

SPECIAL PROJECT DIRECTOR



CLIFF BLONQUIST

HAND DELIVERED

DEC 17 2008

**UTAH DIVISION OF
SOLID & HAZARDOUS WASTE**

2008.03872

December 12, 2008

**Dennis R Downs
Executive Secretary
Utah Solid and Hazardous Waste Control Board**

Subject: Utah Class 1 Landfill Permit Renewal Application

Dear Mr. Downs:

In 2007 the Summit County Board of Commissioners established solid waste and recycling management as a priority for future County action. These developments, in conjunction with a rapidly expanding population and burgeoning tourism industry, created the need for a comprehensive strategic waste management plan for Summit County. The Summit County Integrated Solid Waste Management Master Plan is complete and was adopted by the board of County Commissioners in October 2008.

The permit application was delayed waiting the completion and adoption of the master plan. I apologize for the delay and I hope it did not cause you much of an inconvenience.

If you need additional information please call me at (435) 336- 3120

Sincerely,

Cliff Blonquist
Cliff Blonquist

**Summit County Solid Waste Manager
P. O. Box 128
Coalville, Utah 84017**

SUMMIT
C O U N T Y

2008

HAND DELIVERED

DEC 17 2008

**UTAH DIVISION OF
SOLID & HAZARDOUS WASTE**

2008.03872

**CLASS I MUNICIPAL SOLID WASTE
LANDFILL RENEWAL APPLICATION
FOR: THREE MILE CANYON LANDFILL
SUMMIT COUNTY, UTAH**

Prepared by the Administrative Staff of the Summit County Landfill and Public Works
Department December 10, 2008

Utah Class I and V Landfill Permit Application Form

Part I General Information										APPLICANT: PLEASE COMPLETE ALL SECTIONS.														
I. Landfill Type					<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class V					II. Application Type					<input type="checkbox"/> New Application <input checked="" type="checkbox"/> Renewal Application					<input type="checkbox"/> Facility Expansion <input type="checkbox"/> Modification				
For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number										0104R1														
III. Facility Name and Location																								
Legal Name of Facility THREE MILE CANYON LANDFILL																								
Site Address (street or directions to site) 1/2 MI. SW OF ROCKPORT RESERVOIR & 4 MI. S OF WANSHIP															County SUMMIT									
City					State UT					Zip Code					Telephone 435-336-5297									
Township 1S			Range 5E			Section(s) 5			Quarter/Quarter Section			Quarter Section												
Main Gate Latitude 40 degrees 45 minutes 28 seconds										Longitude 111 degrees 24 minutes 00 seconds														
IV. Facility Owner(s) Information																								
Legal Name of Facility Owner SUMMIT COUNTY																								
Address (mailing) 1755 SOUTH HOYTSTVILLE ROAD																								
City COALVILLE					State UT					Zip Code 84017					Telephone 435-336-3970									
V. Facility Operator(s) Information																								
Legal Name of Facility Operator SUMMIT COUNTY																								
Address (mailing) (SAME AS OWNER INFORMATION)																								
City					State					Zip Code					Telephone									
VI. Property Owner(s) Information																								
Legal Name of Property Owner (SAME AS FACILITY OWNER)																								
Address (mailing)																								
City					State					Zip Code					Telephone									
VII. Contact Information																								
Owner Contact CLIFF BLONQUIST										Title SPECIAL PROJECTS ADMINISTRATOR														
Address (mailing) 1755 SOUTH HOYTSTVILLE ROAD																								
City COALVILLE					State UT					Zip Code 84017					Telephone 435-336-3120									
Email Address cblonquist@co.summit.ut.us										Alternative Telephone (cell or other) 435-640-0926														
Operator Contact MARK OFFRET										Title LANDFILL SUPERINTENDANT														
Address (mailing) 1755 SOUTH HOYTSTVILLE ROAD																								
City COALVILLE					State UT					Zip Code 84017					Telephone 435-336-3970									
Email Address moffret@co.summit.ut.us										Alternative Telephone (cell or other) 435-336-3972														
Property Owner Contact (SAME AS OWNER CONTACT)										Title														
Address (mailing)																								
City					State					Zip Code					Telephone									
Email Address										Alternative Telephone (cell or other)														

Utah Class I and V Landfill Permit Application Form

Part I - General Information (Continued)

VIII. Waste Types (check all that apply) <input checked="" type="checkbox"/> All non-hazardous solid waste (see R315-315-7(3) for PCB special requirements) OR the following specific waste types: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Waste Type</td> <td style="width: 33%;">Combined Disposal Unit</td> <td style="width: 33%;">Monofill Unit</td> </tr> <tr> <td><input type="checkbox"/> Municipal Waste</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> Construction & Demolition</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> Industrial</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> Incinerator Ash</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> Animals</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> Asbestos</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> PCB's (R315-315-7(3) only)</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	Waste Type	Combined Disposal Unit	Monofill Unit	<input type="checkbox"/> Municipal Waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Construction & Demolition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Industrial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Incinerator Ash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Asbestos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> PCB's (R315-315-7(3) only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Other _____	<input type="checkbox"/>	<input type="checkbox"/>	IX. Facility Area Facility Area..... <u>115</u> acres Disposal Area..... <u>23.6</u> acres Design Capacity Years..... <u>10</u> Cubic Yards..... APPROX. <u>731,640</u> Tons..... _____
Waste Type	Combined Disposal Unit	Monofill Unit																										
<input type="checkbox"/> Municipal Waste	<input type="checkbox"/>	<input type="checkbox"/>																										
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<input type="checkbox"/> PCB's (R315-315-7(3) only)	<input type="checkbox"/>	<input type="checkbox"/>																										
<input type="checkbox"/> Other _____	<input type="checkbox"/>	<input type="checkbox"/>																										

X. Fee and Application Documents		Class V Special Requirements
Indicate Documents Attached To This Application	<input type="checkbox"/> Application Fee: Amount \$	<input type="checkbox"/> Documents required by UCA 19-6-108(9) and (10)
<input checked="" type="checkbox"/> Facility Map or Maps <input checked="" type="checkbox"/> Facility Legal Description <input checked="" type="checkbox"/> Plan of Operation <input checked="" type="checkbox"/> Waste Description <input checked="" type="checkbox"/> Ground Water Report <input checked="" type="checkbox"/> Closure Design <input checked="" type="checkbox"/> Cost Estimates <input checked="" type="checkbox"/> Financial Assurance		

I HEREBY CERTIFY THAT THIS INFORMATION AND ALL ATTACHED PAGES ARE CORRECT AND COMPLETE.

Signature of Authorized Owner Representative, _____ CLIFF BLONQUIST Name typed or printed	Title SOLID WASTE MGR.	Date 12-12-08
Signature of Authorized Land Owner Representative (if applicable) _____ Name typed or printed	Title _____	Date _____
Signature of Authorized Operator Representative (if applicable) _____ Name typed or printed	Title _____	Date _____

	Page Number
Cover.....	1
TABLE OF CONTENTS.....	2,3
List of Figures.....	4
Facility General Information.....	5
• Facility Description	
• Legal Description	
• Proof of Ownership	
• Area Served	
• Use Declaration.....	6
• Waste Type and Anticipated Volume	
Plan of Operations Requirements	
• On-site Solid Waste Handling Procedures	
• Schedule for Conducting Inspections and Monitoring.....	7
• Fire or Explosion	
• Corrective Action Program for Contaminated Groundwater.....	8
• Contingency Plans for Other Releases	
• Dust Control.....	9
• Litter Control and Collection	
• Maintenance of Equipment.....	10
• Procedures for Excluding the Receipt of Hazardous Waste	
• Procedures for Controlling Disease Vectors.....	11
• Alternative Waste Handling	
• General Training and Safety Plan	
• Recycling Programs.....	12
• Closure and Post-Closure Care Plan.....	13
• Summary of Estimated Closure and Post-Closure Costs.....	14
• Procedure for Handling Special Waste.....	15
Geohydrological Assessment.....	16
• Local Geology	
• Hydrogeology	
• Ground Water Quality.....	17
• Surface Water	

- Water Rights
- Site Water Balance

Ground Water Monitoring Program.....18

- Groundwater Monitoring Well System
- Sampling Procedures and analysis.....19
- Groundwater Quality Protection Standards

ENGINEERING REPORT

Location Standards

- Land Use Compatability
- Geology.....20
- Surface Water.....21

Solid Waste Management Plan

Cell Design and Development

Discussion of Run-on and Run-off Control Systems.....22

Storm Modeling.....23

Storm Input Values

Storm Output.....24

Active-Phase Storm Water Controls

Waste Cells.....25

Detention Basin

Culverts

Post-Closure Storm Water Controls.....26

Upgradient Diversion Swale

Perimeter Drainage Swales

Erosion Potential

Closure and Post Closure Design and Maintenance.....27

Permeability Value for the Berm Soils.....28

UTAH CLASS I PERMIT RENEWAL APPLICATION

FOR

THREE MILE CANYON LANDFILL

DECEMBER 10, 2008

Facility General Information

Facility description

The landfill is located in a relatively flat basin on the north side of Three Mile Canyon approximately one half mile southwest of Rockport Reservoir and approximately 4 miles south of the town of Wanship in Summit County, Utah. The landfill site occupies approximately 115 acres, which includes the permitted landfill cell, maintenance building, scale station, gate house, storm water detention pond, and access roads. The currently permitted landfill cell occupies approximately 23.6 acres.

Legal Description:

Beginning at a point which falls North 663.21 feet, and West 1779.79 feet from the Southeast corner of Section 5, Township 1 South, Range 5 East, Salt Lake Base and Meridian, said Section corner is a mound of stone on a North-South fence line; thence North 67° 45' 49" East 900.00 feet; thence North 12° 48' 28" West 827.00 feet; thence North 57° 30' 44" West 1440.00 feet; thence South 79° 30' 16" West 2148.50 feet; then South 13° 47' 58" East 1945.22 feet; then North 75° 06' 51" East 2028.50 feet to the point of beginning.

Proof of Ownership:

The property is owned by Summit County. A copy of the deed is included in Appendix A. The property surrounding the landfill is owned by Utelite Mining Company, as shown on Figure 1, site vicinity map. The area is zoned as AG-100, agricultural.

Area Served:

All incorporated and unincorporated areas of Summit County. The population was estimated to be 36,871 in 2006.

Use Declaration:

Summit County as a public entity and owner of the Three Mile Canyon Landfill does not operate this land fill as a commercial facility.

Waste Type and Anticipated Volume

In 2007 (349 operating days), the Three Mile Canyon Landfill generated 41,860 tons of Class I and Class IV municipal solid waste for an average daily total of approximately 135 tons.

Plan of Operations Requirements**On-site Solid Waste Handling Procedures**

The landfill is owned and operated by Summit County. The Summit County Special Projects Manager oversees landfill programs. The Summit County Solid Waste Superintendant acts as Landfill Manager with supervisory responsibility over the Landfill and personnel. Daily operation of the Landfill is under the direction of the landfill operator, known as the Facility Supervisor.

The Facility Supervisor is responsible for unlocking the gate at the beginning of each day and for directing the collection vehicles to the proper location for disposal of waste. Direction of vehicles also may be accomplished through the placement of directional signs. The landfill is attended by at least two operators at all times that the landfill is open.

A scale for weighing waste loads is in place and a facility supervisor accurately accounts for load weights and volumes of each delivery vehicle arriving at the site.

An area near the public drop-off area has been established as a collection location for Household Hazardous Waste (HHW) such as tires, paint, batteries, used oil and white goods. This collection area has been established to collect residential HHW brought to the landfill by the public, and HHW which may be discovered in waste unloaded by the commercial hauler who transports municipal solid waste to the landfill.

Summit County works with steel reclamation and recycling firms to remove white goods, batteries, and used oil from the landfill on a periodic basis. The contractor is required to meet all State of Utah and EPA requirements for removal of chlorofluorocarbons from white goods. Tires are not accepted in bulk at the landfill; however, the landfill has a waste tire collection area and periodically collects and delivers these tires to a commercial hauler for disposal. The tire collection area is

maintained in a manner that protects human health and environment by: a) maintaining the piles in a manageable size to reduce the chance of an accidental fire from spreading between piles, and b) periodic monitoring of the entire area for mosquito protection and, if found, treatment or removal of tires.

Green waste is collected near the public drop off area. Periodically the green waste is chipped and utilized at the landfill.

Incoming waste is deposited at the working face under the direction of the Facility Supervisor. Refuse is spread in thin layers approximately one foot thick across the working face, and then is compacted by six passes with either the crawler or the compactor. At the end of the working day, the operator spreads approximately six inches of daily cover material over the compacted refuse.

Schedule for Conducting Inspections and Monitoring

INSPECTION ACTIVITY	FREQUENCY
Access road condition & maintenance	during operation as needed
Fence inspection & maintenance	quarterly
Daily cover inspection	during daily operation
Post closure final cover inspection	monthly
Drainage channel condition	monthly
Landfill equipment maintenance recommendation	Per manufacturer's

Fire or Explosion

A landfill fire or explosion would be particularly hazardous in the presence of discarded household chemicals, paints, fuels, etc.; however, waste load monitoring minimizes this potential. A fire may be started by spontaneous combustion in refuse containers, but is usually the result of vandalism or disposal of hot coals and ashes. Daily cover effectively prevents fires from spreading throughout the landfill. The primary means of fire control is the exclusion and or isolation of hot or burning loads. In the event that fires do erupt during operation hours, the burning material will be separated from other material and covered with soil, using onsite earthmoving equipment. This action will be supported, when necessary, by the

availability of additional equipment owned by the Summit County Public Works Dept.

Small fires may be extinguished with fire extinguishers provided in the site vehicles or by using a water tank, if available. Upon notification of a fire or explosion, which is not controllable with onsite fire protection equipment, a long blast (greater than 30 seconds) on a vehicle horn will be sounded, nonessential equipment will be shut down, and all site personnel will assemble outside the landfill entrance. The local Summit County Fire Dept. will be alerted and all personnel will move to a safe distance from the involved area until the fire is extinguished. Secondary fire control may also be provided by other Summit County Fire Dept. units. The telephone number and location of the nearest fire station is displayed in a conspicuous place in the area of the working face and in the site office. The Landfill employees participate in a fire drill conducted on an annual basis.

Fires which occur during times that the landfill is closed are more difficult to control due to the time available for the fire to spread. If a fire is reported after hours, the Landfill Manager may utilize site equipment to segregate the burning portion and bury the fire with soil. Otherwise, the local fire dept. will be summoned to control the fire.

Corrective Action Program for Contaminated Groundwater

The landfill has two downgradient groundwater monitor wells (MW-3 and MW-7) and one upgradient well (MW-9) west of the disposal cell as identified in Figure 5. The most recent detection monitoring completed September 10, 2008 evaluated any potential impact to the groundwater from the landfill operation. The results of this report are included and identified as Appendix B.

Contingency Plans for Other Releases

The Contingency Plan is designed to minimize hazards to human health or the environment from any unplanned sudden or slow seeping discharge to air, soil, surface or groundwater. The provisions of this plan shall be carried out immediately when there is an emergency situation or release, which could threaten human health or the environment. Emergency evacuation of the site will not be necessary give the nature of the waste materials stored and processed at the site. The probability of fire, explosion, or toxic vapor generation from any emergency incident is remote.

Due to the size, remote location and semi-arid nature of the site, a significant amount of explosive landfill gas is neither expected to be generated nor to migrate off site. The Landfill Manager is responsible for quarterly monitoring of landfill gas using a methane detection meter capable of measuring methane at levels below the Lower Explosive Limit (LEL). Gas monitoring will be conducted to test for methane at the LEL at the facility boundary and at 25% of the LEL in the facility structures. In the event that explosive gases are detected above the LEL during monitoring, or at any other time, the emergency audible alarm and evacuation procedures outlined in the "Fire or Explosion" Section above will be implemented.

A sample of the form "Landfill Gas Monitoring" is included in Appendix D. Completed Forms are kept on file at the site for inclusion in the annual report.

There are no containment systems at the site other than a storm water collection area. No leachate collection structures exist or are planned for the site at this time.

Dust Control

The fugitive dust program is intended to control dust emissions from roads, construction and general operations covering the waste. Fugitive dust resulting from daily operations is minimal. The access road to the landfill is paved and negligible dust results from ingress and egress to the landfill. Dust control measures are implemented during the excavation, transport and placement of all soils. A water truck is available and is used whenever needed to control fugitive dust within the landfill site.

Litter Control and Collection

This section addresses the control of litter that may blow from the active face of the landfill. The current method to contain the majority of litter is operational controls, which have been previously addressed, namely the compaction of waste and the application of daily cover. In addition to these operational controls, a litter fence has been constructed in order to reduce the chance for waste to blow off site.

The 8 foot high chain link fence has been constructed to control blowing litter. Because the predominant winds are out of the west, the fence has been installed along the eastern boundary of the disposal cell. Litter crews periodically remove litter from the fence and from any other areas within the landfill area.

Litter, which has escaped from the landfill cell, is collected as necessary to avoid a fire hazard and an aesthetic nuisance. The area immediately surrounding the landfill

cell is inspected for litter on a monthly basis and is collected at a minimum of a quarterly basis.

Maintenance of Equipment

Equipment used at the landfill is maintained per manufacturer's recommendations and specifications.

Three groundwater wells are presently being monitored at the site on a quarterly basis per UAC R315-30B-2(11)(a). When assessment monitoring is no longer necessary these wells will be monitored on a semi-annual basis for the life of the Landfill and during any post-closure care period. Inspection and maintenance procedures for the monitor of the wells will consist of a visual inspection performed during semi-annual sampling and will include examination of the concrete pad for cracks, shifting or other damage. If damage to the well casing is discovered, these sections will be repaired or the well will be replaced as may be necessary and practical. Details of the inspections and maintenance activities are recorded in a field notebook and copies are kept on file at the site.

Procedures for Excluding the Receipt of Hazardous Waste

The Landfill specifically excludes the following types of waste:

- Hazardous waste
- PCB containing waste
- Pathological/infectious waste ("Red-Bag")
- Liquid waste (including septic and sump wastes)
- Toxic waste and chemical wastes
- Bulk loads of tires
- Asbestos

The program to exclude the disposal of hazardous or PCB containing waste shall conform to UAC R315-303-5(7). The Facility Supervisor is responsible for identification and prohibition of excluded wastes. All employees will be trained in methods and techniques for identifying hazardous waste, or waste containing PCB's, spotting liquid waste, drums, waste in sealed containers, Red-Bag waste, and waste which exhibit unusual odors or markings. The Facility Supervisor at a minimum of once per day shall perform random inspections of waste loads at the face. The inspection results shall be included on the load Inspection Record Form. If hazardous or PCB-containing waste is discovered on the working face, it will be segregated from the other waste pending alternative disposal. The Executive Secretary, the hauler, and generator shall be notified within 24 hours. The area containing the waste shall be restricted to other waste haulers

pending removal of the material. The Landfill Manager will have the ultimate authority and responsibility for decisions regarding acceptance or rejection of any waste.

Procedures for Controlling Disease Vectors

The primary technique used for controlling disease vectors in and around the landfill area is the addition of daily cover (minimum six inches). Exclusion of specific types of solid waste controls disease vectors and the subsequent spread of disease. Special wastes such as infectious waste, and liquid waste, which may directly carry disease or lead to the propagation of disease vectors, are excluded from the Landfill. Animal carcasses received are placed at the base of the working face and covered daily. Tires are placed within a controlled area as described in the "On-site Solid Waste Handling Procedures" Section of this document.

Alternative Waste Handling

The landfill currently has one Caterpillar 826 (CAT) compactor, one CAT D-7 crawler, one 950 CAT loader, one ten wheel dumpster truck, and one ten-wheel dump truck. In the event that one unit of equipment cannot operate due to maintenance or repair, the other units will be utilized to push refuse, or haul refuse to the working face and cover material placed per normal operational procedures. No contingency is planned for additional compaction equipment.

The current landfill cell comprises a total of 23.6 acres, and is large enough that if a portion of the site must be closed due to emergency, or becomes inaccessible, it is likely that another area within the approved active cell could be designated to receive waste materials on a temporary basis. If, in the unlikely event, on-site roads become impassible, the landfill Manager may elect to temporarily close the site.

General Training and Safety Plan

Each employee who works with solid waste at the landfill is trained and has a working knowledge of basic maintenance and operational techniques necessary to operate and maintain the facility in a manner which does not endanger human health and safety or environmental quality. Training is accomplished through on-the-job training (OTJ) and classroom training sessions.

The Landfill Manager, or a designated professional trainer directs the training program. Initial training is completed within three months of employment, followed by an annual review of basic waste management skills.

Training Schedule

- A. **Introductory Training (half hour minimum):** Synopsis of solid waste regulations, record keeping and transporter requirements. Required by all personnel annually, and is conducted on the job.
- B. **Policies and Procedures (half hour minimum):** Security, inspections and emergency response training. Required by all personnel annually, is conducted on the job and/or by lectures and a video course.
- C. **Safety (one hour minimum):** Personal protection, hazardous waste recognition, hazardous material handling, emergency response and first aid. Required by all personnel annually with lecture and video course.
- D. **Landfill Operations:** all landfill personnel are required to enroll annually in one of two courses offered by the Utah Chapter of the Solid Waste Association of North America (SWANA). The courses include the Landfill Operator Course and the Waste Screening Course.
- E. **Summit County is currently training personnel to become SWANA certified**

The training documents are kept with the Plan of Operation for five years.

Recycling Programs

Summit County's goal is to divert the amount of Municipal Solid Waste (MSW) entering the Three Mile Canyon Landfill by 30 percent by the year 2010, and 70 percent by 2030. Based on a 2007 diversion rate of 18 percent and an assumed continued increase in recycling efforts, it is estimated that currently the County diverts approximately 20 percent of MSW from entering the landfill.

Currently, the diversion programs provided by Summit County are voluntary, and some of the programs are only available in parts of the County. The County has the following existing waste diversion programs:

- Residential curbside recycling program
- Commercial, industrial, and institutional recycling program
- Drop-site recycling program
- Landfill drop-site
- Household Hazardous Waste collection program

Closure and Post-Closure Care Plan

Final closure activities will be implemented when the capacity of the landfill has been reached. Closure of the site is to be performed in such a manner as to minimize the need for post-closure maintenance and minimize the potential effects of the landfill on the surrounding environment. Post-closure operations will consist of groundwater monitoring and periodic site inspections to determine that the site is performing as designed.

An illustrative final cover design of the landfill is shown in Figure 3 and Figure 4. The final cover of the landfill will consist of 18 inches of compacted clay and six inches of topsoil. The final cover will be constructed after the waste has been placed and compacted to the graded outline in the plans. The cover will be constructed with a minimum 3% slope to the sides of the permitted cell area to promote drainage from the cell. The compacted clay cover will be constructed with a maximum hydraulic conductivity of 5×10^{-7} cm/sec. The topsoil will be obtained from the site from overburden that has been removed to develop the landfill.

The total remaining volume (air space) capacity of the landfill calculated in 2007 is approximately 731,640 cubic yards. At an average disposal rate of 135 tons per day, 1.3% population growth rate, and an average placed waste density of 1000 pounds per cubic yard, the volume of the landfill is expected to meet the estimated requirements of Summit County for a period of approximately 7+ years (2014).

Closure activities at the landfill will commence within 30 days after final placement of waste and shall be completed with 180 days.

An estimate of closure and post-closure of costs is shown on the following page.

SUMMARY OF ESTIMATED CLOSURE AND POST-CLOSURE COSTS				
TASK	QUANTITY	UNITS	UNIT COSTS	TASK COST
Closure				
Conduct Site evaluation	1	Lump Sum	\$ 3,400	\$ 3,400
Remove Building & Equipment	2	Lump Sum	\$ 3,100	\$ 6,200
Construction Storm Water	1	Lump Sum	\$ 5,000	\$ 5,000
Move & Place Clay	58,000	Cubic Yds	\$ 4	\$ 232,000
Soil Testing	58,000	Cubic Yds	\$ 1	\$ 58,000
Move & Place Topsoil	19,500	Cubic Yds	\$ 2	\$ 39,000
Final Grading	24	Acres	\$ 1,500	\$ 36,000
Storm Water Controls	1	Lump Sum	\$ 6,500	\$ 6,500
Seeding- Revegetation	24	Acres	\$ 500	\$ 12,000
SUBTOTAL				\$ 398,100
10% Administrative Services				\$ 39,800
12% Technical & Professional Services				\$ 47,800
ESTIMATED TOTAL CLOSURE COST				\$ 485,700
Post Closure				
Site Inspections*	120	Events	\$ 600	\$ 72,000
Annual Maintenance*	30	Events	\$ 1,750	\$ 52,500
Gas Monitoring**	60	Lump Sum	\$ 600	\$ 36,000
Groundwater Monitoring/Report**	60	Lump Sum	\$ 2,300	\$ 138,000
Groundwater Analysis**	60	Lump Sum	\$ 2,300	\$ 138,000
Repair & Maintain Cover***	1440	Cubic Yds	\$ 15	\$ 21,600
Abandon Wells****	289	Feet	\$ 20	\$ 5,780
SUBTOTAL				\$ 463,880
6% Administrative Services				\$ 27,800
7% Technical & Professional Services				\$ 185,600
10% Miscellaneous & Contingency				\$ 46,400
ESTIMATED TOTAL POST CLOSURE COST				\$ 723,680
TOTAL				\$ 1,209,380
NOTES TO TABLE				
*May be reduced to annual inspections upon site stabilization, with DEQ approval.				
**May be discontinued upon site stabilization, with DEQ approval				
***Calculated at 2 cubic yards/acre x 24 acres x 30 years				
****Calculated at 289 feet (total wells depths of MW3, MW7 & MW9 x \$20 per foot).				

A final inspection will be performed at the landfill site at the termination of the landfill activities. The final inspection will determine if the landfill meets the closure requirements as outlined in the permit and closure plans. Inspection will include: cell cover design requirements, run-on and run-off controls, and maintenance of proper final grade on the cell to promote run-off.

In addition to the periodic inspections, post closure monitoring of the landfill will include sampling the groundwater monitor wells at the site. The wells will be sampled on a semi-annual basis through both the active period of the landfill operations, and the post-closure period.

Methane gas will also be monitored quarterly during the post-closure period at the perimeter of the landfill and within any buildings at the landfill site. If sufficient data indicates that little or no gas is generated, application will be made to the Executive Secretary to modify the schedule for gas monitoring, or to discontinue monitoring. Any maintenance of the monitoring structures will be addressed during scheduled inspections.

Post closure maintenance will consist of inspecting the cover and run-on and run-off control structures and making any necessary repairs. Possible maintenance activities may include grading, repair of swales and riprap areas, and repair or replacement of culverts. Inspection and maintenance at the landfill will be performed semi-annually during the post closure period and shall coincide with the scheduled monitoring events.

Procedure for Handling Special Wastes

Animal carcasses are accepted at the Landfill. Carcasses received are placed at the base of the working face and covered daily.

Plans and Operation Procedures to minimize liquids

Trained landfill spotting personnel inspect daily for liquids. Waste screening processes follow SWANA and Utah State Dept of Environmental quality procedure requirements.

Geohydrological Assessment

Local Geology

The site is located within a topographic basin, which opens to the south into Three Mile Canyon. Elevations within the site boundary range from 6180 to 6570 feet above sea level. The central portion of the property where the permitted cell is located is relatively flat. Surrounding the flat area to the west, north, and east are steep hillsides with slopes of 40 to 50 percent. The flat portion of the site is underlain by 10 to 20 feet of colluvial reddish-brown clays and silty clays. The steeper slopes are underlain by 5 to 10 feet of sandy silty clay. The bedrock underlying the site is the Preuss Sandstone formation, which locally consists of reddish-brown siltstone. The siltstone is moderately hard and closely to moderately fractured in the upper 10 to 15 feet, but becomes tighter with depth. The Rock Quality Designation (RQD), defined as the percentage of core per foot that is longer than 4 inches, averages about 50 percent for the siltstone to a depth of 100 feet. The in-situ permeability of the bedrock ranged from 1.9×10^{-5} to 9.7×10^{-7} cm/sec.

There are no active faults in the vicinity of the landfill. Two thrust faults have been mapped in the area, the first approximately one mile north of the site, running parallel to Kent canyon, and the second approximately 120 feet south of the site. These faults are thought to have occurred during the deposition of the Frontier Formation prior to 58 million years ago. There are no significant landslide or subsidence areas in the Three Mile Canyon area.

Hydrogeology

Groundwater occurs in two main aquifers at the site; a shallow perched water zone and a deeper aquifer. Perched water has been encountered at depths of 19 to 25 feet below the original ground surface as shown on Figure 6, Hydrogeologic Cross Section A-A. This water zone occurs in the upper sections of bedrock underlying the site and is derived principally from snowmelt and storm water runoff. The direction of flow of the perched aquifer follows the topography, flowing southeast into the colluvial soils of Three Mile Canyon, to the east toward Rockport Reservoir, as shown on Figure 5 Hydrogeologic Map.

The top of the deeper aquifer occurs from 36 to 65 feet below the original ground surface. Multiple layers of siltstone are encountered between the surface landfill operation and the deeper aquifer. The aquifer flows toward the Weber River Valley and associated alluvial deposits to the east. However, there is evidence that although the area groundwater gradients flow to Rockport Reservoir, the reservoir is locally recharging the groundwater system. The groundwater gradient across the site ranges

from 0.07 to 0.1 ft/ft. The principal sources of recharge are likely to occur by direct precipitation within the basin and from surface runoff from the surrounding slopes. Infiltration into exposed rock outcrops also convey to the aquifer.

Ground Water Quality

Groundwater at the site has been routinely analyzed since landfilling operations began. There are presently three wells that are monitored at the site, including two downgradient wells (MW-3 and MW-7) and one upgradient well (MW-9). Ground water monitoring has occurred since 1985. The analytical data from these groundwater monitoring events are on record at the UDSHW.

Surface Water

Three Mile Creek, located approximately 1000 feet south of the site, is an intermittent stream, which flows into Rockport Reservoir. The stream drains most of Three Mile Canyon and receives the runoff from the landfill. It is considered to be water quality limited by state standards. Diversion swales have been constructed around the landfill, which route the surface drainage through a catch basin. The principal reason for the catch basin is to remove errant litter from the flow prior to exiting the site.

Rockport Reservoir is located approximately one half mile to the east of the site. Total Dissolved Solids (TDS) concentrations within the reservoir, range from 100 to 300 mg/L.

Water Rights

A search of water rights on file with the Department of Natural Resources has been conducted for a radius of 2000 feet from the site. The nearest well on record is located 1250 south of the site, belonging to the Utelite Corporation. No other wells are within 2000 feet of the site.

Site Water Balance

The amount of water that will percolate through a landfill and eventually reach the water table is a function of the amount of water applied to the landfill cover, the evaporation at the site, the permeability characteristics of the landfill, and the soil profile. The HELP (Hydrologic Evaluation of Landfill Performance) model was used to

estimate the amount of precipitation that would percolate through the soil profile (Class I Municipal Solid Waste Landfill Application, 1997).

Landfill performance was modeled using conservative values of climatological data, soil profile characteristics and surface drainage. The following assumptions and data were used for input into the HELP model:

- HELP is used to model post-closure condition
- Precipitation and temperature records from Wanship Dam for the period 1955 to 1992
- Use evaporation values in database (Salt Lake City)
- Depth to water table is 50 feet
- Modeling period—30 years

The average annual precipitation for the period of record was 16.06 inches. Based on this precipitation, HELP calculates the water balance for the site, which includes; evapotranspiration, runoff, percolation, and change in water storage of the subsurface soils. Average annual values for 30 years for evapotranspiration were 14.39 inches with a runoff of 1.03 inches per year. Percolation through the vadose zone below the landfill was calculated to be 0.62 inches.

Ground Water Monitoring Program

Groundwater Monitoring Well System

Groundwater will be monitored during the active phase of the landfill, and during the post-closure period of 30 years. Three groundwater wells are presently being monitored at the site, including two downgradient wells (MW-3 and MW-7) and one upgradient well (MW-9). The most recent well (MW-9) was installed in 1994.

The upgradient well is located near the western edge of the landfill and is used to collect groundwater representative of background water quality. From the upgradient well, the hydraulic gradient generally follows the topographic contours to the east and southeast. The two downgradient wells are located hydraulically downgradient of the landfill and are considered points of compliance.

Groundwater at the site has been routinely analyzed since landfill operations began. The groundwater quality results for five of the monitor wells at the site have been submitted and on file at the UDSHW.

Sampling Procedures and Analysis

Sampling of the compliance wells and the background well are currently being performed on a quarterly basis. The most recent report is included as Appendix B. All analysis are performed in accordance to National Environmental Laboratory Accreditation Program protocols unless noted otherwise in individual reports.

Since May 2002, assessment monitoring has been performed on the monitor wells following the requirements outlined in UAC R315-308-2(11).

In addition, EPA laboratory test methods 624 and 625 for volatile and semi-volatile organic compounds are being tested once every three years. Analysis shall continue for these constituents according to this schedule throughout the 30 year post-closure period.

Groundwater Quality Protection Standards

The groundwater classification system established in the State of Utah Groundwater Quality Protection Regulations designated the groundwater as Class I Drinking Water Quality Groundwater, based on background total dissolved solids (TDS) less than 500 mg/l. The groundwater quality protection standard for all constituents in the compliance wells shall be the groundwater quality standards in Table 1 of UAC R317-6-2.

Groundwater monitoring started in 1985, and the current monitoring system consists of one well located topographically above the landfill to measure background groundwater concentrations and two wells located below the landfill to measure potential impacts to the groundwater from the landfill. There have been some fluctuations in the concentrations of various contaminants over the years, but all of the contaminants that are required to be monitored by the State of Utah are below the groundwater protection levels established by the State. Currently, wells are monitored on a quarterly basis.

Refer to Appendix B for the latest monitoring test results, and groundwater plan.

ENGINEERING REPORT

Location Standards

Land Use Compatibility

The Three Mile Canyon Landfill site meets the following location standards:

- It is not within 1,000 feet of any park, recreation area, or wilderness area.
- It is not within any wildlife management areas, or "prime" or "unique" farmland.
- It is not within one quarter mile of permanent dwellings, residential area, schools, churches, or historic structures.
- It is not within 10,000 feet of any airport runway.
- No archeological sites are nearby.

Geology (see Figure 2)

The facility is not located in an unstable area and no subsidence or landslides have been noted in the area. The stability of the embankment was modeled using PCSTABL5M. The computer program was developed at Purdue University to model the static and pseudo-static (earthquake) stability of slopes. The factor of safety against instability of the slope is calculated using the method of slices. There are several types of method of slices analysis available; the type used for this evaluation was the "Simplified Bishops Method", which is appropriate for circular shaped failure surfaces. Potential failure surfaces are generated from random locations across the critical area at the toe of the slope. A total of 800 trial failure surfaces are generated for each run. The program provides output for the ten surfaces with the lowest factor of safety. The program requires site-specific input data including:

- Soil profile
- Soil strengths
- Seismic data

The soil profile used for stability analysis was a cross section of the steepest area of the embankment, and including the future final slope of the waste placement. The final berm will have a slope of 3:1. The final design plans for the landfill requires that the slope of any subsequent berm construction be at a 3:1 slope. Refer to Appendix C.

Assumed soil strength values include a cohesion and friction angle. Based on information obtained from previous site investigations, the site soil has been determined to be a silty clay or clay soil. The strength values assumed for the soil used in the berm were obtained from typical values found in literature for re-compacted soils. Values of cohesion for a silty clay or clay range from 1,300 to 2,000 pounds per square foot (psf); a conservative cohesion of 1,500 was used. Friction angles range from 27 degrees to 34 degrees; a conservative value of 29 degrees was used.

The landfill is located in a seismic impact zone as defined in the Rules: the area has greater than a 10% chance of exceeding an acceleration of 0.1 g in 250 years. Seismic acceleration maps, and site specific fault information for Wanship dam, were used to

evaluate the potential earthquake induced acceleration at the site. A general acceleration map for the United States shows the acceleration at the site with a 10% chance exceedence in 250 years to be 0.50 g (Algermissen, 1982). A similar map developed specifically for the Wasatch Front shows an acceleration of approximately 0.03 g at the site (Youngs, 1987). The Safety Evaluation of Existing Dams (SEED) Reports for Wanship Dam (1990), located 2 miles from the landfill, rigorously identified all local faults and expected Maximum Credible Earthquake (MCE) for each fault. The acceleration from each fault was calculated based on the Fault's MCE, the distance from the landfill, and attenuation curves (Seed, 1969). The maximum acceleration of 0.30 g was used in the pseudo-static stability analysis of the embankment slope at the site.

Based on the assumed profile, soil strengths, and earthquake loading, the minimum factor of safety computed by PCSTABL5M for the static case was 3.1.

Surface Water

The site is not located within an existing floodplain.

