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Draft Application for a Permit to Operate a Class I Landfill

SUVSWD Bayview Class I Landfill Permit Application

Prepared for
Bayview Landfill
South Utah Valley Solid Waste District
Springville, Utah

Prepared by
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March 19, 2009

SUVSWD Bayview Landfill
Class I Landfill Permit Application

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Part 1: General Information

Utah Class I and V Landfill Permit Application Form

Part I General Information							
***I.* Landfill Type:** Class I				***II.* Application Type:** Renewal Application			
Current Permit Number: 9420R1							
***III.* Facility Name and Location**							
Legal Name of Facility: Bayview Landfill							
Site Address: 10800 S. State Road 68							**County:** Utah
Township 9 South	Range 1 West	All of Section 17 plus the S ½ of the SE ¼ of the NE ¼ of Section 18					
Main Gate Latitude	degrees	minutes	seconds	Longitude	degrees	minutes	seconds
North	40	02	00	West	111	57	30
***IV.* Facility Lessee and Operator Information**							
Legal Name of Lessee and Operator: South Utah Valley Solid Waste District							
Address (mailing): PO Box 507							
City: Springville	**State:** Utah	**Zip Code:** 84663-0507	**Telephone:** 801-489-3027				
***V.* Property Owner(s) Information**							
Legal Name of Property Owner: Utah School and Institutional Trust Lands Administration							
Address (mailing): 675 East 500 South, Suite 500							
City: Salt Lake City	**State:** Utah	**Zip Code:** 84102-2818	**Telephone:** 801-538-5100				
***VI.* Contact Information**							
Operator Contact: Richard Henry							**Title:** District Manager
Address (mailing): PO Box 507							
City: Springville	**State:** Utah	**Zip Code:** 84663-0507	**Telephone:** 801-489-3027				
Operator Contact: Scott Aitken				**Title:** Landfill Foreman			
Address (mailing): PO Box 507							
City: Springville	**State:** Utah	**Zip Code:** 84663-0507	**Telephone:** 801-489-3027				

Certification of Submitted Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

.

Name: Richard Henry Title: District Manager

Signature: Date:

SUBSCRIBED AND SWORN to before this _____ day of _____, 2009.

My commission expires on the _____ day of _____, 20___.

Notary Public in and for

(Seal) _____County, Utah

Part 2: General Report

2.1 Facility Description

2.1.1 General

The South Utah Valley Solid Waste District (the District) was formed in 1989 to own and operate solid waste facilities for the cities of Provo, Salem, Spanish Fork, Springville, Mapleton, and Goshen, Utah. It assumed the existing and previously permitted landfill operations from the City of Provo. Solid waste facilities operated by the District are:

- A transfer station located in Springville;
- The Bayview Landfill located north of Elberta.

A separate, non-District-owned transfer station in Goshen also provides waste to the Bayview Landfill. This Permit Application applies only to the landfill, and does not include design, construction, or operation plans of the transfer stations.

The District added a compost facility at the Bayview Landfill in 2004. The compost facility processes a combination of yard waste and biosolids and is jointly permitted through the Division of Solid and Hazardous Waste and the Division of Water Quality. The Operating Plan for the compost facility is included as Appendix R to this Permit Application.

The Bayview Landfill was located, permitted, designed, and constructed by Provo City Corporation during the 1980s. The City received a Conditional Use Permit for the landfill site through the Utah County Board of Adjustment. Several conditions were attached to the Conditional Use Permit, one of which requires that only compacted or baled garbage be accepted at the landfill. A second of these conditions permits disposal of garbage from Provo City Corporation only; this condition was later modified to allow disposal of garbage from the District only. Therefore, no out-of-District wastes can be disposed of in the Bayview Landfill without approval of the County Board of Adjustment. A copy of the District's Conditional Use Permit is included as an attachment to Appendix S.

The Bayview Landfill is located in Sections 17 and 18, T9S, R1W approximately 6 miles north of Elberta, Utah, and directly west of State Highway 68. The landfill property includes all 640 acres of Section 17, and a 20-acre parcel in Section 18. All solid waste disposal activities are planned within the Section 17

parcel; the 20-acre Section 18 parcel houses a culinary well, a water storage tank, and an upgradient monitoring well associated with the landfill operations.

The Bayview Landfill site is located in the Goshen Valley approximately 2 to 3 miles west of Goshen Bay, the southwestern-most portion of Utah Lake. The Goshen Valley slopes upward away from the lake toward the East Tintic Mountains some 7 miles southwest of the lake. The landfill site similarly slopes with an approximate 150-foot rise from the eastern to the western boundaries of Section 17. The eastern boundary of the landfill site is approximately 120 feet above the current water elevation of Utah Lake.

The land use surrounding the site is generally rural agricultural, with orchard, grain, hay, and livestock grazing as the predominant land uses in the vicinity of the site. The nearest residence is located more than 1 mile from the northern property boundary, and the nearest town, Elberta, is 5.5 miles south of the site.

2.1.2 Area Served

The service area for the Bayview Landfill includes the cities of Provo, Salem, Spanish Fork, Springville, Mapleton, Goshen, and some contiguous areas. As stated above, the landfill's Conditional Use Permit prohibits it from receiving wastes generated outside of the District service area. The landfill is also prohibited from receiving wastes that have not been compacted or baled. These prohibitions limit the landfill's ability to accept wastes from other areas of the County or adjoining counties. The conditions also prohibit use by the general public.

2.1.3 Waste Types

The Bayview Landfill accepts wastes from the District's transfer station in Springville and a city-owned transfer station in Goshen. The transfer stations provide record keeping, screening and compacting of incoming wastes, and shipping of the solid wastes to the Bayview Landfill. The transfer stations accept residential and commercial solid wastes, including yard wastes, but generally do not accept construction debris (C&D) wastes. The transfer stations also do not accept regulated hazardous wastes. The screening of the wastes at the transfer stations is not covered by this permit application.

Yard wastes arriving at the transfer stations may either be segregated for composting, or commingled and compacted with the residential and commercial wastes for compacting and disposal. Transfer station personnel make these decisions based on the quantity and ease of separation of the yard wastes, and the workload at the specific moment in time. Yard wastes that are segregated will be

transferred to the closed Spanish Fork Landfill for grinding and then transferred to the compost facility at the Bayview Landfill.

The wastes accepted at the transfer stations are generally compacted, loaded into over-the-road vehicles, and transported to the landfill for disposal. When transfer station staff observe recyclable materials, and when there is time to easily and safely remove the recyclable materials, they will segregate these materials into on-site dumpsters for recycling.

Table 1-1 provides a summary of the quantity of wastes disposed of at the Bayview Landfill since it began operation in February 1991. The data reflects actual quantities shipped from the transfer stations during each fiscal year (July 1 through June 30).

Table 1-1: Tonnage Disposed at the Bayview Landfill

Year	Actual Tonnage
90-91	32,713
91-92	82,841
92-93	92,045
93-94	96,899
94-95	106,641
95-96	105,746
96-97	108,305
97-98	119,391
98-99	126,661
99-00	124,286
00-01	127,031
01-02	126,664
02-03	130,521
03-04	131,689
04-05	136,940
05-06	141,047
06-07	149,499
07-08	146,509

2.1.4 Landfill Development

Landfill Cell 1 reached capacity and Cell 2 – Stage 1 began receiving waste during fiscal year 2004. The landfill is currently placing waste in Cell 2 – Stage 1 and expects to reach capacity by the end of 2009, at which time Cell 2 – Stage 2 will begin receiving waste. Excavation of Cell 2 – Stage 2 is currently ongoing. Part 3 of this Permit Application describes the landfill staging plan.

The District has produced three master plans to guide development of the Bayview Landfill. The initial Landfill Master Plan (HDR, 1988) projected seven separate cells with a total waste disposal capacity of 7.64 million tons at the Bayview Landfill. This capacity was calculated based on a conservative in-place density of 1,000 pounds of solid waste per cubic yard (lbs/cy). The current in-place density based on known weights and surveyed volumes is approximately 1,500 lbs/cy, thereby increasing the capacity of the 7-cell plan by 50%. The Bayview Landfill Master Plan Update (HDR, 2002) considered several scenarios to utilize the airspace and footprint of Cells 2 and 3 more efficiently. The selected scenario combined Cells 2 and 3 into a single landfill Cell, deepened the excavation, and decreased the elevation of the liner requiring pumping of generated leachate.

A revised Cell 2 Master Plan (HDR, 2008; Appendix A) evaluated changes to the base grade of Cell 2 to further increase capacity. The Cell 2 Master Plan revised the base grade of Stage 2 to a 2% slope down to the northeast on the western portion of Stage 2, and a 2% slope down to the southeast on the eastern portion of Stage 2. This increased the capacity of Stage 2 to 2,300,000 cy, and the total capacity of Cell 2 to approximately 8,460,000 cy, with 7,800,000 cy remaining as of February 2009. At 1,500 lbs/cy, this equates to about a total capacity of 6,345,000 tons, with 5,900,000 tons remaining.

Since Cell 2 is expected to remain active through approximately 2032, it is not timely to revise the master plan for the remainder of the Bayview Landfill. However, it is expected that a revised master plan would more than double the capacity calculated in the 1988 Landfill Master Plan, yielding a total capacity of more than 20 million tons. This means that the Bayview Landfill has an expected useful lifetime of more than 50 years from the date of this Permit Application.

2.2 Solid Waste Management Plan

During 1992, the District participated in the development of the Utah County Solid Waste Management Plan (SWMP). The SWMP was developed in response to Senate Bill 255 to address county-wide planning for solid waste disposal over the next 20-year period. Two copies of this SWMP have previously been submitted to the Utah Division of Solid and Hazardous Waste. All of the activities discussed in this permit application were anticipated in, and are consistent with, the SWMP.

In addition, the District has prepared a Landfill Master Plan (HDR, 1988), a Bayview Landfill Master Plan Update (HDR, 2002), and a Cell 2 Master Plan (HDR, 2009) to guide development of the Bayview Landfill site. A copy of the

most recent plan, the Cell 2 Master Plan is attached to this application as Appendix A.

2.3 Legal Description

The Bayview Landfill consists of the following parcels:

- Parcel "A": SW1/4 NW1/4 Section 17, T9S, R1W.
- Parcel "B": That portion of Section 17, T9S, R1W not described in Parcel "A. "
- Parcel "C": S1/2 of the SE1/4 of the NE1/4, Section 18, T9S, R1W.

This land was conveyed by the Utah Division of State Lands to the Provo City Corporation for a term of 51 years under Special Use Lease Agreement No. 498 (Appendix B). The term of this lease agreement extends through the year 2035. The lease agreement contains a clause for extension of the lease beyond the 51-year period.

2.4 Operations Plan

The two Operating Plans relevant to the Bayview Landfill site are presented in the Appendices to this Permit Application. Appendix S presents the current Landfill Operating Plan, while Appendix R presents the current Compost Facility Operating Plan.

2.5 Financial Assurance Plan

2.5.1 Cost Estimate for Closure and Post-Closure Care

Federal and State of Utah Rules and Regulations require that the owners of municipal solid waste landfills demonstrate the financial capability to conduct closure, post-closure care, and corrective action (if necessary). To meet these requirements, the owner must place in the operating record for the landfill an estimate of the cost of hiring a third party to perform closure, post-closure care, or corrective action. In addition, the owner must demonstrate that the funding is fully available for any year after 2009 to provide for closure, post-closure care, and corrective action for landfill cells that may require closure, post-closure care, or corrective action within the five year period between permit revisions. Both the cost estimate and the funding mechanism must be updated on an annual basis.

The regulations allow six different funding mechanisms to demonstrate financial assurance including: trust funds, surety bonds, insurance, letters of credit, local

government financial tests, or local government guarantees. These funding mechanisms may be used individually or in combination with one another to demonstrate financial assurance. The regulations define specific requirements for each funding mechanism.

Appendix C contains an estimate of the costs for post-closure care of Cell 1 and closure and post-closure care of Cell 2 – Stage 1 and Stage 2 at the Bayview Landfill. Landfill Cell 2 – Stage 2 will remain active beyond the period covered by this permit application. As calculated in Appendix C, the estimate for third-party closure and post-closure care is $2,216,022.

2.5.2 Proposed Financial Assurance Mechanism

The District will use a trust fund to demonstrate financial assurance. In 1992, the District established separate accounts in the State Pool accumulating funds for closure and post-closure care of Cell 1 and corrective action. During 1997, the District transferred these funds into the Closure Trust Fund established by the State Treasurer. As of October 31, 2008, the closure/post-closure account held $2,979,148 which means that the trust fund is fully funded.

The District has consistently operated on a cash basis since its inception in 1990. It accumulates funds in advance to finance its capital facilities needs, and pays cash for all capital improvements, equipment, and services. This means that the District has no long-term debt to encumber its resources.

An alternative closure cap has been approved for the Bayview Landfill and the landfill plans to use the alternative cap design for Cell 2. Details of the alternative cap are discussed in Section 2.6 and Appendix N. The District plans to finance the partial closure of Cell 2 – Stage 1 from operating funds and does not intend to diminish the Trust Fund. In 2010, District personnel will begin depositing intermediate cover on the side slopes of Cell 2 – Stage 1. Therefore, Cell 2 will be partially closed during this permit period. Therefore, the Trust Fund account is adequately funded and will remain fully funded during the remainder of the current permit. In any case, the District will continue to report on the status and adequacy of the trust fund in its annual reports to UDEQ.

