

11070

Permit Renewal Application **HAND DELIVERED**
for the
Garfield County
John's Valley Class II Landfill

OCT 11 2007
 UTAH DIVISION OF
 SOLID & HAZARDOUS WASTE
 07.03009

REQUEST FOR ADDITIONAL INFORMATION #1

May 3, 2004

The following request for additions information is formatted with general areas of the application shown with underline followed by a short discussion of the issue. The bulleted items are the areas that need a response.

Authorized Signature

Section R315-310-2(4) of the *Solid Waste Permitting and Management Rules* (Rules) requires the application and all reports required by a permit or requested by the Executive Secretary shall be signed by either a principal executive officer or a ranking elected official. The application was submitted under the signature of Commissioner Maloy Dodds. Alternatively, Commissioner Dodds may authorize another person as the duly representative of Garfield County. The authorization to designate another individual to represent Garfield County must be submitted to the Executive Secretary in writing.

- The revised application and any other required reports must be submitted under the signature of Commissioner Dodds or another designated representative.

FACILITY GENERAL INFORMATION

Legal Description

Page 2 and Exhibit 3a of the application provides the legal description of the landfill facility as located in southwest quarter of Section 36. However, page 3 of the application explains that the facility gate is located in the Southwest quarter of Section 30.

- The application needs to be modified to clarify and ensure the correct descriptions of the facility are provided.

Non-Commercial Landfill

Where Corrections
 can be found

Refer
 comments for
 actual location
 Brian Blumenthal

Page 3 ✓

Rules. As an example, see the enclosed copy of San Juan County Landfill's Plan of Operation.

Page 6 of the application states the waste will be covered with a minimum of 6 inches of earthen material at the end of each day or with an alternate daily cover approved by the Executive Secretary. Section R315-303-4(4) of the Rules allows the Executive Secretary to approve an alternative daily cover provided it does not present a threat to human health or the environment. The Executive Secretary will establish a schedule for using the alternative cover based on the application's demonstration that the performance of the alternative daily cover to control vectors, fires, odors, blowing litter, and scavenging.

Page 7,
changed

✓ As part of the 5-year permit renewal process, the examination of the alternative daily cover must be reviewed. The application needs to provide the performance demonstration for each specific product used as an alternative daily cover. Please note that the page 15 references to the alternative daily cover of the application may also need to be modified.

Renewal

✓ The last sentence of the first paragraph on page 9 needs to be modified to explain that daily cover may include use of an alternative daily cover approved by the Executive Secretary.

Section R315-303-4(4)(c) of the Rules explains that areas of the landfill which have not received waste for more that 30 days shall be covered with an intermediate cover that consists of a minimum of 12 inches of soil.

Page 17, 8

✓ The application needs to include the procedure for applying an intermediate cover.

Section R315-303-3(1)(b) of the Rules requires the landfill to minimize liquids by prohibiting the disposal of containerized liquids larger than household size, noncontainerized liquids, sludges containing free liquids, or any waste containing free liquids in containers larger than household size (five gallons). However, page 6 of the application lists only waste treatment plant sludge, digested waste water treatment plant sludge, or septage containing free liquids will be prohibited from disposal.

Page 8

✓ The application needs to be expanded to ensure no waste containing free liquids, as required in Section R315-303-3(1)(b), is disposed.

Section R315-302-2(2)(j) and R315-303-4(7) of the Rules requires the landfill to have procedures for excluding the receipt of prohibited hazardous waste or prohibited waste containing PCBs. Page 7 of the application explains that random checks will be made during deposition, spreading, and covering operations. Page 8 of the application explains that waste will be observed as it is removed from the collection vehicle and the waste will be further examined for hazardous materials, as it is being spread by the operator and compacted. As described in the application, the observations and examination of the

waste could be conducted from the driver seat of the heavy equipment. Random waste inspection requires closer examination of the waste from the ground.

Page 10

• The application needs to be expanded to include the details of the procedures for conducting waste inspections.

Exclusion of Hazardous Waste

Page 8 of the application explains that waste from collection vehicles will be observed to ensure no prohibited hazardous wastes are deposited. Page 8 also states that during periods when the landfill is open for the public, at least one percent of the vehicles (but not less than one vehicle per week) will be examined. To ensure prohibited hazardous waste is not received, 1% of all vehicles, both citizen vehicles and route collection vehicles need to be examined.

Page 10

• The application must explain that random waste inspection of at least 1% of all vehicles, both collection and citizen vehicles, will be conducted.

Section R315-303-4(7)(b) of the Rules explains that if receipt of prohibited hazardous waste or prohibited waste containing PCBs are discovered, the Executive Secretary, the hauler, and generator will be notified within 24 hours. In addition the owner, or operator will assure proper cleanup, transport, and disposal of the waste. However, page 8 of the application explains that if prohibited hazardous substances are encountered the appropriate authorities will be contacted.

Page 10

• The application needs to be expanded to describe site specific procedures to meet the requirements of Section R315-303-4(7)(b) of the Rules. The procedures should identify which agencies will be contacted and the time frame for making the contact.

Inspections and Monitoring

Sections R315-302-2(3) and R315-302-2(5) of the Rules require the location where the permanent records are stored to be approved by the Executive Secretary and require the records shall be stored for a minimum of three years. Page 7 of the application, which describes the routine and compliance inspection program, does not provide the record storage procedures.

Page 9

• The application needs to be modified to include the record storage location and length of time records will be stored.