SOLID WASTE MANAGEMENT PLAN

It is assumed for the basis of this permit application that the existing Three Mile Canyon landfill will receive waste for the next 10 years from all of Summit County. The population for the County is estimated to be 56,000 in the year 2018. Based on the population projection, an additional 667,520 tons of solid waste will be disposed at the site. The total area of the site is 23.6 acres.

The total remaining volume (air space) capacity of the landfill calculated in 2007 is approximately 731,640 cubic yards. At an average disposal rate of 135 tons per day, 1.3% population growth rate, and an average placed waste density of 1000 pounds per cubic yard, the volume of the landfill is expected to meet the estimated requirements of Summit County for a period of approximately 7+ years (2014).

CELL DESIGN AND DEVELOPMENT

The landfill currently has one cell, which will be used under the existing permit for disposal of municipal solid waste. An active working cell is the area within the permitted cell that is actively receiving waste during a day (which has not yet had daily cover placed). The future working face of the landfill will be constructed and maintained to a maximum of 3:1 horizontal to vertical slope.

The existing landfill cell design consists of compacted natural clay underlying the currently approved cell waste disposal area. As the landfill expands, future proposed waste cells will be constructed as approved by the Utah State Division of Solid and Hazardous Waste.

The waste will be unloaded at the base of the working face and will be spread over the working face by a track-mounted dozer or steel-wheeled compactor. All waste will be compacted prior to placement of daily cover (minimum 6 inches depth). The daily cover material will consist of soil from future cell expansion areas. Unloading of waste will be restricted to one area of the working face to limit the amount of waste exposed and requiring daily cover.

Once the cell is completed, a final cover will be constructed with a minimum 3% grade and the surface will be re-vegetated. The final cover will consist of 18 inches of compacted clay available from the existing stockpiles of native soil. A 6 inch thick topsoil layer will then be placed over the compacted clay layer. The topsoil also will be available from stockpiled materials.

The landfill will be operated with a minimum of three pieces of heavy equipment; a crawler-dozer, a front loader and a compactor. These units are currently being utilized by Summit County landfill personnel, and may be augmented as necessary with additional equipment from the Summit County Public Works Dept in the future, as necessary and needed.

The landfill facility has utility vehicles capable of moving around the site during inclement weather and powerful enough to pull small trailer-mounted equipment, which may be needed at the site.

DISCUSSION OF RUN-ON AND RUN-OFF CONTROL SYSTEMS

Run-on/run-off controls will be implemented prior to construction of the final cover to prevent run-on to and run-off from the active portion of the landfill. The active area of the landfill is considered to be any area with exposed waste, or any area that has previously received waste and is capped with daily cover only. Run-on/run-off controls will also be constructed as part of the final design to minimize potential erosion of the final cover and embankment. The proposed storm controls are designed to manage run-off from a 25 year, 24 hour storm.

Prior to construction of the final cover, all run-off from the active area will be retained and not allowed to flow off site. Run-off from areas of the landfill with intermediate cover will be routed through the existing detention basin prior to discharge to the existing channel. Currently, run-off from the interactive area of the cell is discharged

from the north side of the landfill near where the access road enters the site. The intermediate cover shall continue to be sloped toward the north as the waste lifts are placed until the final elevation of the final cover is reached.

Run-off from the final cover will be collected in the perimeter diversion swales located and routed to the existing drainage channel located southeast of the disposal cell. The final cover is designed to reduce run-off, promote evapotranspiration, and minimize percolation into the waste by providing a vegetated low-permeability final cover.

There does not appear to be any potential for dry-weather flow at the landfill site. Municipal waste disposed in the landfill will not produce any significant quantity of free liquids.

STORM Modeling

Storm water run-off calculations were performed to determine the run-off volume and maximum flow rates. The run-off was determined for the area immediately upgradient (west) of the landfill, the drainage basin located northwest of the landfill that flows into the existing drainage channel north of the landfill, and the active and post-closure conditions of the landfill. The computer program "STORM" was used. STORM uses the Soil Conservation Service method to determine run-off from the designated precipitation event. The precipitation for the 25 year, 24 hour storm event was estimated from NOAA Atlas 2 "Precipitation Frequency of Western United States" (1973) to be 2.5 inches.

The total area within the permit boundary is approximately 28 acres with a disturbed area of 23.6 acres and an undisturbed (no construction) area of 4 acres. The disturbed areas were assumed to be uncompacted native soil with no vegetation. Each area with a unique soil type, in the surrounding drainage basin, was modeled separately. Assumptions used in storm water run-off modeling are presented below as "STORM" Input Values.

"STORM" Input Values

PARAMETER	LANDFILL	DRAINAGE BASIN
Precipitation event	2.5"	2.5"
CN(2)-disturbed area	80(3)	NA (not applicable)
--undisturbed area	67	Varies (46 to 67)
Area	28 acres	200 acres
Time of Concentration	0.10hr(4)	Varies (0.1 to 0.36) hr

1. Area of drainage basin – area of the waste disposal area
2. From Viessman, "Introduction to Hydrology", 1989
3. Assumed value
4. Minimum time of concentration allowed in STORM

The maximum run-off discharge rates were determined in order to design storm water control structures that would safely pass the 25 year, 24 hour storm, without any adverse impacts to the landfill. STORM results are presented below as "STORM" Output.

"STORM" OUTPUT

AREA	MAXIMUM DISCHARGE	TOTAL Run-off VOLUME (acre ft)
Area west of landfill(1)	8.0	0.6
Entire drainage basin(2)	27	3.6
Landfill area	35	2.1
Total	70	6.3

- (1) The area west of the cell that flows in the existing diversion swale.
- (2) Basin that the landfill is located in minus the waste disposal area.

As shown above in the tables, the predicted maximum discharge rate from the smaller area landfill is equal to the discharge from the remainder of the drainage basin. This is due to the fact that a large percentage of the landfill has been stripped of vegetation, which increases run-off. Also, because of the relatively small area of the landfill the maximum discharge peaks at one time, while the flow from the entire basin is attenuated.

Currently, run-off from areas that have been disturbed pass through the existing detention pond. The detention pond slows the water down and allows sediment in the run-off to be deposited in the basin. Most is removed and is not discharged through the outlet of the detention basin.

Active-Phase Storm Water Controls

Currently, storm water run-off is managed through the existing control structures of diversion swales, culverts, detention pond, and construction of bermed waste sub cells. These controls are designed to divert, convey, and detain storm water in order to minimize contamination of the storm water. With the exception of the waste sub cells, all controls implemented will remain in place during the active phase and post-closure period.

Waste Cells

Waste sub cells are used to control run-on/run-off impacting the active areas within the disposal cell. These sub cells have been constructed and designed to totally contain run-off and to prevent run-on into the active waste placement area. Precipitation that falls on the exposed waste within the active sub cell will be retained by the earthen berms constructed around the sub cell, and are contained within the active area.

In order to minimize the amount of water that could potentially infiltrate into the waste, the waste sub cells are confined within an area of 1 acre or less. The rest of the landfill area has intermediate or final cover over the waste, and the run-off from these areas flow north where it is discharged into the natural drainage channel and subsequently routed through the detention pond. The use of waste sub cells allow for storm water that potentially comes into contact with the waste to be captured and contained.

Detention Basin

Water flowing in the drainage channel located along the north edge of the landfill is routed through the existing detention pond located at the southeast corner of the landfill. The drainage channel collects run-off from the drainage basin west and north of the landfill, and from inactive areas in the landfill itself. Run-off from inactive disturbed areas of the landfill is routed through the detention basin. The detention basin slows the water, allowing sediments to drop out of suspension.

The east embankment of the landfill forms one side of the detention pond, with the natural channel side slope forming the other side. The detention pond dam is located near the southeast corner of the landfill. A 24" diameter corrugated metal pipe (CMP) outlet placed near the top of the dam structure discharges into the natural channel below the dam. The capacity of the detention pond to the level of the outlet structure is 100,000 cubic feet. Small precipitation events are contained within the detention ponds with no discharge from the outlet. This detains the run-off from a 25 year, 24 hour storm for a minimum of 25 minutes before discharging any storm water. This detention time is sufficient for the majority of the suspended solids to settle out of the run-off.

Culverts

The access road constructed by Summit County in the spring of 1996 has had culverts installed under the road. The installed culverts pass flow from the small dry washes north of the landfill and drain into the existing drainage swale located along the north edge of the landfill. Other culverts are installed under the existing road to transport run-off under the roadway. The CMP culverts range in diameter from 18 inches to 36 inches.

Post-Closure Storm Water Controls

The Post-closure storm water controls are designed to prevent adverse impacts to the final cover or embankment during the post-closure period.

Upgradient Diversion Swale

Surface run-on from upgradient (west) of the site is currently controlled by an existing diversion swale that is located approximately 100 feet west up slope of the permit area. This diversion swale is a relatively flat area that has been graded into the side of the mountain and slopes slightly into the hillside. The hill above the landfill is covered with sagebrush, and sheet flow from the hill is captured along the length of the diversion swale. The run-on is diverted around the landfill with approximately half of the potential run-on flowing south where it is currently discharged to the ground surface south of the landfill, eventually flowing to Three Mile Canyon Creek (see figure 6).

Perimeter Drainage Swales

Run-off from the final cover is collected in drainage swales located around the perimeter of the landfill (see figure 6). The swales are built with a maximum side slope of 2:1 and minimum depth of 1.5 feet. The drainage swales are excavated in native soil. Riprap covers the surface of the drainage swales in areas where the slope is greater than 5%.

Erosion Potential

In order to evaluate the long term performance of the landfill cover in terms of durability and integrity, the potential for erosion from the cap was calculated for both water and wind erosion. The reference used for these calculations is "Erosion Control during Highway Construction—Manual on Principals and Practices", National Cooperative Highway Research Program Report No. 221, Transportation Research Board.

Based on calculations using the Universal Soil Loss Equation, the potential erosion due to water is 1.5 tons/acre/year, resulting in approximately 0.0006 feet per year removed from the final cover. Wind erosion calculations indicate the potential of 0.68 tons/acre/year, resulting in approximately 0.00028 feet per year removed from the final cover. These calculations indicate that the vegetative layer will effectively protect the landfill cover from long term erosion over the length of the post-closure period.

CLOSURE AND POST CLOSURE DESIGN AND MAINTENANCE

The closure of the landfill operations at the Three Mile Canyon Landfill will minimize the need for further maintenance; minimize the threats to human health and the environment from post closure escape of solid waste constituents, leachate, landfill gases, contaminated run-off or waste decomposition products to the groundwater, surface water or the atmosphere; and prepare the facility or unit for the post closure period.

To minimize maintenance and minimize threats to human health or the environment, a design plan for final cover and grading has been prepared (see figure 3). The landfill will be covered with a final design cover which will consist of an 18 inch compacted silty clay layer and a final 6 inch topsoil cover.

Material testing was performed on samples of the silty clay material at the site, which is used for the bottom liner and cover of the landfill. The following tests were performed on the representative sample:

- Washed sieve
- Hydrometer
- Atterberg Limits
- Standard Proctor test (ASTM D698)
- Permeability

Based on the results of the Proctor test, two samples were remolded for permeability tests. A sample representing the bottom liner of the landfill was compacted to approximately 91% of the maximum dry density of the material (the target density of the sample was 90% of the maximum dry density), at a moisture content of 2.7% below optimum. A sample representing the cover liner of the landfill was compacted to 95% of the maximum dry density, at a moisture content of 2% to 3% above optimum.

As indicated by the test results, the bottom liner is expect to have a permeability of approximately 3.8×10^{-7} cm/sec, while the cover is expected to have a permeability of 1.3×10^{-7} cm/sec. Because of the slightly higher compaction of the sample representing the bottom liner, the permeability of the sample is actually lower than expected. The relationship between the top and bottom liners of the landfill, as indicated by the test results, will fulfill the requirements of UAC R315-303-4(4).

The north, south, and east facing slopes of the berm are considered to be the final cover for these respective sides of the landfill cell. Based on approximate measurements obtained from Plate 1 of the 1987 Dame & Moore report, it appears that the width of the berm at its base is about 70 feet. The top of the berm is approximately 15 feet wide, and it is estimated that midway up the berm the width is approximately 40 feet.

Samples of the berm were collected in November and December 1996 and permeability tests were performed by Bingham Engineering's soils laboratory. A standard Proctor test was performed on the material and the results indicated a maximum dry density of 108.5 pounds per cubic foot (pcf) and an optimum moisture content of 18%. Three samples were then compacted to 87, 90, and 100 percent of the maximum dry density, respectively, then tested within a falling head permeameter. The results are summarized in the following table.

PERMEABILITY VALUE FOR THE BERM SOILS

Relation to Standard Proctor Permeability	Compaction Density	Moisture Content	
100% Maximum Dry Density cm/sec	108.5 pcf	23.5%	2.7×10^{-6}
90% Maximum Dry Density cm/sec	97.7 pcf	21.0%	7.0×10^{-6}
87% Maximum Dry Density cm/sec	91.8 pcf	18.9%	4.7×10^{-5}

Based on the original plans the berm material was to be compacted to a minimum of 90% pcf of the maximum dry density. These recent test results could then suggest permeability less than 7.0×10^{-6} cm/sec.

A computer program solving the modified Berggren solution was used to predict the frost penetration of the final cover. Four modeling runs were conducted, using two separate soil types with and without snow cover. The first two model runs used data from the berm material, and the second two used the natural soil, which will be compacted for the cover. The input parameters and the associated results are summarized in the following table:

PREDICTED FROST PENETRATION OF THE COVER

Layer Thickness Penetration	Moisture Content	Dry Density	Frost
24 inches (no snow)	24%	93 pcf	26.5 inches
24 inches (6" snow)	24%	93 pcf	2.5 inches
24 inches (no snow)	15%	110 pcf	31 inches
24 inches (6" snow)	15%	110 pcf	3.1 inches

As indicated in the table, if no snow cover is assumed, frost penetration could reach a depth of 2.5 feet; however, it is reasonable to assume at least 6 inches of snow cover during the coldest part of the winter season. A 6 inch snow cover provides an insulating layer that keeps frost from penetrating through the cover and compromising the permeability of the final cover.

Deep rooted vegetation will be discouraged through substitution of shallow rooted vegetation. The seed mixture specified in the Application consists of grasses and forbs having relatively shallow root systems. Root penetration into the cover is not expected to be deep enough to compromise the permeability of the cover based on the specified seed mixture.

The compacted silty clay layer will have a maximum field permeability of 5×10^{-7} cm/sec. The topsoil will be re-vegetated as soon as practicable after the completion of the final cover with the following seed mixture (or equivalent) specified by the Department of Transportation for local area right-of-ways:

Smooth brome	8 lbs PLS/acre
Fairway wheatgrass	8 lbs PLS/acre
Slender wheatgrass	4 lbs PLS/acre
Sheeps fescue	4 lbs PLS/acre
Sodar wheatgrass	4 lbs PLS/acre
Spreader II alfalfa	4 lbs PLS/acre
Wood fiber hydromulch	2000 lbs/acre
Tackifier	500 lbs/acre

The waste disposal cell is expected to experience some settlement. However, the closure plan is designed to maintain a positive drainage off the trench area throughout the closure period. The majority of settlement will take place during and prior to final grading and cover placement. The final grades will be constructed to a minimum 3% slope on the top of the cell. All run-off will be directed off and around the disposal cells. The entire site will be constructed with a perimeter drainage system, which will minimize any run-off from the adjacent hillsides from contacting the waste cells.

During the post closure period the cover shall be inspected bi-annually. Maintenance of slopes, drainage channels and covers will be performed as required.

FINANCIAL ASSURANCE

Summit County has chosen to demonstrate financial assurance for the closure and post-closure requirements using the "Local Government Financial Test." Summit County has placed a reference to the closure and post closure care cost assured through the financial test into their Year Ended December 31, 2009 Comprehensive Annual Financial Report and will do so in every subsequent annual report until post-closure has been completed. The County will submit the required financial documentation to the Executive Secretary of the Solid and Hazardous Waste Board at the close of each fiscal year to demonstrate financial assurance. Financial Assurance is also demonstrated by the December 7, 2010 letter following this page.

An estimate for the closure and the post-closure maintenance and monitoring of the Three Mile Canyon landfill has been prepared, and is summarized on Page 14. The estimate is based on the total area for final closure of 24 acres for placement of clay, topsoil, and re-vegetation.

ADMINISTRATIVE REQUIREMENTS

A. Permit Modification

Any requested modifications to this permit will be made by application to the DEQ, and/or as approved by the Executive Secretary.

B. Permit Transfer

This permit may be transferred to a new permittee or new permittees by meeting the requirements of the permit transfer provisions of UAC R315-310-11.

C. Expansion

This permit application is for a Class I Landfill. The permitted landfill must operate according to the design and Operation Plan described and explained within this permit application. Any expansion of the current footprint designated in the description contained in this permit application, but within the property boundaries designated herein, will require submittal of plans and specifications to the Executive Secretary. The plans and specifications must be approved by the Executive Secretary prior to construction.

Any expansion of the landfill facility beyond the property boundaries designated in the description contained in the application will require submittal of a new permit application in accordance with the requirements of UAC R315-310.

Summit (County of) UT

Moody's Org ID: 600007815 6 Digit Cusip: 86605F, 86605P, 86605R, 86606H, 866900

Seniormost Tax Backed Rating Aa1 Outlook No Outlook	Market Segment: U.S. Public Finance Sector: COUNTY State: Utah
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Research	Ratings	Related Organizations
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Sale Data

Sale Description	Security Type	Sale Date
General Obligation Public Safety Refunding Bonds, Series 2009	General Obligation	18 Feb 2009
Sales Tax Revenue Bonds (Recreational and Cultural Sales Tax Pledge) Series 2003	Sales and Use Tax	03 Mar 2003
Lease Rental Revenue Bonds, Series 2000	Lease Rental	17 Apr 2000
Lease Revenue Bonds, Series 1999	Lease Rental	08 Nov 1999
General Obligation Public Safety Refunding Bonds, Series 1998	General Obligation	09 Dec 1998

Sale-level Detail: General Obligation Public Safety Refunding Bonds, Series 2009

Sale ID 821504516 Security General Obligation Primary Purpose COUNTY Support Sale Type PF BOND	Issuer Summit (County of) UT Obligor Summit (County of) UT Analyst Matthew A. Jones Releasing Office New York - (Moody's In Endorsement EU Endorsed
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Rating Detail Sale-Level History

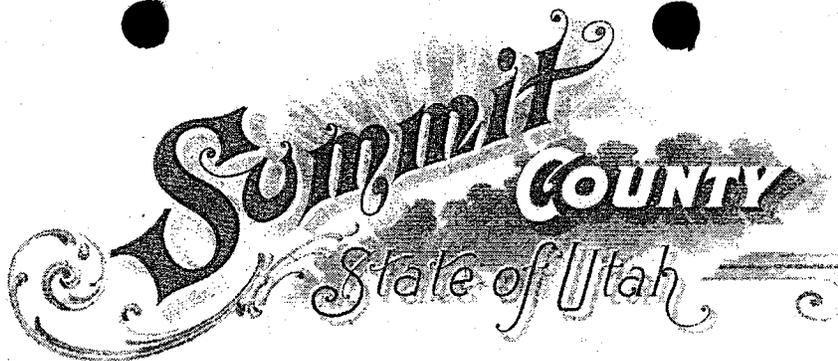
Rating Type	Rating	Rating Action	Rating Date	
Underlying	Aa1	Change in Scale	01 May 2010	Not on Watch

Maturity Detail

<input checked="" type="checkbox"/> CUSIP	Maturity Date	Rating Type	Rating	Rating Date	Watch Status
<input checked="" type="checkbox"/> 866900CE1	15 Dec 2009				
<input checked="" type="checkbox"/> 866900CF8	15 Dec 2010				
<input checked="" type="checkbox"/> 866900CM3	15 Dec 2011				
<input checked="" type="checkbox"/> 866900CG6	15 Dec 2011				
<input type="checkbox"/> 866900CH4	15 Dec 2012	Underlying	Aa1	01 May 2010	Not on Watch
		Enhanced			
		Insured			
<input type="checkbox"/> 866900CN1	15 Dec 2013	Underlying	Aa1	01 May 2010	Not on Watch
		Enhanced			
		Insured			
<input type="checkbox"/> 866900CJ0	15 Dec 2013	Underlying	Aa1	01 May 2010	Not on Watch
		Enhanced			
		Insured			

Auditor

Blake Frazier



Division of
Solid and Hazardous Waste

MAY 03 2012

Scott T. Anderson, Director

Division of Solid and Hazardous Waste

P.O. Box 144880

Salt Lake City, Utah 84114-4880

May 1, 2012

Dear Mr. Anderson

The last official bond rating Summit County received was from Standard & Poor's on April 29, 2010. This rating is reviewed on a yearly basis by Standard & Poor's and has not changed. The rating received at that time was a "AA-" with a stable outlook.

Summit County does not have any environmental obligations other than the Three Mile Canyon and Henefer landfills' closure and post-closure costs.

Sincerely,

A handwritten signature in cursive script that reads "Blake L. Frazier".

Blake L. Frazier

Auditor

Summit County



December 7, 2010

Utah Division of Solid and Hazardous Waste
 288 No. 1460 West
 Salt Lake City, Utah 84114-4880

Re: Financial Assurance Plan, Three Mile Canyon and Henefer Landfills

To Whom It May Concern:

This letter and Attachment are provided to establish financial assurance sufficient to assure adequate closure and post-closure care of Three Mile Canyon Class I landfill and Henefer Class IV Landfill as required under Utah Administrative Code (UAC) R315-309. Total Closure costs have been estimated at \$1,096,288 (\$916,328 and \$179,960 for the Three Mile Canyon and Henefer Landfills respectively) by Bingham Environmental, Inc. (Bingham) in accordance with UACR315-309-2(3) and are attached to this letter. Summit County intends to establish financial assurance using the Local Government Financial Test as provided by UACR315-309-3(7) and as demonstrated as follows:

UACR315-309-3(7)(b)(i)

Summit County currently has unsecured outstanding general obligation bonds and has been issued a rating of Aa2 by Moody's on those bonds.

UACR315-309-3(7)(b)(iii)

Summit County's financial statements are audited by Ulrich & Associates an independent certified public accounting firm, and are prepared in conformity with Generally Accepted Accounting Principals for governments.

UACR315-309-3(7)(b)(iv)

Summit county has prepared the 2009 fiscal year comprehensive annual financial report which includes a reference to the closure and post-closure care costs assured through the financial test including; a) the nature and source of the closure and post-closure care requirements, b) the reported liability at the balance sheet date, c) the estimated total closure and post-closure care costs remaining to be recognized, d) the percentage of landfill capacity used to date, and e) the estimated landfill life in years.

UACR315-309-3(7)(d)(i)

The costs of closure and post-closure care of the Three Mile Canyon and Henefer Landfills are the only current costs that Summit County is assuring by a financial test. I certify that Summit county currently exceeds the requirements of Subsections UACR315-309-3(7)(b) and (f) for closure care costs of the Three Mile Canyon and Henefer Landfills. Summit County's total operating revenue for 2009 was \$48,718,382 allowing the assurance of up to \$20,948,904 (43%) under the Local Government Financial Test.

UACR315-309-3(7)(d)(ii)

Summit county's independently audited financial statements prepared by Ulrich & Associates, for the 2009 fiscal year are attached to this letter.

UACR315-309-3(7)(d)(iii)

A report to Summit County from a independent certified public accountant stating the procedures performed and the findings relative to the requirements of Subsections UACR315-309-3(7)(b)(iii) and UACR315-309-3(7)(c)(iii) and (iv) in the audit.

UACR315-309-3(7)(d)(iv)

A copy of the 2009 fiscal year comprehensive annual financial report which includes a reference to the closure and post-closure care costs assured through the financial test is provided to the DSHW as part of the 2009 annual report.

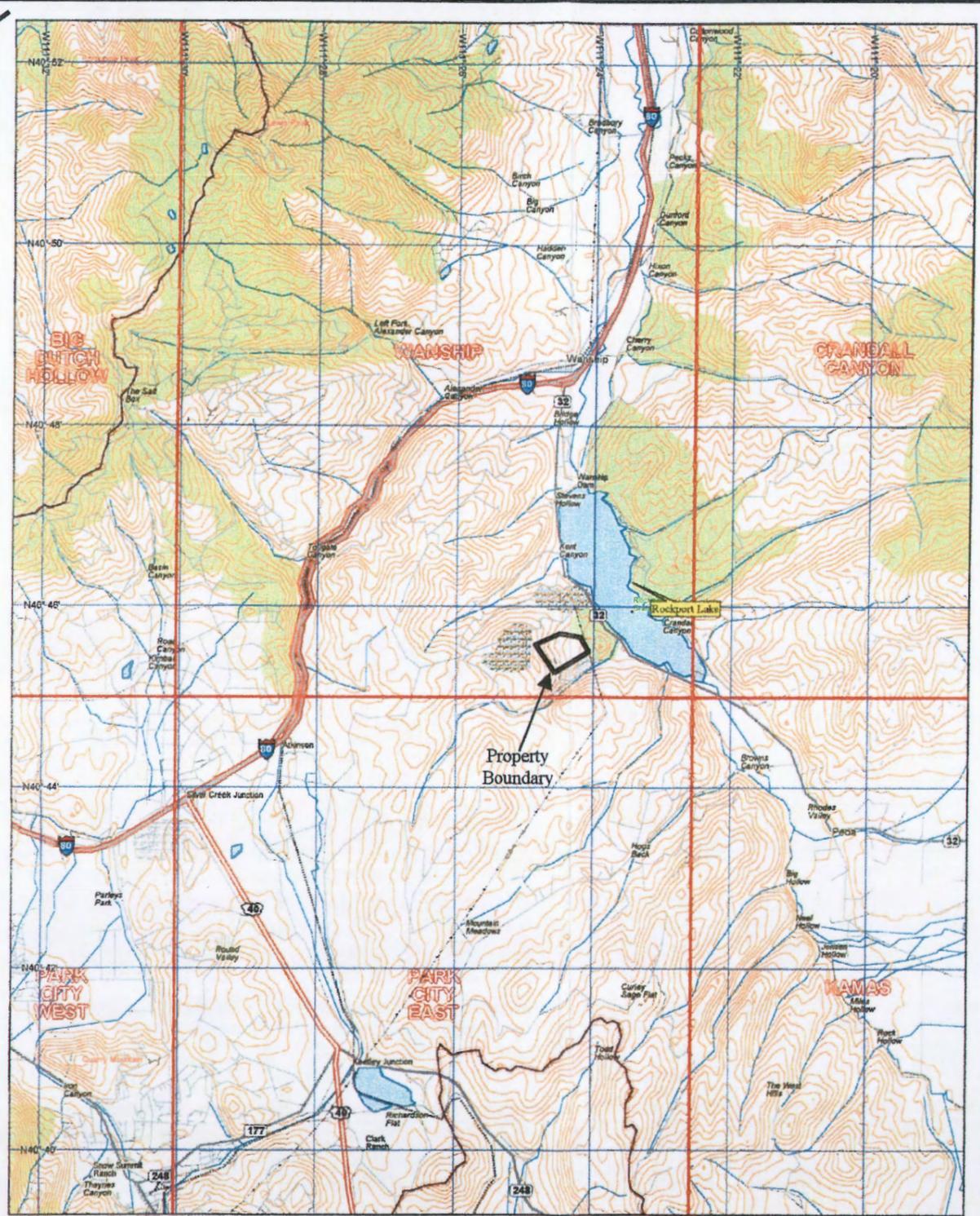
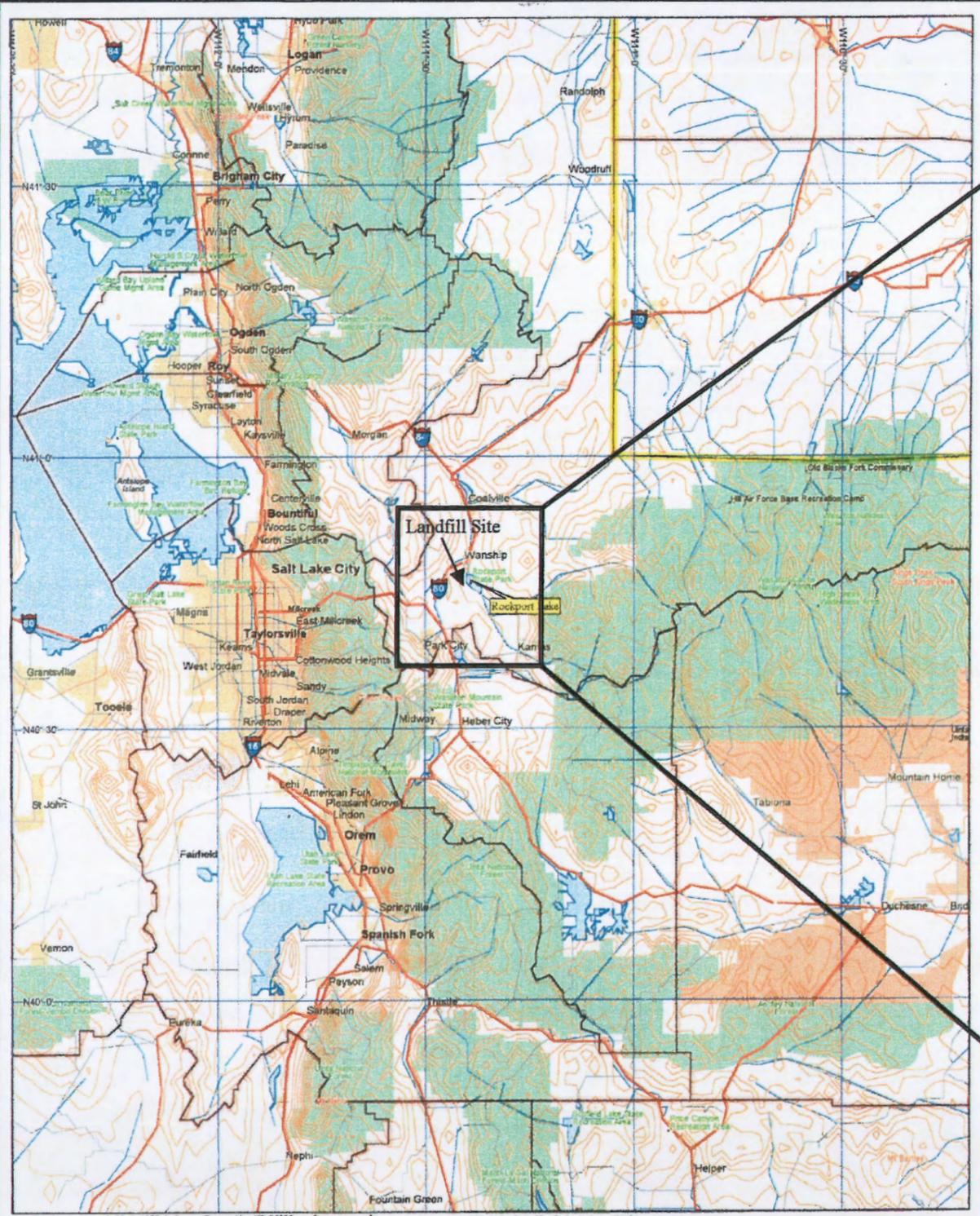
Thank you for your attention to this matter. Please do not hesitate to contact me if you have any questions or require additional information.

Sincerely,



Blake L. Frazier
Auditor

FIGURES 1 THROUGH 6



3-D TopoQuads Copyright © 1999 Delorme Yarmouth, ME 04094
 Scale: 1 : 1,000,000 Detail: 1-6 Datum: NAD83

3-D TopoQuads Copyright © 1999 Delorme Yarmouth, ME 04094
 4000 ft Scale: 1 : 100,000 Detail: 11-0 Datum: NAD83

LOCATION MAP
THREE MILE CANYON CLASS I LANDFILL

PROJECT NO: 71.25561.3401

SOURCE: Delorme 3-D TopoQuads, 1999 Edition

FIGURE 1

ATC Associates Inc.
 2681 Parleys Way, Suite 106
 Salt Lake City, Utah 84109
 (801) 412-0003

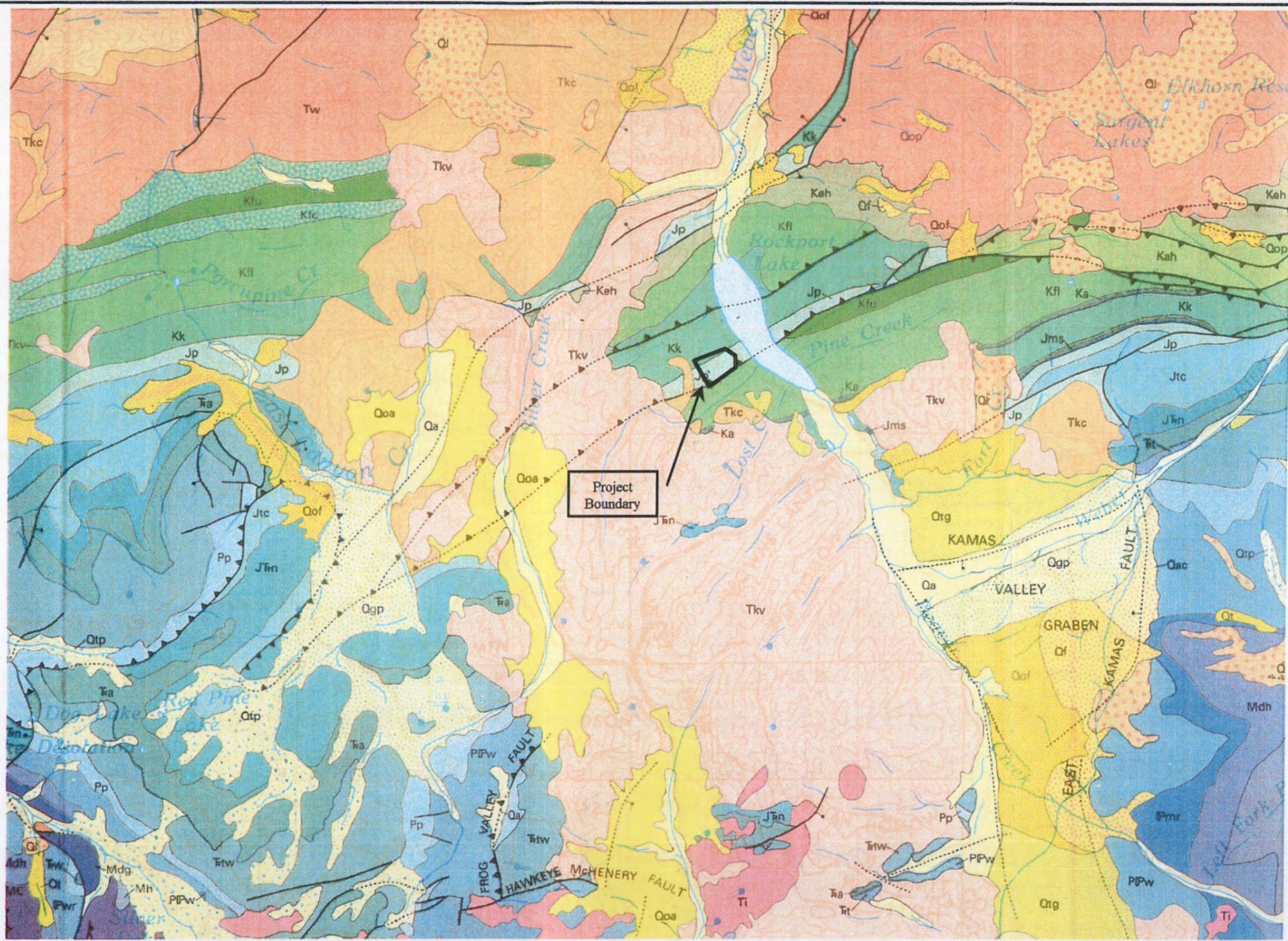
ATC
 ASSOCIATES INC

FIGURE 1

1

2

- Qac Alluvium and colluvium (Holocene)
- Qr Talus and colluvium (Holocene)
- Qa Alluvium (Holocene)
- Ql Landslide deposits (Holocene and Pleistocene)
- Qf Alluvial and debris-fan deposits (Holocene and Pleistocene)
- Qoa Old alluvium (Pleistocene)
- Qop Older pediment deposits (Pleistocene)
- Qof Older alluvial-fan and debris-fan deposits (Pleistocene)
- Qgp Outwash deposits of Pinedale age (Pleistocene)
- QTg Gravel (Pleistocene or Pliocene)
- Tkv Keetley Volcanics (Oligocene and Eocene?)
- Tkc Conglomerate (Oligocene and Eocene)
- Tn Norwood Tuff (Oligocene and Eocene)
- Tw Wasatch Formation (Eocene and Paleocene)
- Keh Hams Fork Member of Evanston Formation (Upper Cretaceous)
- Kah Adaville and Hilliard Formations (Upper Cretaceous)
- Kh Henefer Formation (Upper Cretaceous)
- Kfu Upper Member Frontier Formation (Upper Cretaceous)
- Kfl Lower Member Frontier Formation (Upper Cretaceous)
- Kfc Conglomerate Facies Frontier Formation (Upper Cretaceous)
- Ka Aspen Shale (Lower Cretaceous)
- Kk Kelvin Formation (Lower Cretaceous)
- Jms Morrison and Stump Formations (Jurassic)
- Jp Preuss Formation (Middle Jurassic)
- Jtc Twin Creek Limestone (Middle Jurassic)
- Jfn Nugget Sandstone (Jurassic? And Triassic?)
- Tfa Ankareh Formation (Upper and Lower Triassic)
- Tt Thaynes Limestone (Lower Triassic)
- Pp Park City Formation and related rocks (Permian)



GEOLOGIC MAP OF SITE VICINITY
THREE MILE CANYON CLASS I LANDFILL

PROJECT NO: 71.25561.3401

SOURCE: Geologic and Structure Maps of the Salt Lake City Quadrangle, Utah and Wyoming United States Geological Survey Map I-1997, dated 1992

FIGURE 2

ATC Associates Inc.
2681 Parleys Way, Suite 106
Salt Lake City, Utah 84109
(801) 412-0003



FIGURE 2



0 200 400

Feet
1 inch equals 200 feet

Legend

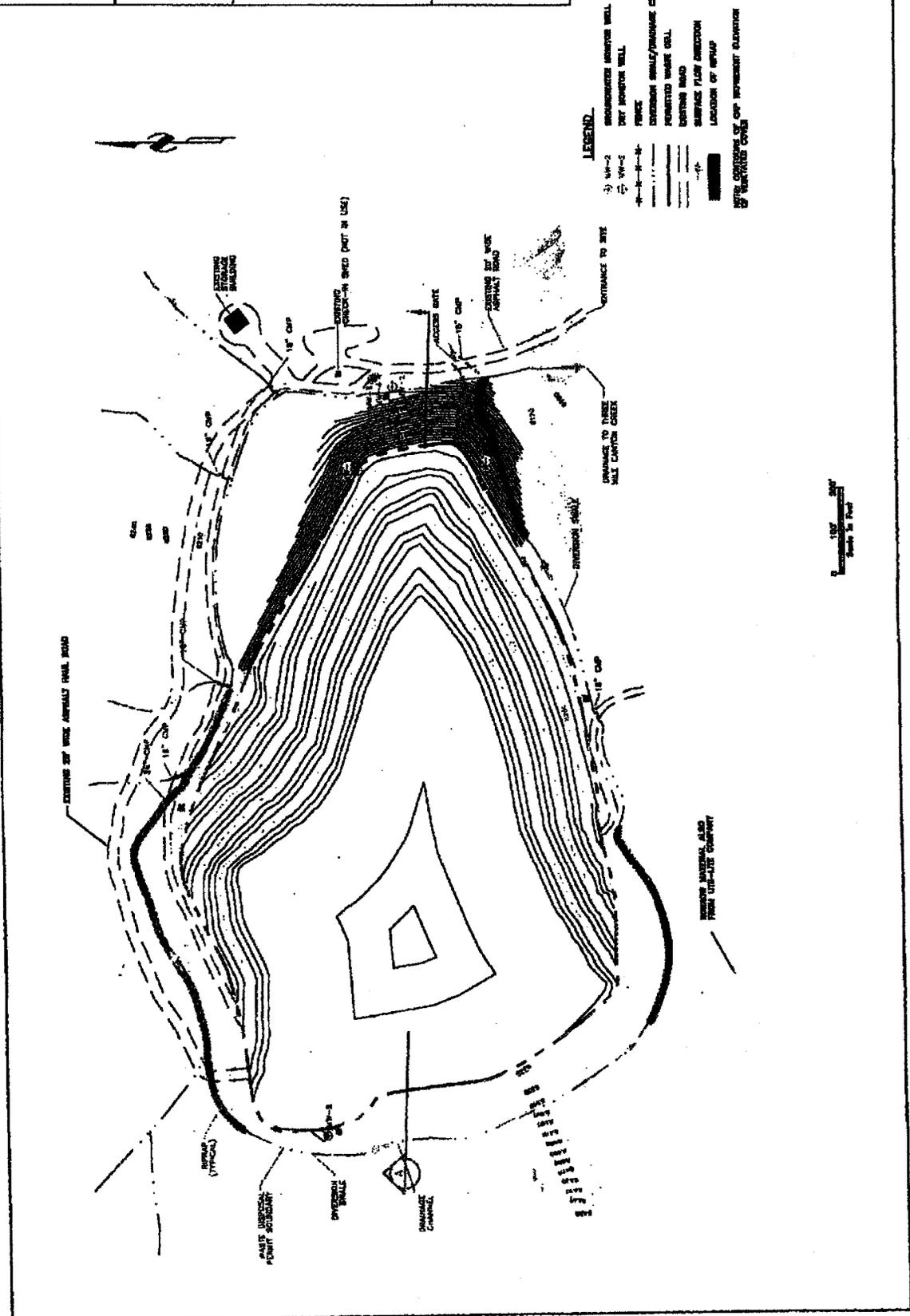
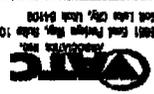
- EXISTING CONTOURS
- PROPOSED FINAL COVER CONTOURS

NOTE: AERIAL SOURCE IS ESRI IMAGERY WORLD 2D DATASET, AUGUST 2004.