2.6 Closure Plan

This section describes post-closure care for Cell 1 and the closure plan for Cell 2. Landfill Cell 1 reached capacity in 2004 and the final cover was placed in 2008. Stage 1 of Cell 2 will reach operating capacity by the end of 2009, at which time Stage 2 of Cell 2 will begin receiving waste. Waste will be placed in Cell 2 Stage 2 for about 9 years, or until 2019. Landfill Cell 2 will operate beyond the five-

year period covered by this permit and will not reach capacity until approximately 2032.

2.6.1 Final Cover Installation

An alternate final cover design of the capping system for the Bayview Landfill has been completed. The final contours of Cell 1 were projected in the 1988 Master Plan, and are depicted on Figure T-3 in Appendix T. Final contours of Cell 1 were achieved in 2004, at which point Cell 2 – Stage 1 began receiving waste. As mentioned, Stage 1 of Cell 2 will reach capacity and intermediate final cover placement will begin in 2010. The approved alternative final cover is planned for Cell 2 when it reaches final contours in 2032. The design for the alternate capping system includes the following layers of material from the bottom up:

- 6 inches of intermediate cover placed over the daily cover to provide a 12-inch cushion of soil over the solid waste;
- 34-inches of evaporative cap constructed from the olive-brown silty sand available on-site. The top six inches of this evaporative cap will be capable of supporting vegetative growth by amending it with compost to aid in initial seed germination.

As with Cell 1, a series of metal stakes with plastic fibers attached to the top will be placed in the final cover of Cell 2 on 100-foot centers across the cell. These metal stakes are commonly referred to as "blue tops" or "whiskers" and will be driven into the final cover until the plastic fibers are just below the completed final cover surface. This will provide a visual method (if the fibers begin to show over time) to determine if erosion of the final cover is occurring. Additionally, a series of benchmarks will be located around the perimeter of the landfill to be used to determine when settlement of the waste or cover materials has ceased.

The Landfill Foreman will inspect the completed cap weekly until vegetation is established, and monthly thereafter to ensure that damage to the capping system is detected and repaired early. The vegetation on the landfill cap will be maintained to blend into the surrounding semi-arid landscape.

The Landfill Foreman will also inspect the completed cap to determine that the final contours are maintained, and that the flow of stormwater is unimpeded. Areas in which excessive settlement or erosion of 1 inch has occurred, as evidenced by the exposure of the blue top survey stakes, will be regraded, mulched, and seeded as specified above.

2.6.2 Site Capacity

The landfill is currently achieving an in-place waste density of approximately 1,500 lbs/cy. At capacity, Cell 1contained approximately 1,800,000 tons of solid waste (2.4 million cubic yards at 1,500 lbs/cy). At the current rate of solid waste compaction, the District estimates that Cell 2 will contain approximately 6,345,000 tons of solid waste (8,460,000 million cy at 1,500lbs/cy). At the current waste acceptance rate of 146,000 tons plus a 3% annual increase, Cell 2 is expected to last until approximately 2032.

Based on the 1988 Master Plan, Cells 4 through 7, as currently configured, have a capacity of about 4,600,000 tons of waste with a waste density of 1,000 lbs/cy. The Bayview landfill currently achieves about 1,500 lbs/cy of in-place waste. Making this conversion, Cells 4 through 7 would have a capacity for about 6,900,000 tons, equating to an additional 46 years of life (at 150,000 tons per year).

2.6.3 Closure Schedule and Funding

Cell 1 reached capacity in 2004 and the final cover was placed in 2008. Seeding of the Cell 1 final cover is scheduled to be completed during early 2009 and is the only requirement remaining for final closure of Cell 1. Cell 2 – Stage 1 will reach capacity by the end of 2009 and begin receive intermediate cover on the side-slopes in 2010. Cell 2 – Stage 2 will begin receiving waste in 2010. Cell 2 – Stage 2 will remain active beyond the five-year period covered by this permit and will not reach final contours until approximately 2019.

Final closure construction will begin within 2 months of final receipt of solid waste in Cell 2. Closure construction will proceed on a continuous schedule to provide for completion of the closure cap within 18 months of final receipt of solid waste. The exact schedule cannot be predicted because the closure must be coordinated with both the final receipt of waste, and the beginning of the active growing season to provide cover vegetation an optimal chance of survival. The UDEQ will be notified when closure construction has been completed so that a final inspection can be made.

The closure costs projected in Section 2.5 assume that the entire closure cap, including intermediate soil cover, for Cell 2 Stage 1 and Stage 2 will be constructed as part of the closure. This is a very conservative assumption, since intermediate cover material will be placed as part of landfill operations. Furthermore, closure costs are anticipated to be paid from operating funds, leaving the trust fund intact. These assumptions allow the expedited closure of the landfill cell, and ensure that funding will be available to allow a third party to close the landfill under tight time constraints, if needed.

2.7 Post-Closure Care Plan

Post-closure care for Cell 1 of the Bayview Landfill will consist of long-term maintenance of the closure cap and ongoing sampling of the groundwater monitoring wells and gas monitoring stations to ensure that the landfill cell has been closed in accordance with regulations. The post-closure care period will be 30 years unless unexpected environmental contamination or continued subsidence occurs, or a shorter period if it can be proven that it no longer presents a threat to human health or the environment. The costs for post-closure care identified in Section 2.5 include Cell 2 – Stages 1 and 2, as well as Cell 1. The post-closure care plan will be applied to other cells as they are closed.

2.7.1 Monitoring and Maintenance

Semi-annual groundwater and quarterly landfill gas monitoring will occur throughout the post-closure period. This frequency will be increased if data indicate that contamination may have occurred. The post-closure monitoring frequency will revert if the more frequent monitoring demonstrates that contamination, if present, is not attributable to the landfill.

Collection and treatment of leachate generated in Cell 1 and Cell 2 will be provided by a new dual-lined evaporation pond to be constructed directly north and upstream of the existing evaporation pond. The new pond will also have a leak detection system. The existing pond will provide stormwater and process water runoff containment for the adjacent biosolids compost facility. These leachate collection and treatment systems will be inspected as part of the ongoing activities for other landfill cells during the post-closure period for Cell 1 and Cell 2. Since the Bayview Landfill has no planned surface water discharge, no surface water monitoring will be required during the post-closure period.

Table 7-1 provides a schedule for conducting inspections and maintenance and for recording these routine activities. The Landfill Foreman will be responsible for conducting the inspections, scheduling maintenance, and recording these activities on the forms provided in Appendix I.

Table 7-1: Frequency of Inspection and Maintenance of Facilities During Post-Closure Care

Landfill Facility	Inspection or Maintenance	Frequency
Landfill Cell	Closure cap integrity. Cell perimeter fence integrity.	Quarterly
Stormwater / Leachate Pond	Perimeter fence integrity. Water depth. Liner system integrity.	Quarterly
Other Appurtenances	Entrance gate integrity. Perimeter fence integrity. Monitoring station integrity. Berm integrity. Run-on and Run-off Control Systems.	Quarterly

The above activities will be carried out as part of the ongoing operations during the active life of the site. They will be expanded to include the entire site at final landfill closure and will continue throughout the post-closure monitoring period.

A written summary of the activities performed during each inspection will be maintained. The District will retain the right of entry to the closed landfill, maintain all right-of-ways, and conduct maintenance and/or remediation activities as needed. The landfill will be inspected on a quarterly basis for the following conditions:

- Integrity of the final cover (including erosion, subsidence, seeps and settlement);
- Loss of vegetative cover or growth of undesirable plant species;
- Visible debris, litter, and waste;
- Condition of access roads, gates, and fences;
- Integrity of on-site structures;
- Integrity of groundwater monitoring system;
- Integrity of methane monitoring system;
- Integrity of drainage features;
- Integrity of the leachate collection system;

The final cover will be inspected for erosion or other maintenance problems. Any problems detected during routine site inspections will be corrected as soon as practicable. All eroded areas will be recovered with suitable soil to establish erosion control and infiltration layers, as well as positive drainage to maintain the integrity of the final cover as outlined in Section 2.6.1. All bare areas in the final cover will be re-vegetated as necessary.

The need for final cover system repairs due to differential settlement or subsidence will be determined based on an evaluation of whether the final cover in the affected area has been impaired. Any areas where the integrity of the final cover has been compromised will be repaired as necessary.

Eroded areas in drainage ditches will be repaired and re-graded. Sediment buildup will be removed from areas where flow is restricted. Temporary stormwater control structures will be constructed and maintained as needed.

The leachate collection system will be maintained and operated as needed to minimize leachate head on the liner. The District may seek the approval of the UDEQ to cease leachate extraction and treatment if it can demonstrate that leachate generation has diminished and no longer poses a threat to human health and environment.

2.7.2 Land Title, Land Use, and Zoning Restrictions

The future land use of Cells 1 and 2 is reversion to grazing land, which is the historical land use. The title of the land is expected to remain with its current owner, the Utah Division of State Lands. The Utah County Board of Adjustment did not impose zoning restrictions on the site. However, the District will cooperate with the landowner and the County Board of Adjustment in developing zoning restrictions that are in the best interests of the landowner.

2.7.3 Post Closure Costs

The costs identified in Section 2.5 for post-closure care have been assumed to be recurring annual costs. The trust fund for this post-closure care has been assumed to be available in its entirety at the beginning of the post-closure care period. This is a very conservative assumption since the landfill is planned to operate for a minimum of 25 years (by term of lease). The interest on the principal of the trust fund is expected to cover the limited inspection and maintenance activities currently scheduled as part of the ongoing operation (e.g., leachate collection and evaporation facilities) of the landfill site if the site is unexpectedly closed.

2.8 References

HDR Techserv, Inc. 1987. Landfill Approval Assistance Hydrogeologic and Seismic Review, p.37.

HDR Techserv, Inc. 1988. Landfill Master Plan, Bayview Landfill.

South Utah Valley Solid Waste District. 1994. Annual Report, p.6.

HDR Engineering – Permit Application Bayview Landfill, 1996.

HDR Engineering – Master Plan Update, Bayview Landfill, 2002.

HDR Engineering – Permit Application, Bayview Landfill, 2003.

HDR Engineering – Permanent Composting Facility Operating Plan, 2004.

HDR Engineering – Cell 2 Master Plan Update, 2008.

South Utah Valley Solid Waste District. 2008. Annual Report.

Part 3: Technical and Engineering Report

3.1 Introduction

This Part 3 – Technical and Engineering Report presents information on geology, hydrology, location restrictions and engineering design for the Bayview Landfill. This information has been updated from previous permits to reflect the final closure of Cell 1, pending interim closure of Cell 2 – Stage 1, and modifications to the leachate collection system and Cell 2 – Stage 2 liner design and excavation contours. Portions of the text that do not require modifications have been left as originally presented in previous permit applications.

3.1.1 Facility Maps and Drawings

Figures for this permit application are found in Part 4. Figure 1 contains the most recent USGS Topographic Map of the vicinity surrounding and including the Bayview Landfill. The boundaries of the property are shown on this map, as well as a 1- and 2-mile radius around the property boundary. Figure 2 is the most recent USGS Topographic Map of just the Bayview landfill property. Figure 3 is a recent topographic map of Cell 2 produced from aerial photography performed in December 2008 and updated with ground survey information obtained during the same month.

Figure 4 is a portion of the state of Utah Earthquake Distribution Map (MF-1856). Figure 5 is a Landfill Facilities Map showing the current and planned facilities. Figure 6 to 13 contain permit level construction details for the development of revised Cell 2 – Stage 2, a new leachate evaporation pond, and projected final contours of Cell 2. Cell 2 is the combination of previously permitted Cells 2 and 3, as outlined in the January 2002 Master Plan update and modified in the January 2009 Cell 2 Master Plan by HDR, Inc. The most recent plan, the Cell 2 Master Plan, is included as Appendix A to this application.

Appendix D contains the final engineering drawings and specifications for the development of Cell 2 – Stage 2. Appendix T contains a draft Cell 1 closure status letter and as-built drawings.

3.2 Geohydrological Evaluation

3.2.1 General

Several studies are available in the public and nonpublic arenas that describe the geology and hydrogeology of the region and the site. The hydrogeology of the Goshen Valley has been described by Dustin (1978) and Cordova (1970). These studies also describe the general geology of the area including the Bayview Landfill site. Two hydrogeological investigations were commissioned by Provo City Corporation during the original permitting of the site in the 1980s (Chen and Associates, 1980; Rollin, Brown, and Gunnell [RBG], 1983). These investigations provided shallow geological data specific to the landfill site. During litigation regarding permitting of the site, several parties (Hintze and Fuhriman, 1983; Environmental Science and Engineering, 1986; and Danzberger, 1986) re-evaluated and re-interpreted the data presented in the Dustin, Cordova, Chen, and RBG studies, and re-interpreted site-specific geologic and hydrogeologic data. These re-evaluations presented no new data, and do not contribute to the understanding of the site.

During 1986 and 1987, the Utah County Planning Commission evaluated the Bayview Landfill site seismicity. This evaluation included on-site trenching to determine whether lineaments present on the site represented the surface expression of geologic faults. The Planning Commission's geologist concluded that the lineaments were not related to faults or seismic activities at the site (Robison, 1987).