Fire / Explosion Contingency Plan

Page 7 of the application explains that if an event occurs that prohibits the deposition of waste in the active cell, materials will be diverted for up to one month and stored in the unlined alternate storage site. Upon resolution of the event the waste will then be

transported to the final disposition site and treated as incoming waste. The next landfill disposal cell will be constructed with a liner and a leachate collection system. Once installed, waste may not be stored, beyond seven days, except on a lined or sealed surface as per Section R315-314-2 of the Rules.

Page 9

• The application needs to be modified to demonstrate that waste will be stored on a lined or sealed surface. The *Alternative Disposal* section on page 9 of the application also needs to be similarly modified.

Filling Sequence

The sequence of how the lifts are placed in a lined landfill is crucial to the protection of the liner and the performance of the disposal unit.

Put in Exhibit
Do w/ Final Design

• The application needs to provide the detailed procedures of how the first lift of waste is placed and the details, including a drawing, of the sequencing of waste placement to complete the landfill unit.

The filling sequence will be included in the final design.

Page 12 Exhibit

GEOHYDROLOGICAL ASSESSMENT

Surface Waters

Page 12 of the application explains that field discussions with Division staff indicate it would be desirable to relocate an irrigation ditch that runs through the landfill property. The location of the irrigation ditch is not provided in any of the exhibits. Current Division staff are not familiar with any prior discussion and are unsure how the irrigation ditch conflicts with the Rules.

Page 15

• The application needs to include sufficient information relating the irrigation ditch to identify any conflicts with the Rules.

Water Balance

Page 12 of the application contains multiple inferences that no leachate will be generated at the landfill. Given the results from the landfill groundwater monitoring wells, these statements may not be accurate.

Deleted

• The references to the production of leachate need to be clarified.



Page 12 of the application refers to water balance calculations submitted as part of the 1990's permit application. Those calculations were not included in the exhibits. The only water balance calculation needed in the permit renewal application is to demonstrate sufficient capacity of the leachate collection trench.

deleted

The water balance section needs to be clarified or eliminated from the application. Any reference calculations need to be provided in the application.

Water Monitoring System

Page 12 of the application states that due to the semi-arid nature of the site and water balance results, it could be determined that groundwater monitoring, surface water monitoring, and vadose zone monitoring are not justified. However, the results from the groundwater monitoring wells indicated that monitoring of the landfill is justified.

Deleted

It is recommended that this sentence be deleted or modified to more accurately reflect current conditions.

PRELIMINARY ENGINEERING REPORT

Construction of the Lined landfill Cell

In general, the application needs to provide greater detail of the proposed landfill design. The application needs to provide the conceptual design for the entire unit, not just the next lined cell. The applicant should be aware that the in depth review of the specific design will be required as part of the review of the final design and the quality assurance/quality control plan for construction of the lined cell. The following section provides some of the initial questions that must be answered to demonstrate that the lined landfill cell will meet the requirements of the Rules.

Exhibit 8 includes only a drawing of the existing unlined cell and the first lined cell.

- Additional scaled drawings and discussion are required to be included in the application. Those drawings and discussion must include, but are not limited to:
 - Discussion of construction techniques to tie in the first lined cell with the next lined cell,
 - Drawings and discussion showing how the landfill unit will be constructed from first to last phase within the landfill unit.
 - Cross sectional drawing for the length and wide of the initial lined cell, top view (aerial) of bottom liner and closed landfill.
 - Detailed drawing showing the liner design for the inner slope of the landfill.

Conceptually

- 1) Tie to Next Cell
 - 2) Phase Diagram
 - 3) Consider Tailor
- See plans

Detailed enough Room can tell what is going on

Exhibit 8 drawings contain cross section of the lined and unlined cell. The drawings show manufacturer required cover of unspecified thickness, manufacturer required buffer layer of unspecified thickness, manufacturer required base of unspecified thickness. What are these material, purposes, and thickness?

- The application needs to specify the products to be used and make necessary changes to the drawings.

See plans

60 mil HDPE
Geog. Mem. Clay Liner

Better Description
re: for to preliminary
design -
see drawing

The Exhibit 8 cross-sectional drawing of the bottom liner system does not include drainage net, leachate collection layer, or leachate collection pipes.

- The application needs to provide the details of the leachate collection system and make necessary changes to the drawings. *detail*

Exhibit 8 shows the bottom liner goes to the base of the old unlined cell and does not extend up the end of the waste slope. All leachate, which is to be recirculated, must remain on the lined portion of the disposal cell. Having an open-ended design liner will restrict the placement of the recirculation leachate.

- The application needs to address how the liner design and the recirculation of leachate will be integrated.

A20
page 17

Final Cover Design

The Exhibit 8 drawing of the lined landfill final cover does not show a drainage layer.

- Details of how the water will move off the final cap liner will need to be included in the application. *Slopes w/ arrows -*
- A detailed cross sectional drawing needs to be provided to show how the final cover liner design ties into the bottom liner. *Detail*

Plan

Plan

Elevation of Bottom Liner and Ground Water

Section R315-302-1(2)(e) of the Rules requires that the bottom of the lowest liner shall be at least five feet above the historic high level of groundwater. Page 11 states that initial sampling of the landfill indicated that groundwater was not encountered until approximately 80 feet. Page 14 of the application states that the cells are approximately 50 in total depth. However, no specific elevations are provided.

- The application needs to include the discussion and determination of the elevation of the historical high groundwater and the lowest elevation of the liner to demonstrate the required five feet of separation is provided.

Plan & Page 14

done
use data
shown
Plan

Leachate Collection System

The leachate collection trench will contain standing water, which produces hydraulic head on the liner. This head will exaggerate any flaws in the liner. In order to ensure the needed environmental protection, at a minimum, an additional 60 mil liner and gcl will be required in the leachate collection trench.

