hydrology, the area was determined not to be a wetlands (COE letter, September 26, 1988). Additionally, the National Flood Insurance Program Maps for Salt Lake County indicate the limits of the 100-year floodplain for Lee Creek. The landfill expansion area is outside of this floodplain (Figure 4).

Based on the above information, it can be determined that the lateral expansion of the SLVL is consistent with the draft DEQ Subtitle D regulations criteria for landfill location in relation to surface water (R315-301-6(2)(c)).

2.3.2 Groundwater

The Quaternary alluvial sediments form the principal water bearing deposits in the area. Four types of aquifers were noted in the area within the Quaternary alluvial deposits of the Jordan River Valley, including (1) a confined (artesian) aquifer, (2) a deep unconfined aquifer, (3) a shallow unconfined aquifer overlying the artesian aquifer, and (4) local, unconfined perched aquifers. The aquifers described under 1 and 2 above compose the principal aquifers and are the source of most of the groundwater production from wells within the valley.

Groundwater under the landfill expansion area has been assessed during several investigations. The groundwater aquifer beneath the site, which contributes a significant volume of groundwater to borings and test pits, is generally encountered at depths of greater than 10 feet below the ground surface. The potentiometric surface of the confined groundwater is historically variable beneath the site and has ranged from above ground surface to approximately 12 feet below the ground surface. Recharge of this shallow aquifer is probably from surface inflow from the Jordan River and its tributaries, irrigation, and upward migration of water beneath the site. The flow of this aquifer beneath the site is directed northwesterly toward the Great Salt Lake, which is consistent with regional groundwater flow.

Groundwater quality at the SLVL site has been monitored since 1982. Results of inorganic parameters analyses indicate that the water contains concentrations of chlorides and total dissolved solids (TDS) above federal secondary drinking water standards. Specifically, the groundwater beneath the expansion area has an average TDS in excess of 10,000 milligrams per liter (mg/l). On the basis of these monitoring data, groundwater beneath Parcel VII (one of the expansion parcels) would be classified as having limited beneficial use (Class III) or being saline (Class IV) under the definitions of the Utah Groundwater Protection Act of 1989. Under the Act, saline groundwater is defined as TDS concentrations greater than 10,000 mg/l.

The analyses for dissolved metals in the groundwater samples collected from wells in the expansion area indicate that iron and manganese exceed federal secondary drinking water standards for these metals. Analyses of water samples for organic and volatile organic compounds did not detect any parameter concentrations that are of concern.

The draft DEQ Subtitle D regulations state that a lateral expansion of a facility shall be prohibited if the bottom of the lowest liner is less than 10 feet above the seasonal high level of groundwater in the uppermost aquifer. Since the highest level of groundwater in the expansion area is periodically at the ground surface, the expansion area does not meet this criterium. However, as discussed above, the draft DEQ Subtitle D regulations allow for an exemption from the location criteria if the disposal site is to be located over an area where the groundwater has a TDS of greater than 10,000 mg/l. The landfill expansion area falls into this category since the average TDS in the groundwater beneath the expansion area is greater than 10,000 mg/l. Accordingly, the Executive Secretary of the DEQ can exempt the disposal site from the requirement to maintain a separation of at least 10 feet between the seasonal high groundwater level and the bottom of the lowest landfill liner.