During the original construction of the Bayview Landfill in 1989, the contractor drilled and installed 12 monitoring wells. Six of these wells are deep wells (170 to 310 feet below ground surface) that provide geological data from regions deeper than earlier Provo studies. Three additional deep monitoring wells have been installed since the Bayview Landfill began operating. These wells serve as compliance monitoring wells and also provide hydrogeological data specific to the site. In April 1994, the District published an evaluation of two years of hydrograph and laboratory analytical data. Groundwater monitoring has been ongoing at the site with evaluations submitted to the UDEQ. The Districts Groundwater Monitoring Plan is included as Appendix F. Boring logs for monitoring wells are included as Appendix E.

During 1993, the U.S. Geological Survey (U.S.G.S.) conducted an evaluation of the aquifers in Utah and Goshen Valleys. A summary of selected data collected during this evaluation has been published as Utah Hydrologic Data Report No. 50, and is attached to this permit application as Appendix G.

3.2.2 Geology

3.2.2.1 Stratigraphy

The Bayview Landfill site is located in Goshen Valley between the East Tintic Mountains and Utah Lake. The Goshen Valley is bounded on the north by the Lake Mountains, on the west by the Mosida Hills and the East Tintic Mountains, on the south by Long Ridge, and on the east by Utah Lake and West Mountain. The site lies on the eastern slope of the East Tintic Mountains as the slope approaches Utah Lake. The terrain in the vicinity of the landfill site slopes toward the lake at approximately 2.5%; the terrain is steeper to the west and shallower to the east of the site.

The Goshen Valley is underlain by a thick sequence of consolidated and unconsolidated sediments overlying sedimentary Paleozoic limestone and dolomitic basement rock. The surficial materials at the site consist of heterogeneous deposits of gravel, sand, silt, and clay laid down in Lake Bonneville. These deposits were derived from erosion of the East Tintic Mountains, and were dropped into the lake as beach, bar, and spit deposits along the fluctuating shoreline. The materials are poorly to moderately well sorted and are derived from a mixture of Paleozoic sedimentary (limestone and quartzite) and Tertiary volcanic outcrops. In some places, these lake sediments are overlain by beach and dune sands representing Lake Bonneville shoreline and Quaternary deposits, respectively. The western portion of the landfill site exhibits dune and beach sand deposits. The thickness of these strata is discussed in Section 3.2.3.2 – Aquifers.

Two other Pleistocene deposits underlie the Lake Bonneville Group sediments: the Terrace gravel, and the Older Alluvium. The Terrace gravel consists of gravel and sand benches and contains an aquifer referred to as the Upper Pleistocene aquifer. The Older Alluvium consists of cemented gravel and sand (fanglomerate) and contains an aquifer referred to as the Lower Pleistocene aquifer. Miocene latites and conglomerates reportedly underlie the Pleistocene deposits; the conglomerates reportedly consist of cobbles and boulders in a sandy matrix. It does not appear that the deep monitoring wells constructed at the Bayview Landfill site penetrate into the Lower Pleistocene aquifer.

3.2.2.2 Instability and Seismicity

No unstable slopes or subsidence areas have been mapped in the vicinity of the Bayview Landfill site. However, the Utah County Planning Commission has not prepared landslide, unstable area, or subsidence maps for this portion of the county. To the best recollection of Commission personnel, the Planning

Commission has received no reports of landslides or subsidence. The site is relatively flat and is not subject to steep cuts that would create slope stability problems. There does not appear to be any surface observable evidence that the site is located in a floc type land stability problem area.

Numerous faults traverse the Goshen Valley. Most of these faults are believed to be inactive; however, more than 25 earthquake epicenters have been plotted within approximately 5 miles of the landfill site. Most of these epicenters are located south, southeast, or southwest of the site (Figure 4). These epicenters include one with a reported intensity of VII on the Modified Mercali Intensity Scale, and several with reported intensities of IV or V (U.S.G.S, 1986).

The Utah County Planning Commission has not prepared seismicity maps for this portion of the county. The Uniform Building Code (1994) classifies this portion of Utah as a Class 3 Seismic Zone, and requires use of a horizontal acceleration of 0.3g in the design of engineered structures. This classification places the Bayview Landfill site in a seismic impact zone as defined under the Utah Solid Waste Permitting and Management Rules.

3.2.3 Hydrology

3.2.3.1 Surface Water

Three surface water channels cross the landfill site (see Figure 2). These surface water channels flow ephemerally from watersheds west of the landfill site. The northern and central channels originate about 2 miles west of the site in Section 14. Each of these channels has a drainage basin of less than 1,000 acres. The southern channel originates less than 1 mile west of the site in Section 18, and has a drainage basin of less than 200 acres.

The northern and central channels have cut gullies approximately 5 feet deep and 30 feet wide through the dune sands on the steep, western portion of the landfill site. These channels decrease in size to less than 3 feet in depth and less than 10 feet in width on the eastern portion of the site. The southern channel is only 1 to 2 feet in depth.

The drainage channels appear to be completely dry during most years. These channels carry water only during storm events and during spring run-off from the foothills west of the site. The sandy nature of the area and of the channel bottoms allows water to infiltrate into subsoils during storm events with a more frequent return period.

3.2.3.2 Hydrology

Aquifers

Previous studies (Cordova, 1980; Dustin, 1978) have defined four aquifers underlying the Goshen Valley; however, not all of these aquifers appear to be present at the Bayview Landfill site (Brook, 1994; Carpenter, 1994a). As identified in previous reports, the uppermost aquifer, the water table aquifer, is contained in the Lake Bonneville group, and is commonly found at depths of less than 25 feet below ground level (bgl). The second aquifer, the Upper Pleistocene aquifer, is contained in a sand and gravel deposit, the Terrace gravel, at depths of 150 to 300 feet bgl in the Goshen Valley. The Upper Pleistocene aquifer reportedly ranges from 75 to 100 feet in thickness. The Upper and Lower Pleistocene aquifers are separated by a 50- to 100-foot thick cemented sand and gravel confining layer. This confining layer is thought to partially separate the two Pleistocene aquifers. The Lower Pleistocene aquifer is reported to vary in thickness from 25 to 175 feet. The third aquifer, the Tertiary aquifer, is reportedly found at 200 to 500 feet bgl; its thickness is unknown, but may exceed 1,500 feet in the Goshen Valley.

Eight shallow soil borings, six shallow monitoring wells, and six deep monitoring wells indicate that the Lake Bonneville group water table aquifer is not present at the site (Carpenter, 1994a). The six shallow monitoring wells are constructed with a 20-foot screen and a 1-foot sump below 49 feet of casing. The wells contain dedicated pumps mounted at 65 feet bgl. Boring logs are attached to this permit application as Appendix E. All of the shallow wells have contained small amounts of water during most sampling events; however, none of the wells have contained sufficient water to allow purging or sampling. The water in these wells is believed to be condensation within the well, rather than perched groundwater (Carpenter, 1994a).

The nine deep monitoring wells appear to be screened in the Upper Pleistocene aquifer (Carpenter, 1994a). The nine deep monitoring wells do not appear to have penetrated through the Upper Pleistocene aquifer into the Lower Pleistocene aquifer. Boring logs for these wells are presented in Appendix E. This aquifer is the uppermost usable aquifer in the immediate vicinity of the landfill site.

The landfill culinary well appears to be screened in the Lower Pleistocene aquifer (Carpenter, 1994a). The well log indicates that the partially confining layer between Upper and Lower Pleistocene aquifers is not present at the site. This is consistent with the interpretation of the U.S. Geological Survey for this portion of the Goshen Valley (Brook, 1994). The Upper and Lower Pleistocene aquifers

appear to represent a single, water table (unconfined) aquifer in the vicinity of the Bayview Landfill.

Water Rights

The Utah Department of Natural Resources Water Rights Division lists only one active water right within 2,000 feet of the Bayview Landfill site boundary. This active water right is the culinary water well for the landfill. This well is located upgradient of the site, and is screened in the Lower Pleistocene aquifer.

Based on a review of the USGS topographic maps for the site, approximately 7 wells are located up to 2 miles from the site boundary (USGS, 1993) including the landfill culinary well.

Groundwater Flow

The previous studies indicate that groundwater flow enters the Goshen Valley from the south through Current Creek Gap, and from the northwest through the Mosida Hills. These groundwater flows converge near the Bayview Landfill site. The groundwater underlying the site is expected to flow northeast toward Utah Lake. Cordova (1970) estimated transmissivity of the Pleistocene aquifer to be between 50,000 and 300,000 gallons per day per foot (gpd/ft). Earthfax (1984) estimated the velocity of groundwater flow north of Elberta to be 24 feet per year (ft/yr).

In April 1994, the District issued a report on the results of the District's background monitoring program (Carpenter, 1994b). This report provided an assessment of the background water quality and flow direction in the immediate vicinity of landfill. This report stated that the groundwater flow at the site moves northeasterly toward Utah Lake, and estimated the velocity of this flow at 1.8 ft/yr. The report in Appendix F has been updated to include recent groundwater monitoring events.

The discrepancy between the published values and the apparent velocity of groundwater at the site is unexplained. However, this does not seem to be important since the upper aquifer is more than 100 feet below the bottom of the landfill.

Groundwater Chemistry

The uppermost aquifer (the Upper Pleistocene aquifer) underlying the Bayview Landfill site is classified as a Class II aquifer. Appendix F contains the groundwater monitoring plan for the landfill. Statistical analyses of groundwater monitoring data have been completed semi-annually since the completion of

background sampling in 1993. Statistical analysis results are submitted with the District's annual reports. The analyses show no contamination of the groundwater by inorganic or organic chemicals. Statistical evaluation of the data shows a general trend of increasing concentration for total dissolved solids, sulfate, chloride, calcium, magnesium, sodium, and bicarbonate from southwest to northeast below the site. This is consistent with the regional trend of increased concentration of inorganic chemicals as they move toward Utah Lake through the shallow Pleistocene aquifer (Carpenter, 1994). Groundwater analytical results are submitted to UDEQ annually.

3.3 Engineering Report

3.3.1 Location Standards

UDEQ has adopted specific locational restrictions that include the locational criteria specified in the federal Subtitle D regulations. The Utah location restrictions for municipal solid waste landfills are outlined below. Subtitle D criteria are highlighted with an asterisk (*).

Location Restriction Compliance was previously analyzed as part of the 1996 permit application. The following portions of Section 3.1 are excerpted from that application.

1. Land Use Compatibility (R315-302-1(2)(a))
    a. Parks and protected areas
    b. Ecologically and scientifically significant areas
    c. Prime farmland
    d. Dwellings and structures*
    e. Airport runways*
    f. Archeological sites
    g. Land use planning or zoning
2. Geology (R315-302-1(2)(b)) Fault areas*
    a. Seismic impact zones*
    b. Unstable areas*
3. Surface Water (R315-302-1(2)(c)
    a. Floodplains*
    b. Wetlands*

4. Groundwater (R315-302-1(2)(e))
    a. Groundwater/landfill separation
    b. Sole source aquifer
    c. Groundwater quality
    d. Source protection areas

The following sections present the State of Utah location restrictions and discuss the Bayview Landfill's compliance with those requirements.

3.3.1.1 Land Use Compatibility

The Utah Solid Waste Permitting and Management Rules state that no municipal solid waste landfill shall be located within the following restriction zones:

- One thousand feet of a national, state, or county park, monument, or recreation area; designated wilderness or wilderness study area; or wild and scenic river area.
- Ecologically and scientifically significant natural areas, including wildlife management areas and habitat for listed or proposed endangered species as designated pursuant to the Endangered Species Act of 1982.
- Farmland classified as prime, unique or of statewide importance by the U.S. Department of Agriculture Soil Conservation Service under the Prime Farmland Protection Act.
- One-fourth mile of existing permanent dwellings, residential areas, and other incompatible structures such as schools, churches, and historic structures or properties listed or eligible to be listed in the State or National Register of Historic Places.
- Ten thousand feet of any airport runway end used by turbojet aircraft, or 5,000 feet of any airport runway end used by only piston-type aircraft.
- Areas with respect to archeological sites that would violate R9-8-404.
- An area that is at variance with any locally adopted land use plan or zoning requirement unless otherwise provided by local law or ordinance.

The Bayview Landfill is not located within any of these restriction zones. The land use directly adjacent to the landfill is primarily agricultural. The nearest residence is located more than 1 mile north of the site boundary, and the nearest town, Elberta, is located approximately 5.5 miles south of the site. The nearest

airport is located approximately 17 miles from the site. No parks, ecologically significant areas, prime farmland, or archeological sites are known to exist near the site. The Bayview Landfill site is surrounded on the north and west by land zoned mining and grazing (MEG1), and on the south and east by land zoned agricultural (A1). The landfill is not inconsistent with these planned land uses. In any case, the site was permitted by the Utah County Board of Adjustment under a Conditional Use Permit, and therefore, is consistent with the local zoning and land use planning.

3.3.1.2 Geology

The Utah Solid Waste Permitting and Management Rules state that no municipal solid waste landfill shall be located in a subsidence area, in a dam failure flood area, over an underground mine or salt bed, or on or adjacent to geologic features that could compromise the structural integrity of the facility.

- Fault Areas. A new facility or a lateral expansion of an existing facility shall not be located within 200 feet of a Holocene fault.
- Unstable Areas. Unstable areas require demonstration that the site has been engineered to ensure that the integrity of the structural components of the facility will not be damaged by the unstable conditions.
- Seismic Impact Zones. A new facility of a lateral expansion of an existing facility shall not be located in seismic impact zones unless all containment structures are designed to resist the maximum anticipated horizontal acceleration for the site.