EXHIBIT
**THREE MILE LANDFILL EXISTING CONTOURS
AND PROPOSED FINAL COVER CONTOURS**
SUMMIT COUNTY INTEGRATED SOLID WASTE
MANAGEMENT MASTER PLAN
SUMMIT COUNTY, UTAH

FIGURE 3

DATE PREPARED: 07-26-03
 DRAWN BY: [Name]
 CHECKED BY: [Name]
 PROJECT NO.: 21-000-0001
 SHEET NO.: 108
 SHEET TITLE: FINAL COVER GRADING PLAN
 PROJECT TITLE: [Project Name]
 CLIENT: [Client Name]

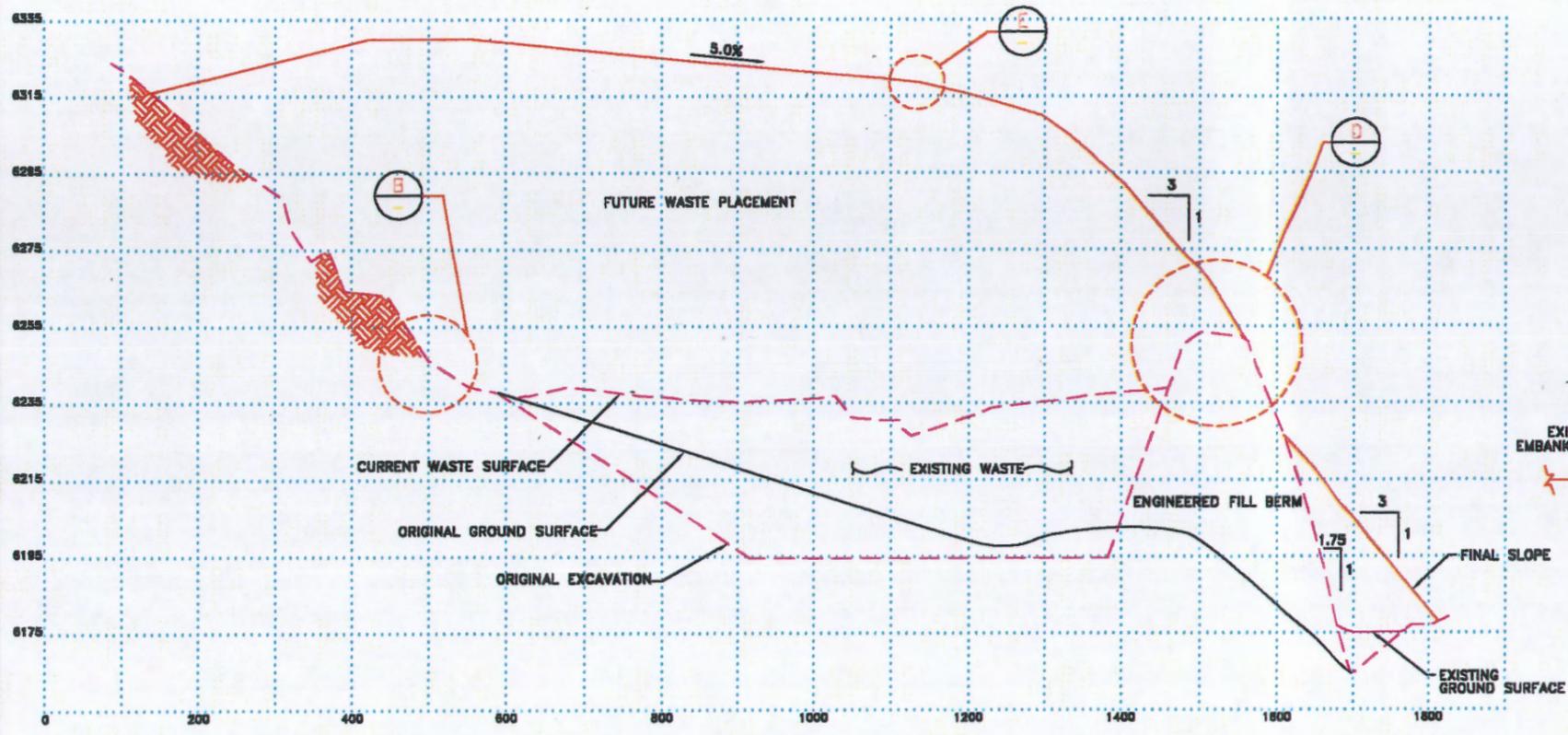


- LEGEND**
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 - 2) 18"-0" 18" CIP
 - 3) 18"-0" 18" CIP
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 - 5) 18"-0" 18" CIP
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 - 99) 18"-0" 18" CIP
 - 100) 18"-0" 18" CIP

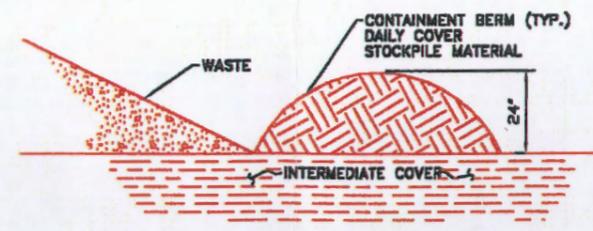
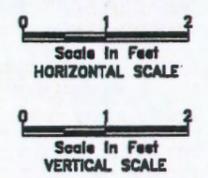
SCALE: 1" = 10'

EXISTING MATERIALS ALSO FROM USABLE COMPANY

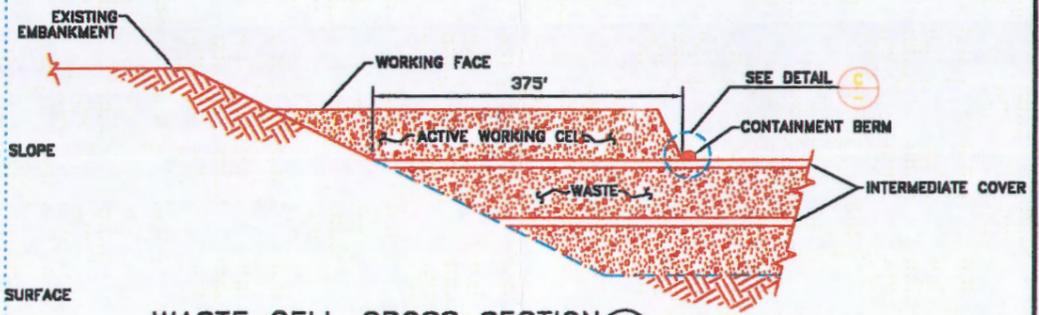
4



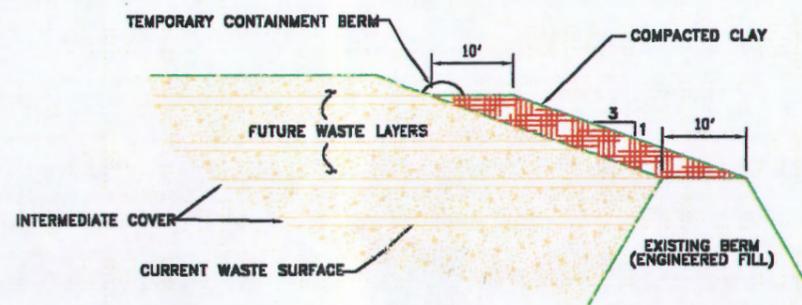
CROSS SECTION A
N.T.S.



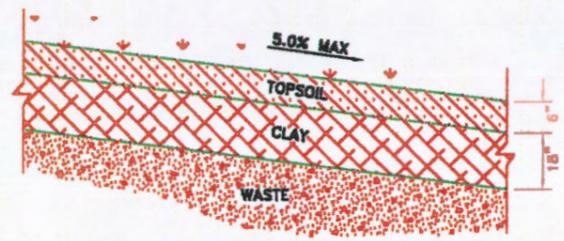
ACTIVE WORKING CELL SURFACE DRAINAGE CONTAINMENT DETAIL C
(TYP.)
N.T.S.



WASTE CELL CROSS SECTION B
(TYP.)
N.T.S.



D
N.T.S.



COVER DETAIL E
N.T.S.

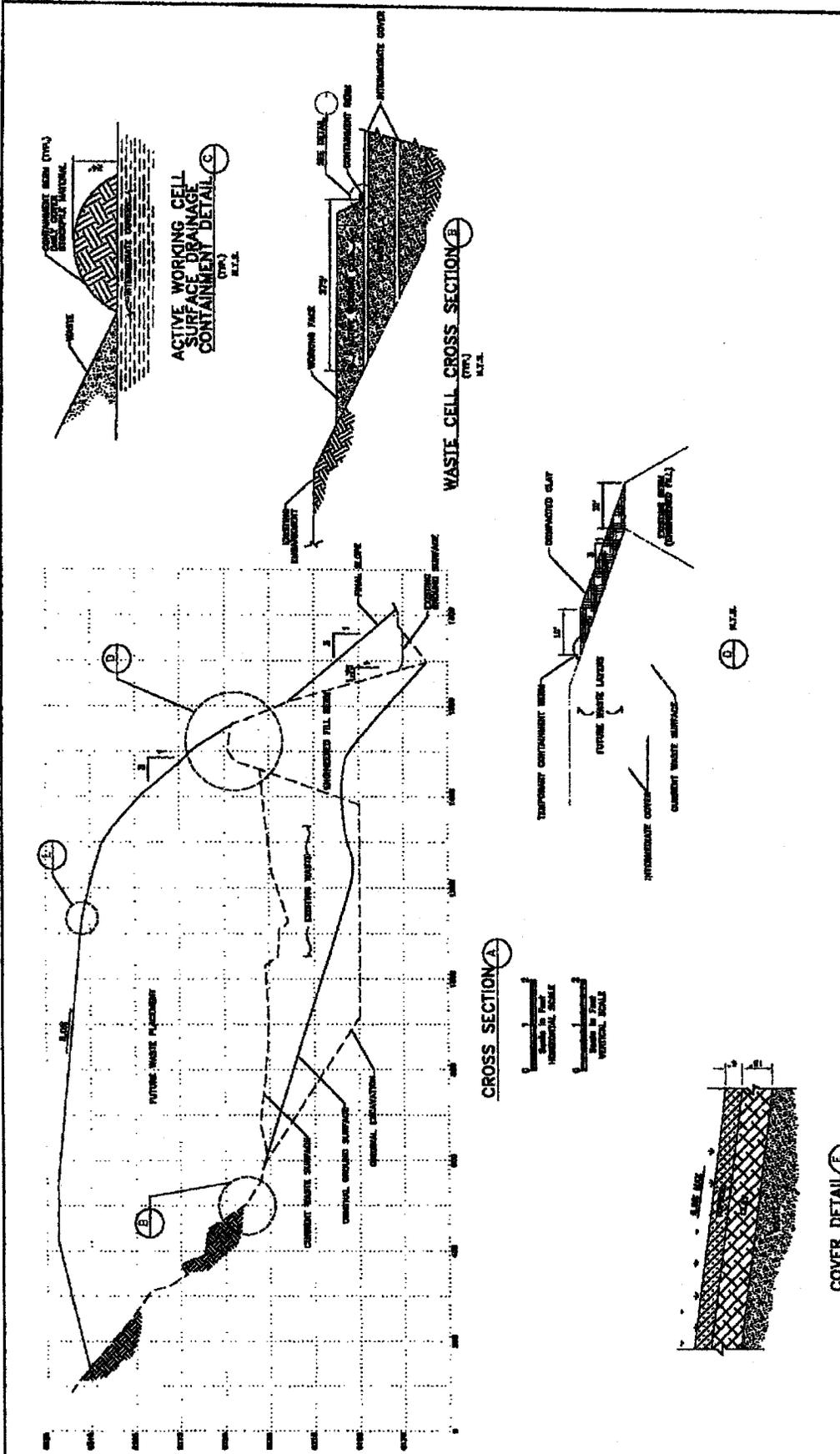
ATC
ASSOCIATES INC.
2681 East Parleys Way, Suite 106
Salt Lake City, Utah 84109

CROSS SECTION AND DETAILS
THREE MILE CANYON LANDFILL
SUMMIT COUNTY, UTAH

DRAWN BY: BIX
PREPARED BY: DH
REVIEWED BY: DH
PROJ NO: 71.2556.3401
DATE PREPARED: 07-28-03

FIGURE 4

FIGURE 4



<p>VATC VENTNOR ASSOCIATES, INC. 2001 East Parkway Way, Suite 100 Salt Lake City, Utah 84103</p>	CROSS SECTION AND DETAILS THREE MILE CANYON LANDFILL SUMMIT COUNTY, UTAH		FIGURE 4
	DESIGNED BY: DR	PREPARED BY: DR	
	REVISIONS BY: DR		
	PROJECT NO. 71.000A.001	DATE PREPARED: 07-28-03	

5

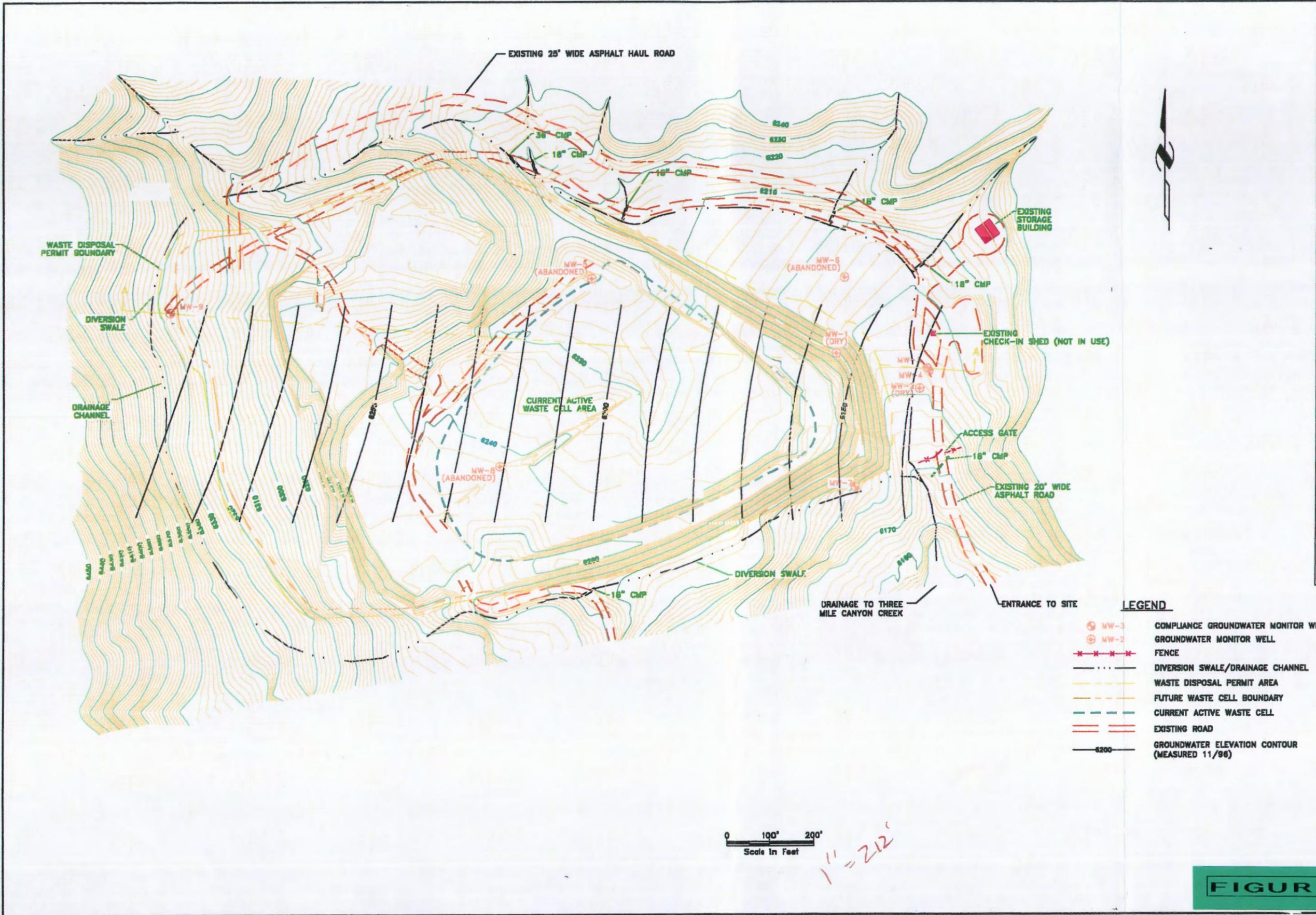


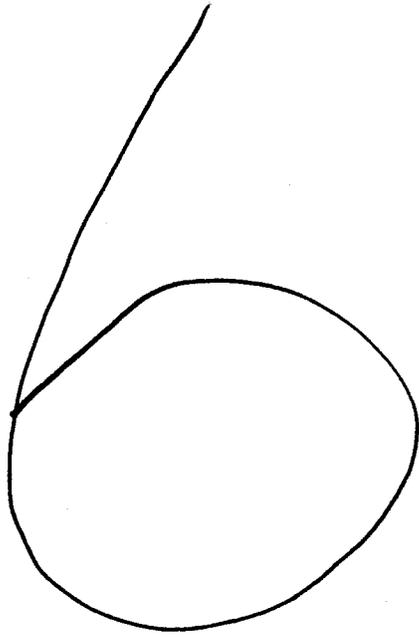
FIGURE 5

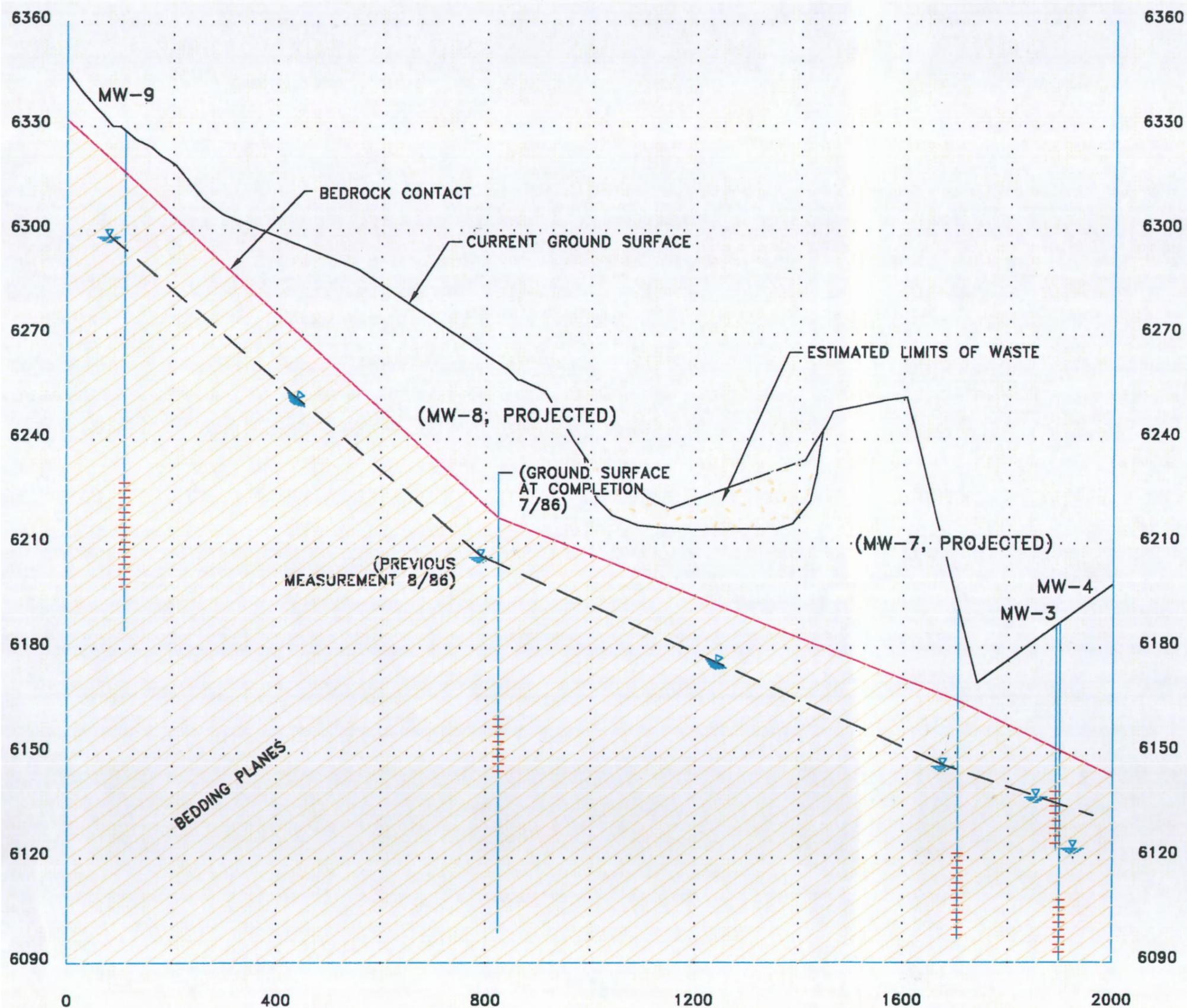
DRAWN BY: BIK
 PREPARED BY: DH
 REVIEWED BY: DH
 PROJ. NO: 71.2556.3401
 DATE PREPARED: 07-28-03

HYDROGEOLOGIC MAP
 THREE MILE CANYON LANDFILL
 SUMMIT COUNTY, UTAH

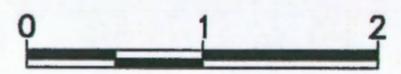
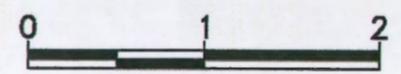
ATC
 ASSOCIATES INC.
 2681 East Parleys Way, Suite 106
 Salt Lake City, Utah 84109

FIGURE 5





 GROUNDWATER ELEVATIONS MEASURED 11/96
 SCREENED INTERVAL
 PROJECTED GROUNDWATER SURFACE



FIGURE

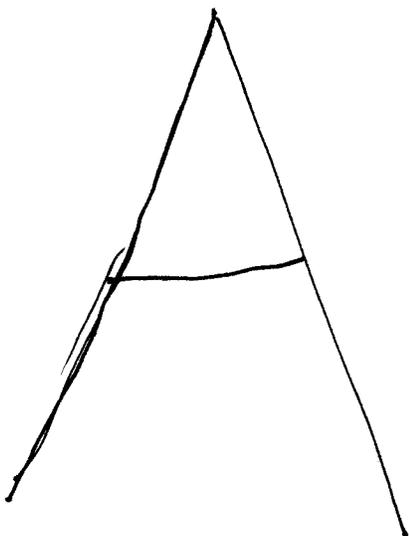
DRAWN BY: BIK
PREPARED BY: DH
REVIEWED BY: DH
PROJ. NO: 71-2556.3401
DATE PREPARED: 07-28-03

CROSS SECTION A-A'
THREE MILE CANYON LANDFILL
SUMMIT COUNTY, UTAH



ATC ASSOCIATES INC.
2681 East Parleys Way, Suite 106
Salt Lake City, Utah 84109

FIGURE 6



PROOF OF OWNERSHIP

APPENDIX A

WHEN RECORDED, MAIL TO:

Grantee
S-9449

REQUEST OF Summit County
FEE ALAN OFFICER, DEPT. CO. RECORDER
S. A.C.
RECORDED 3-19-86 at 11:50 A.M.
Space Above for Recorder's Use

Warranty Deed

(Corporate Form),
UTELITE CORPORATION, a Utah Corporation

organized and existing under the laws of the State of Utah, with its principal office at
, of County of

~~XXXXXX~~
State of Utah,

grantor, hereby conveys and warrants to

SUMMIT COUNTY

of
TEN AND NO/100

Grantee,
for the sum of
DOLLARS,
County,

the following described tract of land in (and other good and valuable consideration)
State of Utah: Summit

See Exhibit "A" attached hereto and by reference made a part hereof.

SUBJECT TO current general taxes, easements, restrictions, and rights
of way of record or visible upon inspection.

BOOK 377 PAGE 10-12

The officers who sign this deed hereby certify that this deed and the transfer represented thereby was duly authorized under a resolution duly adopted by the board of directors of the grantor at a lawful meeting duly held and attended by a quorum.

In witness whereof, the grantor has caused its corporate name and seal to be hereunto affixed by its duly authorized officers this 19 day of March

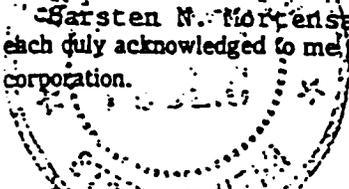
A.D., 19 86.
UTELITE CORPORATION, a Utah
Corporation
By [Signature] Company
Vice President.

Attest:

(Corporate Seal) Secretary.

STATE OF UTAH
COUNTY OF } ss.

On the day of March 1986, A.D., personally appeared before me
Carsten N. Mortensen and Carsten N. Mortensen
who being by me duly sworn, did say, each for himself, that he, the said Carsten N. Mortensen
is the president, and he, the said is the secretary
of Utelite Corporation, A Utah Corporation Company, and that the within and foregoing
instrument was signed in behalf of said corporation by authority of a resolution of its board of directors, and said
Carsten N. Mortensen and
each duly acknowledged to me that said corporation executed the same and that the seal affixed is the seal of the said
corporation.



[Signature]
Notary Public

EXHIBIT "A"

The surface estate only, in and to a parcel of land located in the South half of Sec. 5, T.1S., R.5E., S.L.B. & M. being more fully described as follows:

Beginning at a point which falls North 663.21 feet, and West 1,779.79 feet from the Southeast corner of said Section 5, Township 1 South, Range 5 East, Salt Lake Base and Meridian said Section corner is a mound of stone on a North-South fence line; thence North $67^{\circ}45'49''$ East 900.0 feet; thence North $12^{\circ}48'28''$ West 827.0 feet; thence North $57^{\circ}30'44''$ West 1,140.0 feet; thence South $79^{\circ}30'16''$ West 2,148.5 feet; thence South $13^{\circ}47'58''$ East 1,945.22 feet; thence North $75^{\circ}06'51''$ East 2,028.5 feet to the point of BEGINNING. (Hereinafter, the "Landfill Site").

Together with an easement for ingress and egress over along and across a sixty foot wide strip of land located in the S.E. Quarter of Section 5, T.1S., R.5E., Salt Lake Base and Meridian, the centerline of which is more fully described as follows:

Beginning at a point which falls North 367 feet, and West 863 feet from the S.E. Corner of said Section 5, said point falls on the North right-of-way line of an existing county road; thence northwesterly along a curve to the right 136.04 feet, said curve has a central angle of $25^{\circ}58'58''$; thence N. $55^{\circ}52'24''$ W. 242.96 feet to a curve to the right; thence northwesterly along said curve 212.32 feet; said curve has a central angle of $40^{\circ}33'$; thence No. $15^{\circ}19'24''$ W. 119.18 feet to a curve to the right; thence northwesterly along said curve 5.46 feet to the boundary line of the Summit County landfill; said curve has a central angle of $1^{\circ}02'34''$; said point falls North 841.38 feet, and west 1343.98 feet from said S.E. corner of said Section 5. (Hereinafter, the "Road Right of Way.")

BOOK 377 PAGE 11

Grantor is retaining and excepting from this conveyance its present leasehold interest in and right to mine minerals from the Landfill Site, but Grantor shall not mine under the Landfill Site but may mine under the Road Right of Way.

Grantor shall have and retain, and reserves and excepts from this conveyance an easement and right of way for access and utilities across and through the Landfill Site to Grantor's property east, north and west of the Landfill Site, the location of such easement and right of way to be reasonably agreed to between the Grantor and Grantee.

As a condition of this conveyance, Grantor and Grantee agree that Grantor in the future in order to facilitate its mining may from time to time relocate the access road to the Landfill Site. Grantee hereby agrees to permit Grantor at its expense to relocate said road, except that Grantee at its expense agrees to pave the first 1000 feet of such road relocation.

As a condition of this conveyance, Grantor and Grantee agree that Grantor shall have the right to dispose of a reasonable amount of overburden and waste material, whether natural or manmade, on the Landfill Site. Such overburden and waste material shall be placed in the southeast quarter of the Landfill Site, at the precise location or locations to be reasonably specified by Grantee, unless Grantor and Grantee shall mutually agree otherwise as to a site or sites elsewhere within the Landfill Site for disposal of such overburden. Grantor shall bear all costs of loading, hauling and dumping such overburden and waste material, but Grantee shall not charge Grantor for disposing of such material on the Landfill Site. For purposes of this paragraph, the term "reasonable" as used above shall mean up to 10,000 tons of overburden and waste material per year, and such further yearly amounts as may reasonably be agreed to by Grantor and Grantee.

The terms Grantor and Grantee herein shall include their successors and assigns, and the conditions and agreements herein shall bind and inure to the benefit of Grantor, Grantee and their successors and assigns, and shall run with the land.



Western States Title Company

370 East Fifth South Salt Lake City, Utah 84111 801 363-8000

Authorized Agent of

 **TICOR
TITLE INSURANCE**

Policy of Title Insurance

SUBJECT TO THE EXCLUSIONS FROM COVERAGE, THE EXCEPTIONS CONTAINED IN SCHEDULE B AND THE PROVISIONS OF THE CONDITIONS AND STIPULATIONS HEREOF, TICOR TITLE INSURANCE COMPANY (a Stock Company), a California corporation, herein called the Company, insures, as of Date of Policy shown in Schedule A, against loss or damage, not exceeding the amount of insurance stated in Schedule A, and costs, attorneys' fees and expenses which the Company may become obligated to pay hereunder, sustained or incurred by the insured by reason of:

1. Title to the estate or interest described in Schedule A being vested otherwise than as stated therein;
2. Any defect in or lien or encumbrance on such title;
3. Lack of a right of access to and from the land; or
4. Unmarketability of such title.

This policy shall not be valid or binding until countersigned below by a validating signatory of the Company.



TICOR TITLE INSURANCE COMPANY

By Gerald L. Appel President

Attest Rich E. Eulach Secretary

Countersigned:
By William E. [Signature]
Validating Signatory

OWNERS POLICY
Schedule A

Agent's
 Order No.: S-9449

Number	Amount of Insurance	Date of Policy	PREMIUM
OWNERS OD 334257	\$ 300,000.00	March 19, 1986	985.00
		@ 11:51 a.m.	

1. Name of Insured:

SUMMIT COUNTY

2. The estate or interest in the land described herein and which is covered by this policy is:

FEE SIMPLE

3. The estate or interest referred to herein is at Date of Policy vested in the insured.

4. The land herein described is encumbered by the following mortgage or trust deed, and assignments:

and the mortgage or trust deeds, if any, shown in Schedule B hereof

5. The land referred to in this policy is located in the County of Summit
 State of Utah and described as follows:

The surface estate only in and to the following:

BEGINNING at a point which falls North 663.21 feet, and West 1,779.79 feet from the Southeast corner of said Section 5, Township 1 South, Range 5 East, Salt Lake Base and Meridian; said Section corner is a mound of stone on a North-South fence line; thence North 67°45'49" East 900.0 feet; thence North 12°48'28" West 827.0 feet; thence North 57°30'44" West 1,140.0 feet; thence South 79°30'16" West 2,148.5 feet; thence South 13°47'58" East 1,945.22 feet; thence North 75°06'51" East 2,028.5 feet to the point of BEGINNING.

TOGETHER WITH an easement for ingress and egress over along and across a sixty foot wide strip of land located in the Southeast quarter of Section 5, Township 1 South, Range 5 East, Salt Lake Base and Meridian; the centerline of which is more fully described as follows:

continued

ALTA OWNERS FORM

PARAGRAPH 5

SCHEDULE A CONTINUED

Policy Number

Agent's Reference No. S-9449

Loan

Policy Number 334257

Owners

BEGINNING at a point which falls North 367 feet, and West 863 feet from the Southeast corner of said Section 5, said point falls on the North right of way line of an existing county road; thence Northwesterly along a curve to the right 136.04 feet, said curve has a central angle of 25°58'58"; thence North 55°52'24" West 242.96 feet to a curve to the right; thence Northwesterly along said curve 212.32 feet; said curve has a central angle of 40°33'; thence North 15°19'24" West 119.18 feet to a curve to the right; thence Northwesterly along said curve 5.46 feet to the boundary line of the Summit County landfill; said curve has a central angle of 1°02'34"; said point falls North 841.38 feet, and West 1343.98 feet from said Southeast corner of said Section 5.