See Plan

Shoreman Plan - Capacity for 25 yr storm

See Plan

- The application needs to include the modified design of the leachate collection trench.

The application explains that leachate will be taken from the collection trench and recirculated (spread on the waste above the lined cell). The leachate will follow the path of least resistance and will move in a horizontal and vertical direction. Thus, leachate will move horizontally an unknown distance before it reaches the bottom of the landfill. This unknown horizontal migration poses a challenge. Exhibit 8 shows the bottom liner beginning at the base of the old unlined cell and does not extend up the end of the waste slope. How far horizontally for the edge of the liner must the leachate be placed to ensure 100% of the recirculated leachate migrates to the lined portion of the cell and not to the unlined cell?

back of the site -

Show you up step

See Plan

- The application needs to include the modified design to protect the liner from physical damage.

Page 15 of the application states that the leachate in the collection trench will be extracted when the trench reaches 50% capacity.

Add section

Page 17 See Plan

- The *Plan of Operations* needs to specify the leachate handling procedures and identify the equipment that will be used. The application needs to demonstrate, including drawings, that the use of the leachate removal equipment will not threaten the integrity of the liner system.

Page 15 of the application explains that the leachate collection trench has the capacity to handle a 25-year storm event.

Page 17

- The design of the leachate collection trench must consider that the requirement to always maintain a minimum freeboard of one 25-year storm event. For example, if the leachate collection trench had a total storage capacity of just one 25-year storm event, all leachate entering the collection trench would immediately have to be removed to maintain the reserve capacity of the 25-year storm event.

The first year of operating the lined cell provides the greatest potential for producing surges in the production of leachate. The small volume of waste in the cell provides a limited buffer to retard any moisture from immediately being transported to the collection trench. How will the leachate be managed in the event that the maximum storage capacity is reached during the winter or early spring when evapotranspiration is reduced and recirculation of the leachate is less effective?

Page 18

- The application needs to provide greater discussion of the leachate management procedures during the early operation of the lined cell.

Section R315-310-4(2)(c)(v) of the Rules requires the application to address the interim and final leachate collection, treatment, and disposal. During the operating phases of the

landfill, the leachate will be recirculated. At closure, leachate will continue to be generated for years, but it can't be recirculated due to the final cover liner.

Page 18, 19

The application needs to show the design for collection, treatment, and disposal of the leachate during the post-closure period. The calculations for managing the leachate during the post-closure phase need to be included in the post-closure cost estimates.

Landfill Gas Control and Monitoring

Section R315-303-2(2) of the Rules provides the concentration limits for explosive gases. Section R315-303-3(5) of the Rules explains the monitoring and notification requirements. Page 17 of the application needs to be expanded to discuss the gas monitoring procedures in greater detail.

Page 19
Exhibit 5

The plan of operation should include the gas monitoring procedures including specific location of sampling sites, the concentration limits and calibration of equipment, procedures if a violation occurs. The quarterly inspection report should be modified to include the results of the quarterly gas-monitoring event.

Page 17 of the application states that gas monitoring of remote locations can be eliminated at the discretion of the landfill manager. The location of monitoring points needs to be established as part of the permitting process. Eliminating any monitoring points can only be done with the approval of the Executive Secretary. Any approval to eliminate monitoring points can only occur once the minimum number and location of sampling sites is approved through the permitting process.

Page 19

The *Landfill Gas Control and Monitoring* portion of the application needs to be expanded to identify the sampling locations and modified to meet the requirements of the Rules.

The application explains, on page 17, that should unacceptable levels of landfill gases be detected, contingency plans described in other areas of this permit will be implemented.

Page 19

Rather than refer to another section in the application, the *Landfill Gas Control and Monitoring* portion needs to be expanded to included the specific contingency plans for explosive gas violations. The application needs to demonstrate how Section R315-303-3(5)(b) of the Rules will be met.

Slope Stability

Page 17 of the application provides a discussion of the slope stability analysis conducted for the excavated interior side slope (4:1 side slope) and the final cover (6:1 slope). Both analyses indicate that a factor of safety of greater than one was achieved.

However, an additional slope stability analysis needs to be conducted to examine the waste working face slope near the end of the liner. Slope failure at edge of the liner could result in failure of the leachate collection trench and rupture of the liner. The analysis should be conducted to reflect the maximum slope condition found during the operation of the disposal cell.

Will go to Report from Davis Co.



- The application needs to include a slope stability analysis of the open end of the waste pile. *Page 20, 21*
- The slope stability model run outputs for all the analyses needs to be included in the application.

Exhibits / Appen

CLOSURE / POST CLOSURE

Page 20 of the application explains that when the ultimate final closure is imminent, the Division will be contacted. Additionally, the Executive Secretary will be informed of incremental closure of individual cells through routine state inspections, annual reports, and renewal applications. These notification procedures do not meet the timeframes contained in the Rules and are not adequate to ensure QA/QC plans are submitted to the Executive Secretary for review and approval of the closure plan prior to beginning construction of the final cover.

PA3C229F1

- The application needs to include the time frame and procedure to obtain the required Executive Secretary approval of the QA/QC Plan prior to construction. In addition, the application needs to include the closure notification procedures and time frames as required in Section R315-302-3(4) of the Rules.

PA3C229F1

The application indicates that closure of the unlined disposal cell will be accomplished during the life of this permit life (5 years).

- The application needs to include a discussion of the requirement to get a closure plan approved as required by Section R315-302-3 of the Rules.

Section R315-302-3 of the Rules requires as-builts and certification of closure according to the plan, for each unit closure, to be signed by a professional engineer registered in the State of Utah.

PA3C229F1

- These closure requirements need to be recognized in the application.