The Bayview Landfill site does not include known Holocene faults, and all solid waste containment will occur more than 200 feet from the property boundary. A trenching study was conducted to determine whether apparent lineaments represented the surface expression of faults. This study concluded that the lineaments were not related to faults (see Appendix H). The Bayview Landfill is not located within a known unstable area as defined in the regulations.

Historic seismic records indicate that more than 25 earthquake events have occurred with epicenters within approximately 5 miles of the Bayview Landfill site. These earthquake events have occurred south, southwest, and southeast of the site. These earthquake events are presented in USGS Miscellaneous Field Studies Map MF-1856 and are summarized in Figure 4.

The Utah County Planning Department has not mapped the western portions of Utah County for seismic activity. The Uniform Building Code (1991) appears to classify all of Utah County as a Class 3 Seismic Zone. Structures in a Class 3

Seismic Zone are required to use a horizontal acceleration of 0.3g unless studies demonstrate that another horizontal acceleration is more appropriate.

Design for Cell 2 has been analyzed considering seismic activity and has been found to be stable with an adequate factor of safety. See Appendix J.

Seismic stability analyses have been conducted to demonstrate that the proposed landfill components can resist the maximum horizontal acceleration expected at the site. These analyses were conducted in accordance with the State of Utah Administrative Rules and EPA guidance presented in RCRA Subtitle D (258) Seismic Design Guidance for Municipal Solid Waste Facilities, (EPA, 1995).

The landfill components considered in these analyses included: linear systems, leachate collection and delivery systems, the leachate collection and run-on/run-off control systems and the final cover.

The scope of the analyses included a review of regional and local soils, geology and seismic selection of the design earthquake and the site specific earthquake acceleration; static and pseudo-static stability analyses for each landfill component: and evaluation of stability and potential deformations for each landfill component.

The results of these analyses are presented in Appendix J and indicate the following:

- The Bayview Landfill site is located in a Seismic Impact Zone. Both deterministic and probabilistic methods indicate a peak bedrock acceleration of 0.5g. The dense granular soils offer little amplification or attenuation of the bedrock acceleration through the overlying soil column.
- The cut and fill slopes and run-on/run-off structures have adequate static factor of safety and indicate minimal permanent deformations (U<1 cm) in response to the design seismic event.
- The side slope liner and leachate collection/recovery system will require a geosynthetic reinforcement to increase the static factor of safety and limit permanent deformations in response to the design seismic event.
- The closure cap system has an adequate static factor of safety and indicates acceptable permanent deformation (U<10 cm) in response to the design seismic event. No reinforcement is required for the final cover.

These demonstration analyses indicate that the proposed Bayview landfill components are designed to resist the "maximum horizontal acceleration" at the site.

3.3.1.3 Surface Water

The Utah Solid Waste Permitting and Management Rules state that no municipal solid waste landfill shall be located within a public water system watershed, a floodplain, or a wetland without specific approval of the Executive Secretary.

The Bayview Landfill site is not located within a public water system watershed or 100-year floodplain. Three surface water drainage features cross the site from west to east. The Landfill Master Plan provides that the three drainage areas will be improved to divert run-on from the active landfill cells. The drainage features do not contain vegetation that is characteristic of wetlands areas. No other wetland areas have been identified on the site. Calculations for run-on and run-off ditches can be found in Appendix M.

3.3.1.4 Groundwater

The Utah Solid Waste Permitting and Management Rules state that no municipal solid waste landfill shall be located within the following restriction zones:

- Within 5 feet of the historical high groundwater elevation.
- Within 100 feet vertically (50 feet for high total dissolved solids [TDS between 1,000 and 3,000 mg/l] aquifers) of an aquifer that could be used for drinking water unless constructed with a composite liner system.
- Over an aquifer designated as a sole source aquifer or a 1B aquifer.
- In a drinking water source protection area.

The Bayview Landfill is not located within a sole source or 1B aquifer, or in a drinking water source protection area. Landfill cells will not be constructed within 5 feet of the historical high groundwater elevation. The shallowest groundwater at the site, the Upper Pleistocene aquifer, is located more than 100 feet below the bottom of the proposed liner system. A composite liner system consisting of a geosynthetic clay liner (GCL) and an HDPE geomembrane is proposed for the bottom of Cell 2.

3.3.2 Engineering Design

In 1987, the District prepared a Landfill Master Plan (HDR, 1987) to guide development of the site over its active life, which is expected to exceed 50 years. Figure 5 in Part 4 illustrates the landfill facilities, which include the following:

- Six landfill cells (previous Cells 2 and 3 have been combined into Cell 2). Cell 2 will be approximately 83 acres in size. The cells are further subdivided into smaller areas, called "stages," to facilitate construction

and to minimize the area open to receiving stormwater at any one time. Each stage represents approximately 15 acres;

- Three stormwater/leachate evaporation ponds:
  - An existing pond designed to receive contact stormwater and leachate from the northern half of the site,
  - A proposed leachate evaporation pond designed to receive stormwater and leachate from Cells 1 and 2 so that the existing pond can contain stormwater and process runoff produced by the compost facility, and
  - A third, future pond to receive contact stormwater and leachate from the southern half of the site;
- Screening berms to provide visual screening of the active landfill cells from State Highway 68;
- Three stormwater diversion channels using the existing ephemeral surface water drainage channels;
- A windrow composting facility located east of Cell 2;
- A maintenance building.

The Master Plan was updated in 2002 (HDR) to show a combined Cell 2 and 3, and to increase excavation depths in this new Cell 2. A 2008 Cell 2 Master Plan (Appendix A) modified Cell 2 – Stage 2 base grades to drain the western two-thirds down at 2% to the north and east, and the eastern third down at 2% to the southeast, and modified the leachate drainage plan to accommodate the new grades. Excavation depths remain more than 100 feet above the uppermost aquifer. An additional leachate evaporation pond was designed to collect leachate and stormwater from Cells 1 and 2 only. The Cell 2 Master Plan is attached to this permit application as Appendix A.

Landfill Cell 1 achieved final contours in 2004 and the final cover was placed in 2008. Cell 1 was built as designed and final cover seeding is all that remains for closure to be completed. Landfill Cell 2 – Stage 1 will reach capacity by the end of 2009, at which time landfill personnel will begin placing the intermediate cover on the side slopes of Stage 1. After Cell 2 reaches final contours and the final cap is in place in approximately 2032, long-term monitoring of the final cover and groundwater monitoring wells will continue for the 30-year post-closure care period.

3.3.2.1 Landfill Cell 2 – Stage 2

Stage 2 of Landfill Cell 2 consists of a 15-acre, geosynthetic clay and HDPE-lined area located in the E1/2 of the NW1/4 of Section 17. The excavation for this cell stage began in 2004 and is ongoing. The excavated soils have been used for liner protection, daily cover, with a portion used to close Cell 1or stockpiled. The stockpiled soil will be used for daily cover and intermediate cover on Cell 2 – Stage 1.

Cell 2 – Stage 2 grading is divided into two parts (Figure 9). Generally, excavation side slopes will be constructed on a 4:1 (H:V) slope. The excavation bottom slopes of the larger, western portion will be graded down at 2% north to south and 2.5% west to east, so that leachate drains to the northeast corner of the western portion of Cell 2 – Stage 2. The excavation will be constructed with a leachate collection trench along the eastern edge of the excavation bottom. The leachate collection swale will be graded at a 2.0% slope down from south to north toward a sump at the north edge of Stage 2. From the sump, leachate will be conveyed north to the existing leachate drain line. The smaller, eastern portion of Stage 2 slopes down at 2% to the south and east, where a new leachate collection sump will be built and a new leachate drain line will convey leachate from the eastern portion of Stage 2 to the leachate collection system in Stage 1.

The liner system for Cell 2 – Stage 2 consists of the following components (from bottom to top):

- A 12- to 20-ounce non-woven, needle punched polypropylene geotextile. The excavation specification will allow 4-inches minus material to remain on the surface of the excavation. A heavy geotextile will provide puncture resistance for the overlying geomembrane. Alternately, a sand cushion may be used in lieu of, or to reduce the required weight of, the geotextile cushion;
- A bentonite impregnated geotextile (geosynthetic clay liner – GCL). The GCL provides an additional barrier to leachate and landfill gas migration;
- A 60-mil textured HDPE flexible membrane liner;
- A woven reinforced geotextile. This high strength geotextile will provide the tensile strength necessary to resist the sliding forces generated on a 4:1 slope by the 2-foot-thick soil protective layer;
- A 12- to 16-ounce non-woven geotextile placed on top of the HPDE liner (of the floor of the excavation) to provide protection to the HDPE liner;

- A 2-foot thick protective cover layer. This soil layer will protect the geotextile, HDPE and GCL during placement of the first lift of solid waste. It is also intended to provide a pathway for leachate movement above the HDPE toward the leachate collection and removal system.

Appendix O contains a Construction Quality Assurance Plan (CQA). This CQA plan requires the installation contractor to conduct a construction quality control program during installation. As a result, all seams will be tested for continuity. In addition, periodic samples will be removed from the rolls and subjected to tensile testing at a third party laboratory. Construction oversight personnel will be on-site at all times during HDPE, GCL and geotextile installation, and during placement of the 2-foot thick protective layer. These personnel will provide a CQA review of the construction and installation of the liner system.

3.3.2.2 Leachate Management

In its current design, runoff and leachate from Cell 1, Cell 2 – Stage 1, and the compost facility are contained in the existing leachate pond. However, the pond is not dual lined and does not have leak detection, both of which are now required for leachate ponds. Therefore, a new leachate pond has been designed and will be constructed as part of this permit renewal. The new pond will receive leachate and stormwater from Cell 1 and Cell 2 only. The existing pond will receive stormwater and process runoff from the compost facility only.

Leachate and contact stormwater within the active landfill cell (Cell 2 – Stage 2) will drain via one of two collection pipes and sumps. Leachate and storm water will be transmitted through a 2-foot thick protective cover soil to a leachate collection pipe (See Figures 11 and 12). The leachate collection pipe will consist of an 8-inch diameter perforated PVC or HDPE pipe encased in a granular fill wrapped with a geotextile. The pipe trench will be approximately 2 feet in depth, matching the thickness of the protective cover. The perforated leachate collection pipe will enter a gravel-filled sump. The leachate collection pipes will be installed along the eastern edge of each portion of Stage 2. The western portion of Stage 2 will drain to a sump at the north edge of Stage 1. The eastern portion will drain to a new sump at the southeast corner of Stage 2 where it will be pumped back to the existing sump at the north edge of Stage 1. From the sumps, the pipe (solid wall) continues up the side slopes and terminates at the top of excavation as a clean-out. An 18-inch HDPE pipe also continues up the side slope. A submersible pump capable of pumping a minimum of 50 gallons per minute can be lowered down the 18-inch pipe to pump leachate out of the cell into the existing leachate drain line that runs along the northern edge of Cell 2. The leachate drain line will discharge to a newly designed evaporation pond that

will be constructed immediately north of the existing pond. Leachate will be managed by this system during filling and after closure. Design details of these systems can be seen on Figures 11 to 13. Sizing calculations for the new pond are found in Appendix L.

The new leachate evaporation pond will be constructed, tested, and inspected using the same personnel and techniques as used for the previously constructed landfill cells and evaporation pond. The south side of the pond will be constructed on a 10:1 slope to allow access for equipment to remove sediments with the remaining sideslopes 4:1. The new evaporation pond was designed to contain the leachate generated from all of Cell 1 and Cell 2 and contact stormwater from the largest of the currently undeveloped Cell 2 stages (Stage 3) for the 25-year, 24-hour storm event.

The proposed evaporation pond liner system consists of the following layers (from bottom to top):

- A 16-ounce non-woven geotextile;
- A 60-mil HDPE geomembrane;
- A geonet, sandwiched between two layers of non-woven geotextile;
- A UV-resistant 60-mil HDPE geomembrane, textured on side slopes;
- A 6-inch layer of sand (bottom and the 10:1 sideslope only) as a cushion layer beneath the soil cement to protect the 60-mil HDPE geomembrane; and
- An 8-inch layer of soil cement (bottom and the 10:1 sideslope only). The cement will allow the District to enter the pond and remove accumulated sediment using a front-end loader.

The proposed evaporation pond will also have a leak detection system between the lower 60-mil HDPE geomembrane and the sandwiched geonet/geotextile layer. The geonet will convey any fluid that leaks through the primary liner to a gravel-filled sump with an 8" perforated HDPE pipe. The pipe will extend up a 4:1 sideslope as a solid-wall pipe and terminate at a manhole structure where a portable water level meter and, if needed, a pump can be lowered down to check for leaks in the primary evaporation pond liner.

Modeling

Since the leachate generation calculations were done for the October 2003 Permit Application, no modifications have been made to the landfill that affect the amount of leachate generated or the performance of the leachate collection system. Because of this, the Hydrologic Evaluation of Landfill Performance

(HELP) model, hydraulic head calculations, and calculations for the flow capacity of the leachate collection pipe used for the 2003 Permit Application are still valid and are included in Appendix K.

Analyses have been conducted to evaluate the sizing and capacity of the proposed leachate evaporation pond for the combination of contact stormwater run-off from the contributing cell area and leachate generation from all of Cell 1 and Cell 2. Only stormwater from the largest stage in Cell 2 (Stage 3) was considered in the stormwater runoff calculations because the stages will be developed in sequence, with each stage receiving intermediate cover when it reaches capacity, thereby reducing contact stormwater runoff. The 25-year, 24-hour storm event was used to compute run-off. The results of the analysis, presented in Appendix L, indicate the proposed leachate evaporation pond is sized adequately to contain the leachate generated from Cell 1 and Cell 2 and the contaminated stormwater run-off from the equivalent area of Cell 2 – Stage 3.