ALTA OWNERS FORM

Schedule B

Policy Number _____
Loan

Agent's Reference No. S-9449

Policy Number 334257
Owners

This policy does not insure against loss or damage by reason of the following:

General Exceptions:

- (1) Rights or claims of parties in possession not shown by the public records.
- (2) Encroachments, overlaps, boundary line disputes, and any other matters which would be disclosed by an accurate survey and inspection of the premises.
- (3) Easements or claims of easements not shown by the public records.
- (4) Any lien, or right to a lien, for services, labor, or material heretofore or hereafter furnished, imposed by law and not shown by the public records.

Special Exceptions: The mortgage, if any, referred to in Item 4 of Schedule A, and the following exceptions:

(1) Taxes

1. (Affects this and other property)
Taxes for the year 1986, now a lien, not yet due or payable. Taxes for the year 1985, have been paid. (Serial No. NS-32).

2. Easement and Right of Way (width not disclosed) for Electric Transmission and Distribution Facilities as created in favor of UTAH POWER AND LIGHT COMPANY by instrument recorded December 22, 1916 as Entry No. 26948 in Book P of Miscellaneous at Page 71 of the Official Records. Along a center line as follows:

COMMENCING on the North boundary of Grantor's land at a point 136 feet East of the Northwest corner of Section 5, Township 1 South, Range 5 East, Salt Lake Base and Meridian; thence running South 6°56' East 320 feet to angle point, thence 17°35' East 5060 feet to South boundary of Grantor's land; all contained within the East one-half of Section 5, Township 1 South, Range 5 East, Salt Lake Base and Meridian.

3. Easement and Right of Way (width not disclosed) for Electric Transmission and Distribution Facilities as created in favor of UTAH POWER AND LIGHT COMPANY by instrument recorded March 6, 1955 as Entry No. 85045 in Book 2A of Miscellaneous at Page 228 of the Official Records. Along a center line as follows:

continued

Policy Number

Agent's Reference No. S-9449

Loan

Policy Number 334257

Owners

BEGINNING on the North boundary line of Grantor's land at a point 1625 feet West, more or less, from the East quarter corner of Section 5, Township 1 South, Range 5 East, Salt Lake Base and Meridian; thence South 17°53' East 2330 feet, more or less, thence South 18°12' East 1120 feet, more or less, to the East boundary line of said land and being in the Northwest quarter of the Southeast quarter and the South one-half of the Southeast quarter of said Section 5.

4. A Right of Way and easement 30 feet in width for gas distribution facilities, as created in favor of MOUNTAIN FUEL SUPPLY COMPANY by instrument recorded July 13, 1970 as Entry No. 111391 in Book M26 at Page 663 of the Official Records, through and across said property along a center line described as follows:

BEGINNING at a point 676.43 feet North and 1.82 feet East from the Southeast corner of said Section 5, said point being on the East line of Grantor's property, thence South 59°55'53" West 266.20 feet, thence South 70°39'15" West 542.30 feet, thence South 73°44'15" West 377.36 feet, thence South 60°39'15" West 201.80 feet, thence South 40°26'15" West 193 feet, more or less, to the South line of Grantor's property.

5. Easement and Right of Way (width not disclosed) for Electric Transmission and Distribution Facilities as created in favor of UTAH POWER AND LIGHT COMPANY by instrument recorded October 6, 1970 as Entry No. 111881 in Book M28 at Page 227 of the Official Records. Along a center line as follows:

BEGINNING in an existing line on the Grantor's land at a point 510 feet North and 1160 feet West, more or less, from the Southeast corner of Section 5, Township 1 South, Range 5 East, Salt Lake Base and Meridian; thence South 84°22' East 1162 feet to the East boundary fence of said land and being in the Southeast quarter of the Southeast quarter of said Section 5.

6. Reservations contained in that certain Patent recorded April 2, 1902 as Entry No. 10623 in Book G at Page 512 of the Official Records, said reservations being set forth as follows:

Yet excluding and excepting from the transfer by these presents "All mineral lands: should any such be found to exist in the tracts described in the foregoing but this exclusion and exception according to the terms of the State "Shall not be construed to include coal and iron land."

7. Reservations contained in that certain Deed executed by the UNION PACIFIC RAILROAD COMPANY and recorded February 8, 1910 as Entry No. 19754 in Book J at Page 65 of the Official Records, said reservations being set forth as follows:

continued

Policy Number

Loan

Agent's Reference No. S-9449

Policy Number 334257

Owners

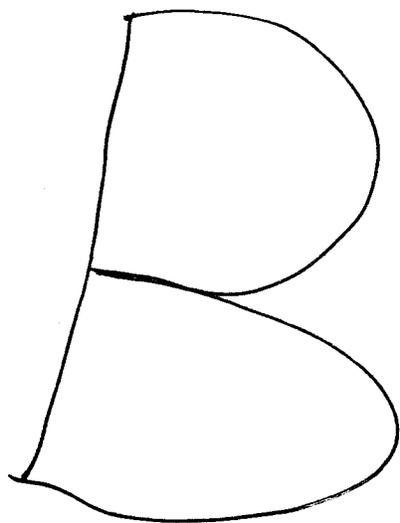
FIRST: All coal and other minerals within or underlying said lands.

SECOND: The exclusive right to prospect in and upon said land for coal and other minerals therein, or which may be supposed to be therein, and to mine for and remove, from said land, all coal and other minerals which may be found thereon by anyone.

THIRD: The right of ingress, egress and regress upon said land to prospect for, mine and remove any and all such coal or other minerals, and the right to use so much of said land as may be convenient or necessary for the right of way to and from such prospect places, mines and for roads and approaches thereto or for removal therefrom of coal, minerals, machinery or other materials.

FOURTH: The right of said UNION PACIFIC RAILROAD COMPANY to maintain and operate its railroad in its present form of construction, and to make any change in the form of construction or method of operation of said railroad.

9. Terms and conditions contained in that certain Warranty Deed executed March 19, 1986 by UTELITE CORPORATION, in favor of SUMMIT COUNTY, recorded March 19, 1986 as Entry No. 247813 in Book 377 at Page 10 of the Official Records, reference to which is hereby made for the particulars.



RECEIVED

OCT 28 2011

UTAH DIVISION OF
SOLID & HAZARDOUS WASTE

2011.02347

Introduction

Summit County owns and operates a Class I municipal Solid waste Landfill at Three Mile Canyon in Summit County, Utah. The site is located 4 miles south of Wanship and a half mile west of Rockport Reservoir. The County is in the process of renewing the application for the landfill at Three Mile Canyon. Figure 1 from Bingham Environmental (1997) shows location of Landfill.

According to R315-308 of Utah Administrative Code a groundwater monitoring / sampling plan is necessary with the renewal application.

The Landfill became operational in 1986. Five wells have been monitored at the site but presently three wells are in service today. The existing information on these well is presented in Figure 2 from ATC Associates Inc. (2003) and Table 1 and Table 2 from Five Star Engineers (2007).

The Three mile Landfill groundwater monitoring program has been under assessment monitoring since May of 2001.

The following sampling and analysis plan covers the protocol for collecting samples from the wells and submission to the laboratory.

Field Procedures

2.1 Sampling Preparation

The laboratory selected to analyze the groundwater shall supply all containers, chemical preservatives, labels, trip and field blanks, chain of custody forms and coolers. Field data shall be entered on a Field Data Sheet (Appendix A) or other approved form. The laboratory selected should be consulted prior to monitoring in order that appropriate containers are provided for each sampling event.

2.2 Equipment Preparation

Prior to site arrival the water level indicator, pH/temperature meter, and conductivity meters' probes should be decontaminated and calibrated following manufacturers' instructions.

- Water level indicator- the indicator will be washed by hand prior to site arrival with a non-phosphate detergent and rinsed with distilled water. The tape will be dried with a paper towel as it is reeled back to the holding spool.

- Temperature, pH and specific conductivity measuring device (probe) will be washed by hand with non-phosphate detergent and rinsed with distilled water after each well. The meter will then be checked for calibration. Field calibration results will be recorded on Calibration Data Sheet (Appendix B).

2.3 Field QA/QC Samples

Contamination that may occur in the field or from shipping is monitored with a trip or field blanks.

- Trip Blank – These are blanks prefilled in the Laboratory with deionized water and labeled. They are sent along with the other sampling containers for the sampling event. Once returned to the laboratory the blanks will be tested for any contamination that may occur along the way.
- Field Blank – These containers are filled with a supply of deionized water at a monitoring site at the landfill. The blank will be tested for any contamination that is a result of conditions that hinder the natural air quality.

Duplicate Samples – These samples will be taken at different monitoring well locations and labeled with a one (1) and the monitoring well number. Samples should be collected close to the same point and time as a regular sample. Field duplicate samples are helpful in making sure sampling and laboratory analysis are accurate.

2.4 Water level

A water level measurement will be taken with an indicator prior to any activity at the well. The water level indicator will be equipped with a sensor that signals when the probe contacts the water. Water levels will be measured in tenths of foot (0.1 foot). The probe will be decontaminated with non-phosphate detergent and rinsed with deionized water between monitoring wells. Monitoring wells shall have a reference point properly marked at the top of the PVC casing where the water level is measured.

2.5 Purge Equipment and Procedure

Groundwater wells will be purged with dedicated bladder pumps and will remain dedicated to each well unless a replacement pump becomes necessary.

Well purging will be conducted utilizing dedicated pumps and the Low Flow Procedure. The purging rate will be between 100-200 milliliters per minute or until a minimum of two pump and tubing volumes have been displaced and field parameters stabilized.

Stabilization defined as:

- Temperature three consecutive measurements within 10%
- pH three consecutive measurements with units of 0.2 or less
- Specific Conductivity three consecutive measurements within 3% of each other

These measurements will be recorded on field data sheets every two to three minutes.

The bladder pump will be used for well purging and sample collection.

Equipment necessary for sampling:

- Bladder pump controller
- Bladder pump
- Carbon dioxide source/ compressed gas
- Field parameter measuring devices
- New disposable gloves/ nitrile

Procedure:

- Install nitrile gloves
- Connect gauges to Carbon dioxide cylinder and discharge to pump fitting at the top of well
- Turn on pump controller and select number of cycles per minute
- Adjust controller to the desire flow rate (approximately 100-200 millimeters per minute)

Pump until two volumes of water have been removed from pump and casing or until field parameters have stabilized.

In some cases it may be necessary due to bladder pump failure to purge by a bailer until the bladder pump is replaced or repaired. If this becomes necessary a minimum of three well casings of water needs to be removed or until field parameters have stabilized.

2.6 Purge Water

In normal circumstances the purge water can be discarded on the ground away from the monitoring well. It may be necessary in some circumstances to store purge water in containers if the water has been found to be contaminated from previous analysis.

2.7 Sample Collection

Well sampling should begin from the up gradient well first to avoid cross contamination with the other wells which have more potential to become contaminated. Collection order is as follows:

- Field Parameters (Temperature, pH, Turbidity, and Specific Conductivity)
- Volatile Organics
- Inorganics
- Metals

2.8 Volatile Organics Sample Collection

Care should be taken when filling these containers to insure that no headspace or air bubbles are present after the cap has been placed on the vial and tightened. If air bubbles are present the vial must have additional water added until the vial is free from air bubbles.

2.9 Sample Preservation

It is necessary when sampling that the containers when filled with the groundwater be placed into coolers that contain either ice or ice water packs in order to maintain the stability of the water or retard biological activity. The containers should be delivered to the laboratory as soon as the sampling event is completed. If this is not possible, the containers will be taken and stored in a refrigerator at the appropriate temperature until the samples can be taken to laboratory the following day.

2.10 Field Measurements

It is required to record water levels, temperature, ph and conductivity at each sampling event. These measurements serve to document properly collected samples.

Before sampling all equipment shall be calibrated, checked with standard operating procedures and documented in the Field Data Sheet.

2.11 Field Data

All field data will be entered on a Field Data Sheet (Appendix A) or equivalent. All entries should be legible and initialed at the bottom of the page.

2.12 Chain of Custody

In order to insure the integrity of the samples the collector shall fill in all applicable sections of the chain of custody form (Appendix C). A list of required tests to be preformed will be submitted to the laboratory with the chain of custody form. All sample containers should be labeled to prevent loss or misidentification and include:

- Name of client (Summit County)
- Date and time of sampling
- Sample identification

2.13 Sample Transport

Samples shall be delivered from the field to the laboratory as quickly as possible and no later than next day at the latest. Shipping containers or ice chests with bottle dividers and insulation material prevent breakage during handling or delivery. A Sufficient number of Ice packs must be included to maintain proper temperature.

3.0 Laboratory Quality Assurance/Quality Control

3.1 Precision and Accuracy From Five Star Engineers (2007)

The laboratory prepares matrix spike and matrix spike duplicate samples by adding a known amount of analyte, such as arsenic, to two aliquots of the same sample. The matrix spike and matrix spike duplicate are then analyzed. Accuracy for the matrix spike and matrix spike duplicate samples is defined as the recovery, i.e. the amount recovered in the analysis divided by the quantity "know" to be present, times 100 percent. A result of 100 percent indicates perfect accuracy. Target recoveries of 80 to 120 percent are acceptable for most analytes. Arsenic, selenium, and thallium (the GFAA metals) have slightly wider ranges of recovery, usually in the range of 70 to 130 percent, due to inter-element interferences. There, recoveries of 80 to 120 percent will indicate good accuracy (70 to 130 percent for arsenic, selenium, and thallium). If recoveries for the matrix spike and matrix spike duplicate fall outside that range, the laboratory will be contacted for an explanation so that data can be qualified as acceptable, estimated or rejected.

Precision is defined how close the results are for the matrix spike and the matrix spike duplicate samples. Therefore, it is an indication of how well the laboratory is able to repeat a measurement. Precision between two measurements (A and B) is given as the relative percent difference, calculated as follows:

$$RPD = (A - B) 100\% / \text{divided by } (A + B) / 2$$

The laboratory is generally able to repeat results in a water sample within 10 percent. For matrix spike/ matrix spike duplicates with RPDs greater than 10 percent, the laboratory will be contacted for an explanation so that the data can be qualified as acceptable, estimated or rejected.

If both sample results exceed the RDL (reporting detection limit) the RPD (relative percent difference) should be less than 25 percent or the current lab acceptance limit, whichever is lower. Laboratory precision is only one part of the total precision of the measurement process leading from sample collection through data reporting.

For this project, laboratory control samples, or blank spikes which ever are available will be used to assess accuracy. Results should be within 20 percent of the true value. Accuracy will also be assessed by the evaluation of method blank data. Analytical results for method blanks should be less than the MDL (minimum detection limit). Note that some common organic laboratory contaminants may exceed the reporting MDL. Sample results that are less than 10

times the concentration detected in the method blank will be qualified with a "B" flag to indicate the sample results may be biased. The use of matrix spike recovery data will provide additional information regarding method performance on actual samples. The laboratory will use professional judgement regarding assessment of data quality and any subsequent action taken as a result of matrix spike recoveries. Accuracy is controlled primarily by the laboratory and usually reported as percent recovery.

Representative samples will be obtained through the following practice:

- The use of generally accepted sampling procedures will allow for the collection of representative samples.
- Sub-sampling within the laboratory will be conducted according to lab standard operating procedures. These procedures are designed to obtain representative sub-samples.

Data comparability will be obtained through the use of standard sampling procedures, trained personnel and through standard analytical methods used by the laboratory. Additional adherence to the procedures and QC approach contained in this QA plan will provide for comparable data throughout the duration of this project.

Completeness will be evaluated by the following criteria:

- The number of usable data points compared to the project data points as detailed in this plan
- Compliance with the data quality criteria as presented in this section.

The goal for the above criteria is to obtain 100 percent data completeness. However, where data are not complete, decisions regarding re-sampling and/ or reanalysis will be made by a collaborative process involving both data users and data generators (laboratory). These decisions will take into account the project data quality objectives as presented above.

3.2 Data Analysis

The purpose of this section is to provide basis for analyzing Summit County groundwater data. This section will also determine ways to deal with inconsistencies in the data groundwater monitoring data.

3.3 Outliers

Inconsistently large or small values (outliers) can be introduced in the data due to sampling, laboratory, transportation, transcription error or actual extreme values. Summit County will evaluate current and historical data and screen each well and constituent for the existence of outliers using the method outlined in USEPA 1989 Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, section 8.2. Background observations that are considered to be outliers, will not be included in the statistical analysis to preserve the power of the statistical test to detect a release from the facility. If an extreme value occurs in a compliance well or during compliance sampling event, the facility should collect a resample during the compliance period of the initial sample. This will enable Summit County to distinguish between an extreme value in a compliance well and indication of a release from the facility. Background observations should be evaluated to determine if data is normally distributed prior to running the outlier test.

3.4 Missing Data

If a sampling event results in a missing data value, an attempt to resample for the missing value should be made within the compliance period of the initial sampling event. It is recommended that the re-sample be collected as close to the initial sampling event as possible to minimize the effects of variation due to the differences in sample collection time and to allow additional time for a verification sample if needed.

3.5 Data Below Detection Limits

For data where the percentage of data below the laboratory limit of detection or laboratory limit of quantitation is less than 25 percent, Summit County will replace the non-detects or non-quantitation values with half the laboratory limit of detection or quantitation. However, when the percentage of non-detects or non-quantified values is greater than 25 percent and less than 50 percent, the mean and standard deviation will be adjusted using either Aitchison's adjustment (USEPA 1992 section 2.2.2 and Aitchison, 1955) or Cohen's adjustment (USEPA 1989 section 8.1.3 and Cohen, 1961).

3.5 Checking Data Distribution

Parametric statistical test methods assume that the data follow a certain distribution, for groundwater statistics the distributions usually are the normal, log-normal. Five star Engineers will verify that the distributional assumptions of a particular test method are valid prior to applying the statistical test method. No testing of normality is needed if the percentage of non-detects or non-quantified values are greater than 50 percent, since a non-parametric statistical test method should be applied.

Selection of Statistical Method Statistical interval methods commonly applied in ground water data analysis are the confidence interval, prediction interval and tolerance interval. Prediction and tolerance intervals are often applied for compliance sampling events in detection and assessment monitoring. Confidence intervals are often applied for comparisons to a ground water protection standard which is based on a mean or median value.

Summit County will use Control Charts Shewhart-CUSUM to analyze the Three mile Landfill groundwater monitoring data and request variance from inter-well statistical comparisons. The County will follow the procedure outlined in the US EPA 1989 interim final guidance "Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities", and US EPA Addendum to Interim Final Guidance 1992 "Statistical Analysis of Ground-water Monitoring Data RCRA Facility".

American Society for Testing and Materials "Standard Guide for Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Program" suggest that Intra-Well Comparison is appropriate for those facilities that have no definable hydraulic gradient have no existing contamination and have few background wells. US EPA Addendum to Interim Final Guidance 1992 "Statistical Analysis of Ground-water Monitoring Data at RCRA Facility" section 6.1 indicated that this method is appropriate for initially uncontaminated wells. This EPA guidance also lists the following advantages of a Control Chart over Prediction Limits:

- Data from the well can be viewed graphically over time. Trends and changes in the concentration can be seen easily because all sample data can be plotted on the chart as it is collected, giving the data analysis a historic over view of the pattern of contamination
- Intra-well comparison method will eliminate the need to worry about spatial variability between wells in different locations
- Whenever background data is compared to compliance point measurement, there is a risk that any statistical difference between the wells is a result of contamination at the facility

3.6 Hydraulic Gradient

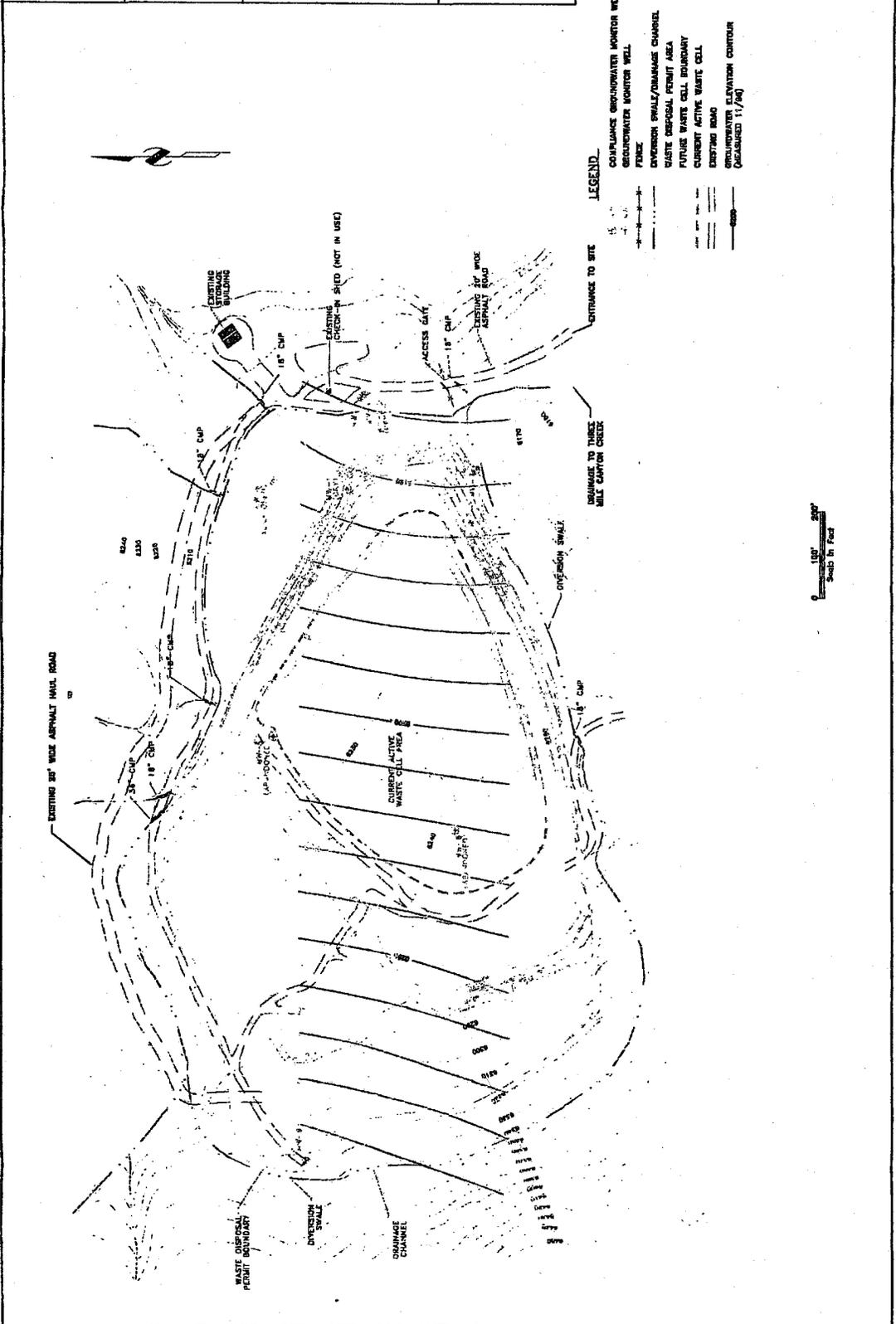
Inter-well analysis requires that the hydrogeologic conditions are contiguous and uniform throughout the site and that all wells are screened in the same interval. These conditions must be met or natural differences in constituent levels can confound the background to compliance comparisons and may lead to erroneous conclusions about facility impacts. Thus, a significant disadvantage of inter-well tests is their decreased power to detect differences in the presence of spatially varying hydrogeology.

Intra-well analysis does not require that the hydrogeologic conditions are contiguous and uniform throughout the site and that all wells are screened in the same interval. This is because the intra-well analysis identifies changes over time at a given well instead of changes between wells.

FIGURES

1 and 2

 2581 East Parkway Way, Suite 105 Salt Lake City, Utah 84108 (801) 488-8888 VATC Environmental Associates Inc.	SITE MAP THREE MILE CANYON LANDFILL SUMMIT COUNTY, UTAH	DATE PREPARED: 07-28-03 PROJ. NO.: 71-258A-001 PREPARED BY: BH CHECKED BY: BH
	FIGURE 2	
	CROWN ENV. INC.	
	PREPARED BY: BH	



- LEGEND**
- COMPLIANCE GROUNDWATER MONITOR WELL
 - GROUNDWATER MONITOR WELL
 - FENCE
 - DIVERSION SWALE/DRAINAGE CHANNEL
 - WASTE DISPOSAL PERMIT AREA
 - FUTURE WASTE CELL BOUNDARY
 - CURRENT ACTIVE WASTE CELL
 - EXISTING ROAD
 - GROUNDWATER ELEVATION CONTOUR (MEASURED 11/00)

0 100' 200'
 SCALE IN FEET

TABLES

1 and 2

Existing Groundwater Monitoring Well System

The Three Mile landfill has three monitoring wells. Well number nine (MW-9) is currently considered an upgradient well, and well numbers three (MW-3) and seven (MW-7) are currently considered as downgradient wells. The groundwater monitoring system abandoned several wells for various reasons. Tables 1 and 2 show existing and abandoned groundwater monitoring well system information.

Table 1: Three Mile Landfill Existing Groundwater Monitoring Well System Information.

Information	MW-3	MW-7	MW-9
Completion date	85	86	94
Depth to water level after completion (feet)	47.5	90.0	36.24
Location	Downgradient	Downgradient	Upgradient
Northing	11152.76	10880.67	11256.70
Easting	13967.76	13803.92	12213.71
Elevation top of the PVC	6187.56	6191.04	6327.80
Elevation Ground Surface	6184.09	6189.40	6325.48
Elevation to the top of the Sand pack	6140.09	6123.4	6217.5
Elevation to the bottom of the Sand pack	6128.09	6095.90	6185.50
Elevation to the top of the screen	6137.09	6122.90	6211.20
Elevation to the bottom of the screen	6127.59	6096.40	6190.50
Groundwater elevation	6137.07	6146.68	6298.10

Figure 2 from ATC Associated (2003) shows the locations of the existing and abandoned monitoring wells, and the direction of groundwater flow. The groundwater monitoring wells are 55 to 140 feet deep and the water table appears to be in zone of the siltstone underneath the landfill.

Bingham Environmental Inc, report 1997, indicated that all wells are installed in accordance with DEQ rules. The wells are developed for groundwater sampling by surging, and bailing sediment laden water until the groundwater was relatively clear.

Table 2: Three Mile Landfill Abandoned Groundwater Monitoring Well System Information.

	MW-1	MW-2	MW-4	MW-5	MW-6	MW-8
Year Completed			85	86	86	86
Depth to water level after completion , feet			68.4	N/A	N/A	24.6
Location			Downgradient			Upgradient
Northing (feet)	11187.95	11106.79	11146.32	11361.02	11362.76	10928.29
Easting (feet)	13759.52	13950.59	13971.83	13997.28	13777.76	12986.83
Elevation top of the PVC (feet)	6226.18	6185.42	6187.04	6234.35	N/A	N/A
Elevation Ground Surface (feet)	6223.65	6181.95	6183.57	6231.01	6186.83	6242.25
Elevation to the top of the Sand pack (feet)	6219.65	6159.95	6113.57	9181.35	6133.83	6185.25
Elevation to the bottom of the Sand pack (feet)	6209.65	6144.95	6085.57	6164.35	6116.83	6109.75
Elevation to the top of the screen (feet)	6218.65	6154.95	6105.57	6175.35	6127.83	6176.25
Elevation to the bottom of the screen (feet)	6210.15	6147.45	6086.07	6165.35	6117.33	6156.25
Groundwater elevation (feet)	dry	dry	6121.71	dry	dry	N/A

*******Rock Port Reservoir normal water elevation is approximately 6049.0 ft**

APPENDIX A

APPENDIX B

Calibration Data Sheet

Project: _____
Calibrated By: _____
Date: _____ Time: _____

Calibration Solution Temperature: _____ C

pH Meter

Model _____
Serial Number _____
Calibration Solution _____
Instrument Reading _____
Known pH _____

Conductivity Meter

Model _____
Serial Number _____
Calibration Solution _____
Instrument Reading _____
Known pH _____

Calibration Data Sheet

Project: _____
Calibrated By: _____
Date: _____ Time: _____

Calibration Solution Temperature: _____ C

pH Meter

Model _____
Serial Number _____
Calibration Solution _____
Instrument Reading _____
Known pH _____

Conductivity Meter

Model _____
Serial Number _____
Calibration Solution _____
Instrument Reading _____
Known pH _____

APPENDIX C



**AMERICAN
WEST
ANALYTICAL
LABORATORIES**

September 30, 2008

Brent Ovard
Summit County
PO Box 128
Coalville, UT 84017

TEL: (435) 336-3278

FAX: (435) 336-3286

RE: Landfill

463 West 3600 South
Salt Lake City, Utah
84115

Lab Set ID: L86243

Dear Brent Ovard:

American West Analytical Labs received 6 samples on 9/10/2008 for the analyses presented in the following report.

(801) 263-8686

Toll Free (888) 263-8686

Fax (801) 263-8687

Email: awal@awal-labs.com

All analyses were performed in accordance to National Environmental Laboratory Accreditation Program (NELAP) protocols unless noted otherwise. If you have any questions or concerns regarding this report please feel free to call. The abbreviation "Surr" found in organic reports indicates a surrogate compound that is intentionally added by the laboratory to determine sample injection, extraction and/or purging efficiency.

Kyle F. Gross
Laboratory Director

Thank you.

Jose Rocha
QA Officer

Approved by: 
Laboratory Director or designee

Report Date: 9/30/2008 Page 1 of 52

AMERICAN WEST ANALYTICAL LABORATORIES

Kyle F. Gross
Laboratory Director

463 West 3600 South
Salt Lake City, Utah 84115
(801) 263-8686
email: awal@awal-labs.com

Jose Rocha
QA Officer

INORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-01G
Field Sample ID: MW-9
Collected: 9/9/2008 10:30:00 AM
Received: 9/10/2008

TOTAL METALS

Analytical Results	Units	Date Analyzed	Tech	Method Used	MDL	Reporting Limit	Analytical Results	
Antimony	mg/L	9/11/2008	DDW	6020	0.00018	0.0010	< 0.0010	UB
Arsenic	mg/L	9/11/2008	DDW	6020	0.00011	0.00060	0.0077	
Barium	mg/L	9/11/2008	DDW	6020	0.00019	0.00040	0.13	
Beryllium	mg/L	9/11/2008	DDW	6020	0.00059	0.00060	< 0.00060	U
Cadmium	mg/L	9/11/2008	DDW	6020	0.00009	0.00018	< 0.00018	U
Calcium	mg/L	9/16/2008	LC	6010B	0.048	1.0	4.1	
Chromium	mg/L	9/16/2008	LC	6010B	0.0023	0.010	< 0.010	U
Cobalt	mg/L	9/11/2008	DDW	6020	0.00024	0.0012	< 0.0012	U
Copper	mg/L	9/11/2008	DDW	6020	0.00065	0.00080	< 0.00080	U
Iron	mg/L	9/16/2008	LC	6010B	0.0082	0.050	0.051	B
Lead	mg/L	9/11/2008	DDW	6020	0.00019	0.00040	< 0.00040	U
Magnesium	mg/L	9/16/2008	LC	6010B	0.036	1.0	1.5	
Manganese	mg/L	9/11/2008	DDW	6020	0.0012	0.0012	0.011	
Mercury	mg/L	9/18/2008	BGT	7470A	0.000059	0.00020	0.00008	J
Nickel	mg/L	9/11/2008	DDW	6020	0.00021	0.00080	0.0004	J
Potassium	mg/L	9/16/2008	LC	6010B	0.17	1.0	1.0	
Selenium	mg/L	9/11/2008	DDW	6020	0.00015	0.00080	< 0.00080	U
Silver	mg/L	9/11/2008	DDW	6020	0.000082	0.00040	< 0.00040	U
Sodium	mg/L	9/16/2008	LC	6010B	1	10	120	2~
Thallium	mg/L	9/11/2008	DDW	6020	0.00032	0.00040	< 0.00040	U
Vanadium	mg/L	9/16/2008	LC	6010B	0.0019	0.0050	< 0.0050	U
Zinc	mg/L	9/11/2008	DDW	6020	0.0053	0.0054	0.017	

U - This flag indicates the compound was analyzed for but not detected above the MDL.

L - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

~ - This analyte was also detected in the method blank.

2 - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.

Report Date: 9/30/2008 Page 2 of 52

~ - The reporting limits were raised due to high analyte concentrations.

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Kyle F. Gross
 Laboratory Director

 Jose Rocha
 QA Officer

INORGANIC ANALYSIS REPORT

Client: Summit County
 Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-02G
 Field Sample ID: MW-7
 Collected: 9/9/2008 11:00:00 AM
 Received: 9/10/2008

TOTAL METALS

Analytical Results	Units	Date Analyzed	Tech	Method Used	MDL	Reporting Limit	Analytical Results	
Antimony	mg/L	9/11/2008	DDW	6020	0.00018	0.0010	0.0008	JB
Arsenic	mg/L	9/11/2008	DDW	6020	0.00011	0.00060	0.0071	
Barium	mg/L	9/11/2008	DDW	6020	0.00019	0.00040	0.074	
Beryllium	mg/L	9/11/2008	DDW	6020	0.00059	0.00060	< 0.00060	U
Cadmium	mg/L	9/11/2008	DDW	6020	0.00009	0.00018	< 0.00018	U
Calcium	mg/L	9/16/2008	LC	6010B	0.048	1.0	5.1	
Chromium	mg/L	9/16/2008	LC	6010B	0.0023	0.010	< 0.010	U
Cobalt	mg/L	9/11/2008	DDW	6020	0.00024	0.0012	< 0.0012	U
Copper	mg/L	9/11/2008	DDW	6020	0.00065	0.00080	< 0.00080	U
Iron	mg/L	9/16/2008	LC	6010B	0.0082	0.050	0.04	JB
Lead	mg/L	9/11/2008	DDW	6020	0.00019	0.00040	0.0004	J
Magnesium	mg/L	9/16/2008	LC	6010B	0.036	1.0	2.0	
Manganese	mg/L	9/11/2008	DDW	6020	0.0012	0.0012	0.0028	
Mercury	mg/L	9/18/2008	BGT	7470A	0.000059	0.00020	< 0.00020	U
Nickel	mg/L	9/11/2008	DDW	6020	0.00021	0.00080	0.0007	J
Potassium	mg/L	9/16/2008	LC	6010B	0.17	1.0	1.8	
Selenium	mg/L	9/11/2008	DDW	6020	0.00015	0.00080	0.011	
Silver	mg/L	9/11/2008	DDW	6020	0.000082	0.00040	< 0.00040	U
Sodium	mg/L	9/16/2008	LC	6010B	1	10	190	~
Thallium	mg/L	9/11/2008	DDW	6020	0.00032	0.00040	< 0.00040	U
Vanadium	mg/L	9/16/2008	LC	6010B	0.0019	0.0050	0.004	J
Zinc	mg/L	9/11/2008	DDW	6020	0.0053	0.0054	0.012	

U - This flag indicates the compound was analyzed for but not detected above the MDL.

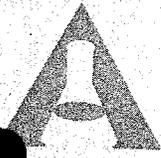
J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

~ - This analyte was also detected in the method blank.

~- - The reporting limits were raised due to high analyte concentrations.

Report Date: 9/30/2008 Page 3 of 52

All analyses applicable to the CWA, SDWA, and RCRA are performed in accordance to NELAC protocols. Pertinent sampling information is located on the attached COC. This report is provided for the exclusive use of the addressee. Privileges of subsequent use of the name of this company or any member of its staff, or reproduction of this report in connection with the advertisement, promotion or sale of any product or process, or in connection with the re-publication of this report for any purpose other than for the addressee will be granted only on contact. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.



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Jose Rocha
QA Officer

INORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

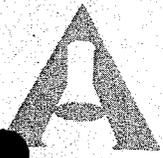
Lab Sample ID: L86243-03G
Field Sample ID: MW-3
Collected: 9/9/2008 11:30:00 AM
Received: 9/10/2008

TOTAL METALS

Table with 8 columns: Analytical Results, Units, Date Analyzed, Tech, Method Used, MDL, Reporting Limit, Analytical Results. Rows include Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc.

U - This flag indicates the compound was analyzed for but not detected above the MDL.
J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.
This analyte was also detected in the method blank.
~ - The reporting limits were raised due to high analyte concentrations.