Page 20 of the application explains the title recording with the County Recorder will be made within 60 days of certification of closure. However Section R315-302-2(6) of the Rules also requires that proof of the record of title filing shall be submitted to the Executive Secretary.

PM 24
4/1

The application needs to be modified to demonstrate Section R315-302-2(6) of the Rules are met.

Page 21 of the application explains the evaluation of the closed portion of the landfill will be made during annual inspection. Section R315-302-2(5) requires that inspection to be conducted no less than quarterly.

The application needs to be modify to include quarterly inspections

Page 24 25 3

FINANCIAL ASSURANCE PLAN

Closure / Post-Closure Cost Estimates

Page 22 of the application simply states that the closure and post closure cost estimates were developed considering the largest area of the disposal facility requiring final cover using projection for a third party to perform the work. As a general statement, this section of the application needs to be greatly expanded.

Appendix

The application needs to identify the source of the third party cost estimates.

More Add
Detail

Page 26
Appendix

A detail discussion of the timing and configuration of the landfill when the most expensive stage will occur needs to be provided. Detailed drawings representing the most expensive phase to close need to be provided. These drawing shall be used to calculate the closure and post closure cost estimates.

Appendix

The cost estimate table needs to be expanded to provide a cost for each specific activity (defined by units cost and number of units required) and product used in the closure process. See the enclosed guidance documents.

Appendix

The cost estimates must be related to the specific design provided in the application. For example, the unlined cell cover cross section in Exhibit 8 shows the manufacturer required base. The specific design details of the manufacturer base material in thickness and volume must be identified to provide a detailed cost estimate.

Financial Assurance Mechanism

The escrow account, established for financial assurance during the original permit, needs to be updated. A specific landfill escrow account agreement has been developed to meet the unique requirements of the Rules. Accordingly, a new escrow account will need to be established. Enclosed are three copies of the escrow account that needs to be completed.

The modified financial assurance mechanism (escrow account) needs to be established before the permit application can be determined complete. Reference

Fill out
New Forms dad
Make sure we comply
Check for Entity Failure
Paragraph -

Scopin Signatures Sent to Jeff.

HAND DELIVERED

OCT 11 2007

**UTAH DIVISION OF
SOLID & HAZARDOUS WASTE**

07.03009

**PERMIT RENEWAL APPLICATION
JOHN'S VALLEY SANITARY LANDFILL**

2007

Prepared by

GARFIELD COUNTY ENGINEERING DEPT.

**PERMIT RENEWAL APPLICATION FOR THE
JOHN'S VALLEY SANITARY LANDFILL**

2007

**Prepared by
GARFIELD COUNTY ENGINEERING DEPARTMENT**

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- Exhibit 1 General Vicinity Map
- Exhibit 2 Project Location Map
- Exhibit 3a Proof of Ownership
- Exhibit 3b Land Use/Zoning Map
- Exhibit 4a Daily Record Form
- Exhibit 4b Hazardous Waste/PCB Inspection Form
- Exhibit 5 Quarterly Inspection Log
- Exhibit 6 Geologic Map
- Exhibit 7 F.E.M.A. Flood Zone Map
- Exhibit 8 Phasing Plan
- Exhibit 9 Topographic Map
- Exhibit 10. Filling Sequence
- Appendix A Slope Stability
- Appendix B Closure / Post-Closure Financial Assurance
- Appendix C Leachate Trench Calculations

APPLICATION

INTRODUCTION

This report serves as the renewal application for the John's Valley Sanitary Landfill located approximately 12 miles north of Tropic, Utah, in what is known as John's Valley. The purpose of the report is to comply with R315-310-8 Administrative Rules of the Utah Division of Solid and Hazardous Waste, Utah Department of Environmental Quality.

Three hundred twenty (320) acres have been acquired, and approximately 40 acres are currently permitted by Garfield County for a sanitary landfill operation. Although the site is centrally located to accommodate regionalization, the site is relatively isolated and has positive characteristics when considering topography, precipitation, groundwater, and soil permeability. The project is located in an area zoned agricultural or multiple use. Initial operation has been initiated on a 24-acre site in the southwest corner of the property. The population within the Garfield County landfill service area is estimated at 6,200.

Waste handled by the John's Valley Sanitary Landfill is comprised of household/commercial waste generated in the service area. Waste is exclusively the household/commercial variety which can fit in a 6- to 8-yard dumpster. No hazardous industry exists within the service area. Commercial waste is basically high volume-low weight paper products. Tree limbs, grass clippings, and agricultural waste are accepted to the extent they are placed in the dumpsters. Special wastes such as dead animals, water treatment plant sludge, certain bulky wastes (car bodies, furniture, appliances) will be accepted only as generated by the service area and only after proper handling provisions have been made. Hazardous waste and bulk liquids will not be placed in the landfill facility.

A draft permit was issued to Garfield County on November 14, 1991. A public comment period was held from November 14 to December 15, 1991. Notice of the comment period was published on November 14, 1991, in the Salt Lake Tribune, Deseret News, and Garfield County News. No comments were received at the office of the Division of Solid and Hazardous Waste. The original permit (#92-05) was issued on January 16, 1992, and the facility began accepting waste June 1, 1992. Exhibit 1 is a general vicinity map included in the original permit application.

RESPONSIBLE PARTIES

The applicant, property owner, and responsible party for site operation is:

Garfield County
Garfield County Courthouse
55 South Main
P. O. Box 77
Panguitch, UT 84759
ATTN: Brian Bremner
Phone: (435) 676-1119
Fax: (435) 676-8239

It should be noted Garfield County is continually upgrading solid waste management services. Future agreements, potential special service district creation, and alternate ownership/operation scenarios may require modification of this section of the permit. In addition, the County may contract site operations with private entities. Garfield County will notify the Executive Secretary of any changes in responsible party status at least 30 days prior to their effective date.