3.3.2.3 Surface Water Controls

The Bayview Landfill site and its vicinity generally drain from west to southeast. Stormwater originating west of the site is routed through three existing surface water channels. See Figure 2. Construction of Landfill Cells 2 required that the northern ephemeral surface drainage channel be relocated (see Figure 5).

Stormwater originating on-site is managed as either non-contact or contact stormwater depending on its source. Non-contact stormwater is water falling on unimproved portions of the site, or on improved portions of the site having no contact with solid waste (e.g., the maintenance building vicinity) or on the final cover of Cell 1. Run-on control structures divert this water from the active landfill cell and stormwater/leachate pond and route this water into the existing surface water channels. Contact stormwater is water falling onto the active landfill cell. Run-off control structures divert water falling on the active landfill cell into the leachate collection system. Ultimately, contact stormwater is stored and evaporated in the evaporation pond. Neither leachate nor contact stormwater are discharged from the site.

Analyses have been conducted for run-on and run-off control systems around Cell 2. These analyses were conducted for a 25-year storm event and the associated time of concentration that produced peak flow. The analyses, presented in Appendix M, indicate that a triangular ditch, nominally 1 foot deep, provides adequate flow capacity. This ditch geometry was constructed concurrent with the Cell 2 construction.

3.3.2.4 Closure and Post-Closure

Cell 1

The final cover of Cell 1 was completed in 2008. An alternate final cap consisting of 34 inches of on-site, olive-brown silty sand was used to close Cell 1. A seed mix similar to that shown in Table 3-1 will be used to establish vegetation during 2009. Final contours for Cell 1 can be seen on Figure T-3 in Appendix T. The side slopes of the landfill were constructed at a 4:1 (H:V) slope, with the top slope being approximately 5%. After seeding the final cover, closure of Cell 1 will be considered completed.

Table 3-1: Seed Mix for Bayview Landfill

% Mix	Type of Grass
0.50%	Sand Drop Seed
1.50%	Alkali Sacaton
3.50%	Blue Grama
17.50%	Blue Bunch Wheat Grass
17.50%	Indian Rice Grass
3.00%	Sandberg Blue Grass
4.00%	Sheep Fescue
16.25%	Slender Wheat Grass
16.25%	Stream Bank Wheat Grass
20.00%	Western Wheat Grass
100.00%	Total

The final capping system used for Cell 1 varies from the standard design in the Utah Administrative Code at R315-303-3(4). However, based on modeling performed for the 2003 permit application, the approved cap is equivalent to the standard design in preventing infiltration. A copy of this analysis is included in Appendix N.

A conceptual design of the gas system is included in Appendix Q. Recent landfill gas monitoring indicates that gas collection is not required. At such time that active extraction is needed, wells will be installed and connected to header pipes and the system will be connected to a blower and the landfill gas burned in a flare or used in a landfill gas generator.

Cell 2

Landfill Cell 2 – Stage 1 will reach capacity by the end of 2009. Stage 2 of Cell 2 will be constructed in 2009, with a portion of the excavated soils used for daily

cover, intermediate cover on Stage 1, or stockpiled. Landfill Cell 2 is not expected to reach capacity until approximately 2032.

The same alternate final capping system as used for Cell 1 will be used for Cell 2 when final contours are reached. In general, this capping system consists of the following layers from the bottom up:

- 6 inches of intermediate cover placed over the daily cover to provide a 12-inch cushion of soil between the solid waste and the barrier layer;
- 34-inches of evaporative cap constructed from the olive-brown silty sand available on-site. The top six inches of this evaporative cap will be capable of supporting vegetative growth by amending the soil with compost to aid in initial seed germination.

A seed mix similar to that shown in Table 3-1 will be used to establish vegetation. Projected final contours for Cell 2 can be seen on Figure 6. The side slopes of Cell 2 will be constructed at a 4:1 (H:V) slope, with a top slope of approximately 5%.

Post-Closure Care

Post-closure care is expected to consist of the following tasks:

- Quarterly inspections of the cap to determine whether significant erosion or differential settlement has occurred;
- Quarterly inspections of the stormwater/leachate evaporation pond;
- Quarterly monitoring of landfill gases at the extraction wells;
- Quarterly inspection of groundwater well integrity;
- Semi-annual monitoring and sampling of groundwater wells.

These activities have been initiated on Cell 1 and will be expanded to all closed areas at the appropriate times. A maintenance program will be developed for the landfill gas recovery system when the system is activated. Closure and post-closure is discussed in more detail in Sections 2.6 and 2.7 of this application.

3.4 Composting

A composting facility was constructed in 2004 after Cell 1 reached capacity. The compost facility is jointly permitted through the Division of Solid and Hazardous waste and the Division of Water Quality. The facility is located east of Cell 2, adjacent to the existing leachate evaporation pond in the SE ¼ of the NE ¼ of Section 17. The composting facility uses windrows to processes two waste

streams, one containing a mixture of biosolids, food and beverage waste, and yard waste, and another containing yard wastes only. An operations plan for the compost facility is included in Appendix R. Quantities of waste processed at the composting facility each year from 2004 through 2007 are shown in Table 3-2.

Table 3-2. Tons of Waste Processed at the Bayview Composting Facility

Year	Biosolids (tons)	Yard Waste (tons)
2004	496	1,556
2005	1015	2,866
2006	1036	4,189
2007	1058	5,874
Total	**3,605**	**14,485**

3.5 References

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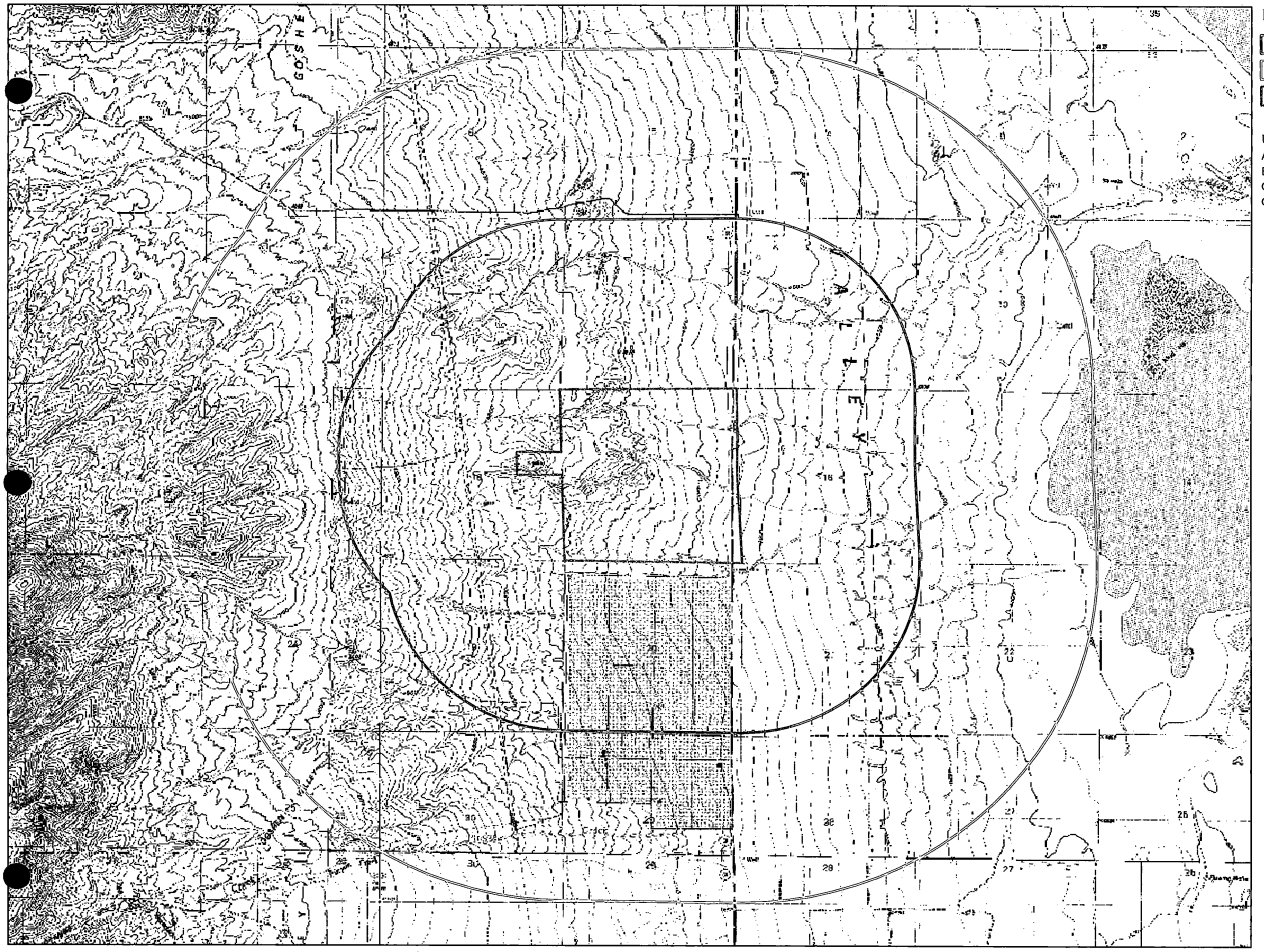
Part 4: Figures

Figure 1.	USGS Topographic Map of Bayview Landfill and Vicinity
Figure 2.	USGS Topographic Map of Bayview Landfill
Figure 3.	Cell 2 Existing Contours
Figure 4.	Earthquake Distribution Map
Figure 5.	Planned and Existing Landfill Facilities
Figure 6.	Cell 2 Final Contours
Figure 7.	Cell 2 Liner/Excavation Contours
Figure 8.	Cell 2 Typical Cross Section
Figure 9.	Cell 2 - Stage 1 & 2 Liner/Excavation Contours
Figure 10.	Liner Details
Figure 11.	Cell 2 Leachate Collection System and Liner Details
Figure 12.	Cell 2 Leachate Collection System, Sump Plan, and Section Details
Figure 13.	Cell 2 Leachate Collection System Details



LEGEND

- 1-Mile Boundary
- 2-Mile Boundary
- Property Line (Approximate)

USGS TOPOGRAPHIC MAPS USED:
Allens Ranch
Eureka
Goshen
Goshen Valley North

N
S

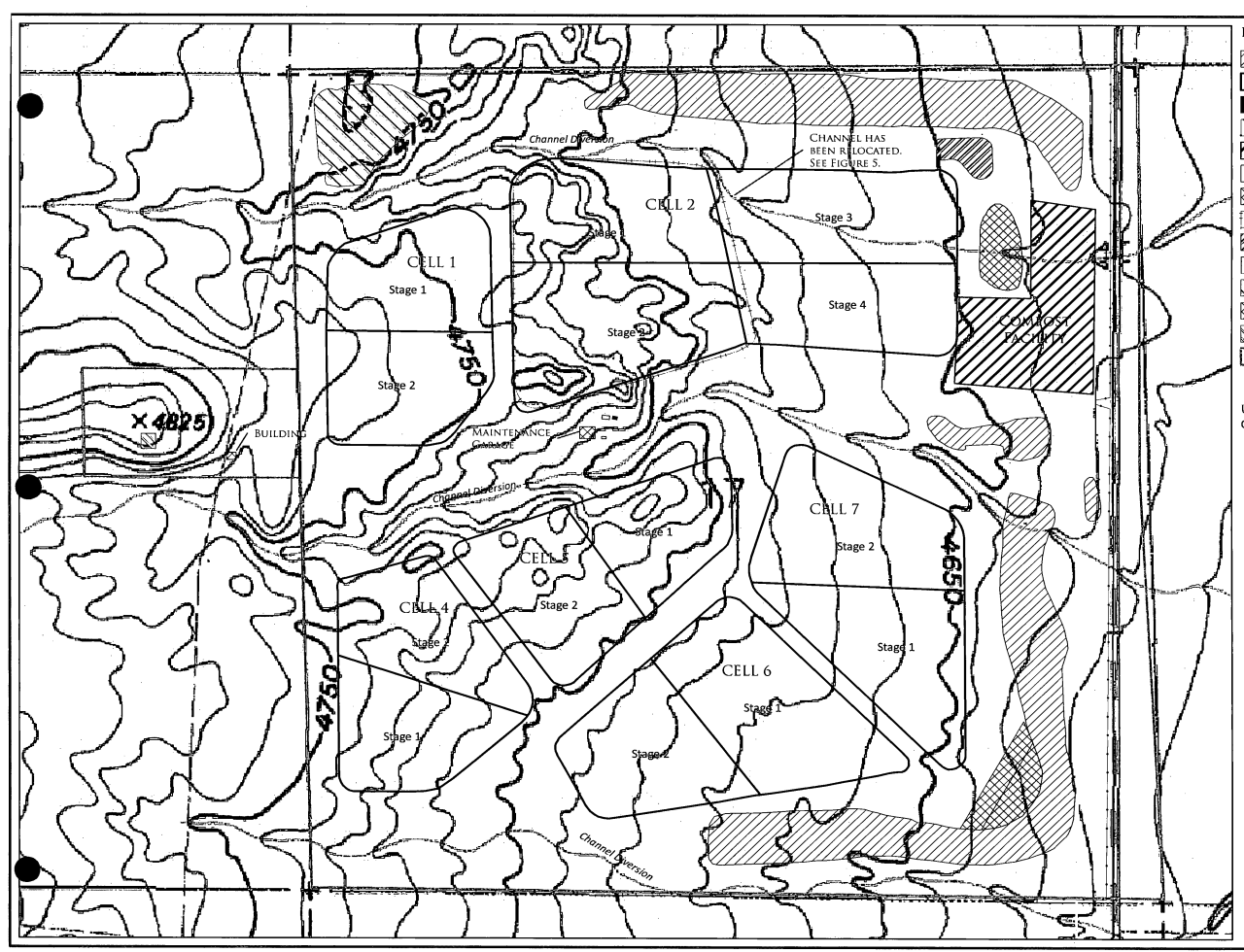
0 0.5 1
Miles

BAYVIEW LANDFILL

FIGURE 1

USGS Topographic Map
with Two Mile Boundary

Tuesday, January 13, 2009 1:58:43 PM



LEGEND

- Berm
- Cell
- Cement Pad/Propane Tank
- Chain Link Fence
- Compost Facility
- Fuel Tank
- Leachate Basin
- Litter Control Fence
- Proposed Leachate Basin Location
- Septic Tank
- Soil Stockpile Area
- Structure
- Water Tank
- Property Line (Approximate)