All analyses applicable to the CWA, SDWA, and RCRA are performed in accordance to NELAC protocols. Pertinent sampling information is located on the attached COC. This report is provided for the exclusive use of the addressee. Privileges of subsequent use of the name of this company or any member of its staff, or reproduction of this report in connection with the advertisement, promotion or sale of any product or process, or in connection with the re-publication of this report for any purpose other than for the addressee will be granted only on contact. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.



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Jose Rocha
QA Officer

INORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-04G
Field Sample ID: MW-19
Collected: 9/9/2008 10:00:00 AM
Received: 9/10/2008

TOTAL METALS

Table with 8 columns: Analytical Results, Units, Date Analyzed, Tech, Method Used, MDL, Reporting Limit, Analytical Results. Rows include Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc.

U - This flag indicates the compound was analyzed for but not detected above the MDL.

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

~ - This analyte was also detected in the method blank.

~ - The reporting limits were raised due to high analyte concentrations.

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QA Officer

INORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-01
Field Sample ID: MW-9
Collected: 9/9/2008 10:30:00 AM
Received: 9/10/2008

Table with 8 columns: Analytical Results, Units, Date Analyzed, Tech, Method Used, MDL, Reporting Limit, Analytical Result. Rows include Ammonia, Bicarbonate, Carbonate, Chloride, COD, Nitrogen, pH @ 25° C, Sulfate, TDS, and Total Organic Carbon.

- U - This flag indicates the compound was analyzed for but not detected above the MDL.
J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.
B - This analyte was also detected below the PQL in the method blank.
H - Sample was received outside of the holding time.
† - This analyte was also detected in the method blank below the PQL at 0.41 mg/L.
! - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.
@ - High RPD due to suspected sample non-homogeneity or matrix interference.



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INORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

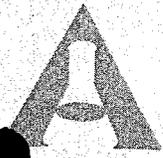
Contact: Brent Ovard

Lab Sample ID: L86243-02
Field Sample ID: MW-7
Collected: 9/9/2008 11:00:00 AM
Received: 9/10/2008

Analytical Results	Units	Date Analyzed	Tech	Method Used	MDL	Reporting Limit	Analytical Result
Ammonia (as N)	mg/L	09/10/08	HR	350.1	0.015	0.050	< 0.050 UB
Bicarbonate (As CaCO3)	mg/L	09/11/08	CMR	2320B	6.1	20	240
Carbonate (As CaCO3)	mg/L	09/11/08	CMR	2320B	6.1	10	< 10 U
Chloride	mg/L	09/11/08	NB	300.0	0.3	2.0	140
COD	mg/L	09/11/08	LPS	HACH 8000	3.9	10	4J
Nitrogen, Nitrate (as N)	mg/L	09/11/08	NB	300.0	0.15	2.0	2.8
pH @ 25° C	pH Units	09/10/08	9:40 pm	SAH	4500H+B	0	1.00 8.06H
Sulfate	mg/L	09/11/08	NB	300.0	0.13	15	29
TDS	mg/L	09/12/08	LPS	160.1	3.6	10	510
Total Organic Carbon	mg/L	09/11/08	CMR	5310B	0.069	1.0	2.4 †

- U - This flag indicates the compound was analyzed for but not detected above the MDL.*
- J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.*
- B - This analyte was also detected below the PQL in the method blank.*
- H - Sample was received outside of the holding time.*
- † - This analyte was also detected in the method blank below the PQL at 0.41 mg/L.*

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INORGANIC ANALYSIS REPORT

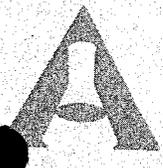
Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-03
Field Sample ID: MW-3
Collected: 9/9/2008 11:30:00 AM
Received: 9/10/2008

Table with 8 columns: Analytical Results, Units, Date Analyzed, Tech, Method Used, MDL, Reporting Limit, Analytical Result. Rows include Ammonia, Bicarbonate, Carbonate, Chloride, COD, Nitrogen, pH @ 25° C, Sulfate, TDS, and Total Organic Carbon.

- U - This flag indicates the compound was analyzed for but not detected above the MDL.
J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.
B - This analyte was also detected below the PQL in the method blank.
H - Sample was received outside of the holding time.
† - This analyte was also detected in the method blank below the PQL at 0.41 mg/L.
¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.
@ - High RPD due to suspected sample non-homogeneity or matrix interference.



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QA Officer

INORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-04
Field Sample ID: MW-19
Collected: 9/9/2008 10:00:00 AM
Received: 9/10/2008

Analytical Results	Units	Date Analyzed	Tech	Method Used	MDL	Reporting Limit	Analytical Result	
Ammonia (as N)	mg/L	09/10/08	HR	350.1	0.015	0.050	0.03 JB	
Bicarbonate (As CaCO3)	mg/L	09/11/08	CMR	2320B	6.1	20	180	
Carbonate (As CaCO3)	mg/L	09/11/08	CMR	2320B	6.1	10	< 10 U	
Chloride	mg/L	09/11/08	NB	300.0	0.15	1.0	87	
COD	mg/L	09/11/08	LPS	HACH 8000	3.9	10	5 J	
Nitrogen, Nitrate (as N)	mg/L	09/11/08	NB	300.0	0.074	1.0	< 1.0 U	
pH @ 25° C	pH Units	09/10/08	9:40 pm	SAH	4500H+B	0	1.00	8.20 H
Sulfate	mg/L	09/11/08	NB	300.0	0.067	7.5	10	
TDS	mg/L	09/12/08	LPS	160.1	3.6	10	340	
Total Organic Carbon	mg/L	09/11/08	CMR	5310B	0.069	1.0	0.9 J†	

- U - This flag indicates the compound was analyzed for but not detected above the MDL.*
- J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.*
- B - This analyte was also detected below the PQL in the method blank.*
- H - Sample was received outside of the holding time.*
- † - This analyte was also detected in the method blank below the PQL at 0.41 mg/L.*

All analyses applicable to the CWA, SDWA, and RCRA are performed in accordance to NELAC protocols. Pertinent sampling information is located on the attached COC. This report is provided for the exclusive use of the addressee. Privileges of subsequent use of the name of this company or any member of its staff, or reproduction of this report in connection with the advertisement, promotion or sale of any product or process, or in connection with the re-publication of this report for any purpose other than for the addressee will be granted only on contact. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

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ORGANIC ANALYSIS REPORT

Client: Summit County
 Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-01B
 Field Sample ID: MW-9
 Collected: 9/9/2008 10:30:00 AM
 Received: 9/10/2008

Analyzed: 9/16/2008 10:38:42 A
 Extracted: 9/11/2008

Analysis Requested: EDB/DBCP by EPA 504

Analytical Results

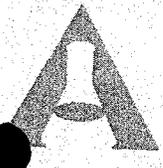
EDB & DBCP by 504.1

Units = $\mu\text{g/L}$

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,2-Dibromoethane	JH	0.0079	0.010	< 0.010	U
1,2-Dibromo-3-chloropropane	JH	0.0087	0.010	< 0.010	U
Surr: 1,2-Dibromopropane	JH	0.0097	47-181	138	

U - This flag indicates the compound was analyzed for but not detected above the MDL.



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ORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-02B
Field Sample ID: MW-7
Collected: 9/9/2008 11:00:00 AM
Received: 9/10/2008

Analyzed: 9/16/2008 10:53:55 A
Extracted: 9/11/2008

Analysis Requested: EDB/DBCP by EPA 504

Analytical Results

EDB & DBCP by 504.1

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,2-Dibromoethane	JH	0.0079	0.010	< 0.010	U
1,2-Dibromo-3-chloropropane	JH	0.0087	0.010	< 0.010	U
Surr: 1,2-Dibromopropane	JH	0.0096	47-181	118	

U - This flag indicates the compound was analyzed for but not detected above the MDL.

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ORGANIC ANALYSIS REPORT

Client: Summit County
 Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-03B
 Field Sample ID: MW-3
 Collected: 9/9/2008 11:30:00 AM
 Received: 9/10/2008

Analyzed: 9/16/2008 11:09:17 A
 Extracted: 9/11/2008

Analysis Requested: EDB/DBCP by EPA 504

Analytical Results

EDB & DBCP by 504.1

Units = µg/L
 Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,2-Dibromoethane	JH	0.008	0.010	< 0.010	U
1,2-Dibromo-3-chloropropane	JH	0.0087	0.010	< 0.010	U
Surr: 1,2-Dibromopropane	JH	0.0097	47-181	119	

U - This flag indicates the compound was analyzed for but not detected above the MDL.

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ORGANIC ANALYSIS REPORT

Client: Summit County
 Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-04B
 Field Sample ID: MW-19
 Collected: 9/9/2008 10:00:00 AM
 Received: 9/10/2008

Analyzed: 9/16/2008 11:24:32 A
 Extracted: 9/11/2008

Analysis Requested: EDB/DBCP by EPA 504

Analytical Results

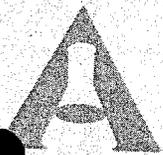
EDB & DBCP by 504.1

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,2-Dibromoethane	JH	0.0079	0.010	< 0.010	U
1,2-Dibromo-3-chloropropane	JH	0.0087	0.010	< 0.010	U
Surr: 1,2-Dibromopropane	JH	0.0097	47-181	110	

U - This flag indicates the compound was analyzed for but not detected above the MDL.



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QA Officer

ORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-05B

Field Sample ID: Trip Blank

Collected: 9/9/2008

Received: 9/10/2008

Analyzed: 9/16/2008 12:10:11 PM

Extracted: 9/11/2008

Analysis Requested: EDB/DBCP by EPA 504

Analytical Results

EDB & DBCP by 504.1

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,2-Dibromoethane	JH	0.0081	0.010	< 0.010	U
1,2-Dibromo-3-chloropropane	JH	0.0088	0.010	< 0.010	U
Surr: 1,2-Dibromopropane	JH	0.0098	47-181	167	

U - This flag indicates the compound was analyzed for but not detected above the MDL.



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ORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-06B
Field Sample ID: Field Blank
Collected: 9/9/2008
Received: 9/10/2008

Analyzed: 9/16/2008 12:25:34 PM
Extracted: 9/11/2008

Analysis Requested: EDB/DBCP by EPA 504

Analytical Results

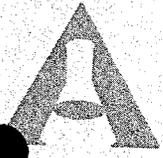
EDB & DBCP by 504.1

Units = $\mu\text{g/L}$

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,2-Dibromoethane	JH	0.0079	0.010	< 0.010	U
1,2-Dibromo-3-chloropropane	JH	0.0087	0.010	< 0.010	U
Surr: 1,2-Dibromopropane	JH	0.0096	47-181	169	

U - This flag indicates the compound was analyzed for but not detected above the MDL.



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QA Officer

ORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-01A
Field Sample ID: MW-9
Collected: 9/9/2008 10:30:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 1:02:00 PM

Analysis Requested: 8260B/5030B

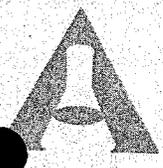
Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L
Dilution Factor = 1

Table with 6 columns: Compound, Tech, MDL, Reporting Limit, Analytical Result, and a status column (U). Rows include Acetone, Acrylonitrile, Benzene, Bromochloromethane, Bromodichloromethane, Bromoform, Carbon disulfide, Carbon tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Dibromochloromethane, 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, 1,2-Dichlorobenzene, 1,4-Dichlorobenzene, trans 1,4-Dichloro-2-butene, 1,1-Dichloroethane, and 1,2-Dichloroethane.

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email: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: L86243-01A
Field Sample ID: MW-9
Collected: 9/9/2008 10:30:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 1:02:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,1-Dichloroethene	ADM	0.022	0.50	< 0.50	U
cis 1,2-Dichloroethene	ADM	0.031	0.50	< 0.50	U
trans 1,2-Dichloroethene	ADM	0.035	0.50	< 0.50	U
1,2-Dichloropropane	ADM	0.016	0.50	< 0.50	U
cis 1,3-Dichloropropene	ADM	0.022	0.50	< 0.50	U
trans 1,3-Dichloropropene	ADM	0.031	0.50	< 0.50	U
Ethylbenzene	ADM	0.032	0.50	< 0.50	U
2-Hexanone	ADM	0.16	1.0	< 1.0	U
Bromomethane	ADM	0.19	1.0	< 1.0	U
Chloromethane	ADM	0.029	0.50	< 0.50	U
Dibromomethane	ADM	0.057	0.50	< 0.50	U
Methylene chloride	ADM	0.044	0.50	< 0.50	U
2-Butanone	ADM	0.84	2.0	< 2.0	U
Iodomethane	ADM	0.062	5.0	< 5.0	U
4-Methyl-2-pentanone	ADM	0.076	1.0	< 1.0	U
Styrene	ADM	0.034	0.50	< 0.50	U
1,1,1,2-Tetrachloroethane	ADM	0.044	0.50	< 0.50	U
1,1,1,2,2-Tetrachloroethane	ADM	0.05	0.50	< 0.50	U
Tetrachloroethene	ADM	0.19	0.50	< 0.50	U
Toluene	ADM	0.028	0.50	0.06	JB
1,1,1-Trichloroethane	ADM	0.039	0.50	< 0.50	U
1,1,2-Trichloroethane	ADM	0.057	0.50	< 0.50	U

All analyses applicable to the CWA, SDWA, and RCRA are performed in accordance to NELAC protocols. Pertinent sampling information is located on the attached COC. This report is provided for the exclusive use of the addressee. Privileges of subsequent use of the name of this company or any member of its staff, or reproduction of this report in connection with the advertisement, promotion or sale of any product or process, or in connection with the re-publication of this report for any purpose other than for the addressee will be granted only on contact. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.



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Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: L86243-01A
Field Sample ID: MW-9
Collected: 9/9/2008 10:30:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 1:02:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
Trichloroethene	ADM	0.052	0.50	< 0.50	U
Trichlorofluoromethane	ADM	0.016	0.50	< 0.50	U
1,2,3-Trichloropropane	ADM	0.067	0.50	< 0.50	U
Vinyl acetate	ADM	0.27	1.0	< 1.0	U
Vinyl chloride	ADM	0.11	0.50	< 0.50	U
Xylenes, Total	ADM	0.14	0.50	< 0.50	U
Surr: 1,2-Dichloroethane-d4	ADM	0	81-120	111	
Surr: 4-Bromofluorobenzene	ADM	0	85-115	99.2	
Surr: Dibromofluoromethane	ADM	0	85-115	105	
Surr: Toluene-d8	ADM	0	85-115	98.7	

U - This flag indicates the compound was analyzed for but not detected above the MDL.

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

B - This analyte was also detected in the method blank <PQL at 0.04µg/L.

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Kyle F. Gross
 Laboratory Director

 Jose Rocha
 QA Officer

ORGANIC ANALYSIS REPORT

Client: Summit County
 Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-02A
 Field Sample ID: MW-7
 Collected: 9/9/2008 11:00:00 AM
 Received: 9/10/2008

Analyzed: 9/19/2008 1:27:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
Acetone	ADM	1.4	2.0	< 2.0	U
Acrylonitrile	ADM	0.17	1.0	< 1.0	U
Benzene	ADM	0.022	0.50	< 0.50	U
Bromochloromethane	ADM	0.054	0.50	< 0.50	U
Bromodichloromethane	ADM	0.25	0.50	< 0.50	U
Bromoform	ADM	0.052	0.50	< 0.50	U
Carbon disulfide	ADM	0.033	0.50	< 0.50	U
Carbon tetrachloride	ADM	0.071	0.50	< 0.50	U
Chlorobenzene	ADM	0.023	0.50	< 0.50	U
Chloroethane	ADM	0.22	0.50	< 0.50	U
Chloroform	ADM	0.028	0.50	< 0.50	U
Dibromochloromethane	ADM	0.27	0.50	< 0.50	U
1,2-Dibromo-3-chloropropane	ADM	0.21	2.0	< 2.0	U
1,2-Dibromoethane	ADM	0.06	0.50	< 0.50	U
1,2-Dichlorobenzene	ADM	0.041	0.50	< 0.50	U
1,4-Dichlorobenzene	ADM	0.2	0.50	< 0.50	U
trans 1,4-Dichloro-2-butene	ADM	0.24	1.0	< 1.0	U
1,1-Dichloroethane	ADM	0.028	0.50	0.03	J
1,2-Dichloroethane	ADM	0.028	0.50	< 0.50	U

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 Laboratory Director

 Jose Rocha
 QA Officer

Lab Sample ID: L86243-02A
 Field Sample ID: MW-7
 Collected: 9/9/2008 11:00:00 AM
 Received: 9/10/2008

Analyzed: 9/19/2008 1:27:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L
 Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,1-Dichloroethene	ADM	0.022	0.50	< 0.50	U
cis 1,2-Dichloroethene	ADM	0.031	0.50	< 0.50	U
trans 1,2-Dichloroethene	ADM	0.035	0.50	< 0.50	U
1,2-Dichloropropane	ADM	0.016	0.50	< 0.50	U
cis 1,3-Dichloropropene	ADM	0.022	0.50	< 0.50	U
trans 1,3-Dichloropropene	ADM	0.031	0.50	< 0.50	U
Ethylbenzene	ADM	0.032	0.50	< 0.50	U
2-Hexanone	ADM	0.16	1.0	< 1.0	U
Bromomethane	ADM	0.19	1.0	< 1.0	U
Chloromethane	ADM	0.029	0.50	< 0.50	U
Dibromomethane	ADM	0.057	0.50	< 0.50	U
Methylene chloride	ADM	0.044	0.50	0.05	J
2-Butanone	ADM	0.84	2.0	< 2.0	U
Iodomethane	ADM	0.062	5.0	< 5.0	U
4-Methyl-2-pentanone	ADM	0.076	1.0	< 1.0	U
Styrene	ADM	0.034	0.50	< 0.50	U
1,1,1,2-Tetrachloroethane	ADM	0.044	0.50	< 0.50	U
1,1,2,2-Tetrachloroethane	ADM	0.05	0.50	< 0.50	U
Tetrachloroethene	ADM	0.19	0.50	< 0.50	U
Toluene	ADM	0.028	0.50	0.07	JB
1,1,1-Trichloroethane	ADM	0.039	0.50	< 0.50	U
1,1,2-Trichloroethane	ADM	0.057	0.50	< 0.50	U

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Kyle F. Gross

Laboratory Director

Jose Rocha

QA Officer

Lab Sample ID: L86243-02A

Field Sample ID: MW-7

Collected: 9/9/2008 11:00:00 AM

Received: 9/10/2008

Analyzed: 9/19/2008 1:27:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
Trichloroethene	ADM	0.052	0.50	< 0.50	U
Trichlorofluoromethane	ADM	0.016	0.50	< 0.50	U
1,2,3-Trichloropropane	ADM	0.067	0.50	< 0.50	U
Vinyl acetate	ADM	0.27	1.0	< 1.0	U
Vinyl chloride	ADM	0.11	0.50	< 0.50	U
Xylenes, Total	ADM	0.14	0.50	< 0.50	U
Surr: 1,2-Dichloroethane-d4	ADM	0	81-120	112	
Surr: 4-Bromofluorobenzene	ADM	0	85-115	98.5	
Surr: Dibromofluoromethane	ADM	0	85-115	105	
Surr: Toluene-d8	ADM	0	85-115	98.4	

U - This flag indicates the compound was analyzed for but not detected above the MDL.

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

B - This analyte was also detected in the method blank <PQL at 0.04µg/L.



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Jose Rocha
QA Officer

Lab Sample ID: L86243-04A
Field Sample ID: MW-19
Collected: 9/9/2008 10:00:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 2:15:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Table with 5 columns: Compound, Tech, MDL, Reporting Limit, Analytical Result. Lists various chemical compounds such as 1,1-Dichloroethene, Ethylbenzene, and Toluene with their respective detection limits and results.

All analyses applicable to the CWA, SDWA, and RCRA are performed in accordance to NELAC protocols. Pertinent sampling information is located on the attached COC. This report is provided for the exclusive use of the addressee.



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Kyle F. Gross
Laboratory Director
Jose Rocha
QA Officer

ORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-03A
Field Sample ID: MW-3
Collected: 9/9/2008 11:30:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 1:51:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

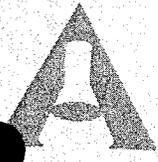
Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Table with 6 columns: Compound, Tech, MDL, Reporting Limit, Analytical Result, and a final column with 'U' or 'U¹'. Rows include Acetone, Acrylonitrile, Benzene, Bromochloromethane, Bromodichloromethane, Bromoform, Carbon disulfide, Carbon tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Dibromochloromethane, 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, 1,2-Dichlorobenzene, 1,4-Dichlorobenzene, trans 1,4-Dichloro-2-butene, 1,1-Dichloroethane, and 1,2-Dichloroethane.

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Laboratory Director

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QA Officer

Lab Sample ID: L86243-03A
Field Sample ID: MW-3
Collected: 9/9/2008 11:30:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 1:51:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

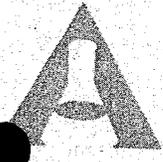
Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,1-Dichloroethene	ADM	0.022	0.50	< 0.50	U ¹
cis 1,2-Dichloroethene	ADM	0.031	0.50	< 0.50	U
trans 1,2-Dichloroethene	ADM	0.035	0.50	< 0.50	U
1,2-Dichloropropane	ADM	0.016	0.50	< 0.50	U ¹
cis 1,3-Dichloropropene	ADM	0.022	0.50	< 0.50	U
trans 1,3-Dichloropropene	ADM	0.031	0.50	< 0.50	U
Ethylbenzene	ADM	0.032	0.50	< 0.50	U ¹
2-Hexanone	ADM	0.16	1.0	< 1.0	U
Bromomethane	ADM	0.19	1.0	< 1.0	U
Chloromethane	ADM	0.029	0.50	< 0.50	U
Dibromomethane	ADM	0.057	0.50	< 0.50	U
Methylene chloride	ADM	0.044	0.50	0.1	J
2-Butanone	ADM	0.84	2.0	< 2.0	U
Iodomethane	ADM	0.062	5.0	< 5.0	U
4-Methyl-2-pentanone	ADM	0.076	1.0	< 1.0	U
Styrene	ADM	0.034	0.50	< 0.50	U
1,1,1,2-Tetrachloroethane	ADM	0.044	0.50	< 0.50	U
1,1,2,2-Tetrachloroethane	ADM	0.05	0.50	< 0.50	U
Tetrachloroethene	ADM	0.19	0.50	< 0.50	U
Toluene	ADM	0.028	0.50	0.06	JB
1,1,1-Trichloroethane	ADM	0.039	0.50	< 0.50	U ¹
1,1,2-Trichloroethane	ADM	0.057	0.50	< 0.50	U

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Laboratory Director
Jose Rocha
QA Officer

Lab Sample ID: L86243-03A
Field Sample ID: MW-3
Collected: 9/9/2008 11:30:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 1:51:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

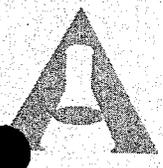
Table with 5 columns: Compound, Tech, MDL, Reporting Limit, Analytical Result. Rows include Trichloroethene, Trichlorofluoromethane, 1,2,3-Trichloropropane, Vinyl acetate, Vinyl chloride, Xylenes, Total, and various Surr: (Surrogate) compounds.

U - This flag indicates the compound was analyzed for but not detected above the MDL.

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

B - This analyte was also detected in the method blank <PQL at 0.04µg/L.

1 - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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Kyle F. Gross
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Jose Rocha
QA Officer

ORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-04A
Field Sample ID: MW-19
Collected: 9/9/2008 10:00:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 2:15:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

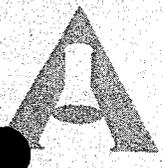
Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
Acetone	ADM	1.4	2.0	3.2	
Acrylonitrile	ADM	0.17	1.0	< 1.0	U
Benzene	ADM	0.022	0.50	< 0.50	U
Bromochloromethane	ADM	0.054	0.50	< 0.50	U
Bromodichloromethane	ADM	0.25	0.50	< 0.50	U
Bromoform	ADM	0.052	0.50	< 0.50	U
Carbon disulfide	ADM	0.033	0.50	< 0.50	U
Carbon tetrachloride	ADM	0.071	0.50	< 0.50	U
Chlorobenzene	ADM	0.023	0.50	< 0.50	U
Chloroethane	ADM	0.22	0.50	< 0.50	U
Chloroform	ADM	0.028	0.50	< 0.50	U
Dibromochloromethane	ADM	0.27	0.50	< 0.50	U
1,2-Dibromo-3-chloropropane	ADM	0.21	2.0	< 2.0	U
1,2-Dibromoethane	ADM	0.06	0.50	< 0.50	U
1,2-Dichlorobenzene	ADM	0.041	0.50	< 0.50	U
1,4-Dichlorobenzene	ADM	0.2	0.50	< 0.50	U
trans 1,4-Dichloro-2-butene	ADM	0.24	1.0	< 1.0	U
1,1-Dichloroethane	ADM	0.028	0.50	< 0.50	U
1,2-Dichloroethane	ADM	0.028	0.50	< 0.50	U

Report Date: 9/30/2008 Page 25 of 52

All analyses applicable to the CWA, SDWA, and RCRA are performed in accordance to NELAC protocols. Pertinent sampling information is located on the attached COC. This report is provided for the exclusive use of the addressee. Privileges of subsequent use of the name of this company or any member of its staff, or reproduction of this report in connection with the advertisement, promotion or sale of any product or process, or in connection with the re-publication of this report for any purpose other than for the addressee will be granted only on contact. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.



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Kyle F. Gross
Laboratory Director
Jose Rocha
QA Officer

Lab Sample ID: L86243-04A
Field Sample ID: MW-19
Collected: 9/9/2008 10:00:00 AM
Received: 9/10/2008

Analyzed: 9/19/2008 2:15:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Table with 5 columns: Compound, Tech, MDL, Reporting Limit, Analytical Result. Rows include Trichloroethene, Trichlorofluoromethane, 1,2,3-Trichloropropane, Vinyl acetate, Vinyl chloride, Xylenes, Total, and various Surr: (Surrogate) compounds.

U - This flag indicates the compound was analyzed for but not detected above the MDL.

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

B - This analyte was also detected in the method blank <PQL at 0.04µg/L.



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Kyle F. Gross
Laboratory Director
Jose Rocha
QA Officer

ORGANIC ANALYSIS REPORT

Client: Summit County
Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-05A
Field Sample ID: Trip Blank
Collected: 9/9/2008
Received: 9/10/2008

Analyzed: 9/19/2008 2:39:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

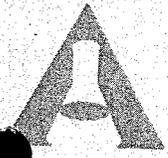
Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Table with 6 columns: Compound, Tech, MDL, Reporting Limit, Analytical Result, and a final status column (U). Rows include Acetone, Acrylonitrile, Benzene, Bromochloromethane, Bromodichloromethane, Bromoform, Carbon disulfide, Carbon tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Dibromochloromethane, 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, 1,2-Dichlorobenzene, 1,4-Dichlorobenzene, trans 1,4-Dichloro-2-butene, 1,1-Dichloroethane, and 1,2-Dichloroethane.

All analyses applicable to the CWA, SDWA, and RCRA are performed in accordance to NELAC protocols. Pertinent sampling information is located on the attached COC. This report is provided for the exclusive use of the addressee. Privileges of subsequent use of the name of this company or any member of its staff, or reproduction of this report in connection with the advertisement, promotion or sale of any product or process, or in connection with the re-publication of this report for any purpose other than for the addressee will be granted only on contact. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.



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Kyle F. Gross
Laboratory Director
Jose Rocha
QA Officer

Lab Sample ID: L86243-05A
Field Sample ID: Trip Blank
Collected: 9/9/2008
Received: 9/10/2008

Analyzed: 9/19/2008 2:39:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Table with 6 columns: Compound, Tech, MDL, Reporting Limit, Analytical Result, and a status column (U, J, JB). Lists various chemical compounds and their detection results.

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Lab Sample ID: L86243-05A
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 Collected: 9/9/2008
 Received: 9/10/2008

Analyzed: 9/19/2008 2:39:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
Trichloroethene	ADM	0.052	0.50	< 0.50	U
Trichlorofluoromethane	ADM	0.016	0.50	< 0.50	U
1,2,3-Trichloropropane	ADM	0.067	0.50	< 0.50	U
Vinyl acetate	ADM	0.27	1.0	< 1.0	U
Vinyl chloride	ADM	0.11	0.50	< 0.50	U
Xylenes, Total	ADM	0.14	0.50	< 0.50	U
Surr: 1,2-Dichloroethane-d4	ADM	0	81-120	114	
Surr: 4-Bromofluorobenzene	ADM	0	85-115	99.8	
Surr: Dibromofluoromethane	ADM	0	85-115	106	
Surr: Toluene-d8	ADM	0	85-115	96.4	

U - This flag indicates the compound was analyzed for but not detected above the MDL.

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

B - This analyte was also detected in the method blank <PQL at 0.04µg/L.

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Kyle F. Gross
 Laboratory Director
 Jose Rocha
 QA Officer

ORGANIC ANALYSIS REPORT

Client: Summit County
 Project ID: Landfill

Contact: Brent Ovard

Lab Sample ID: L86243-06A
 Field Sample ID: Field Blank
 Collected: 9/9/2008
 Received: 9/10/2008

Analyzed: 9/19/2008 3:04:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
Acetone	ADM	1.4	2.0	5.0	
Acrylonitrile	ADM	0.17	1.0	< 1.0	U
Benzene	ADM	0.022	0.50	< 0.50	U
Bromochloromethane	ADM	0.054	0.50	< 0.50	U
Bromodichloromethane	ADM	0.25	0.50	< 0.50	U
Bromoform	ADM	0.052	0.50	< 0.50	U
Carbon disulfide	ADM	0.033	0.50	< 0.50	U
Carbon tetrachloride	ADM	0.071	0.50	< 0.50	U
Chlorobenzene	ADM	0.023	0.50	< 0.50	U
Chloroethane	ADM	0.22	0.50	< 0.50	U
Chloroform	ADM	0.028	0.50	< 0.50	U
Dibromochloromethane	ADM	0.27	0.50	< 0.50	U
1,2-Dibromo-3-chloropropane	ADM	0.21	2.0	< 2.0	U
1,2-Dibromoethane	ADM	0.06	0.50	< 0.50	U
1,2-Dichlorobenzene	ADM	0.041	0.50	< 0.50	U
1,4-Dichlorobenzene	ADM	0.2	0.50	< 0.50	U
trans 1,4-Dichloro-2-butene	ADM	0.24	1.0	< 1.0	U
1,1-Dichloroethane	ADM	0.028	0.50	< 0.50	U
1,2-Dichloroethane	ADM	0.028	0.50	< 0.50	U

Report Date: 9/30/2008 Page 31 of 52

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Lab Sample ID: L86243-06A

Field Sample ID: Field Blank

Collected: 9/9/2008

Received: 9/10/2008

Analyzed: 9/19/2008 3:04:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

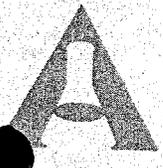
Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
1,1-Dichloroethene	ADM	0.022	0.50	< 0.50	U
cis 1,2-Dichloroethene	ADM	0.031	0.50	< 0.50	U
trans 1,2-Dichloroethene	ADM	0.035	0.50	< 0.50	U
1,2-Dichloropropane	ADM	0.016	0.50	< 0.50	U
cis 1,3-Dichloropropene	ADM	0.022	0.50	< 0.50	U
trans 1,3-Dichloropropene	ADM	0.031	0.50	< 0.50	U
Ethylbenzene	ADM	0.032	0.50	< 0.50	U
2-Hexanone	ADM	0.16	1.0	< 1.0	U
Bromomethane	ADM	0.19	1.0	< 1.0	U
Chloromethane	ADM	0.029	0.50	< 0.50	U
Dibromomethane	ADM	0.057	0.50	< 0.50	U
Methylene chloride	ADM	0.044	0.50	0.73	
2-Butanone	ADM	0.84	2.0	< 2.0	U
Iodomethane	ADM	0.062	5.0	< 5.0	U
4-Methyl-2-pentanone	ADM	0.076	1.0	< 1.0	U
Styrene	ADM	0.034	0.50	< 0.50	U
1,1,1,2-Tetrachloroethane	ADM	0.044	0.50	< 0.50	U
1,1,2,2-Tetrachloroethane	ADM	0.05	0.50	< 0.50	U
Tetrachloroethene	ADM	0.19	0.50	< 0.50	U
Toluene	ADM	0.028	0.50	0.3	JB
1,1,1-Trichloroethane	ADM	0.039	0.50	< 0.50	U
1,1,2-Trichloroethane	ADM	0.057	0.50	< 0.50	U

Report Date: 9/30/2008 Page 32 of 52



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Lab Sample ID: L86243-06A
Field Sample ID: Field Blank
Collected: 9/9/2008
Received: 9/10/2008

Analyzed: 9/19/2008 3:04:00 PM

Analysis Requested: 8260B/5030B

Analytical Results

Utah Landfill VOLATILES by GC/MS 8260B

Units = µg/L

Dilution Factor = 1

Compound	Tech	MDL	Reporting Limit	Analytical Result	
Trichloroethene	ADM	0.052	0.50	< 0.50	U
Trichlorofluoromethane	ADM	0.016	0.50	< 0.50	U
1,2,3-Trichloropropane	ADM	0.067	0.50	< 0.50	U
Vinyl acetate	ADM	0.27	1.0	< 1.0	U
Vinyl chloride	ADM	0.11	0.50	< 0.50	U
Xylenes, Total	ADM	0.14	0.50	0.2	J
Surr: 1,2-Dichloroethane-d4	ADM	0	81-120	118	
Surr: 4-Bromofluorobenzene	ADM	0	85-115	98.7	
Surr: Dibromofluoromethane	ADM	0	85-115	106	
Surr: Toluene-d8	ADM	0	85-115	97.1	

U - This flag indicates the compound was analyzed for but not detected above the MDL.

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

B - This analyte was also detected in the method blank <PQL at 0.04µg/L.



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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: GC

SampType: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
LCS-42345	1,2-Dibromo-3-chloropropane	µg/L	EDB/DBCP	0.09361	0.1	0	93.6	60-130				9/16/2008
LCS-42345	1,2-Dibromoethane	µg/L	EDB/DBCP	0.08208	0.1	0	82.1	57-140				9/16/2008



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Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: GC
SampType: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
MB-42345	1,2-Dibromo-3-chloropropane	µg/L	EDB/DBCP	< 0.010				-			U	9/16/2008
MB-42345	1,2-Dibromoethane	µg/L	EDB/DBCP	< 0.010				-			U	9/16/2008

MB-42345; U - This flag indicates the compound was analyzed for but not detected above the MDL.



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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: GC
SampType: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-04B MS	1,2-Dibromo-3-chloropropane	µg/L	EDB/DBCP	0.09569	0.09755	0	98.1	58-148				9/16/2008
L86243-04B MS	1,2-Dibromoethane	µg/L	EDB/DBCP	0.1207	0.09755	0	124	34-161				9/16/2008



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Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: GC

SampType: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-04B MSD	1,2-Dibromo-3-chloropropane	µg/L	EDB/DBCP	0.1052	0.09645	0	109	58-148	9.47	25		9/16/2008
L86243-04B MSD	1,2-Dibromoethane	µg/L	EDB/DBCP	0.1227	0.09645	0	127	34-161	1.61	25		9/16/2008



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Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: ME

SampType: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
LCS-42344	Antimony	mg/L	6020	0.2075	0.2	0.000415	104	85-115				9/11/2008
LCS-42344	Arsenic	mg/L	6020	0.2112	0.2	0	106	85-115				9/11/2008
LCS-42344	Barium	mg/L	6020	0.2110	0.2	0	106	85-115				9/11/2008
LCS-42344	Beryllium	mg/L	6020	0.2102	0.2	0	105	85-115				9/11/2008
LCS-42344	Cadmium	mg/L	6020	0.2132	0.2	0	107	85-115				9/11/2008
LCS-42344	Cobalt	mg/L	6020	0.2083	0.2	0	104	85-115				9/11/2008
LCS-42344	Copper	mg/L	6020	0.2070	0.2	0	103	85-115				9/11/2008
LCS-42344	Lead	mg/L	6020	0.2123	0.2	0	106	85-115				9/11/2008
LCS-42344	Manganese	mg/L	6020	0.2066	0.2	0	103	85-115				9/11/2008
LCS-42344	Nickel	mg/L	6020	0.2083	0.2	0	104	85-115				9/11/2008
LCS-42344	Selenium	mg/L	6020	0.2024	0.2	0	101	85-115				9/11/2008
LCS-42344	Silver	mg/L	6020	0.2133	0.2	0	107	85-115				9/11/2008
LCS-42344	Thallium	mg/L	6020	0.2051	0.2	0	103	85-115				9/11/2008
LCS-42344	Zinc	mg/L	6020	1.050	1	0	105	85-115				9/11/2008
LCS-42391	Mercury	mg/L	7470A	0.003314	0.00333	0	99.5	80-120				9/18/2008
LCS-42344	Calcium	mg/L	6010B	10.90	10	0	109	75-125				9/16/2008
LCS-42344	Chromium	mg/L	6010B	0.2170	0.2	0	108	75-125				9/16/2008
LCS-42344	Iron	mg/L	6010B	1.140	1	0.00929	113	75-125				9/16/2008
LCS-42344	Magnesium	mg/L	6010B	11.00	10	0	110	75-125				9/16/2008
LCS-42344	Potassium	mg/L	6010B	10.80	10	0	108	75-125				9/16/2008
LCS-42344	Sodium	mg/L	6010B	9.810	10	0	98.1	75-125				9/16/2008
LCS-42344	Vanadium	mg/L	6010B	0.2270	0.2	0	114	75-125				9/16/2008



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Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: ME

SampType: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
MB-42344	Antimony	mg/L	6020	0.0004150				-			J	9/11/2008
MB-42344	Arsenic	mg/L	6020	< 0.00060				-			U	9/11/2008
MB-42344	Barium	mg/L	6020	< 0.00040				-			U	9/11/2008
MB-42344	Beryllium	mg/L	6020	< 0.00060				-			U	9/11/2008
MB-42344	Cadmium	mg/L	6020	< 0.00018				-			U	9/11/2008
MB-42344	Cobalt	mg/L	6020	< 0.0012				-			U	9/11/2008
MB-42344	Copper	mg/L	6020	< 0.00080				-			U	9/11/2008
MB-42344	Lead	mg/L	6020	< 0.00040				-			U	9/11/2008
MB-42344	Manganese	mg/L	6020	< 0.0012				-			U	9/11/2008
MB-42344	Nickel	mg/L	6020	< 0.00080				-			U	9/11/2008
MB-42344	Selenium	mg/L	6020	< 0.00080				-			U	9/11/2008
MB-42344	Silver	mg/L	6020	< 0.00040				-			U	9/11/2008
MB-42344	Thallium	mg/L	6020	< 0.00040				-			U	9/11/2008
MB-42344	Zinc	mg/L	6020	< 0.0050				-			U	9/11/2008
MB-42391	Mercury	mg/L	7470A	< 0.00020				-			U	9/18/2008
MB-42344	Calcium	mg/L	6010B	< 1.0				-			U	9/16/2008
MB-42344	Chromium	mg/L	6010B	< 0.010				-			U	9/16/2008
MB-42344	Iron	mg/L	6010B	0.009290				-			J	9/16/2008
MB-42344	Magnesium	mg/L	6010B	< 1.0				-			U	9/16/2008
MB-42344	Potassium	mg/L	6010B	< 1.0				-			U	9/16/2008
MB-42344	Sodium	mg/L	6010B	< 1.0				-			U	9/16/2008
MB-42344	Vanadium	mg/L	6010B	< 0.0050				-			U	9/16/2008

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

U - This flag indicates the compound was analyzed for but not detected above the MDL.