GENERAL DESCRIPTION

The John's Valley Landfill is currently authorized as a Class II facility and was one of the first Utah landfills permitted after the promulgation of Subtitle D. The facility encompasses 40 acres with current operations located in the southwest corner of the property. Waste volumes for 2006 were 5,728 tons/year and are not anticipated to exceed the 20 ton per day figure any time in the near future.

The facility's original service area comprising western Garfield County has been expanded to include the eastern portion of the County, Piute County and State and federal facilities which cannot be serviced by other facilities.

Closure of other landfills in the area has increased the waste volumes accepted at the John's Valley Landfill. As a result, and considering the need to increase protection of groundwater resources in the area, this application contemplates reclassification to a Class I status. Operational charges resulting from the reclassification will include installation of a composite liner, leachate collection, and cover modifications. A groundwater monitoring system was included as part of the original permit, and a modified groundwater protection plan is being submitted under separate cover.

LEGAL DESCRIPTION

The landfill is legally described as the southwest $\frac{1}{4}$ of the southwest $\frac{1}{4}$ of Section 36, Township 34 South, Range 3 West. Garfield County owns the west $\frac{1}{2}$ of the Section, and will expand landfill boundaries as needed and as part of future permitting activities.

Exhibit 2 depicts the property's relationship to adjacent sections, townships and ranges. Exhibit 3a is

proof of ownership for the property, and Exhibit 3b is the land use/zoning map accepted as part of the original application.

The facility's main gate is located at 112° 04' 03" longitude and 37° 47' 55" latitude (the southeast corner of the southwest ¼ of the southwest ¼ of the southwest ¼, Section 36, Township 34 South, Range 3 West). The project is located in an area zoned for agricultural or multiple use. North and east of the site, agricultural zones extend 2 miles and 3 miles respectively before becoming multiple use lands. Adjacent land west of the site is zoned multiple use. Lands located south of the site are zoned multiple use for 1320 feet and then agricultural for 2-3/4 miles. It should be noted that Garfield County completed the public comment process to approve the landfill, and a conditional use permit was issued as part of the original permitting process. Further land use permits are not required.

WASTE TYPES/AREA TO BE SERVED

Waste accepted by the John's Valley Sanitary Landfill is comprised of municipal solid waste generated within the service area. Waste includes household waste, commercial waste, nonhazardous sludge, small quantity generator waste, and other wastes approved by the permit. Annual waste volumes during the 5 year life of this permit are expected to range from 5700 tons to 7000 tons. Special waste shall be accepted and handled in accordance with Administration Rule R315-315 and the conditions of this permit.

The current service area for the John's Valley Landfill consists of all lands within Garfield and Piute Counties. In addition, federal, State and private entities that cannot be serviced by other facilities may contract with the John's Valley Landfill on an individual basis. Garfield County's current population is approximately 4735, and Piute County's population is 1435.

Garfield County is the owner and operator of the landfill. Garfield County is a body politic and a local subdivision of state government. As such, Garfield County is a tax exempt division of government and cannot provide public services on a commercial basis. Revenues generated at the landfill are used only for solid waste management activities and are not used to fund other governmental activities. Receipts from entities outside Garfield County boundaries are credited to the Solid Waste Management Department budget and are used only to offset solid waste services.

INTENDED SCHEDULE OF CONSTRUCTION

The John's Valley Sanitary Landfill is capable of meeting solid waste disposal needs for Garfield County for more than 50 years. The John's Valley Sanitary Landfill has been operational since the early 1990's. This application is required for renewal of the permit. Adequate capacity exists within the existing excavation for several more years and will be expanded in an ongoing manner as portions of the cell attain final elevation. The intended schedule of construction listing major activities for the life of this permit is found below. The schedule may be updated as part of the regular permit review process.

Fall 2007

Obtain renewed permit from Solid and Hazardous Waste and initiate

	plans for new cell construction.
June 2007	Initiate excavation and grading of lined cell and leachate trench.
Oct. 15, 2007	Initiate placement of composite and synthetic liner.
Nov 15, 2007	Complete composite and synthetic liner for initial lined cell.
Ongoing	Close portions of the landfill reaching final elevation and expand cell to provide additional disposal space.

REQUIRED FORMS

The daily record form used to record weights of volumes of waste received required by Subsection R315-302-2(3)(a)(i) is included as Exhibit 4a. A record form used to record inspections for hazardous waste and PCBs is included as Exhibit 4b.

INSPECTIONS

The owner or operator will inspect the facility to prevent malfunctions, deterioration, operation errors, and discharges which may result in the release of wastes to the environment or a threat to human health. The owner or operator will conduct these inspections at least once each quarter and will complete the inspection log included as Exhibit 5. The inspection log will be kept for a minimum of three (3) years from the date of inspection.

The Executive Secretary or any duly authorized officer, employee or representative of the Board may, at any reasonable time the facility is open and upon presentation of acceptable credentials, enter the facility for inspection purposes. Certified copies of all sampling, monitoring, and testing records, including photographic, video, and electronic data, and all data, communications, and results of the inspection shall be furnished to the owner and to the operator within 30 days of the inspection. A written summary of the inspection containing a list of any deficiencies and recommended actions will be furnished to the owner and to the operator as soon as practicable. In addition, the inspector may discuss potential problems and make preliminary recommendations prior to leaving the facility.