USGS TOPOGRAPHIC MAP USED:
Goshen Valley North

N
S

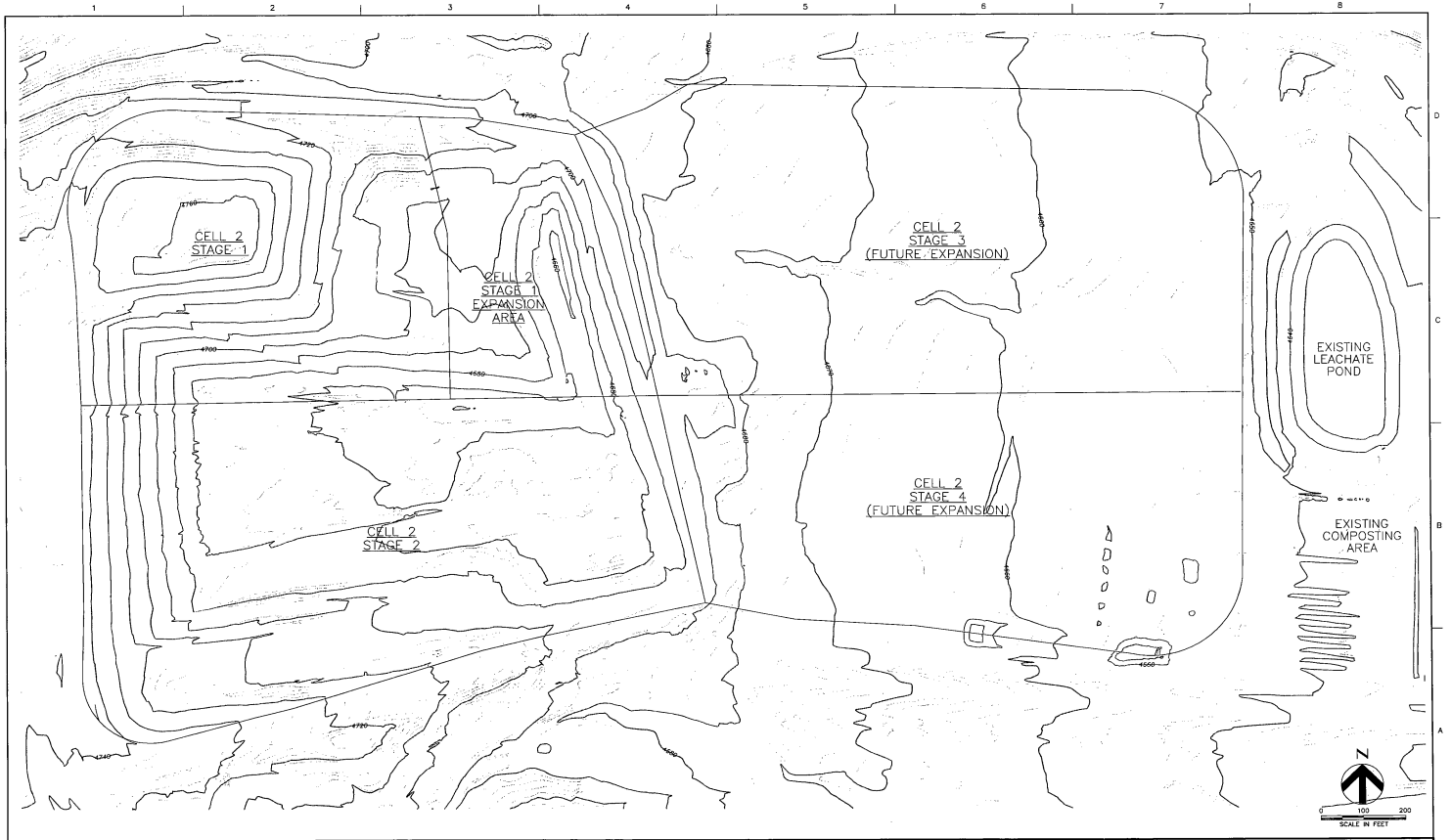
0 0.125 0.25
Miles

BAYVIEW LANDFILL

FIGURE 2

USGS Topographic Map of Bayview Landfill

Monday, January 12, 2009 9:47:47 AM



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STRUCTURAL	
DESIGNED	
DRAWN BY	
PROJECT NUMBER	96439

SOUTH UTAH VALLEY
SOLID WASTE DISTRICT

BAYVIEW LANDFILL
PERMIT APPLICATION

CELL 2 EXISTING CONTOURS

0 1" 2"

FILENAME	FIGURE 3.DWG
SCALE	AS SHOWN

FIGURE 3

LEGEND

Earthquake*

Decade, Magnitude

- ○ 1990s, 2.00 - 2.99
- ○ 1990s, 1.00 - 1.99
- ● 1990s, 0.00 - 0.99
- △ 1980s, 4.00 - 4.99
- △ 1980s, 3.00 - 3.99
- △ 1980s, 2.00 - 2.99
- △ 1980s, 1.00-1.99
- ▲ 1980s, 0.00 - 0.99
- □ 1970s, 2.00 - 2.99
- □ 1970s, 1.00 - 1.99
- ■ 1970s, 0.00 - 0.99
- ◊ 1960s, 2.00 - 2.99
- ◊ 1960s, 1.00 - 1.99
- • **Earthquake Outside 15-Mile Radius of the Property Line**
- **Property Line (Approximate)**

* Earthquakes displayed are within a 15-mile radius of the property line.

N

S

0 5 10

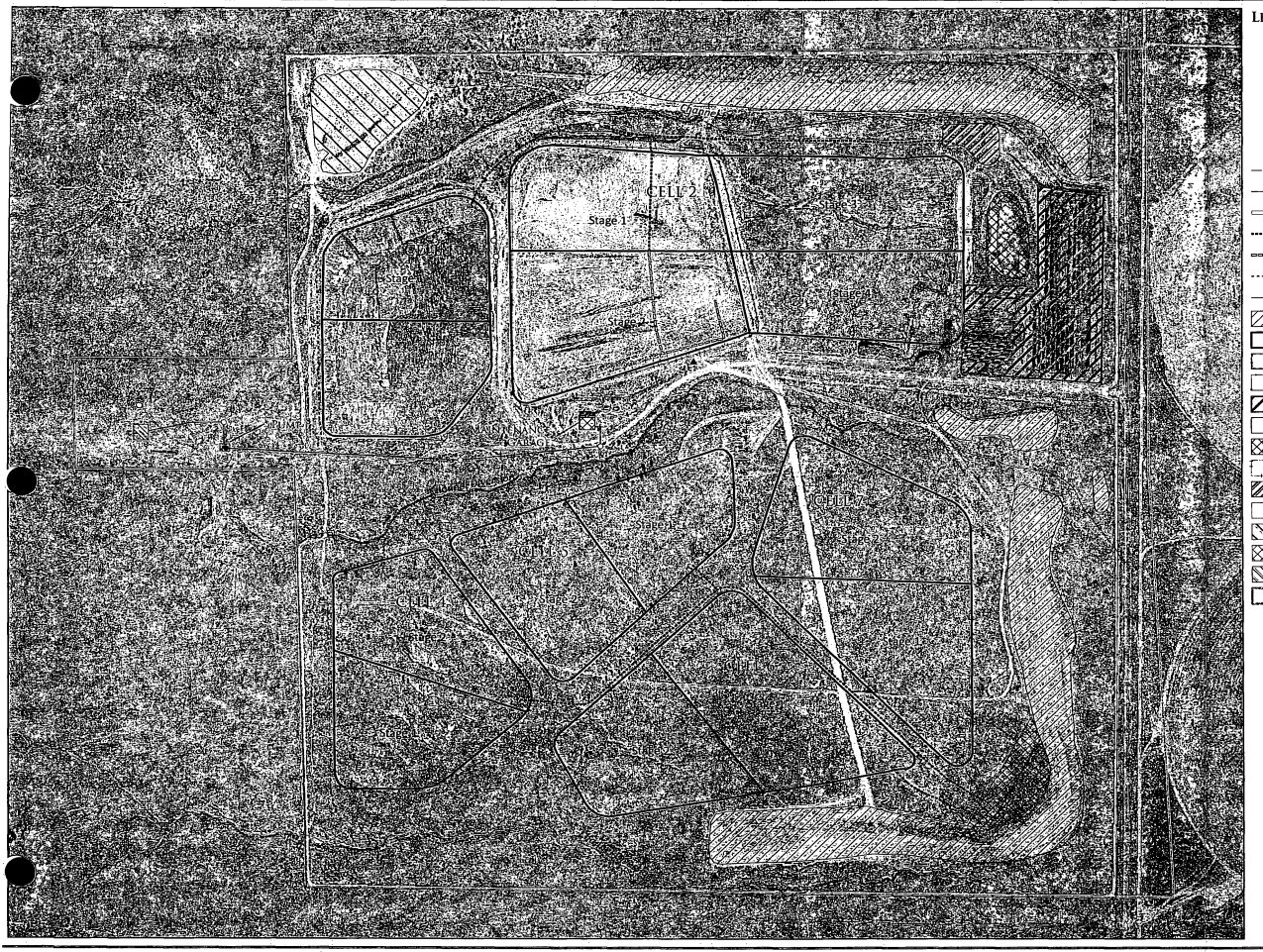
Miles

BAYVIEW LANDFILL

FIGURE 4

Earthquake Distribution Map

Friday, January 9, 2009 11:52:25 AM



LEGEND

- Fire Hydrant
- Leachate Collection Manhole Structure
- Monitoring Well, Approximate Location
- Monitoring Well, Perched Water Table
- Monitoring Well, Shallow Pleistocene Aquifer
- Pump
- Channel Diversion
- Drain Field
- Gate
- Leachate Drain Line
- New Leachate Drain Line
- Surface Water Diversion Ditch
- Water Line
- Berm
- Cell
- Cement Pad/Propane Tank
- Chain Link Fence
- Compost Facility
- Fuel Tank
- Leachate Basin
- Litter Control Fence
- Proposed Leachate Basin Location
- Septic Tank
- Soil Stockpile Area
- Structure
- Water Tank
- Property Line (Approximate)

N

S

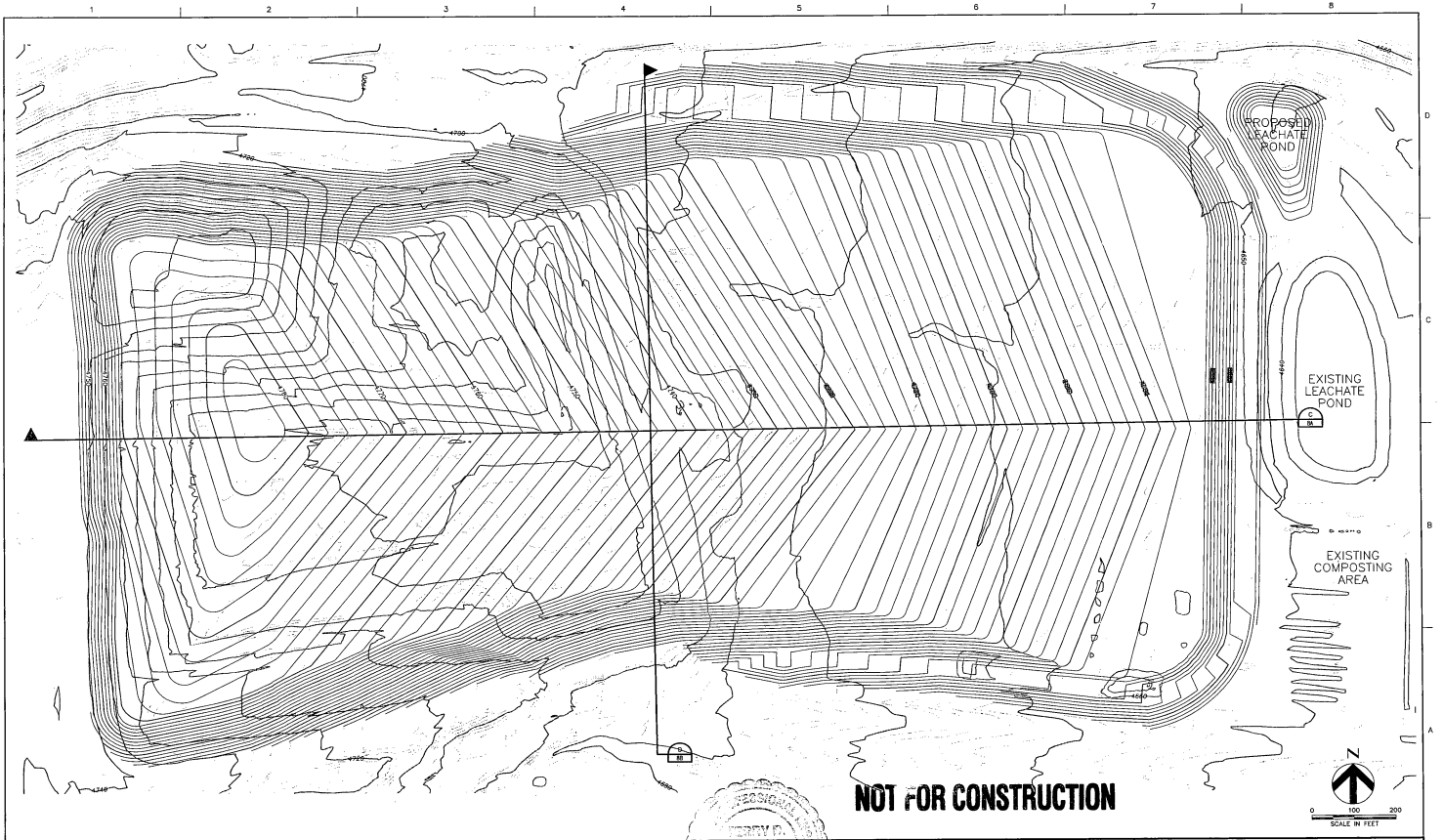
0 0.125 0.25

Miles

BAYVIEW LANDFILL
FIGURE 5

Planned and Existing
Landfill Facilities

uesday, March 3, 2009 1:49:25 PM
I:\SLC STAFF\Rosemary\SUVSWD\Bayview_Landfill\map_docs\mxd\map_bl_BayviewLandfill.mxd