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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: ME

SampType: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-01GMS	Antimony	mg/L	6020	0.2056	0.2	0	103	70-130				9/11/2008
L86243-01GMS	Arsenic	mg/L	6020	0.2110	0.2	0.007719	102	70-130				9/11/2008
L86243-01GMS	Barium	mg/L	6020	0.3341	0.2	0.1291	103	70-130				9/11/2008
L86243-01GMS	Beryllium	mg/L	6020	0.2040	0.2	0	102	70-130				9/11/2008
L86243-01GMS	Cadmium	mg/L	6020	0.2164	0.2	0	108	70-130				9/11/2008
L86243-01GMS	Cobalt	mg/L	6020	0.2067	0.2	0	103	70-130				9/11/2008
L86243-01GMS	Copper	mg/L	6020	0.2015	0.2	0	101	70-130				9/11/2008
L86243-01GMS	Lead	mg/L	6020	0.2137	0.2	0	107	70-130				9/11/2008
L86243-01GMS	Manganese	mg/L	6020	0.2129	0.2	0.01111	101	70-130				9/11/2008
L86243-01GMS	Nickel	mg/L	6020	0.2067	0.2	0.000389	103	70-130				9/11/2008
L86243-01GMS	Selenium	mg/L	6020	0.2156	0.2	0	108	70-130				9/11/2008
L86243-01GMS	Silver	mg/L	6020	0.2103	0.2	0	105	70-130				9/11/2008
L86243-01GMS	Thallium	mg/L	6020	0.2064	0.2	0	103	70-130				9/11/2008
L86243-01GMS	Zinc	mg/L	6020	1.098	1	0.01748	108	70-130				9/11/2008
L86243-01GMS	Mercury	mg/L	7470A	0.003376	0.00333	8.157E-05	98.9	80-120				9/18/2008
L86243-01GMS	Calcium	mg/L	6010B	14.80	10	4.1	107	75-125				9/16/2008
L86243-01GMS	Chromium	mg/L	6010B	0.2180	0.2	0	109	75-125				9/16/2008
L86243-01GMS	Iron	mg/L	6010B	1.180	1	0.0507	113	75-125				9/16/2008
L86243-01GMS	Magnesium	mg/L	6010B	12.60	10	1.48	111	75-125				9/16/2008
L86243-01GMS	Potassium	mg/L	6010B	12.20	10	1.01	112	75-125				9/16/2008
L86243-01GMS	Vanadium	mg/L	6010B	0.2280	0.2	0	114	75-125				9/16/2008
L86243-01GMS	Sodium	mg/L	6010B	128.0	10	120	80.0	75-125				9/16/2008



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Laboratory Director

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QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: ME
SampType: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-01GMSD	Antimony	mg/L	6020	0.2098	0.2	0	105	70-130	2.03	20		9/11/2008
L86243-01GMSD	Arsenic	mg/L	6020	0.2060	0.2	0.007719	99.1	70-130	2.42	20		9/11/2008
L86243-01GMSD	Barium	mg/L	6020	0.3268	0.2	0.1291	98.9	70-130	2.21	20		9/11/2008
L86243-01GMSD	Beryllium	mg/L	6020	0.2027	0.2	0	101	70-130	0.613	20		9/11/2008
L86243-01GMSD	Cadmium	mg/L	6020	0.2119	0.2	0	106	70-130	2.10	20		9/11/2008
L86243-01GMSD	Cobalt	mg/L	6020	0.2018	0.2	0	101	70-130	2.41	20		9/11/2008
L86243-01GMSD	Copper	mg/L	6020	0.1961	0.2	0	98.1	70-130	2.72	20		9/11/2008
L86243-01GMSD	Lead	mg/L	6020	0.2098	0.2	0	105	70-130	1.86	20		9/11/2008
L86243-01GMSD	Manganese	mg/L	6020	0.2075	0.2	0.01111	98.2	70-130	2.57	20		9/11/2008
L86243-01GMSD	Nickel	mg/L	6020	0.2026	0.2	0.000389	101	70-130	2.00	20		9/11/2008
L86243-01GMSD	Selenium	mg/L	6020	0.2053	0.2	0	103	70-130	4.90	20		9/11/2008
L86243-01GMSD	Silver	mg/L	6020	0.2057	0.2	0	103	70-130	2.21	20		9/11/2008
L86243-01GMSD	Thallium	mg/L	6020	0.2021	0.2	0	101	70-130	2.15	20		9/11/2008
L86243-01GMSD	Zinc	mg/L	6020	1.086	1	0.01748	107	70-130	1.14	20		9/11/2008
L86243-01GMSD	Mercury	mg/L	7470A	0.003446	0.00333	8.157E-05	101	80-120	2.07	20		9/18/2008
L86243-01GMSD	Calcium	mg/L	6010B	14.80	10	4.1	107	75-125	0	20		9/16/2008
L86243-01GMSD	Chromium	mg/L	6010B	0.2140	0.2	0	107	75-125	1.85	20		9/16/2008
L86243-01GMSD	Iron	mg/L	6010B	1.160	1	0.0507	111	75-125	1.71	20		9/16/2008
L86243-01GMSD	Magnesium	mg/L	6010B	12.40	10	1.48	109	75-125	1.60	20		9/16/2008
L86243-01GMSD	Potassium	mg/L	6010B	12.40	10	1.01	114	75-125	1.63	20		9/16/2008
L86243-01GMSD	Vanadium	mg/L	6010B	0.2250	0.2	0	112	75-125	1.32	20		9/16/2008
L86243-01GMSD	Sodium	mg/L	6010B	125.0	10	120	50.0	75-125	2.37	20	²	9/16/2008

² - Analyte concentration is too high for accurate matrix spike recovery and/or RPD.



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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: MSVOA

SampType: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
LCS VOC 091908	1,1,1,2-Tetrachloroethane	µg/L	8260B/5030	4.150	5	0	83.0	30-148				9/19/2008
LCS VOC 091908	1,1,1-Trichloroethane	µg/L	8260B/5030	4.630	5	0	92.6	43-165				9/19/2008
LCS VOC 091908	1,1,2,2-Tetrachloroethane	µg/L	8260B/5030	3.660	5	0	73.2	59-131				9/19/2008
LCS VOC 091908	1,1,2-Trichloroethane	µg/L	8260B/5030	3.990	5	0	79.8	60-135				9/19/2008
LCS VOC 091908	1,1-Dichloroethane	µg/L	8260B/5030	4.290	5	0	85.8	58-156				9/19/2008
LCS VOC 091908	1,1-Dichloroethene	µg/L	8260B/5030	4.420	5	0	88.4	29-185				9/19/2008
LCS VOC 091908	1,2,3-Trichloropropane	µg/L	8260B/5030	3.620	5	0	72.4	42-144				9/19/2008
LCS VOC 091908	1,2-Dibromo-3-chloropropane	µg/L	8260B/5030	3.660	5	0	73.2	62-115				9/19/2008
LCS VOC 091908	1,2-Dibromoethane	µg/L	8260B/5030	3.930	5	0	78.6	62-136				9/19/2008
LCS VOC 091908	1,2-Dichlorobenzene	µg/L	8260B/5030	4.130	5	0	82.6	70-130				9/19/2008
LCS VOC 091908	1,2-Dichloroethane	µg/L	8260B/5030	4.040	5	0	80.8	70-130				9/19/2008
LCS VOC 091908	1,2-Dichloropropane	µg/L	8260B/5030	4.170	5	0	83.4	70-130				9/19/2008
LCS VOC 091908	1,4-Dichlorobenzene	µg/L	8260B/5030	4.110	5	0	82.2	43-141				9/19/2008
LCS VOC 091908	2-Butanone	µg/L	8260B/5030	7.960	5	0	159	10-354				9/19/2008
LCS VOC 091908	2-Hexanone	µg/L	8260B/5030	3.220	5	0	64.4	28-152				9/19/2008
LCS VOC 091908	4-Methyl-2-pentanone	µg/L	8260B/5030	3.570	5	0	71.4	57-162				9/19/2008
LCS VOC 091908	Acetone	µg/L	8260B/5030	2.720	5	0	54.4	12-216				9/19/2008
LCS VOC 091908	Acrylonitrile	µg/L	8260B/5030	3.950	5	0	79.0	42-146				9/19/2008
LCS VOC 091908	Benzene	µg/L	8260B/5030	4.380	5	0	87.6	70-146				9/19/2008
LCS VOC 091908	Bromochloromethane	µg/L	8260B/5030	3.710	5	0	74.2	21-170				9/19/2008
LCS VOC 091908	Bromodichloromethane	µg/L	8260B/5030	4.060	5	0	81.2	44-157				9/19/2008
LCS VOC 091908	Bromoform	µg/L	8260B/5030	3.880	5	0	77.6	37-134				9/19/2008
LCS VOC 091908	Bromomethane	µg/L	8260B/5030	3.710	5	0	74.2	35-192				9/19/2008
LCS VOC 091908	Carbon disulfide	µg/L	8260B/5030	4.700	5	0	94.0	10-188				9/19/2008
LCS VOC 091908	Carbon tetrachloride	µg/L	8260B/5030	4.630	5	0	92.6	31-146				9/19/2008
LCS VOC 091908	Chlorobenzene	µg/L	8260B/5030	4.290	5	0	85.8	79-129				9/19/2008
LCS VOC 091908	Chloroethane	µg/L	8260B/5030	4.150	5	0	83.0	42-204				9/19/2008
LCS VOC 091908	Chloroform	µg/L	8260B/5030	4.220	5	0	84.4	70-130				9/19/2008
LCS VOC 091908	Chloromethane	µg/L	8260B/5030	4.810	5	0	96.2	78-142				9/19/2008



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Laboratory Director

Jose Rocha

QA Officer

QC SUMMARY REPORT

CLIENT: Summit County

Work Order: L86243

Project: Landfill

Dept: MSVOA

SampType: LCS

LCS VOC 091908	cis 1,2-Dichloroethene	µg/L	8260B/5030	4.420	5	0	88.4	54-157	9/19/2008
LCS VOC 091908	cis 1,3-Dichloropropene	µg/L	8260B/5030	4.060	5	0	81.2	48-153	9/19/2008
LCS VOC 091908	Dibromochloromethane	µg/L	8260B/5030	3.930	5	0	78.6	22-138	9/19/2008
LCS VOC 091908	Dibromomethane	µg/L	8260B/5030	3.980	5	0	79.6	39-156	9/19/2008
LCS VOC 091908	Ethylbenzene	µg/L	8260B/5030	4.530	5	0	90.6	67-143	9/19/2008
LCS VOC 091908	Iodomethane	µg/L	8260B/5030	3.200	5	0	64.0	42-140	9/19/2008
LCS VOC 091908	Methylene chloride	µg/L	8260B/5030	3.800	5	0	76.0	43-159	9/19/2008
LCS VOC 091908	Styrene	µg/L	8260B/5030	4.320	5	0	86.4	72-139	9/19/2008
LCS VOC 091908	Tetrachloroethene	µg/L	8260B/5030	4.660	5	0	93.2	57-150	9/19/2008
LCS VOC 091908	Toluene	µg/L	8260B/5030	4.400	5	0.04	87.2	22-175	9/19/2008
LCS VOC 091908	trans 1,2-Dichloroethene	µg/L	8260B/5030	4.500	5	0	90.0	42-168	9/19/2008
LCS VOC 091908	trans 1,3-Dichloropropene	µg/L	8260B/5030	3.770	5	0	75.4	41-154	9/19/2008
LCS VOC 091908	trans 1,4-Dichloro-2-butene	µg/L	8260B/5030	5.150	5	0	103	58-142	9/19/2008
LCS VOC 091908	Trichloroethene	µg/L	8260B/5030	4.560	5	0	91.2	76-117	9/19/2008
LCS VOC 091908	Trichlorofluoromethane	µg/L	8260B/5030	3.970	5	0	79.4	69-148	9/19/2008
LCS VOC 091908	Vinyl acetate	µg/L	8260B/5030	2.990	10	0	29.9	10-150	9/19/2008
LCS VOC 091908	Vinyl chloride	µg/L	8260B/5030	4.180	5	0	83.6	10-210	9/19/2008
LCS VOC 091908	Xylenes, Total	µg/L	8260B/5030	13.21	15	0	88.1	10-195	9/19/2008



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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: MSVOA

SampType: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
MB VOC 091908	1,1,1,2-Tetrachloroethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,1,1-Trichloroethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,1,2,2-Tetrachloroethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,1,2-Trichloroethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,1-Dichloroethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,1-Dichloroethene	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,2,3-Trichloropropane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,2-Dibromo-3-chloropropane	µg/L	8260B/5030	< 2.0				-			U	9/19/2008
MB VOC 091908	1,2-Dibromoethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,2-Dichlorobenzene	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,2-Dichloroethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,2-Dichloropropane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	1,4-Dichlorobenzene	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	2-Butanone	µg/L	8260B/5030	< 2.0				-			U	9/19/2008
MB VOC 091908	2-Hexanone	µg/L	8260B/5030	< 1.0				-			U	9/19/2008
MB VOC 091908	4-Methyl-2-pentanone	µg/L	8260B/5030	< 1.0				-			U	9/19/2008
MB VOC 091908	Acetone	µg/L	8260B/5030	< 2.0				-			U	9/19/2008
MB VOC 091908	Acrylonitrile	µg/L	8260B/5030	< 1.0				-			U	9/19/2008
MB VOC 091908	Benzene	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Bromochloromethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Bromodichloromethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Bromoform	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Bromomethane	µg/L	8260B/5030	< 1.0				-			U	9/19/2008
MB VOC 091908	Carbon disulfide	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Carbon tetrachloride	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Chlorobenzene	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Chloroethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Chloroform	µg/L	8260B/5030	< 0.50				-			U	9/19/2008
MB VOC 091908	Chloromethane	µg/L	8260B/5030	< 0.50				-			U	9/19/2008



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Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: MSVOA

SampType: MBLK

MB VOC 091908	cis 1,2-Dichloroethene	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	cis 1,3-Dichloropropene	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Dibromochloromethane	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Dibromomethane	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Ethylbenzene	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Iodomethane	µg/L	8260B/5030	< 5.0	-	U	9/19/2008
MB VOC 091908	Methylene chloride	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Styrene	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Tetrachloroethene	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Toluene	µg/L	8260B/5030	0.04000	-	J	9/19/2008
MB VOC 091908	trans 1,2-Dichloroethene	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	trans 1,3-Dichloropropene	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	trans 1,4-Dichloro-2-butene	µg/L	8260B/5030	< 1.0	-	U	9/19/2008
MB VOC 091908	Trichloroethene	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Trichlorofluoromethane	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Vinyl acetate	µg/L	8260B/5030	< 1.0	-	U	9/19/2008
MB VOC 091908	Vinyl chloride	µg/L	8260B/5030	< 0.50	-	U	9/19/2008
MB VOC 091908	Xylenes, Total	µg/L	8260B/5030	< 0.50	-	U	9/19/2008

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

U - This flag indicates the compound was analyzed for but not detected above the MDL.



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Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: MSVOA

SampType: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-03AMS	1,1,1-Trichloroethane	µg/L	8260B/5030	7.640	5	0	153	70-130			'	9/19/2008
L86243-03AMS	1,1-Dichloroethene	µg/L	8260B/5030	7.330	5	0	147	65-131			'	9/19/2008
L86243-03AMS	1,2-Dichlorobenzene	µg/L	8260B/5030	6.410	5	0	128	70-130			'	9/19/2008
L86243-03AMS	1,2-Dichloroethane	µg/L	8260B/5030	7.150	5	0	143	70-130			'	9/19/2008
L86243-03AMS	1,2-Dichloropropane	µg/L	8260B/5030	6.680	5	0	134	70-130			'	9/19/2008
L86243-03AMS	Benzene	µg/L	8260B/5030	6.840	5	0	137	68-132			'	9/19/2008
L86243-03AMS	Chlorobenzene	µg/L	8260B/5030	6.420	5	0	128	77-123			'	9/19/2008
L86243-03AMS	Chloroform	µg/L	8260B/5030	6.770	5	0	135	70-130			'	9/19/2008
L86243-03AMS	Ethylbenzene	µg/L	8260B/5030	6.590	5	0	132	70-130			'	9/19/2008
L86243-03AMS	Methylene chloride	µg/L	8260B/5030	6.460	5	0.1	127	70-130			'	9/19/2008
L86243-03AMS	Toluene	µg/L	8260B/5030	6.390	5	0.06	127	69-133			'	9/19/2008
L86243-03AMS	Trichloroethene	µg/L	8260B/5030	7.040	5	0	141	68-127			'	9/19/2008
L86243-03AMS	Xylenes, Total	µg/L	8260B/5030	19.54	15	0	130	70-130			'	9/19/2008

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: MSVOA
SampType: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-03AMSD	1,1,1-Trichloroethane	µg/L	8260B/5030	7.210	5	0	144	70-130	5.79	25	'	9/19/2008
L86243-03AMSD	1,1-Dichloroethene	µg/L	8260B/5030	6.920	5	0	138	65-131	5.75	25	'	9/19/2008
L86243-03AMSD	1,2-Dichlorobenzene	µg/L	8260B/5030	6.120	5	0	122	70-130	4.63	25		9/19/2008
L86243-03AMSD	1,2-Dichloroethane	µg/L	8260B/5030	6.830	5	0	137	70-130	4.58	25	'	9/19/2008
L86243-03AMSD	1,2-Dichloropropane	µg/L	8260B/5030	6.210	5	0	124	70-130	7.29	25		9/19/2008
L86243-03AMSD	Benzene	µg/L	8260B/5030	6.460	5	0	129	68-132	5.71	25		9/19/2008
L86243-03AMSD	Chlorobenzene	µg/L	8260B/5030	6.050	5	0	121	77-123	5.93	25		9/19/2008
L86243-03AMSD	Chloroform	µg/L	8260B/5030	6.490	5	0	130	70-130	4.22	25		9/19/2008
L86243-03AMSD	Ethylbenzene	µg/L	8260B/5030	6.210	5	0	124	70-130	5.94	25		9/19/2008
L86243-03AMSD	Methylene chloride	µg/L	8260B/5030	6.170	5	0.1	121	70-130	4.59	25		9/19/2008
L86243-03AMSD	Toluene	µg/L	8260B/5030	6.050	5	0.06	120	69-133	5.47	25		9/19/2008
L86243-03AMSD	Trichloroethene	µg/L	8260B/5030	6.830	5	0	137	68-127	3.03	25	'	9/19/2008
L86243-03AMSD	Xylenes, Total	µg/L	8260B/5030	18.61	15	0	124	70-130	4.88	25		9/19/2008

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: WC

SampType: DUP

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-04EDUP	pH @ 25° C	pH Units	4500H+B	8.200	0	8.2	-	-	0	5	H	9/10/2008
L86243-04CDUP	TDS	mg/L	160.1	330.0	0	336	-	-	1.80	20		9/12/2008
L86247-07BDUP	TDS	mg/L	160.1	< 20	0	0	-	-	0	20		9/12/2008

H - Sample was received outside of the holding time.



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Kyle F. Gross
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Jose Rocha
QA Officer

QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: WC
SampType: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
LCS-R86422	Chloride	mg/L	300.0	5.054	5	0	101	90-110				9/10/2008
LCS-R86422	Nitrogen, Nitrate (as N)	mg/L	300.0	5.123	5	0	102	90-110				9/10/2008
LCS-R86422	Sulfate	mg/L	300.0	5.034	5	0	101	90-110				9/10/2008
LCS-42356	COD	mg/L	HACH 8000	326.0	300	0	109	85-115				9/11/2008
LCS1-42356	COD	mg/L	HACH 8000	109.0	100	0	109	85-115				9/11/2008
LCS2-42356	COD	mg/L	HACH 8000	1017	1000	0	102	85-115				9/11/2008
LCS3-42356	COD	mg/L	HACH 8000	11.00	10	0	110	85-115				9/11/2008
LCS-42325	Ammonia (as N)	mg/L	350.1	1.013	1	0	101	90-110				9/10/2008
LCS-R86391	pH @ 25° C	pH Units	4500H+B	9.050	9	0	101	98-102				9/10/2008
LCS-R86587	TDS	mg/L	160.1	212.0	205	0	103	80-120				9/12/2008
LCS-R86446	Total Organic Carbon	mg/L	5310B	10.30	10	0	103	90-110				9/11/2008
LCS-R87147	Total Organic Carbon	mg/L	5310B	10.95	10	0.7043	102	90-110				9/29/2008



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QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: WC
SampType: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
MB-R86406	Bicarbonate (As CaCO ₃)	mg/L	2320B	< 10				-			U	9/11/2008
MB-R86406	Carbonate (As CaCO ₃)	mg/L	2320B	< 10				-			U	9/11/2008
MB-R86422	Chloride	mg/L	300.0	< 0.10				-			U	9/10/2008
MB-R86422	Nitrogen, Nitrate (as N)	mg/L	300.0	< 0.10				-			U	9/10/2008
MB-R86422	Sulfate	mg/L	300.0	< 0.75				-			U	9/10/2008
MB-42356	COD	mg/L	HACH 8000	< 10				-			U	9/11/2008
MB-42325	Ammonia (as N)	mg/L	350.1	0.01730				-			J	9/10/2008
MB-R86587	TDS	mg/L	160.1	< 10				-			U	9/12/2008
MB-R86446	Total Organic Carbon	mg/L	5310B	0.4097				-			J	9/11/2008
MB-R87147	Total Organic Carbon	mg/L	5310B	0.7043				-			J	9/29/2008

J - Estimated value between the MDL and the reporting limit (PQL). Results are accurate to one significant figure.

U - This flag indicates the compound was analyzed for but not detected above the MDL.



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QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: WC
SampType: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-02EMS	Chloride	mg/L	300.0	663.6	500	143.4	104	90-110				9/10/2008
L86243-02EMS	Nitrogen, Nitrate (as N)	mg/L	300.0	523.8	500	2.83	104	90-110				9/10/2008
L86243-02EMS	Sulfate	mg/L	300.0	541.3	500	29.43	102	90-110				9/10/2008
L86243-04DMS	COD	mg/L	HACH 8000	54.00	50	5	98.0	85-115				9/11/2008
L86219-03AMS	Ammonia (as N)	mg/L	350.1	2.614	2	0.605	100	90-110				9/10/2008
L86243-01FMS	Ammonia (as N)	mg/L	350.1	1.020	1	0	102	90-110				9/10/2008
L86243-01HMS	Total Organic Carbon	mg/L	5310B	4.300	5	0.8249	69.5	80-120				9/11/2008
L86532-01EMS	Total Organic Carbon	mg/L	5310B	6.800	5	1.4	108	80-120				9/29/2008
L86563-06CMS	Total Organic Carbon	mg/L	5310B	7.300	5	1.6	114	80-120				9/29/2008
L86243-03HMS	Total Organic Carbon	mg/L	5310B	39.20	10	17.9	213	80-120				9/29/2008

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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Jose Rocha
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QC SUMMARY REPORT

CLIENT: Summit County
Work Order: L86243
Project: Landfill

Dept: WC

SampType: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qualifiers	Analysis Date
L86243-02EMSD	Chloride	mg/L	300.0	657.8	500	143.4	103	90-110	0.884	20		9/10/2008
L86243-02EMSD	Nitrogen, Nitrate (as N)	mg/L	300.0	518.7	500	2.83	103	90-110	0.968	20		9/10/2008
L86243-02EMSD	Sulfate	mg/L	300.0	535.5	500	29.43	101	90-110	1.07	20		9/10/2008
L86243-04DMSD	COD	mg/L	HACH 8000	56.00	50	5	102	85-115	3.64	10		9/11/2008
L86219-03AMSD	Ammonia (as N)	mg/L	350.1	2.677	2	0.605	104	90-110	2.38	10		9/10/2008
L86243-01FMDS	Ammonia (as N)	mg/L	350.1	1.022	1	0	102	90-110	0.166	10		9/10/2008
L86243-01HMDS	Total Organic Carbon	mg/L	5310B	5.700	5	0.8249	97.5	80-120	28.0	20	@	9/11/2008
L86532-01EMSD	Total Organic Carbon	mg/L	5310B	6.800	5	1.4	108	80-120	0	20		9/29/2008
L86563-06CMSD	Total Organic Carbon	mg/L	5310B	6.900	5	1.6	106	80-120	5.63	20		9/29/2008
L86243-03HMDS	Total Organic Carbon	mg/L	5310B	30.90	10	17.9	130	80-120	23.7	20	'@	9/29/2008

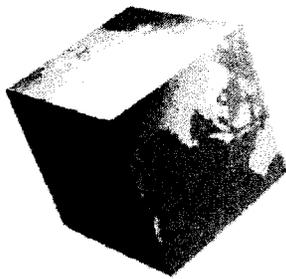
@ - High RPD due to suspected sample non-homogeneity or matrix interference.

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

C

LANDFILL STABILITY ANALYSIS

APPENDIX C



IGES

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Slope Stability Analysis Report
Three Mile Landfill
West of Rockport Reservoir
Summit County, Utah
IGES Inc. Job No. 00301-013

December 10, 2008

Prepared For:

CH2M HILL
c/o David Waite, P.E.

This document was prepared, for use only by the client, only for the purposes stated, and within a reasonable time from its issuance. Please read the "Limitations" section of this report.

Intermountain GeoEnvironmental Services, Inc.
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Contents

Introduction and Site Description.....	1
Assumptions.....	1
Cross Section Selection.....	1
Maximum Horizontal Acceleration.....	1
Municipal Solid Waste Data.....	2
Soil and Rock Data.....	2
Analysis.....	3
Average Horizontal Acceleration.....	3
Slope Stability.....	3
Conclusions.....	4
Closure.....	5
<i>References</i>	6

Introduction and Site Description

Summit County owns and operates a Class I municipal solid waste landfill approximately one half mile west of Rockport Reservoir and 4 miles south of Wanship. The active landfill occupies approximately 24 acres of land within the 115 acres of County owned property in Three Mile Canyon. Figure 1 presents the topography and general arrangement of the Three Mile Landfill.

The design, construction, and operation of landfills in Utah are regulated by Department of Environmental Quality, Division of Solid and Hazardous Waste (DSHW) under the State of Utah Solid Waste Rules (R315-301 through R315-320).

The purpose of this report is to analyze the existing landfill geometry to determine if the slopes are stable under both the static and pseudo-static (seismic) conditions.

Assumptions

Cross Section Selection

The cross sections to be utilized in the stability analysis were chosen based upon both the indicated topography (Figure 1) and the slope map (Figure 2) to identify the steeper slopes. Section views selected for analysis are presented in Figure 3. The subsurface geological data, including the groundwater elevation, was interpreted from the boring logs shown in the Class I Municipal Solid Waste Landfill Application at Three Mile Canyon Summit County, UT by Bingham Environmental (1997).

Maximum Horizontal Acceleration

The maximum horizontal acceleration (MHA) in lithified earth material is defined in 40 CFR part 258.14 (EPA 1991) as the "maximum expected horizontal acceleration depicted on a seismic hazard map with a 90% or greater probability that the acceleration will not be exceeded in 250 years, or the maximum expected horizontal acceleration based on site specific seismic risk assessment." This definition was adopted in full by the DSHW.

Based on the latitude and longitude of the landfill, the United States Geological Survey (USGS) Seismic Hazard Curves and Uniform Hazard Response Spectra V5.0.9 indicate an MHA value of 0.25g for the site (Figure 4). This value is an estimated ground surface acceleration from the 2002

data edition for a 2% probability of exceedance in 50 years and sites with different soil types may amplify or de-amplify this value.

Municipal Solid Waste Data

Review of published data, previous landfill design experience, and engineering judgment, IGES, Inc. estimates that 51 pounds per cubic foot (pcf) is a reasonable representation of the MSW unit weight. Assuming a unit weight of 51 pcf for the MSW incorporates time dependant consolidation that may take place and is conservative as the higher unit weight represents a higher instability driving force for both the static and pseudo-static cases with respect to the use of lower unit weight.

A large scale direct shear test performed in-situ to measure strength properties of MSW, Withiam, et al. (1995), obtained a friction angle of 30 degrees and a cohesion intercept of 200 pounds per square foot (psf). Other work by Kavazanjian et al (1995), suggest a friction angle of 33 degrees and a shearing strength of 500 psf below a normal stress of 627 psf for MSW. Based on this published data and engineering judgment, a value of 30 degrees for the angle of internal friction and 150 psf for the cohesion intercept were used to define the strength properties of the anticipated MSW (Figure 5).

Soil and Rock Data

Strength data was not available for the site soil consisting of silt, silty clay, and clay as noted on the boring logs shown in the Class I Municipal Solid Waste Landfill Application at Three Mile Canyon Summit County, UT by Bingham Environmental (1997). Based on the information provided by the boring logs, and engineering judgment, a value of 30 degrees for the angle of internal friction and 125 psf for the cohesion intercept were used to define the strength properties of the site soil (Figure 6).

Strength properties and unit weight of the on-site siltstone were estimated by using RocData v.4.0 by RocScience. The analysis, which utilizes an extensive database of rock strength data, yielded an equivalent friction angle of 32 degrees for the range of stresses from 0 to 30,000 psf and a cohesion intercept of 3,444 psf. The corresponding coefficients for the Hoek-Brown strength criterion used in the analysis are as follows: $m_b = 0.208$, $s = 0.0001$, and $a = 0.515$ (Figure 7). A reasonable unit weight for the shale was assumed to be 140 pcf.

Analysis

Average Horizontal Acceleration

To estimate the potential amplification of the free field acceleration (0.25g) as it travels up to the base of the landfill and then from the bottom of the landfill to the top of the landfill, a simplified approach was utilized. This method uses the information from Singh and Sun (1995) and Kavazanjian and Matasovic (1995) to estimate the potential amplification. The simplified two step procedure is outlined as follows: 1) estimate the free field peak ground surface acceleration at the base of the refuse; and 2) estimate the peak acceleration at the top of the landfill.

Based on the response spectra for the site (Figure 4), a MHA of 0.25g was used as the ground surface acceleration at the base of the refuse. Utilizing an average shear wave velocity of 700 feet per second and using the analytical data from Singh and Sun (1995), the peak acceleration for a 100 foot high fill was 0.339g. Using the 0.25g acceleration at the base of the landfill and the anticipated peak acceleration of the top of the landfill mass of 0.339g produces an average acceleration of 0.295g. The average acceleration of 0.295g was adjusted as described below and used in the stability and deformation analysis performed for the waste mass.

Slope Stability

Hynes-Griffen and Franklin (1984) performed several Newmark seismic deformation analyses on embankments using 387 strong motion records and 6 artificial accelerograms. The analyses performed considered the yield accelerations (minimum acceleration to cause failure) of the slope sections evaluated by pseudo-static methods and compared them to the anticipated horizontal embankment accelerations. Based on these analyses performed by Hynes-Griffen and Franklin, deformations are anticipated to be one meter or less if the yield acceleration is less than or equal to one-half the horizontal acceleration, with a 20% reduction in shear strength of the waste mass. Krinitzsy, et al. (1995) later directly applied this reasoning to landfills with the modifications of a one foot displacement limit and a $MHA = 0.2(PGA, \text{ or average acceleration}) + 0.1g$. Therefore, using an average horizontal acceleration of 0.164g to obtain a pseudo-static factor of safety of 1.0 or greater indicates satisfactory performance of the waste mass under seismic conditions (deformation less than 1 foot).

Static and pseudo-static analyses of the slope sections were performed using critical sections of the landfill geometry and the soil and waste parameters outlined previously. Results of these

analyses along with the determined yield accelerations (F_y) are presented in Figures 8 - 16. The static and pseudo-static slope stability analyses were completed using the computer program SLIDE v.5.032 by Rocscience. A summary of the static, pseudo-static, and deformation analyses, based on the change in the waste strength parameters and the seismic data generated for the soil profile, is presented below.

Section	Analysis	Minimum FS	Deformation (ft)	F_y (g)
A-A'	Static	2.05	-	-
A-A'	Pseudo-Static	1.12	<1	0.22
B-B'	Static	1.47	-	-
B-B'	Pseudo-Static	0.87	>1	0.09
C-C'	Static	1.64	-	-
C-C'	Pseudo-Static	0.99	>1	0.16

Conclusions

Typical allowable limits in stability analysis are; a minimum factor safety of 1.5 for static conditions, a minimum factor of safety of 1.0 during pseudo-static conditions, and a maximum allowable deformation of 1 foot. Based on the results of the analyses performed using the existing geometry of the landfill, the stability of the slopes is below the minimum standards with the exception of section A-A'. The modeling indicates that Sections B-B' and C-C' would "fail" as defined by deformation exceeding 1 foot in the pseudo-static case.

A sensitivity analysis of a flatter slope was conducted to assess the increase in factors of safety associated with flatter slopes. A proposed landfill geometry of 4H:1V was superimposed onto section B-B'. The results of the stability models are shown in Figures 17 and 18, with a pseudo-static yield coefficient of 0.31 (Figure 19), which shows stability of the slope above the minimum standards. The minimum factors of safety were 3.03 for static conditions and 1.40 for pseudo-static conditions. This analysis indicates that slopes that are 4H:1V or less would be stable even under seismic conditions.

Since the slopes representative of Section B-B' and C-C' are temporary slope and not associated with final cover, it is possible to stabilize the slopes with additional MSW in future landfill cells. Future cells would in essence buttress the existing temporary slopes.

Consideration should be give to flattening all final landfill slopes to a geometry that will be stable under the aforementioned static and pseudo-static conditions (maximum slopes between 3H:1V and 4H:1V).

Closure

The recommendations contained in this report are based on engineering judgment and our review of published data. IGES has not performed a field exploration, performed laboratory testing, nor utilized any site specific data. The subsurface data used in the preparation of this report were obtained from previous work of others and it is possible that variations in the soil and groundwater conditions could exist between the points explored. If any conditions are encountered at this site that are different from those described in this report, IGES should be immediately notified so that we may make any necessary revisions to recommendations contained in this report.

This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No warranty, expressed or implied, is made.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding the report or wish to discuss additional services, please do not hesitate to contact us at your convenience (801) 270-9400.