CLOSURE AND POST CLOSURE

The detailed closure and post-closure plans required by Subsection R315-302-3 are included in other sections of this document. Closure operations will be performed on an ongoing basis as cells reach final elevation. Post-closure care will be performed as described below.

WATER QUALITY REVIEW

The Utah Division of Water Quality issued a groundwater discharge permit for the John's Valley Landfill on February 27, 1992. Changes in State regulations now allow landfills to be permitted by rule. Therefore, renewal of the existing permit is not required. However, water quality testing performed by the State of Utah indicates an increase in concentrations of contaminants in down gradient monitoring wells. As a result, a revised groundwater monitoring plan and cell liners are being proposed as part of the re-permitting process.

Use of an industrial or domestic waste water treatment facility is not contemplated for the active phase of John's Valley Sanitary Landfill. Water balance calculations submitted as part of the original application indicate a diminimus quantity of leachate will be developed at the site. Any leachate collected at the landfill will be evaporated or used in dust control and compaction operations within the active, lined area of the landfill. An industrial or domestic wastewater facility may be used for leachate collected as part of the post closure period.

CONTOURING, FINAL COVER AND SEEDING

Closure operations will consist of leveling, contouring, placement of appropriate covers, and seeding as necessary to reduce infiltration and preserve the integrity of the completed areas of the landfill. Areas of the landfill reaching final elevation will be closed within six (6) months. Closure operations will include leveling and contouring using intermediate cover to reduce infiltration and ponding. Excess material may be stripped and utilized in other operations or left in place. After grading operations promoting drainage are complete, unlined cells will be covered with 18 inches of earthen material having a permeability of 1×10^{-5} cm/sec. and 6 inches of topsoil. Geosynthetic clay liners and other alternate coving systems may be used when permeability characteristics are equal or better than earthen materials and when approved by the Executive Secretary.

For lined cells, cover will consist of composite materials with permeability rates equal to or better than the liners used for the cell. Generally, this will consist of a geosynthetic clay liner, a synthetic liner and additional earthen material to promote vegetation.

Upon completion of the covering operations, closed areas will be seeded. The seed mixture shall be developed after consultation with local range specialists and verifying availability of local seed markets. Recently closed sections of the landfill will be evaluated as part of the quarterly inspection process and will be placed on post-closure status.

FINANCIAL ASSURANCE

A detailed financial assurance plan as required by R315-309 is included in other sections of this document. Federal regulations have exempted many municipal landfills from financial assurance requirements. The County's auditors have recently evaluated the requirements as part of Garfield County's annual audit. Results of the evaluation indicate the County is eligible for financial assurance exemptions. However, the County has elected to establish an escrow account for financial assurance

sufficient to assure adequate closure, post-closure care, and corrective action, if required. Minimum payments of \$46,000.00 per year will be made until the account achieves a \$237,00.00 balance. Garfield County reserves the right to alter the financial assurance mechanism as bonds, insurance, guarantees and other vehicles become available.

PLAN OF OPERATION

INTRODUCTION

This document constitutes the plan of operation for the John's Valley Sanitary Landfill and is intended to comply with the Utah Division of Solid and Hazardous Waste Administrative Rules. Technical questions and comments may be directed to:

Brian B. Bremner, P.E.
P.O. Box 77
Panguitch, Utah 84759
(435) 676-1119

HANDLING PROCEDURES

During the active life of the landfill material designated for disposal will be brought to the working face where it will be dumped, spread, and compacted. No later than the end of each day's operation, waste will be covered with a minimum of 6 inches of earthen material, or with an alternate daily cover that has been approved by the Executive Secretary. Covering operations shall minimize the possibility of infiltration. Procedures for the handling of specific wastes including but not limited to dead animals, large appliances, car bodies and asbestos are delineated below. Scavenging will not be permitted at the site.

The landfill currently accepts only non friable asbestos waste for disposal. Although not currently planned, friable asbestos wastes may be accepted if the conditions of UAC R 315-315-2 are satisfied as follows: a) the asbestos waste is adequately wetted and properly containerized by double bagging and sealing in 6 mil or thicker plastic bags to prevent fiber release and b) asbestos waste containers are generated, and tagged with a warning label that conforms to the requirements of 40 CFR Part 61.149(2).

If properly transported and packaged, asbestos waste which meets the above criteria is received at the landfill, the operator will:

- Verify the quantities of waste received, sign off on the waste shipment record, and send a copy of the waste shipment record to the generator within 30 days;
- Require vehicles that have transported asbestos waste to be marked with warning signs as specified in 40 CFR Part 61.149(d)(1)(iii);
- Inspect the load to verify that the asbestos waste is properly contained in leak-proof containers and properly labeled;
- Place asbestos containers at the bottom of the active face with sufficient care to avoid breaking the containers;

- Cover the waste within 18 hours with a minimum of six inches of material that does not contain asbestos;
- Provide barriers to limit public access to the asbestos disposal area until the waste has been covered with six inches of material which does not contain asbestos; and
- Place warning signs at the entrance and around the perimeter of the asbestos disposal area which comply with 40 CFR 61.154(b).

If the attendant believes the condition of an incoming asbestos load is such that significant amounts of fiber may be released during disposal, the attendant will notify the local and regional health departments and the Executive Secretary. If the wastes are not properly containerized, and the landfill operator inadvertently accepts the load, the operator shall thoroughly soak the asbestos material with a water spray prior to unloading, rinse out the haul truck, dispose of the waste near the base of the active face, and immediately cover the waste prior to compaction with six inches of non-asbestos material in a manner sufficient to prevent fiber release.