APPENDIX
I

Table I

SALT LAKE VALLEY LANDFILL
SALT LAKE COUNTY, UTAH

LANDFILL EXPANSION AREA
PARCELS III, VI, VII AND VIII
QUANTITY SUMMARY ESTIMATE

ITEM DESCRIPTION	UNIT	WASTE TO SOIL RATIO 10 to 1 No Daily Soil Cover	5 to 1 With Daily Soil Cover
Fillspace (1)	cy	49,700,000	49,700,000
Refuse Capacity (2)	cy	45,190,000	41,400,000
Service Life (3)	yr	21	19
SOIL NEEDS			
Daily and Intermediate Cover	cy	4,510,000	8,300,000
Perimeter Berm	cy	490,000	490,000
Module Termination Berm	cy	300,000	300,000
Base Liner System			
Low Permeability Layer, 2 ft	cy	~~1,200,000~~ 156,000	~~1,200,000~~ 156,000
HDPE Liner	sf	16,000,000	16,000,000
LCRS			
Operations Layer, 1 ft	cy	600,000	600,000
Drainage Layer, 1 ft	cy	600,000	600,000
Collection Pipe	lf	64,000	64,000
Final Cover			
Foundation Layer, 1 ft	cy	610,000	610,000
Low Permeability Layer, 1.5 ft	cy	920,000	920,000
Vegetative Layer, 1 ft	cy	610,000	610,000
Existing Landfill (Modules 6, 6 North and 6 South)	cy	674,000	674,000
Total Soil Needs (Including Drainage Material)	cy	~~25,904,000~~ 8,870,000	~~29,694,000~~ 12,660,000
AVAILABLE SOIL			
Expansion Area Excavation	cy	4,100,000	4,100,000
Existing Landfill Pond Excavations	cy	1,224,000	1,224,000

NOTES:

1. Fillspace volume is based on final grade contours as shown on the Master Plan drawings plus 25 percent overfill.
2. Waste capacity is fillspace minus daily and intermediate cover.
3. Service life estimate is based on waste stream of 622,000 tons placed in 1990 with a 5.70% annual growth rate.
4. Landfilling begins on Parcels III,VI, VII and VIII January 1, 1993 and operates 310 days per year.
5. 10 to 1 refuse to soil ratio is based on volume of cover soil placed during the waste compaction study, June 1991. 5 to 1 refuse to soil ratio is based on daily cover soil application.
6. Abbreviations: cubic yards (cy), year (yr), acres (ac), linear feet (lf) and feet (ft).

11/22/91

Source: Salt Lake Valley Master Plan
EMCON, November 1991

APPENDIX
J

July 6, 1995

Kleinfelder File No. 30-8018-06.004

Mr. Harry Campbell
Utah Department of Environmental Quality,
Division of Water Quality
288 North 1460 West
Salt Lake city, Utah 84114

Subject: Leachate and Surface Water Control Systems
Salt Lake Valley Landfill
Salt Lake City, Utah

Dear Mr. Campbell,

Salt Lake Valley Landfill is currently compiling their Permit Application for Operation of a Class I Landfill, in accordance with the new State of Utah Solid Waste Permitting and Management Rules. These rules request that information regarding the proposed handling of leachate and stormwater run-on/run-off be provided to the Division of Water Quality for review.

Surface water run-on and run-off control is described in Salt Lake Valley Landfill's Storm Water Pollution Prevention Plan, prepared in accordance with the requirements of their storm water discharge permit #UTR000074. A copy of this document is attached for your review.

Leachate produced at the landfill (including liquids produced by waste or the percolate through the waste) is captured in a leachate collection and recovery system (LCRS). The LCRS consists of perforated pipes and a granular drainage blanket constructed over the composite liner system. The leachate control system is inspected quarterly. If more than 1 foot of standing leachate is present over the composite liner, the leachate is pumped out of leachate sumps located at the lowest part(s) of the liner. The recovered leachate is then sprayed back on the active face of the landfill where wastes are being discharged, compacted and covered. This facilitates evaporation of the liquid leachate as well as providing dust control in the area of operations. Any leachate that is not evaporated will be adsorbed by the waste or percolate back through the waste column to the LCRS.

Please review the provided information and let us know if the Division of Water Quality has concerns regarding either of these control systems. Operation of these systems will be approved by the division of Solid and Hazardous Waste as part of the landfill permit review and approval.

Please call Dave Lore, Salt Lake Valley Landfill (974-6920) or me if you have any questions regarding this information.

Sincerely,

KLEINFELDER, INC.

Renee D. Zollinger, R.G.
Senior Geologist

cc: Dave Lore, Salt Lake Valley Landfill
Ed McDonald, Salt Lake City Public Works