References

- Bingham Environmental, Class I Municipal Solid Waste Landfill Application at Three Mile Canyon Summit County, Utah, 1997
- Earthquake Hazards Program – National Seismic Hazards Mapping Project, United States Geologic Survey, Golden, Colorado, URL: <http://geohazards.cr.usgs.gov/eq/>
- Hynes-Griffen, M.E. and Franklin, A.G., 1984, *Rationalizing the Seismic Coefficient Method*, Department of the Army, Miscellaneous Paper GL-84-13.
- Kavazanjian, Edward; Matasivic, Neven; Bonaparte, Rudolph; and Schmertmann, Gary R., Evaluation of *MSW Properties for Seismic Analysis, Geoenvironment 2000: Characterization, Containment, Remediation and Performance in Environmental Geotechnics*, Yalcin B. Acar and David E. Daniel, Eds. pp. 1126-1141.
- Krinitzsy, E.L.; Hynes, M.E.; and Franklin, A.G., 1995, Classification of Landfills for Seismic Stability Assessment, Earthquake Design and Performance of Solid Waste Landfills, ASCE Special Publication No. 54, pp. 142-162
- State of Utah Department of Environmental Quality, Division of Solid and Hazardous Waste, 2000, *R315-301 through R315-311 Utah Solid Waste Permitting and Management Rules*.
- Withiam, J.L., Tarvin, P.A., Bushell, T.D., Snow, R.E., Germann, H.W., 1995 *Prediction and Performance of Municipal Landfill Slope. Geoenvironment 2000: Characterization, Containment, Remediation and Performance in Environmental Geotechnics*, Yalcin B. Acar and David E. Daniel, Eds. pp. 1005-1019.



Drawing Notes

SITE PLAN

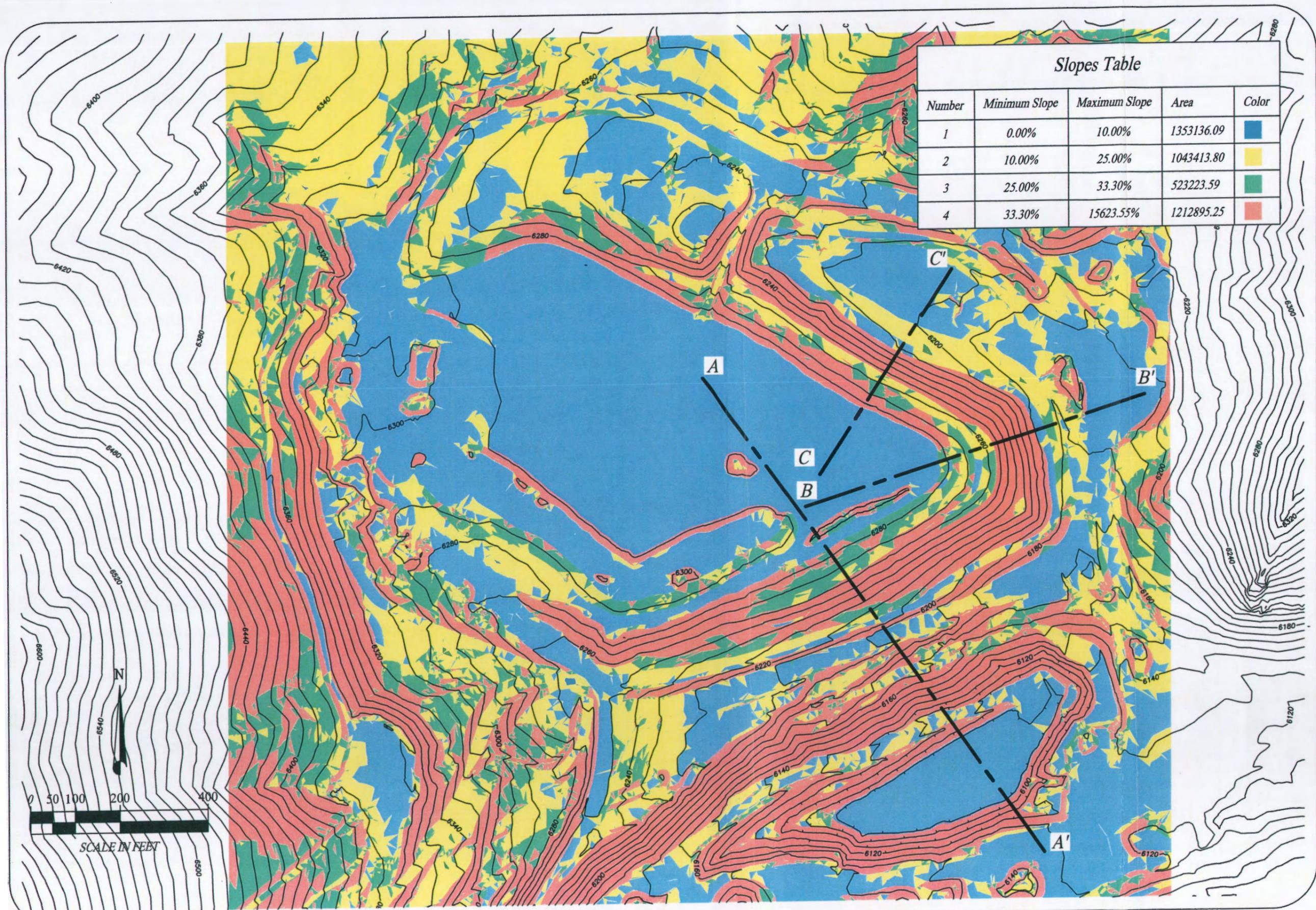
Slope Stability Evaluation
3-Mile Landfill
Summit County, Utah

Project Number 00301-013

No.	Revision/Issue	Date

FIGURE

1



Number	Minimum Slope	Maximum Slope	Area	Color
1	0.00%	10.00%	1353136.09	Blue
2	10.00%	25.00%	1043413.80	Yellow
3	25.00%	33.30%	523223.59	Green
4	33.30%	15623.55%	1212895.25	Red



Drawing Notes

SLOPE PERCENTAGE MAP

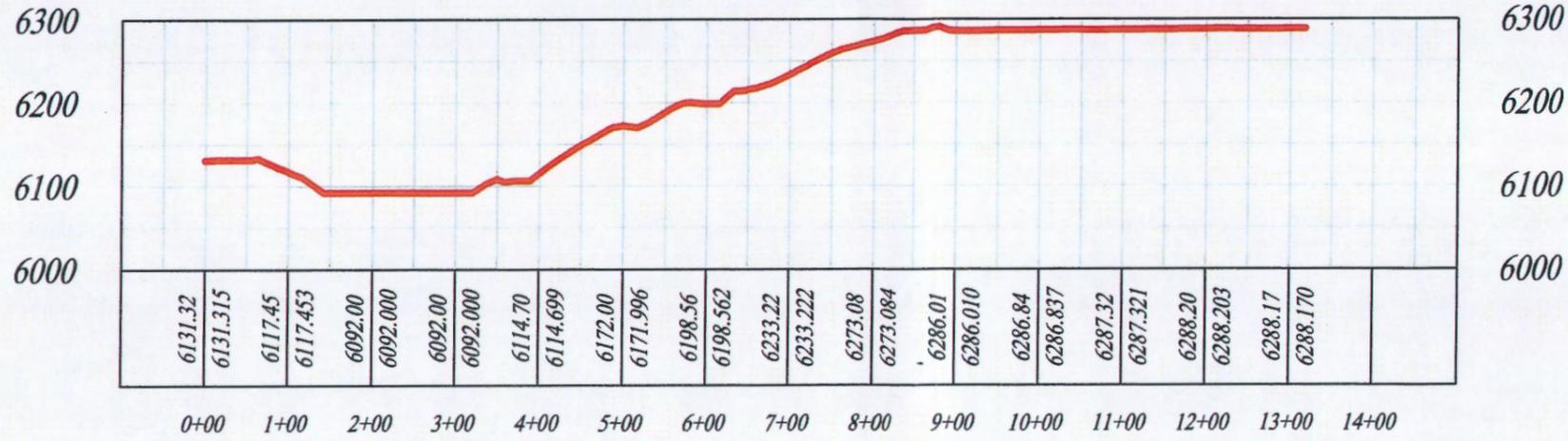
Slope Stability Evaluation
 3-Mile Landfill
 Summit County, Utah

Project Number 00301-013

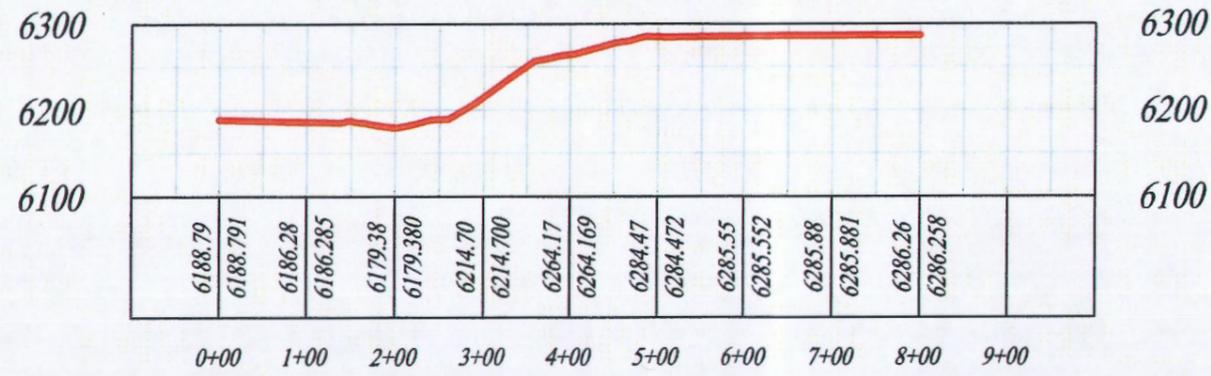
No.	Revision/Issue	Date

FIGURE
2

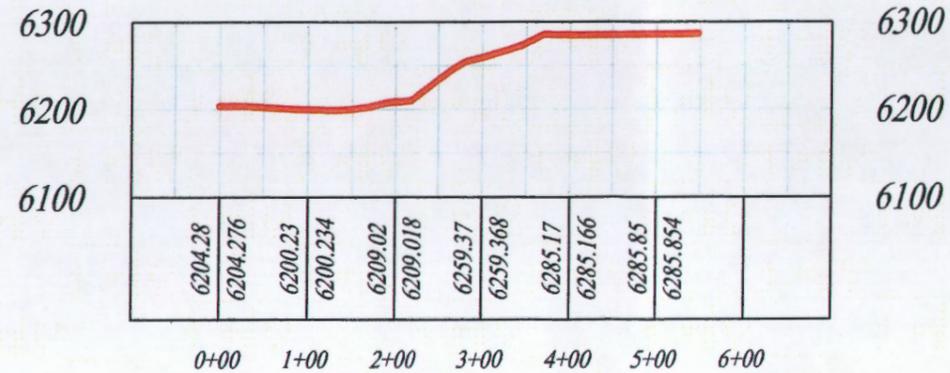
Section A-A' PROFILE



Section B-B' PROFILE



Section C-C' PROFILE



— EXISTING GROUND



Drawing Notes

Slope Stability Evaluation
3-Mile Landfill
Summit County, Utah

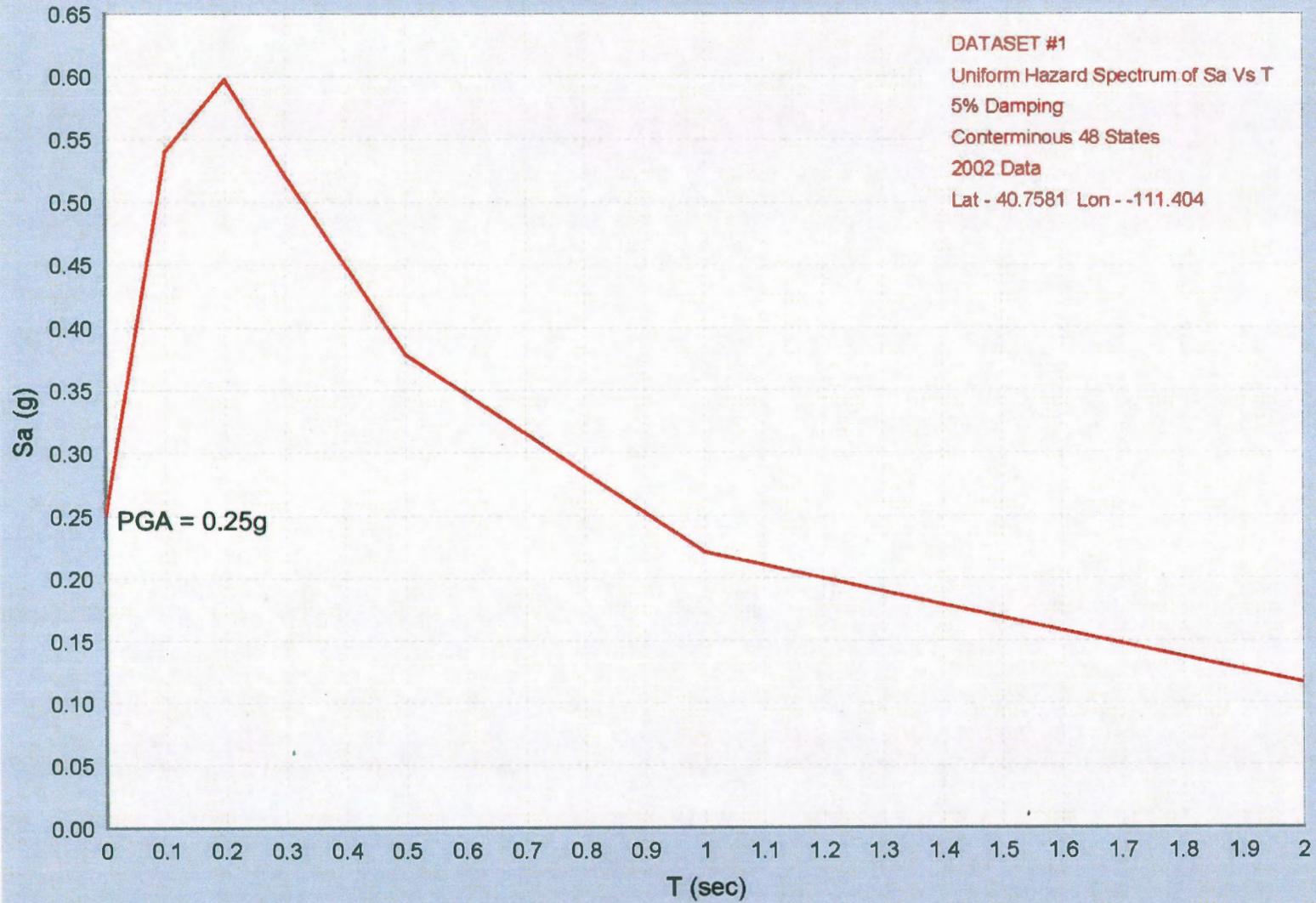
Project Number 00301-013

No.	Revision/Issue	Date

PROFILE VIEW (EXISTING)

FIGURE
3

Uniform Hazard Spectrum of Sa Vs T



4

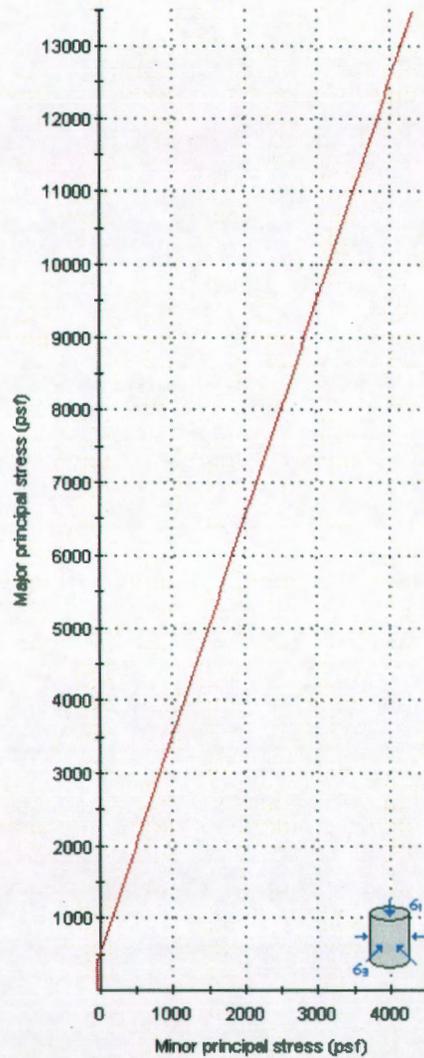
Figure

Uniform Hazard Spectrum for the Three Mile Landfill Site

Project Number: 00301-013

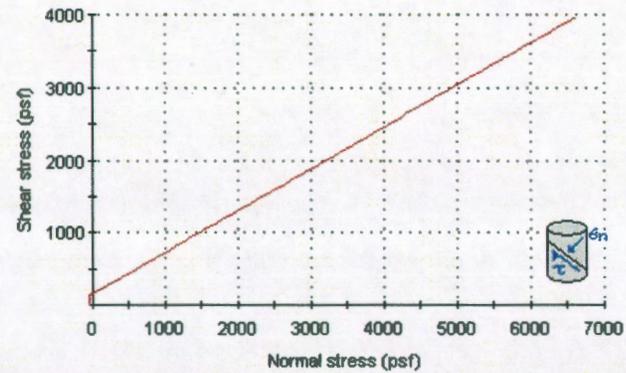


00301-013 Three Mile Landfill Estimation of MSW Strength



Mohr-Coulomb Criterion

cohesion = 150 psf
 friction angle = 30 deg
 tensile strength = -41.65 psf
 uniaxial compressive strength = 519.6 psf
 alpha = 71.57 deg



5

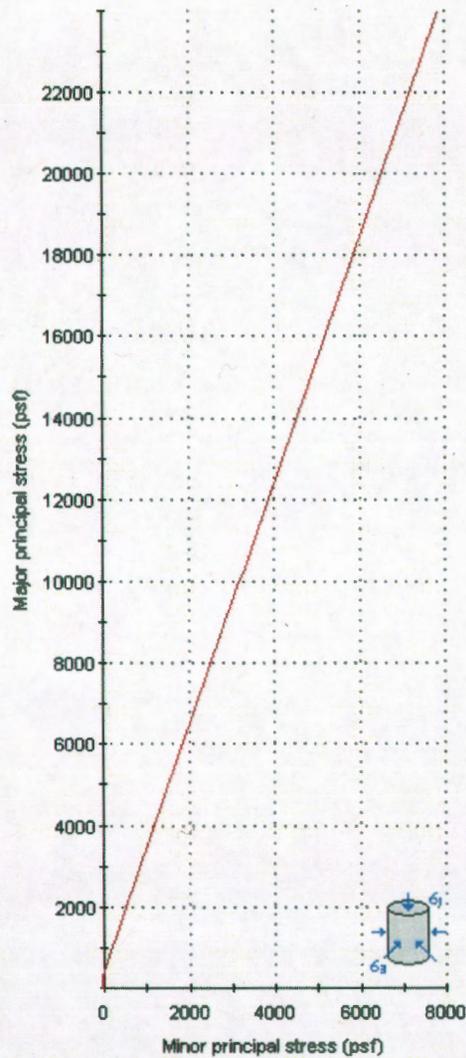
Figure

Estimated Mohr-Coulomb strength parameters for the MSW

Project Number: 00301-013

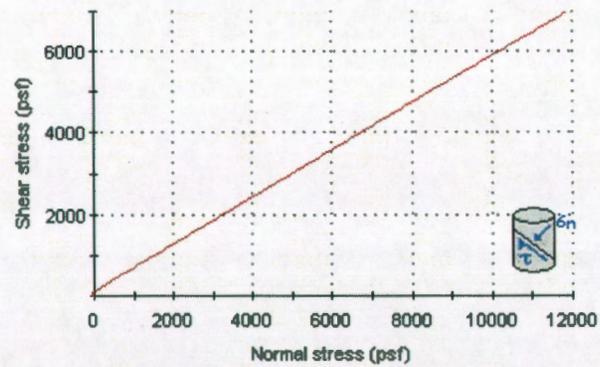


00301-013 Three Mile Landfill Estimation of Composite Site Soil Strength Including Silt, Silty Clay, and Clay



Mohr-Coulomb Criterion

cohesion = 125 psf
 friction angle = 30 deg
 tensile strength = -41.65 psf
 uniaxial compressive strength = 433 psf
 alpha = 71.57 deg



6

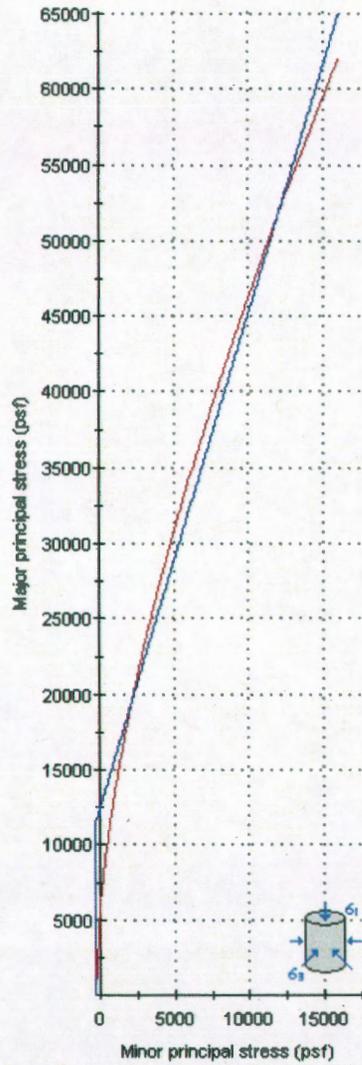
Figure

Estimated Mohr-Coulomb strength parameters for the composite silt, silty clay, and clay site soil

Project Number: 00301-013



00301-013 Three Mile Landfill Estimation of Siltstone



Hoek-Brown Classification

intact uniaxial compressive strength = 730000 psf
 GSI = 36 mi = 7 Disturbance factor = 0.7

Hoek-Brown Criterion

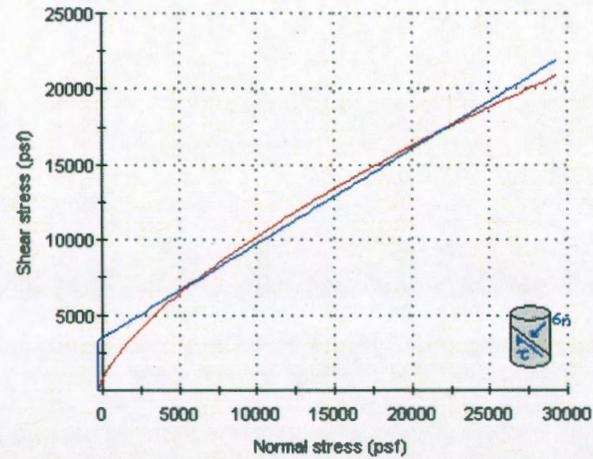
mb = 0.208 s = 0.0001 a = 0.515

Mohr-Coulomb Fit

cohesion = 3443.771 psf friction angle = 32.18 deg

Rock Mass Parameters

tensile strength = -326.985 psf
 uniaxial compressive strength = 6153.927 psf
 global strength = 40825.748 psf
 modulus of deformation = 7934441.37 psf



Section A-A'

File Name: A-A'.sli
 Project Title: 00301-013 Three Mile Landfill Section A-A'
 Material: MSW
 Strength Type: Mohr-Coulomb
 Unit Weight: 51 lb/ft³
 Cohesion: 150 psf
 Friction Angle: 30 degrees
 Material: Composite Soil
 Strength Type: Mohr-Coulomb
 Unit Weight: 100 lb/ft³
 Cohesion: 125 psf
 Friction Angle: 30 degrees
 Material: Siltstone
 Strength Type: Generalised Hoek-Brown
 Unit Weight: 140 lb/ft³
 Unconfined Compressive Strength (intact): 730000 psf
 mb: 0.208
 s: 0.0001
 a: 0.515
 Global Minimums
 Method: bishop simplified
 FS: 2.053960
 Method: spencer
 FS: 2.048910

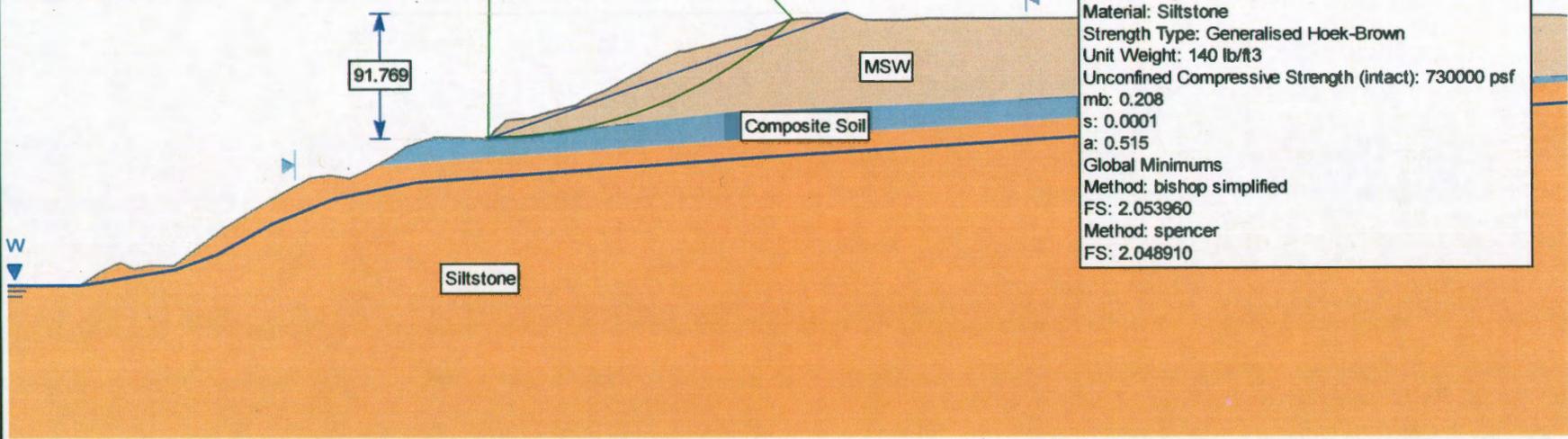
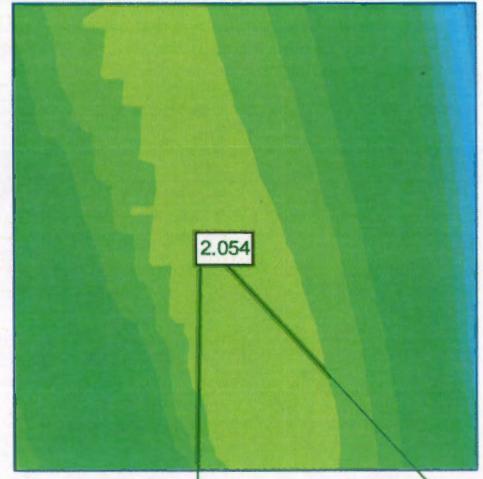
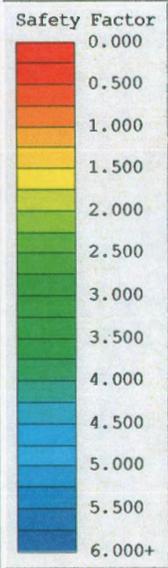


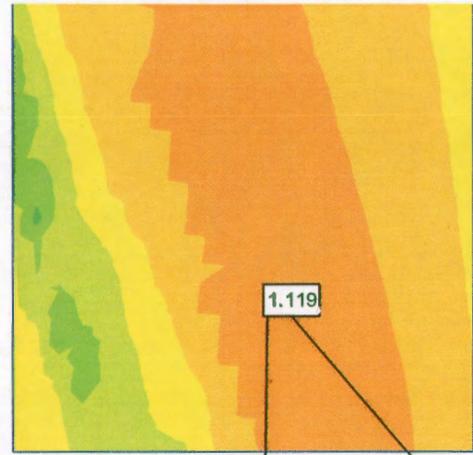
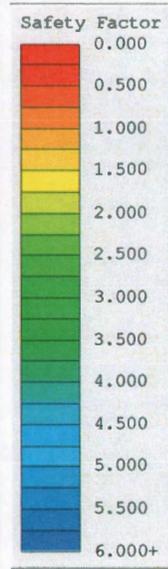
Figure
 8

Static slope stability analysis of section A-A'

Project Number: 00301-013



Section A-A'



File Name: A-A'+S.sli
 Project Title: 00301-013 Three Mile Landfill Section A-A'
 Seismic Load Coefficient (Horizontal): 0.164
 Material: MSW
 Strength Type: Mohr-Coulomb
 Unit Weight: 51 lb/ft³
 Cohesion: 120 psf
 Friction Angle: 24.8 degrees
 Material: Composite Soil
 Strength Type: Mohr-Coulomb
 Unit Weight: 100 lb/ft³
 Cohesion: 125 psf
 Friction Angle: 30 degrees
 Material: Siltstone
 Strength Type: Generalised Hoek-Brown
 Unit Weight: 140 lb/ft³
 Unconfined Compressive Strength (intact): 730000 psf
 mb: 0.208
 s: 0.0001
 a: 0.515
 Global Minimums
 Method: bishop simplified
 FS: 1.118820
 Method: spencer
 FS: 1.120780

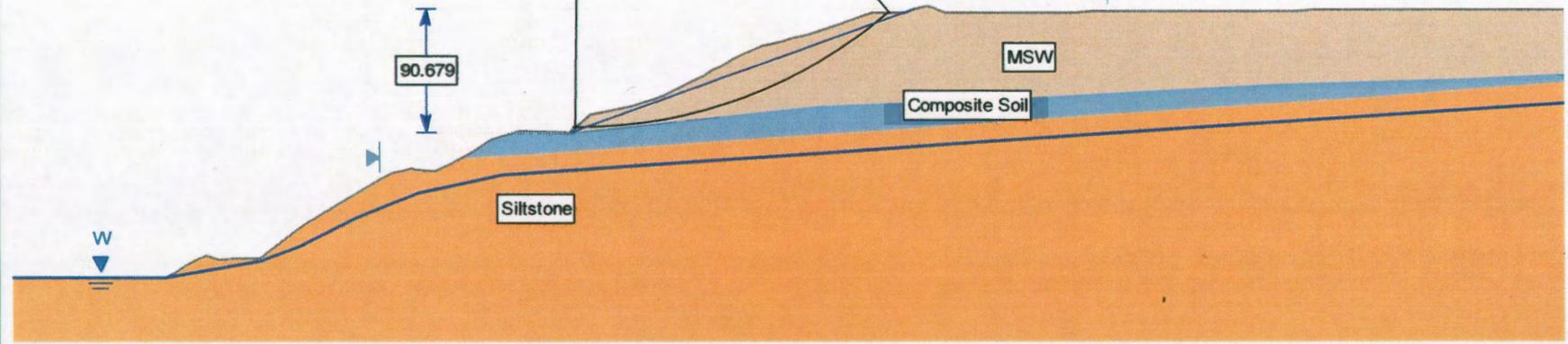


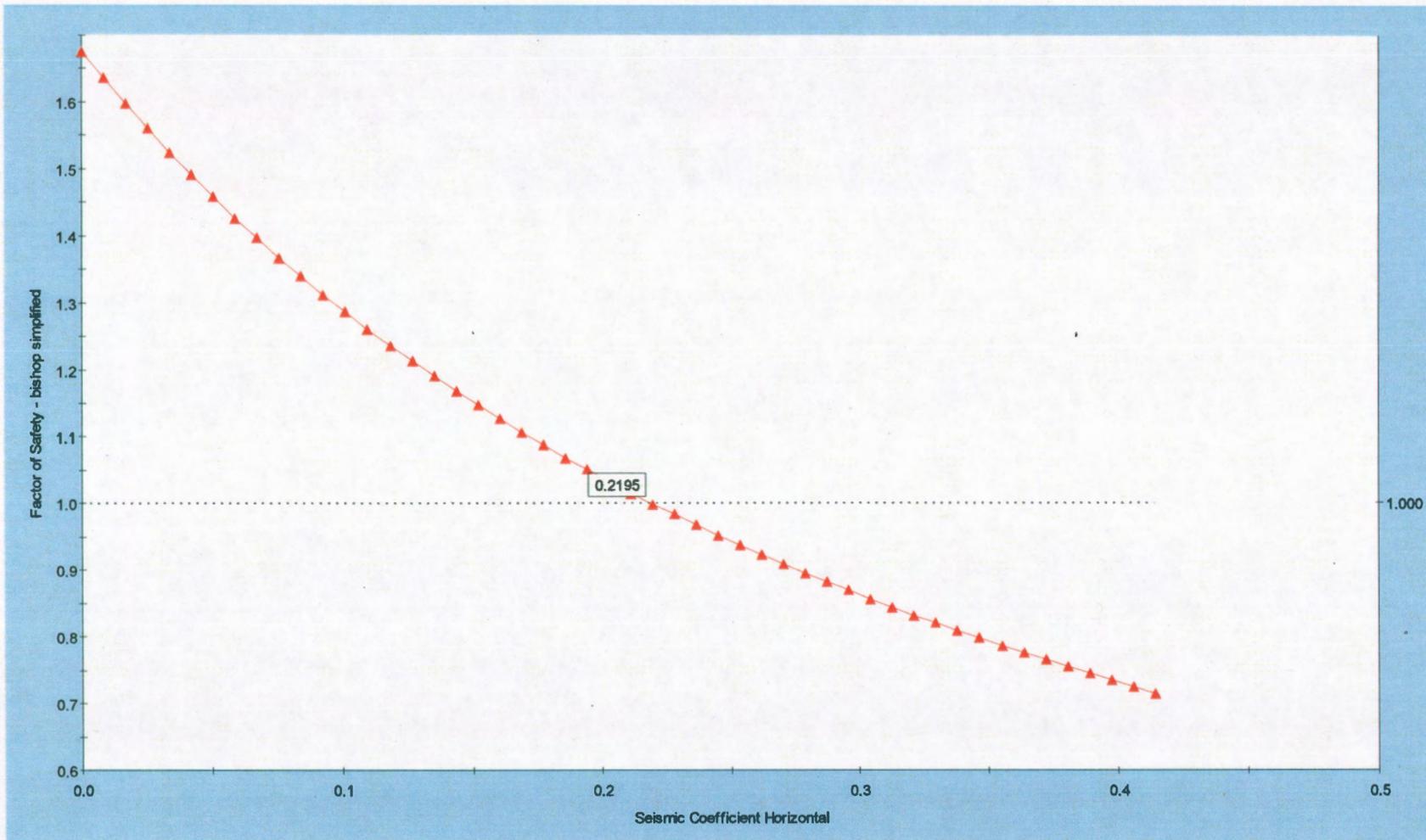
Figure
9

Pseudo-static slope stability analysis of section A-A'

Project Number: 00301-013



Section A-A'



10

Figure

Determination of the yield coefficient for the pseudo-static slope stability analysis of section A-A'

Project Number: 00301-013



Section B-B'