Ash will be transported in such a manner to prevent leakage or the release of fugitive dust. The landfill operator will unload the transport vehicles at the bottom of the working face and keep the ash wetted, if necessary, to prevent fugitive emissions prior to covering; and within 24 hours, the operator will completely cover the ash with a minimum of 6 inches of other non-ash landfill waste or a minimum of 6 inches of material containing no waste or use other methods or materials, if necessary, to control fugitive dust.

Bulky waste such as automobile bodies, furniture, and appliances will be crushed and then pushed onto the working face near the bottom of the cell or into a separate disposal area.

The landfill will minimize liquids by prohibiting containerized liquids or waste containing free liquids in containers larger than five gallons, non containerized liquids, and /or sludges containing free liquids. No waste treatment plant sludge, digested waste water treatment plant sludge, or septage containing free liquids will be disposed in portions of the landfill containing other solid waste. Water treatment plant sludge, digested waste water treatment plant sludge, or septage containing no free liquids will be placed at or near the bottom of the landfill working face and covered with other solid waste or other suitable cover material.

Dead animals received at the facility will be deposited onto the working face at or near the bottom of the cell with other solid waste, or into a separate disposal trench provided they are covered daily with a minimum of 6 inches of earth to prevent odors and the propagation and harborage of rodents and insects.

Areas of the landfill that have not received waste for a period of more than 30 days will be covered with an intermediate cover that consists of a minimum of 12 inches of earthen material.

INSPECTIONS AND MONITORING

Inspection and monitoring at the John's Valley Sanitary Landfill will be conducted in two components: (1) routine and (2) compliance. Routine inspections will be conducted on incoming material on a random basis to prohibit receipt of unacceptable wastes. In addition, random checks will be made during deposition, spreading, and covering operations to insure protection of the environment and absence of nuisances. Unacceptable waste screening inspection will be made by trained personnel; operational inspection will be made by supervisory landfill personnel.

Compliance inspections will be conducted quarterly to assess the integrity of cover, the condition of side slopes and vegetative cover, and the impacts of erosion. In addition, a detailed annual inspection will be conducted to verify compliance with all permit conditions and state and federal regulations. All inspection records will be kept at the landfill for the current calendar year. Within 30 days of the end of the calendar year, annual records will be transferred to the County Courthouse and will be stored for a minimum of three years.

FIRE/EXPLOSION CONTINGENCY PLAN

In the event of a fire or an explosion that prohibits deposition of incoming waste in the existing cell, materials received at the landfill will be diverted and temporarily stored on previous cells and will be covered with an alternate daily cover approved by the Executive Secretary or 6 inches of earthen material. Upon resolution of the unexpected event and not longer than 30 days, the waste will be transported to its final disposal destination and treated as incoming waste.

CORRECTIVE ACTION FOR CONTAMINATED GROUNDWATER

This section describes corrective actions to be taken by owners and operators to regain compliance with protection levels for the John's Valley Sanitary Landfill in the event concentration limits are exceeded in a down gradient compliance monitoring well.

When the concentrations of parameters in down gradient monitoring wells exceed the concentration limits as substantiated by confirmatory analyses, owners and operators of the John's Valley Sanitary Landfill will implement a corrective action program as outlined in R315-308 and in accordance with the revised groundwater monitoring plan submitted separately.

CONTINGENCY PLAN FOR OTHER RELEASES

This section describes corrective actions to be taken by the John's Valley Sanitary Landfill to regain compliance with the protection levels of the permit in the event releases are discovered and acceptable concentration limits are exceeded.

When the concentration of parameters exceed acceptable limits as substantiated by confirmatory analyses, owners and operators of the John's Valley Sanitary Landfill will implement a corrective

action program approved by the Executive Secretary.

DUST CONTROL / AIR QUALITY

Fugitive dust is not anticipated to reach unacceptable levels at the Johns Valley Sanitary Landfill due to the granular nature of the predominant soils. If fugitive dust exceeds acceptable levels, actions will be implemented to reduce dust. These actions may include watering access roads, developing wind breaks, altering management scenarios, or other appropriate measures.

LITTER CONTROL

Litter is controlled through use of best management practices. Active areas and working faces are limited; waste is covered shortly after deposition; and blowing trash is confined as much as practical. In addition, litter control fencing has been established along the perimeter of the active area. However, high winds occasionally occur at the landfill. Any litter escaping the perimeter of the landfill will be periodically picked up by hand.

EQUIPMENT MAINTENANCE

Active collection systems for explosive gases are not proposed for the John's Valley Sanitary Landfill. Therefore, no maintenance will be required for these items. Maintenance of groundwater collection systems and equipment used in day-to-day operations will be performed by landfill employees or contracted mechanics in accordance with manufacturers' recommendations and industry practices.

EXCLUSION OF HAZARDOUS WASTE

As a small rural landfill, the John's Valley facility is in a favorable position regarding exclusion of hazardous waste. During periods when the landfill is open, waste will be observed as it is removed from the collection vehicle. The waste will be further examined for hazardous materials as it is being spread by the operator and compacted. If hazardous materials are found, the collection vehicle driver will be notified and the unacceptable substance will be removed from the landfill.

In addition to the daily inspection procedure, at least one percent of all vehicles (private citizen and route collection) and other suspicious loads will be examined to prohibit unauthorized waste. Vehicles subject to inspection will be directed to dispose of their material near the working face. The waste generator will be detained while the load is inspected. For large loads, the waste will be spread and landfill operators will walk through the waste. If prohibited hazardous waste or prohibited waste containing PCB's are encountered, they will not be accepted. In addition, the Executive Secretary, the hauler, and the generator will be notified within 24 hours. Other appropriate authorities will be contacted as needed. Considering population served, waste volumes generated, and complexity of the solid waste stream, these measures are considered to be adequate.