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SOUTH UTAH VALLEY
SOLID WASTE DISTRICT

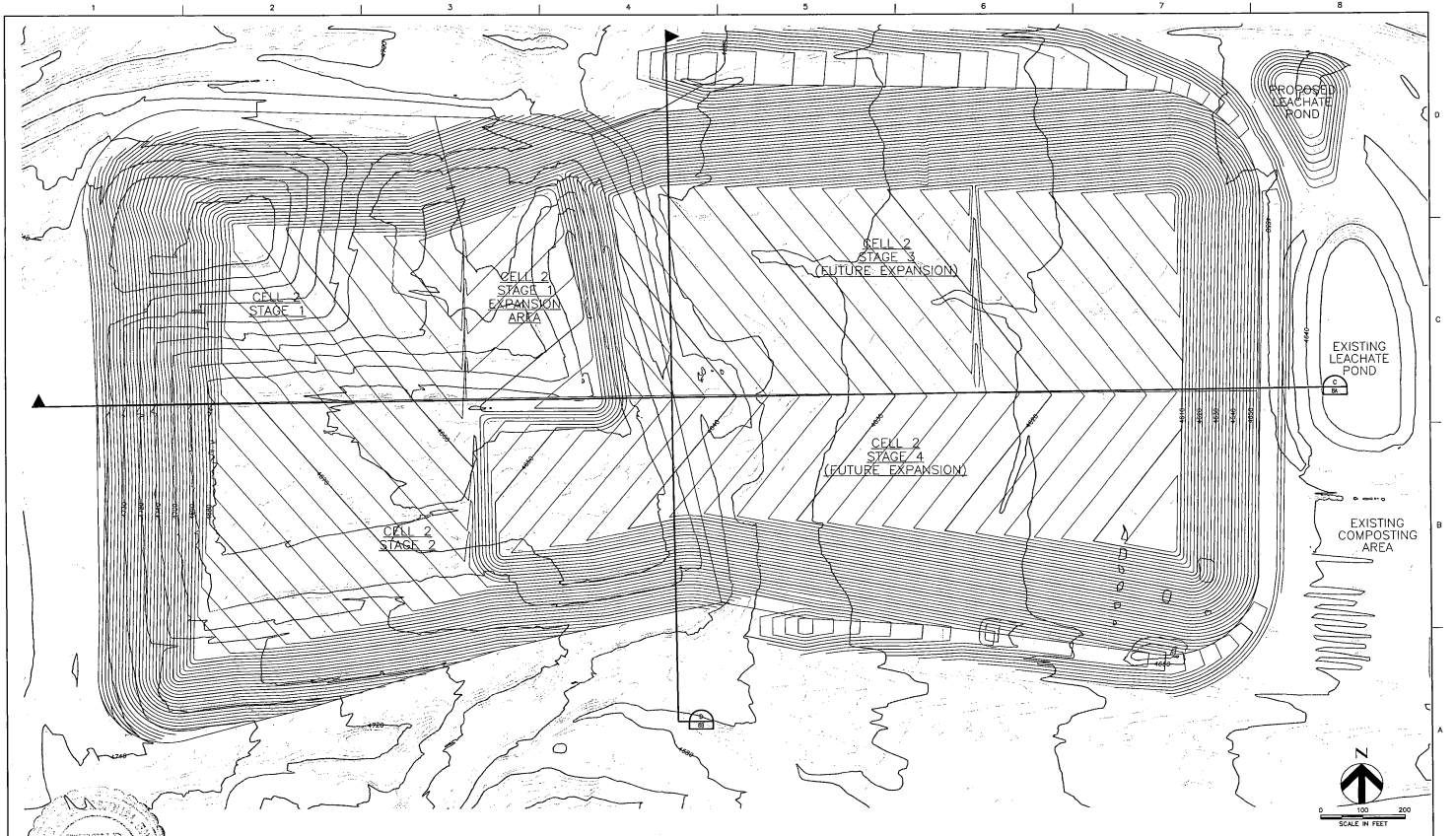
BAYVIEW LANDFILL
PERMIT APPLICATION

CELL 2 FINAL CONTOURS

0 1" 2"

FILENAME	FIGURE 6.DWG
SCALE	1"=100'

FIGURE 6



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SOUTH UTAH VALLEY
SOLID WASTE DISTRICT
TRANSFER STATION/LANDFILL
PERMIT APPLICATION

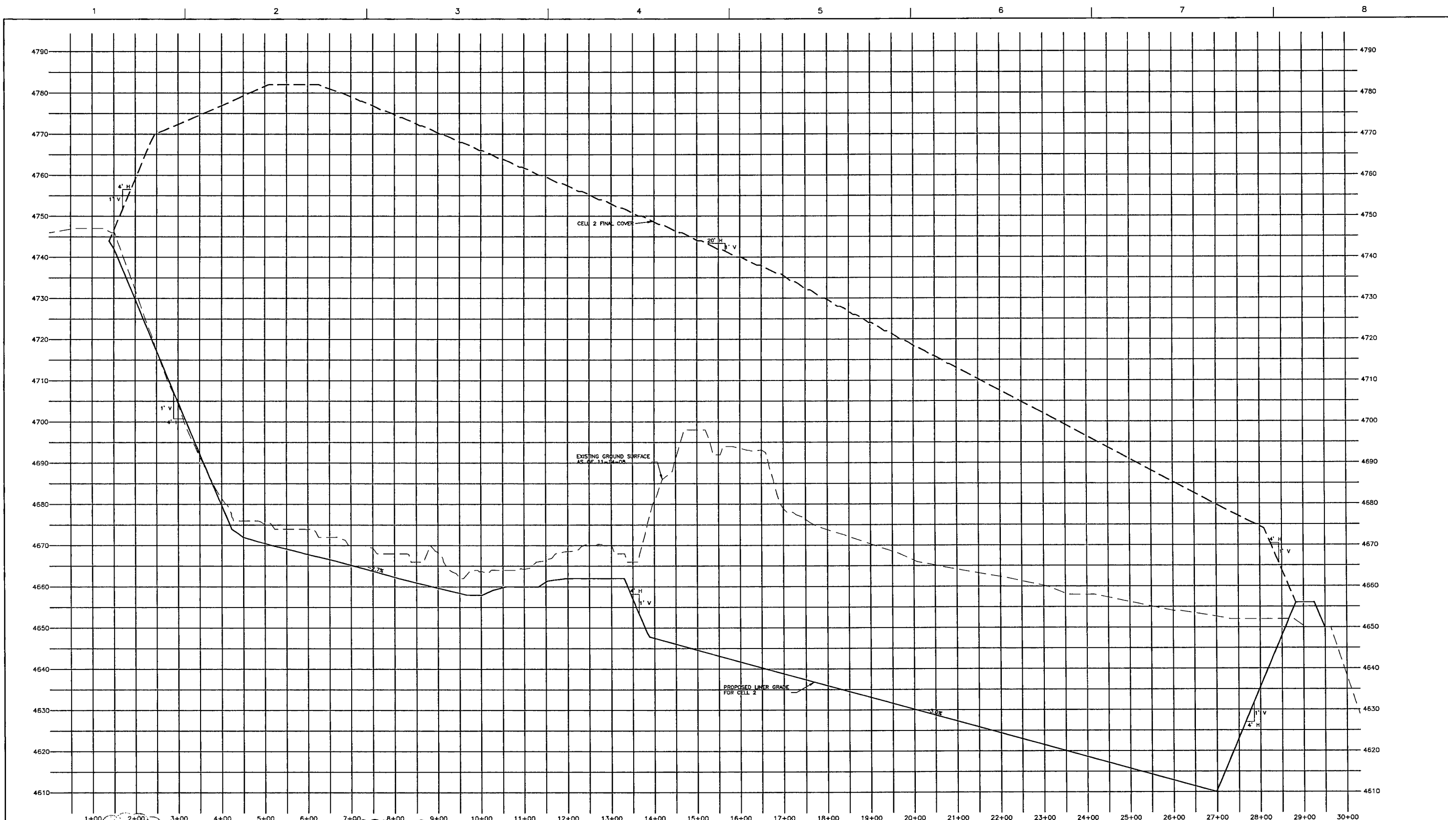
CELL 2 LINER/EXCAVATION CONTOURS

0 1" 2"

FILENAME FIGURE 7.DWG

SCALE AS SHOWN

FIGURE 7



NOT FOR CONSTRUCTION CROSS SECTION C

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SOUTH UTAH VALLEY
SOLID WASTE DISTRICT

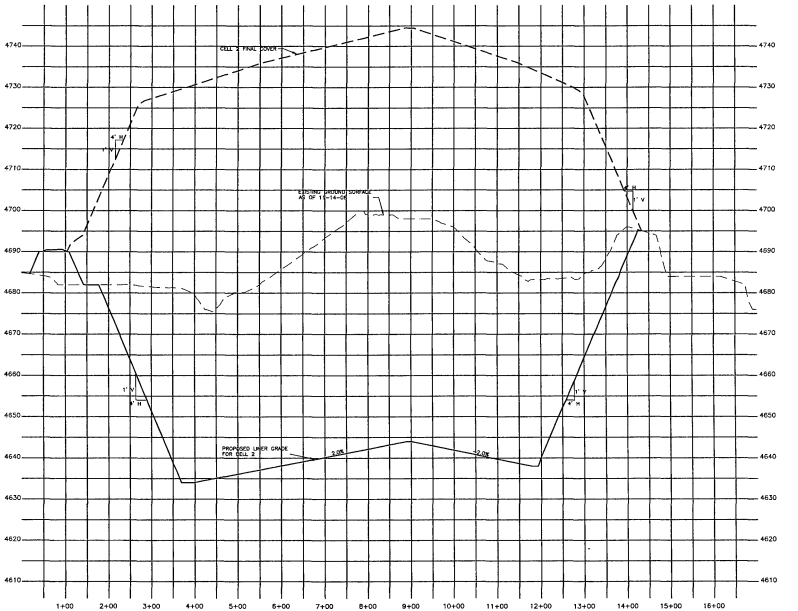
BAYVIEW LANDFILL
PERMIT APPLICATION

CELL 2
TYPICAL CROSS SECTION

0 1" 2"

FILENAME 00C-8.DWG
SCALE H: 1"=100' V: 1"=10'