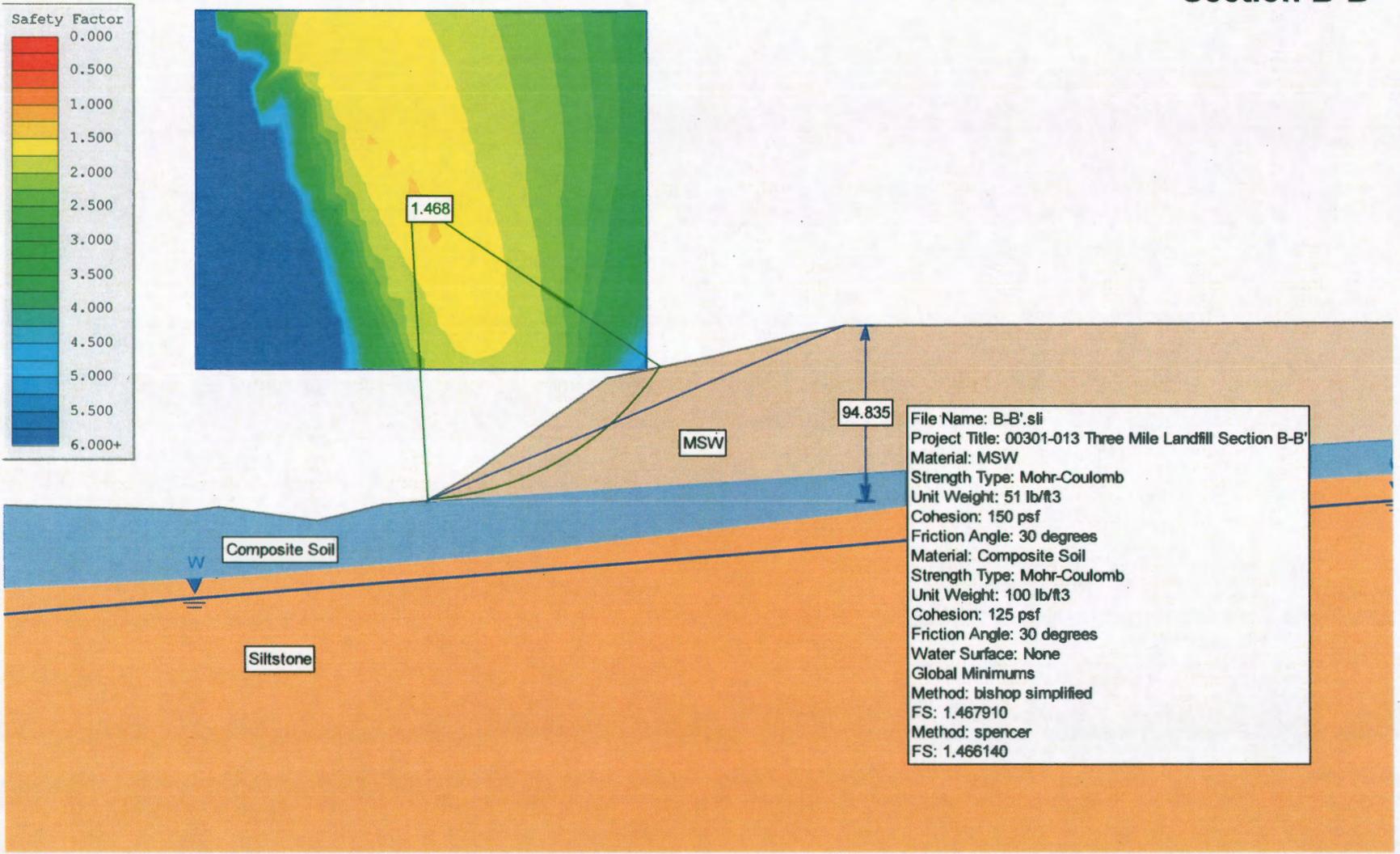


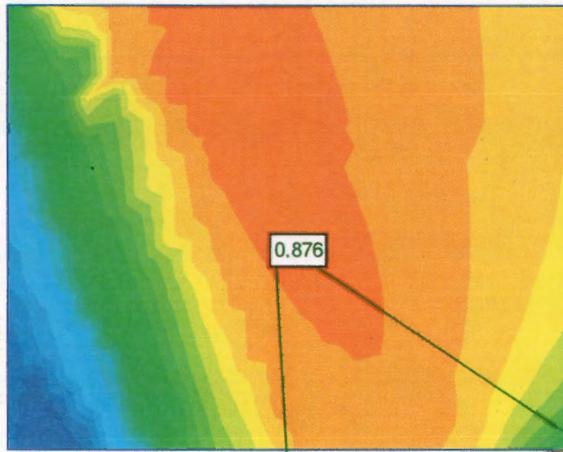
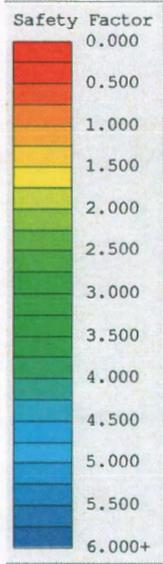
Figure 11

Static slope stability analysis of section B-B'

Project Number: 00301-013



Section B-B'



File Name: B-B'+S.sli
 Project Title: 00301-013 Three Mile Landfill Section B-B'
 Seismic Load Coefficient (Horizontal): 0.164
 Material: MSW
 Strength Type: Mohr-Coulomb
 Unit Weight: 51 lb/ft³
 Cohesion: 120 psf
 Friction Angle: 24.8 degrees
 Material: Composite Soil
 Strength Type: Mohr-Coulomb
 Unit Weight: 100 lb/ft³
 Cohesion: 125 psf
 Friction Angle: 30 degrees
 Material: Siltstone
 Strength Type: Generalised Hoek-Brown
 Unit Weight: 140 lb/ft³
 Unconfined Compressive Strength (intact): 730000 psf
 mb: 0.208
 s: 0.0001
 a: 0.515
 Global Minimums
 Method: bishop simplified
 FS: 0.876005
 Method: spencer
 FS: 0.877160

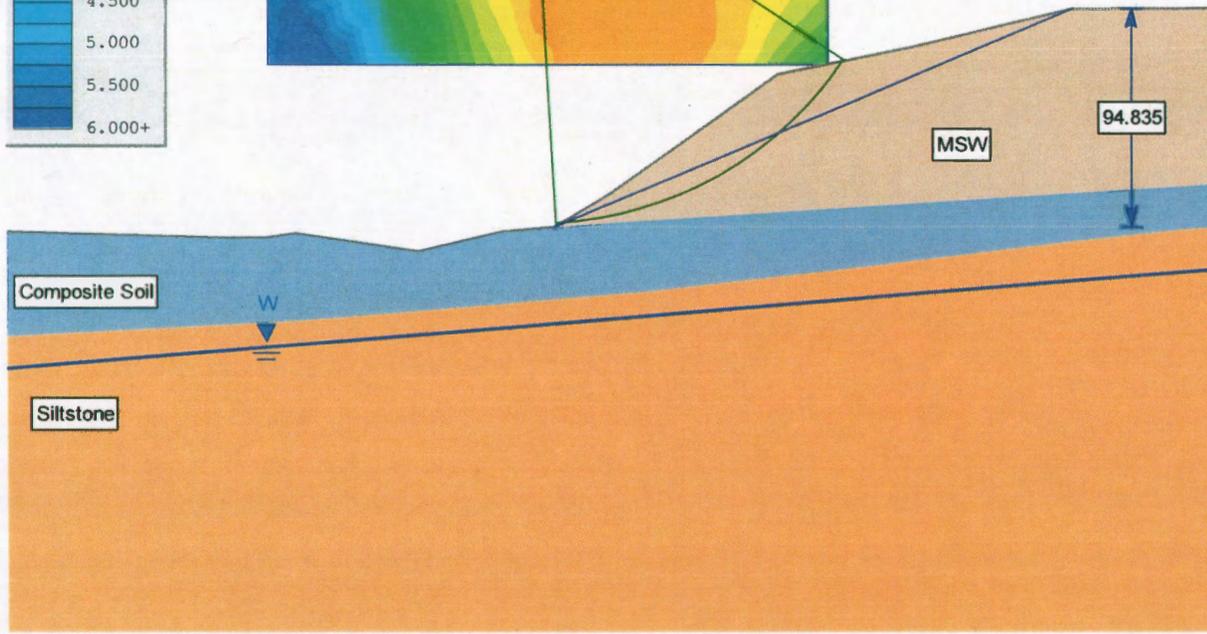


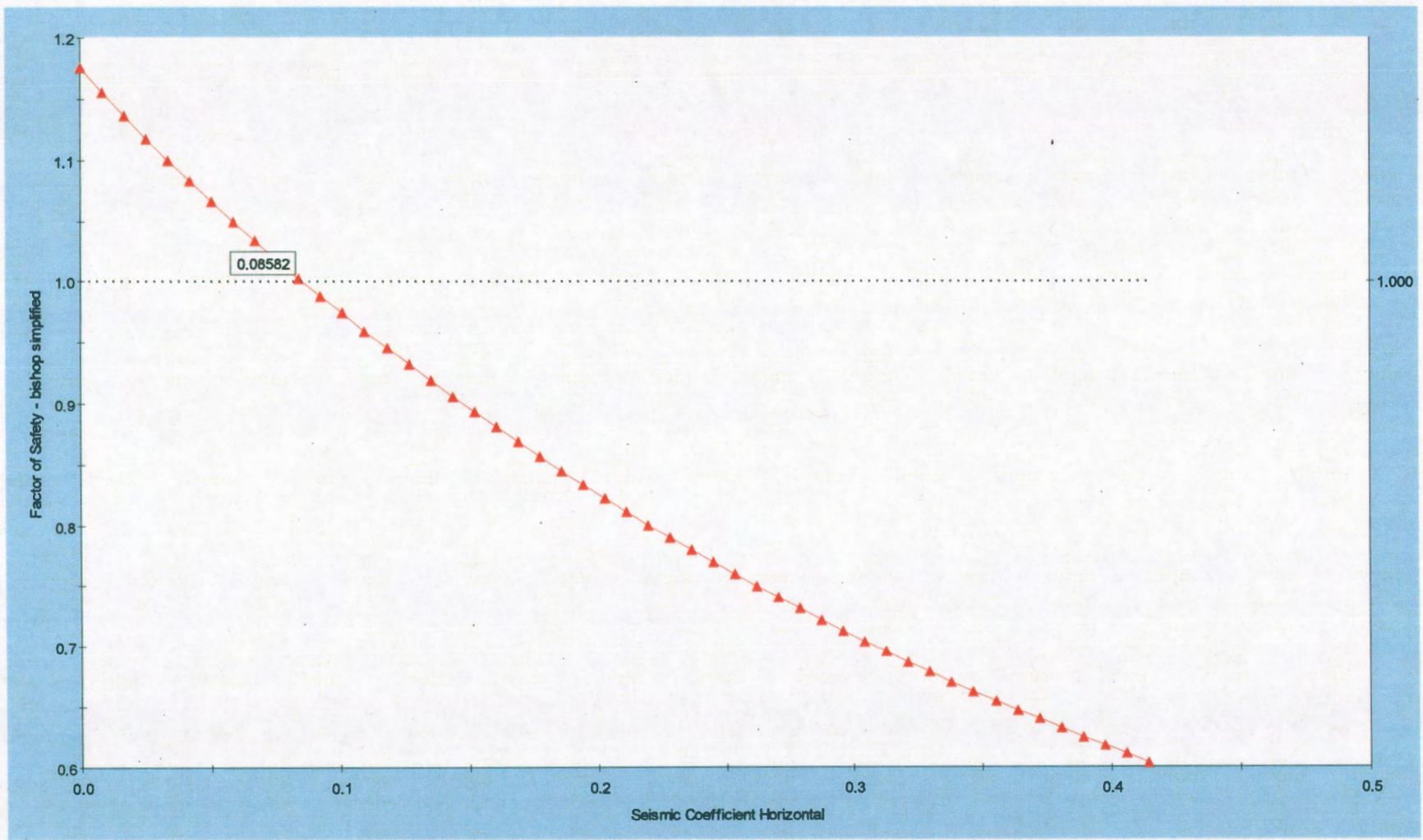
Figure
12

Pseudo-static slope stability analysis of section B-B'

Project Number: 00301-013



Section B-B'



13

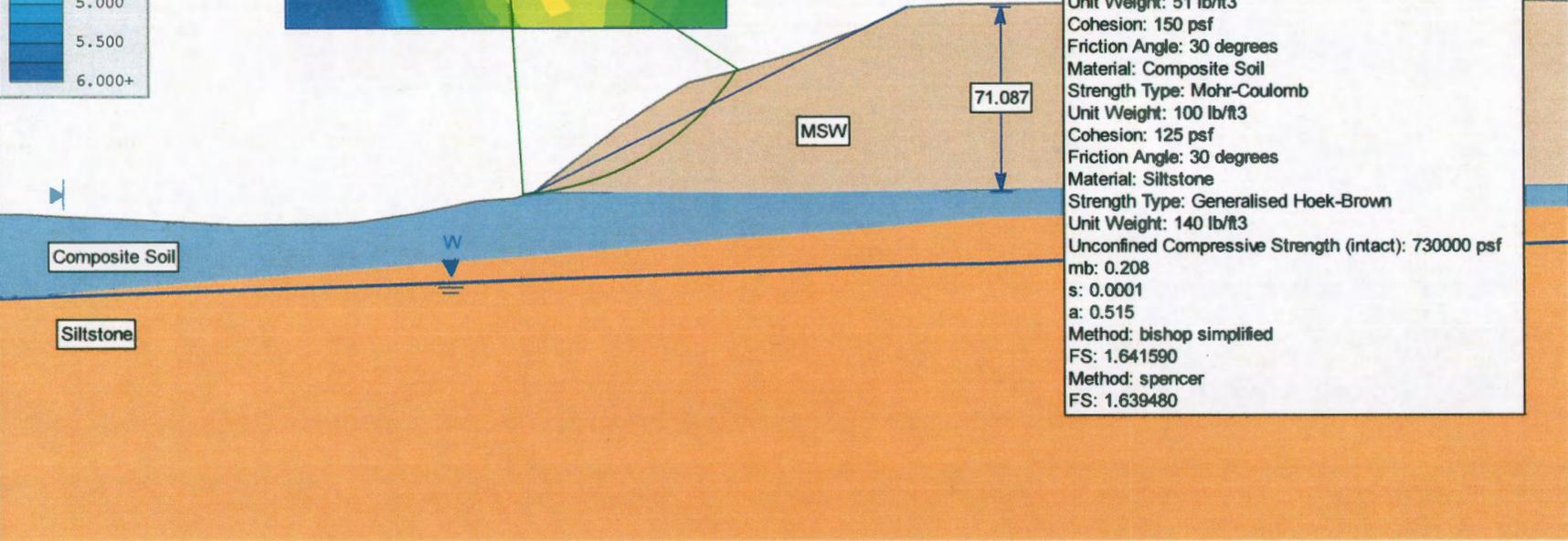
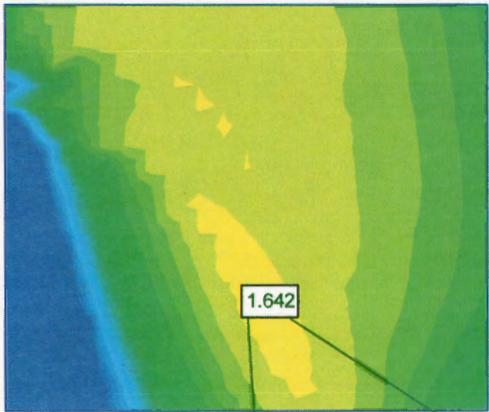
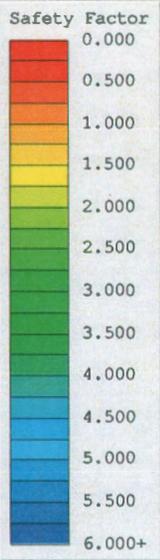
Figure

Determination of the yield coefficient for the pseudo-static slope stability analysis of section B-B'

Project Number: 00301-013



Section C-C'



File Name: C-C'.sli
 Project Title: 00301-013 Three Mile Landfill Section C-C'
 Material: MSW
 Strength Type: Mohr-Coulomb
 Unit Weight: 51 lb/ft³
 Cohesion: 150 psf
 Friction Angle: 30 degrees
 Material: Composite Soil
 Strength Type: Mohr-Coulomb
 Unit Weight: 100 lb/ft³
 Cohesion: 125 psf
 Friction Angle: 30 degrees
 Material: Siltstone
 Strength Type: Generalised Hoek-Brown
 Unit Weight: 140 lb/ft³
 Unconfined Compressive Strength (intact): 730000 psf
 mb: 0.208
 s: 0.0001
 a: 0.515
 Method: bishop simplified
 FS: 1.641590
 Method: spencer
 FS: 1.639480

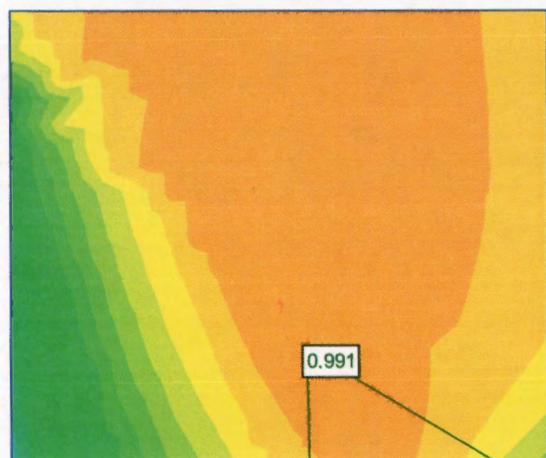
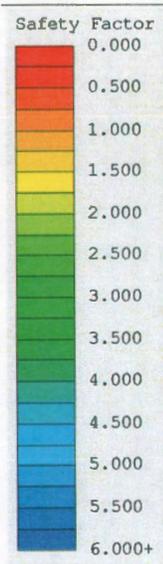
Figure 14

Static slope stability analysis of section C-C'

Project Number: 00301-013



Section C-C'



File Name: C-C'+S.sli
 Project Title: 00301-013 Three Mile Landfill Section C-C'
 Seismic Load Coefficient (Horizontal): 0.164
 Material: MSW
 Strength Type: Mohr-Coulomb
 Unit Weight: 51 lb/ft³
 Cohesion: 120 psf
 Friction Angle: 24.8 degrees
 Material: Composite Soil
 Strength Type: Mohr-Coulomb
 Unit Weight: 100 lb/ft³
 Cohesion: 125 psf
 Friction Angle: 30 degrees
 Material: Siltstone
 Strength Type: Generalised Hoek-Brown
 Unit Weight: 140 lb/ft³
 Unconfined Compressive Strength (intact): 730000 psf
 mb: 0.208
 s: 0.0001
 a: 0.515
 Global Minimums
 Method: bishop simplified
 FS: 0.991027
 Method: spencer
 FS: 0.994422

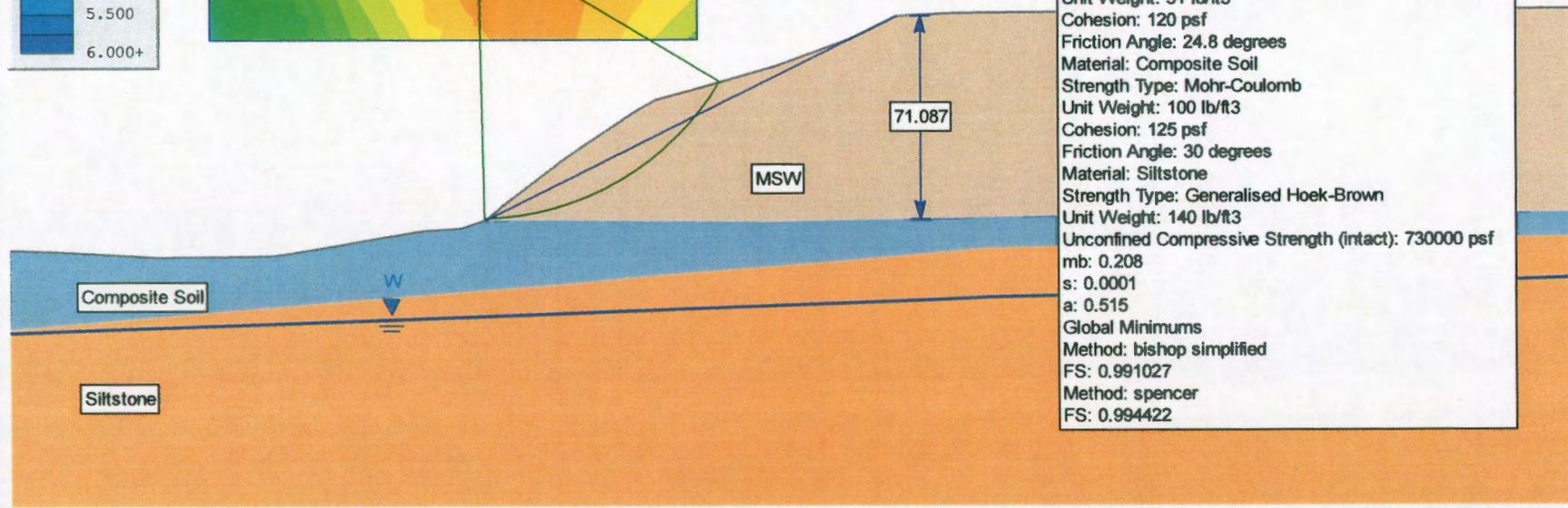


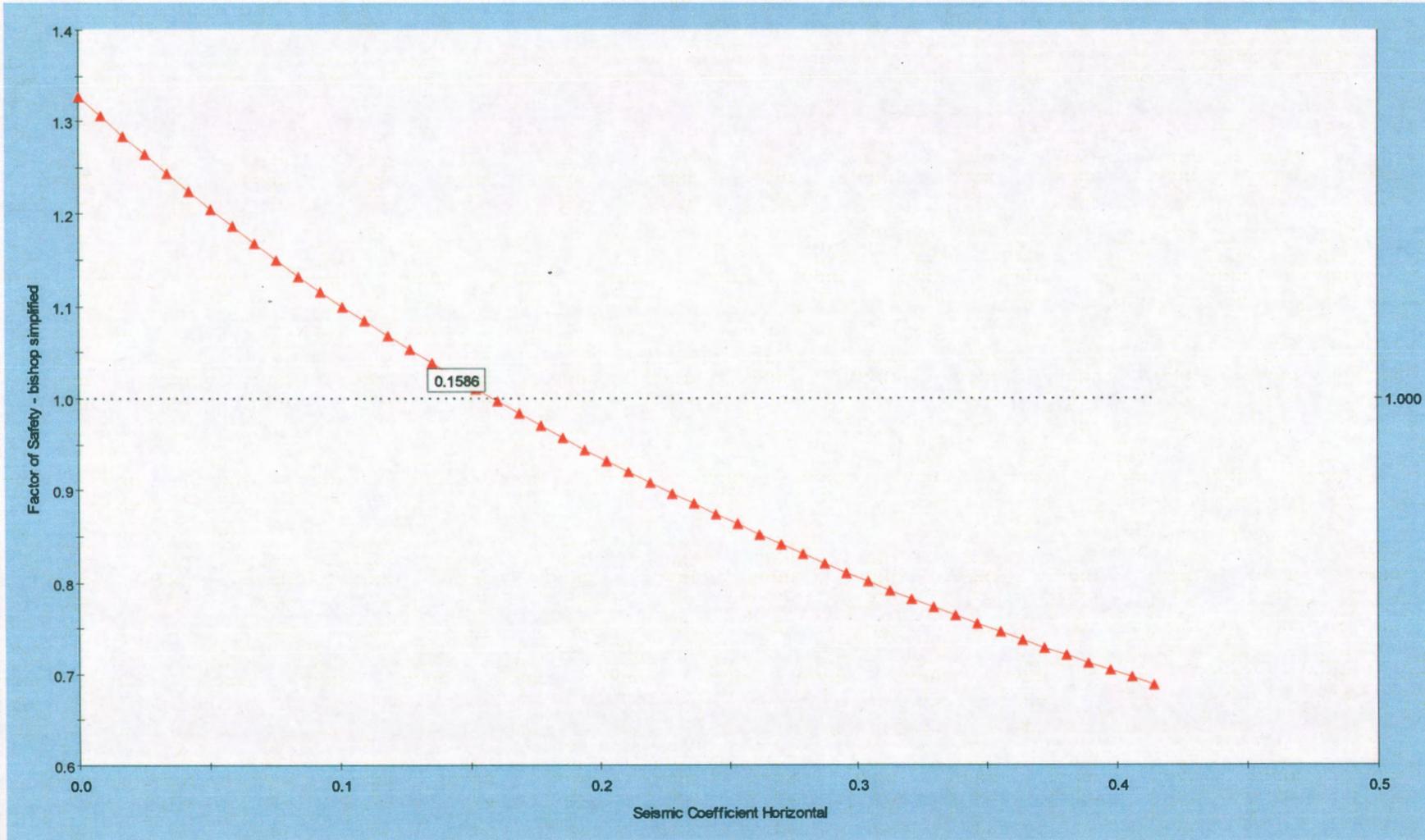
Figure
15

Pseudo-static slope stability analysis of section C-C'

Project Number: 00301-013



Section C-C'



16

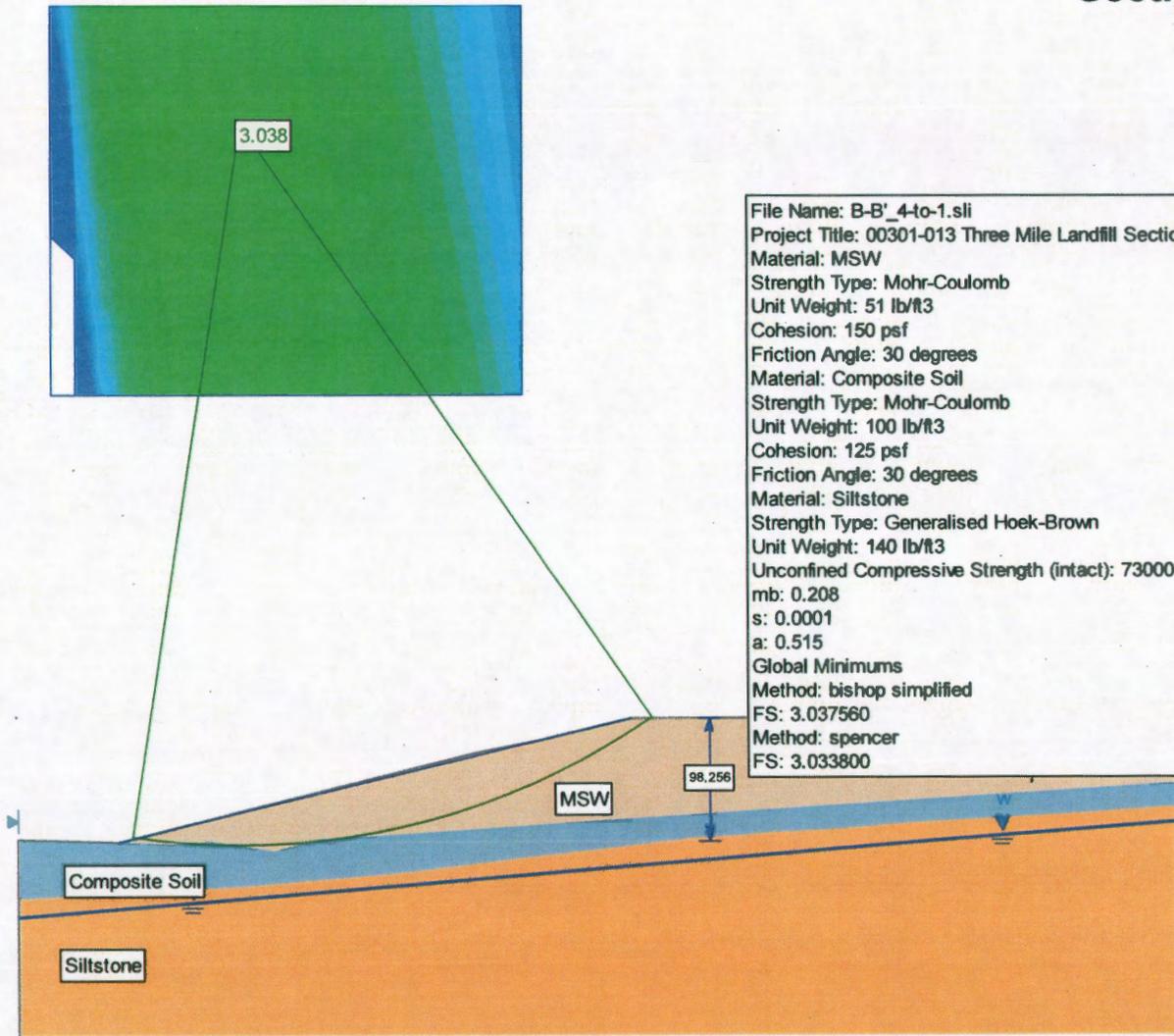
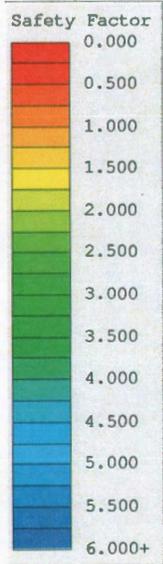
Figure

Determination of the yield coefficient for the pseudo-static slope stability analysis of section C-C'

Project Number: 00301-013



Section B-B' (4H:1V)



File Name: B-B'_4to-1.sli
 Project Title: 00301-013 Three Mile Landfill Section B-B' Modified to 4:1 Slope
 Material: MSW
 Strength Type: Mohr-Coulomb
 Unit Weight: 51 lb/ft³
 Cohesion: 150 psf
 Friction Angle: 30 degrees
 Material: Composite Soil
 Strength Type: Mohr-Coulomb
 Unit Weight: 100 lb/ft³
 Cohesion: 125 psf
 Friction Angle: 30 degrees
 Material: Siltstone
 Strength Type: Generalised Hoek-Brown
 Unit Weight: 140 lb/ft³
 Unconfined Compressive Strength (intact): 730000 psf
 mb: 0.208
 s: 0.0001
 a: 0.515
 Global Minimums
 Method: bishop simplified
 FS: 3.037560
 Method: spencer
 FS: 3.033800

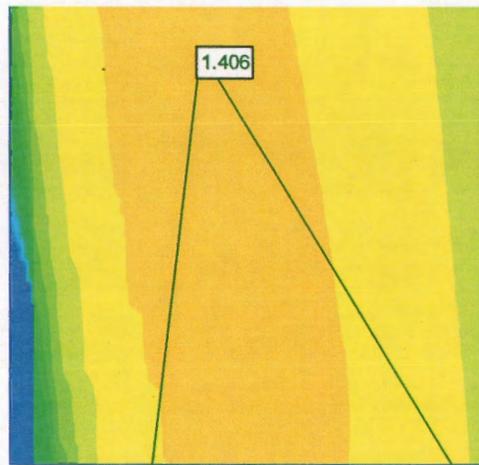
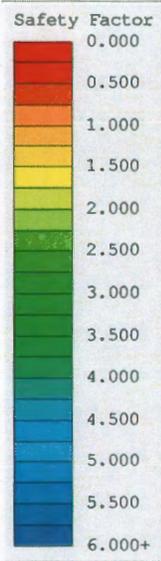
Figure
17

Static slope stability analysis of section B-B' (4H:1V)

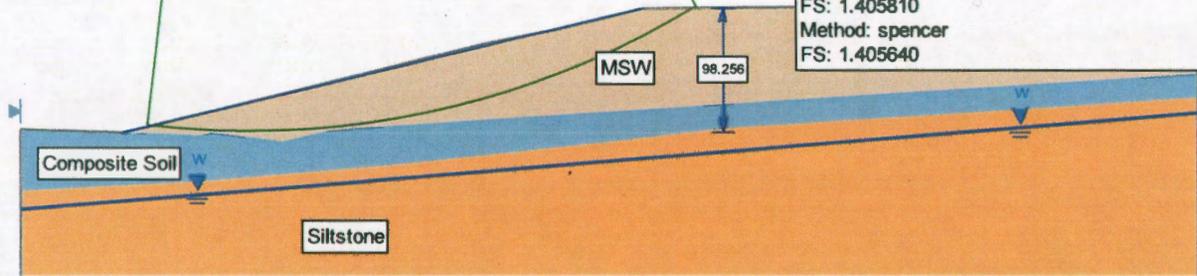
Project Number: 00301-013



Section B-B' (4H:1V)



File Name: B-B'_4-to-1+S.sli
 Project Title: 00301-013 Three Mile Landfill Section B-B' Modified to 4:1 Slope
 Seismic Load Coefficient (Horizontal): 0.164
 Material: MSW
 Strength Type: Mohr-Coulomb
 Unit Weight: 51 lb/ft³
 Cohesion: 120 psf
 Friction Angle: 24.8 degrees
 Material: Composite Soil
 Strength Type: Mohr-Coulomb
 Unit Weight: 100 lb/ft³
 Cohesion: 125 psf
 Friction Angle: 30 degrees
 Material: Siltstone
 Strength Type: Generalised Hoek-Brown
 Unit Weight: 140 lb/ft³
 Unconfined Compressive Strength (intact): 730000 psf
 mb: 0.208
 s: 0.0001
 a: 0.515
 Global Minimums
 Method: bishop simplified
 FS: 1.405810
 Method: spencer
 FS: 1.405640



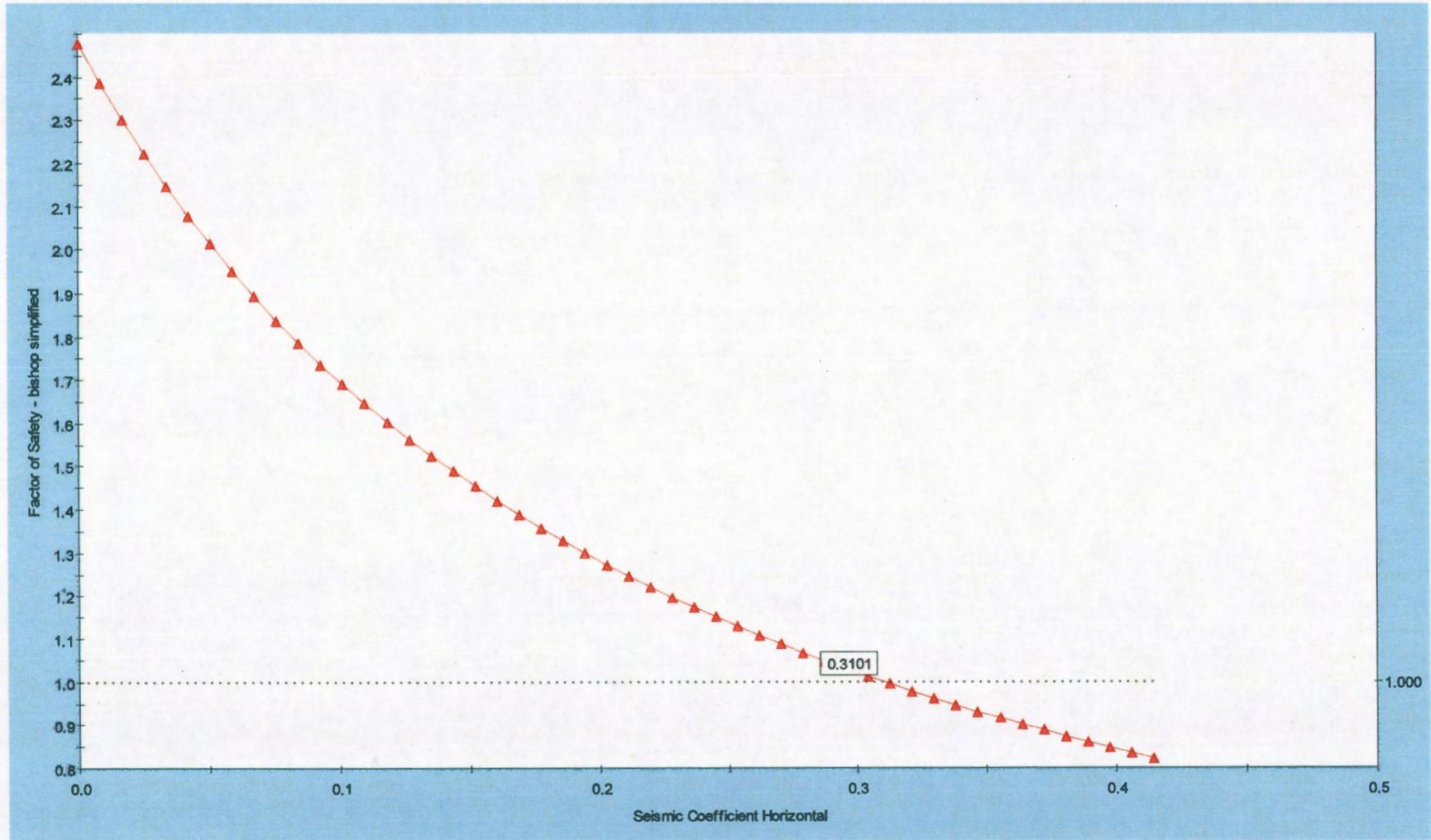
18
Figure

Pseudo-static slope stability analysis of section B-B' (4H:1V)

Project Number: 00301-013



Section B-B' (4H:1V)



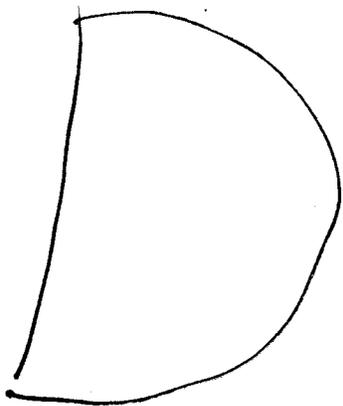
19

Figure

Determination of the yield coefficient for the pseudo-static slope stability analysis of section B-B' (4H:1V)

Project Number: 00301-013





SAMPLE FORMS

APPENDIX D

SUMMIT COUNTY LANDFILL DAILY OPERATING FORM

Date: _____

Operator: _____

Load No.	General Description of Load	Estimated Weight of Load
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

LOAD INSPECTION RECORD

Date: _____

Operator: _____

Load No. _____

General Description of Waste _____

Inspection Method _____

Results of Inspection _____

Summary: Any PCBs or hazardous waste found?

Yes _____ No _____

Inspector Signature: _____

SUMMIT COUNTY LANDFILL GAS MONITORING FORM

Date: _____

Weather: _____

Name: _____

Instrument Used: _____

FACILITY BUILDINGS

Building Location: _____

Percent of Methane LEL: _____

Building Location: _____

Percent of Methane LEL: _____

Results (exceed 25% LEL?): _____

PROPERTY BOUNDARY

Sampling Location*: _____

Percent of LEL: _____

Results (exceed 100% LEL?): _____

*See Sheet 2 of the 1996 Permit Application

SUMMARY

Do gas levels exceed permitted LEL's? Yes _____ No* _____

*Submit an application for discontinuing gas monitoring if gas levels are below permitted LEL values for 2 consecutive years after closure.