FIGURE
8A



CROSS SECTION D

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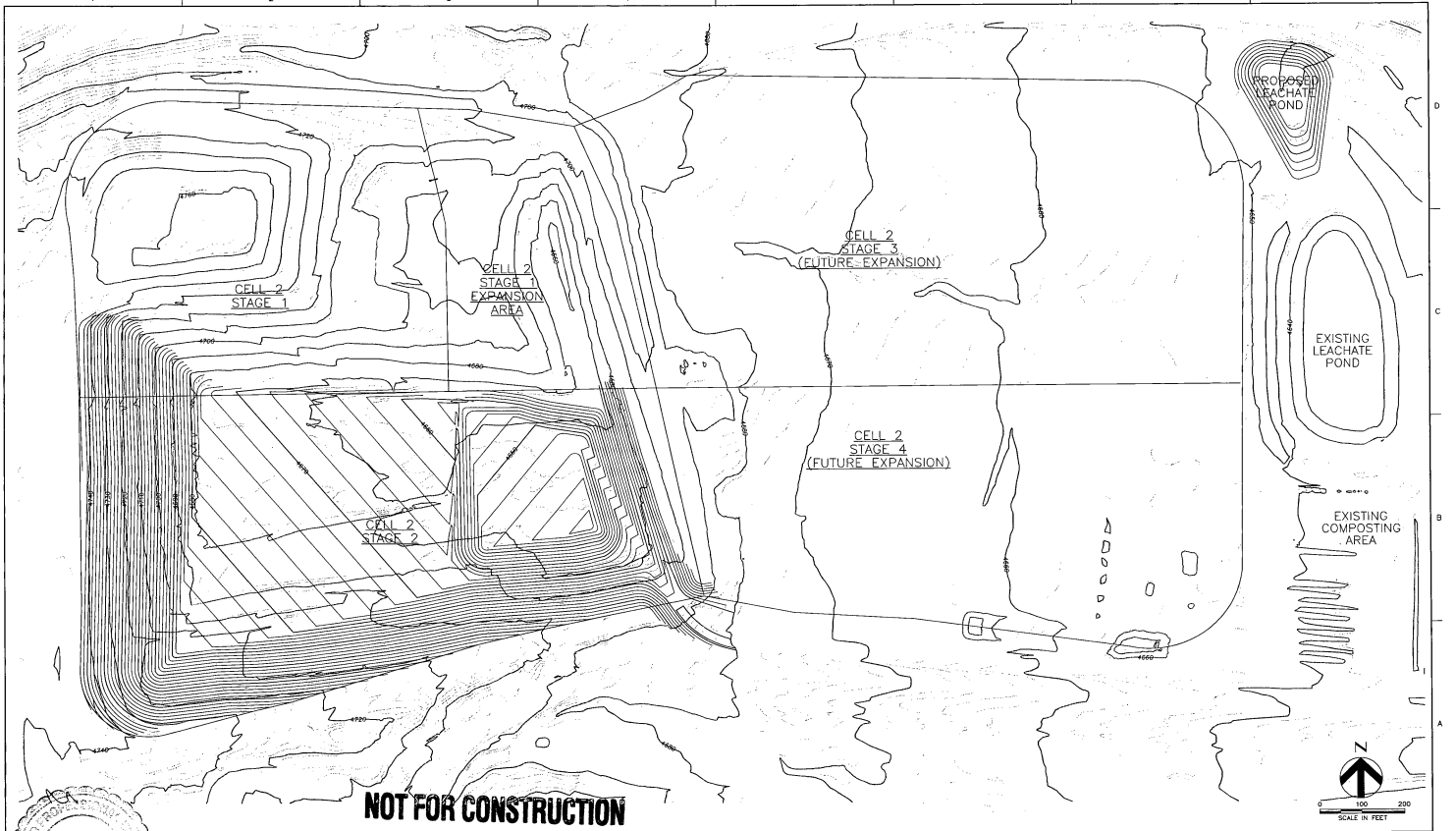
SOUTH UTAH VALLEY
SOLID WASTE DISTRICT

BAYVIEW LANDFILL
PERMIT APPLICATION

CELL 2
TYPICAL CROSS SECTION

0 1" 2"

FILENAME	00C-8.DWG
SCALE	NOT TO SCALE
FIGURE	8B



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DRAWN BY	
PROJECT NUMBER	96439

SOUTH UTAH VALLEY
SOLID WASTE DISTRICT

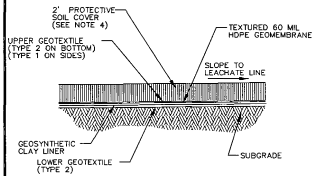
BAYVIEW LANDFILL
PERMIT APPLICATION

CELL 2 STAGE 1 & 2
LINER/EXCAVATION CONTOURS

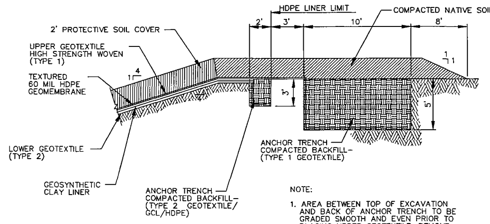
0 1" 2"

FILENAME	FIGURE 9.DWG
SCALE	AS SHOWN

FIGURE 9



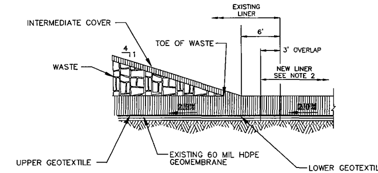
TYPICAL LANDFILL LINER DETAIL (1 / C7)
NOT TO SCALE



NOTE:

1. AREA BETWEEN TOP OF EXCAVATION AND BACK OF ANCHOR TRENCH TO BE GRADED SMOOTH AND EVEN PRIOR TO PLACING UPPER GEOTEXTILE. REMOVE ANGULAR STONES.

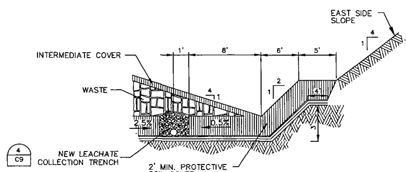
LINER SYSTEM ANCHOR TRENCH (2 / C7)
NOT TO SCALE



STAGE 1/STAGE 2 LINER CONNECTION (3 / C7)
NOT TO SCALE

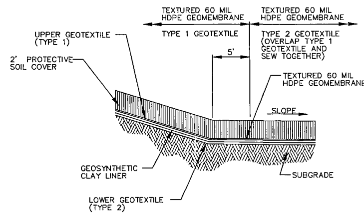
NOTES:

1. TEMPORARY STORMWATER INTERCEPTOR BERM TO BE PLACED IN FRONT OF WORKING AREA TO DIVERT STORMWATER AWAY FROM ACTIVE FACE. OWNER WILL RELOCATE AS NEEDED.
2. STAGE 2 GEOMEMBRANE TO BE WELDED TO STAGE 1. FUTURE GEOSYNTHETIC COMPONENTS TO BE OVERLAPPED AND SECURED.
3. TYPE I GEOTEXTILE IS REINFORCED AND REQUIRED ON SIDE SLOPES ONLY, ABOVE HDPE LINER. TYPE 2 GEOTEXTILE IS NON-REINFORCED (NON-WOVEN) AND IS TO BE USED ABOVE HDPE LINER ON BOTTOM AND BETWEEN SUBGRADE AND GCL. A SAND CUSHION MAY BE USED IN LIEU OF THE LOWER TYPE 2 GEOTEXTILE WITH PRIOR APPROVAL OF ENGINEER AND OWNER.
4. SEE SPECIFICATION 02240 FOR PROTECTIVE COVER MATERIAL REQUIREMENTS.



(4 / C9)

STAGE 2 EASTERN LINER TERMINATION (4 / C7)
NOT TO SCALE



LINER AT SLOPE TRANSITION (5 / C7)
NOT TO SCALE

NOTE: THICKNESS MEASURED PERPENDICULAR TO EXCAVATION SURFACE.

GEOTEXTILE SCHEDULE		
LOCATION	TYPE	COMMENTS
ALL	ALL	REMOVE ALL ANGULAR STONES GREATER THAN 0.5 INCHES
LOWER GEOTEXTILE	2	USE 16 OZ/SY NON-WOVEN IF ROUNDED STONES GREATER THAN 2.5 INCHES ARE REMOVED. USE 20 OZ/SY NON-WOVEN IF ONLY ROUNDED STONES GREATER THAN 4 INCHES ARE REMOVED. NO HORIZONTAL SEAMS ON SIDESLOPES.
UPPER GEOTEXTILE ON SIDESLOPES	1	REINFORCED GEOTEXTILE. NO HORIZONTAL SEAMS ON SIDESLOPES.
UPPER GEOTEXTILE ON BOTTOM (FLOOR)	2	USE 12 OZ/SY NON-WOVEN BENEATH DUNE SAND (PROTECTIVE SOIL COVER)

NOT FOR CONSTRUCTION

TERRY D. ... No. ... (professional seal)

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			STRUCTURAL	
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			PROJECT NUMBER	96439

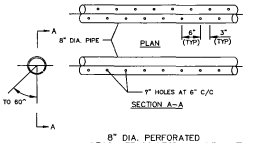
SOUTH UTAH VALLEY SOLID WASTE DISTRICT

BAYVIEW LANDFILL PERMIT APPLICATION

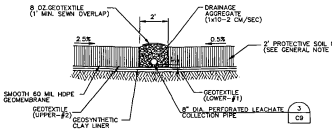
LINER DETAILS

0 1" 2"

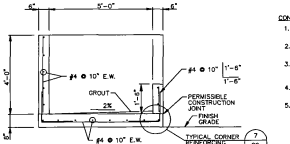
FILENAME: FIGURE 10.DWG
SCALE: N/A
FIGURE: 10



8" DIA. PERFORATED LEACHATE COLLECTION PIPE
NOT TO SCALE
3 C9



LEACHATE COLLECTION TRENCH
NOT TO SCALE
4 C9

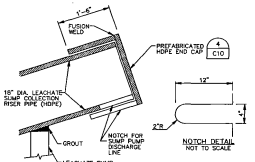


7 C9

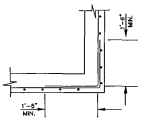
LEACHATE SUMP ACCESS STRUCTURE- SECTION
NOT TO SCALE
5 C9

CONCRETE NOTES:

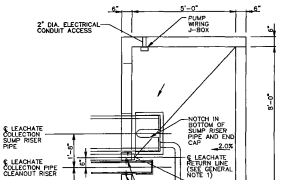
1. ALL CONCRETE SHALL HAVE 4000PSI COMPRESSIVE STRENGTH @ 28 DAYS, NORMAL WEIGHT.
2. ALL CONCRETE SHALL BE IN ACCORDANCE WITH THE "BUILDING CODE REQUIREMENT FOR REINFORCED CONCRETE" ACI-318 LATEST EDITION.
3. REINFORCING BARS SHALL CONFORM TO SPECIFICATIONS FOR "DEFORMED BILLET-STEEL FOR CONCRETE REINFORCEMENT" WITH 60KSI YIELD STRENGTH; ASTM A615 GRADE 60.
4. REINFORCING BARS TO BE WELDED SHALL COMPLY WITH THE REQUIREMENT OF ASTM A706 GRADE 60.
5. COVER ON ALL REINFORCEMENT SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:
   I. CONCRETE PLACED AGAINST GROUND 3 IN
   II. EXPOSED FORMED SURFACES
      A. #5 AND SMALLER 1.5 IN
      B. #6 AND LARGER 2 IN
6. ALL EXPOSED CORNERS SHALL HAVE 1 IN CHAMFER, UNLESS OTHERWISE NOTED.
7. SAWED GROOVES SHOULD BE MADE WITHIN APPROXIMATELY 4 TO 12 HOURS OF SLAB OR PAVEMENT FINISHING. IF THIS IS NOT PRACTICABLE, USE PREMOLDED STRIPS.
8. AS AN ALTERNATIVE, A PRECAST CONCRETE BOX MAY BE USED. THE PRECAST BOX SHOULD HAVE A MINIMUM CONCRETE COMPRESSIVE STRENGTH OF 5000 PSI @ 28 DAYS.



18" DIA. SUMP RISER PIPE
NOT TO SCALE
6 C9



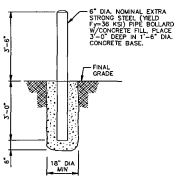
ALL LAP SPLICES FOR #4 BAR
TYPICAL CORNER REINFORCING
NOT TO SCALE
7 C9



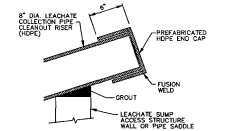
LEACHATE SUMP ACCESS STRUCTURE- PLAN
NOT TO SCALE
8 C9

GENERAL NOTES:

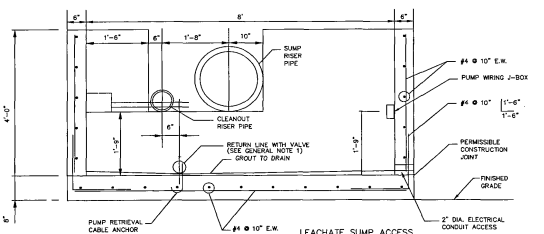
1. LEACHATE RETURN LINE IS TO ALLOW ANY SPILLAGE OR RAINWATER ACCUMULATION IN SUMP ACCESS STRUCTURE TO RETURN TO LANDFILL SUMP FOR REMOVAL. GROUT BOTTOM OF STRUCTURE TO VALVE AFTER INSTALLATION, IF NECESSARY.
2. GROUT BOTTOM TO DRAIN TO RETURN LINE.
3. SEE SPECIFICATION SECTION 02240 FOR PROTECTIVE SOIL COVER REQUIREMENTS.



TYPICAL BOLLARD
NOT TO SCALE
10 C9



8" DIAMETER CLEANOUT RISER PIPE END CAP
NOT TO SCALE
11 C9



NOTE:
THIS AREA IS CORROSIVE.

LEACHATE SUMP ACCESS STRUCTURE- SECTION
NOT TO SCALE
9 C9

NOT FOR CONSTRUCTION

LICENSED PROFESSIONAL ENGINEER
TERRY D. WARNER
No. 340000
STATE OF UTAH

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ELECTRICAL	
STRUCTURAL	
DESIGNED	
DRAWN BY	
PROJECT NUMBER	95439

SOUTH UTAH VALLEY SOLID WASTE DISTRICT

BAYVIEW LANDFILL
PERMIT APPLICATION

CELL 2 LEACHATE COLLECTION SYSTEM AND LINER DETAILS

0 1" 2"

FILENAME	FIGURE 11.DWG	FIGURE
SCALE	N/A	11