A section documenting the results of the formal inspections outlined above has been included as part

of the daily record forms (see Exhibit 4b). Including hazardous/ PCB waste on the record forms will allow landfill managers to incorporate inspections in their daily routine and will permit regular reviews and inspections to be added efficiently while examining waste volumes.

DISEASE VECTOR CONTROL

The primary method for disease vector control at the John's Valley Sanitary Landfill will be providing appropriate cover at the close of each day's operation. The cover will consist of a 6-inch minimum layer of earthen material or an alternate daily cover approved by the Executive Secretary.

Rodents and other vermin will not be permitted to burrow in the active area of the landfill; and trapping or extinction methods will be implemented to protect the integrity of the disease vector control program.

ALTERNATIVE DISPOSAL

Alternative waste handling procedures for periods when the landfill is not in operation will be similar to procedures for fires and explosions. Waste will be deposited in the alternate disposal site and covered with an alternate daily cover approved by the Executive Secretary or 6 inches of earthen material. Procedures will continue in this manner until operations at the landfill can return to normal.

In the event of equipment breakdown that cannot be repaired in a reasonable time, equipment will be borrowed from contributing entities or leased from local distributors. It is the intent of owners and operators to have dedicated equipment at the landfill and, over a period of time, acquire appropriate backup equipment.

TRAINING AND SAFETY PLAN

Currently at least 3 employees involved with the John's Valley Sanitary Landfill have completed the Manager of Landfill Operations Training Course and the Waste Screening Training Course provided by the Solid Waste Association of North America (SWANA). Limited training and educational experience exists for operators of rural landfills; however, employees will be encouraged to attend appropriate seminars and training as time and budgets permit.

Safety procedures will conform to OSHA guidelines; and personnel will be encouraged to participate in additional landfill management, waste screening, safety, and first aid workshops.

RECYCLING

No formal recycling programs are planned for the Johns Valley Landfill. Currently, solid waste collection services in the County collect cardboard in selected locations. When feasible, metal is also set aside and recycled. However, due to low volumes and unstable markets, neither of these operations is considered permanent.

FILLING SEQUENCE

The first lift will begin in the Southeast corner of the lined cell and will be deposited near the end of a construction pad. Equipment used for compaction and cover operations will move onto the cell from the East, and waste will be carefully pushed off the end of the construction pad and covered. Operators will exercise care to avoid pushing waste through the earthen protective cover. Landfill personnel will continue to deposit and spread waste material in a northerly and westerly direction until sufficient area is present to accommodate incoming trucks. Subsequent loads will be brought onto the previous waste and carefully deposited, pushed and covered. Operations will continue in this manner progressing in a westerly and northerly direction until the lined cell is covered with one lift of waste.

Additional lifts will begin at the toe of slope at the Southeast corner and progress in a westerly and northerly direction to cover the bottom area of the cell. When waste reaches natural ground level, operations will begin moving from west to east and / or construction of Phase II b will be initiated.

GEOHYDROLOGICAL ASSESSMENT

GEOLOGY

The John's Valley sub-basin lies between Flake Mountain and the head of Black Canyon north of Bryce Canyon, Utah. The sub-basin comprises an area of approximately 30,000 acres and is bounded by sedimentary and volcanic formations on all sides. The Paunsaugant fault separates the valley from the Table Cliffs and Aquarius plateaus along much of the eastern valley margin and is the main structural element forming the sub-basin. The East Fork of the Sevier River flows through John's Valley and is the predominant topographic feature.

Site specific geology for the John's Valley Landfill indicates alluvium containing interbedded layers of dense sands, gravels, silts and clays. Permeability of the material decreases with depth, and ranges from 83 feet per year 10 feet below the surface to 6 feet per year 50 feet below the surface. Detailed geologic maps and information were submitted as part of the original Landfill Permit and Groundwater Discharge Permit applications and are on file with the Utah Department of Environmental Quality.

Due to the sedimentary nature of the valley, no significant geologic features, faults, or unstable areas exist within the landfill boundaries. Exhibit 6 is a geologic map for the site.

HYDROLOGY

The climate in the area is dry, high mountain desert. The seasons are well defined, and there is a fairly wide daily range in temperature. The average length of the growing season at Bryce is 138 days, or from May 17 (the date of the last killing frost in the spring) to October 2 (the date of the first frost in the fall). In any given year the length of the growing season may vary considerably from the average. Average annual precipitation at Bryce is approximately 12 inches. The largest amount of precipitation is during August and September, and the least during May and June. Data kept by the weather bureau on the velocity of wind near the landfill are not available for the area. It would appear, however, that the windiest part of the year is in the spring and the early summer. The prevailing winds are usually dry and blow from the south to southwest.

Maps for the 24 hour 25 year and 100 year precipitation events were examined. Estimated rainfall totals were 2.8 inches and 3.4 inches respectively.

ON-SITE SOIL PROPERTIES

On-site soils consist primarily of interbedded layers of sands and gravels and occasional clay/silt lenses. Density and impermeability of the soils increase with depth and range from 34 blows and 83 feet per year at 10 ft. depth to 75 blows and 6 feet per year at 50 ft. depth. The material is clean and free from foreign matter.

The top 6 to 12 inches is described by the U.S. Soil Conservation Services as notter loam comprised

of gravelly, sandy and clayey material. On-site experience indicates a predominance of fine grained material that can readily be compacted to a permeability of 1×10^{-5} cm/sec.

In addition to on-site soils, Garfield County has acquired 40 acres (the southeast $\frac{1}{4}$ of the southeast $\frac{1}{4}$ of Section 36, Township 34 South, Range 3 West) for use as a borrow site. Laboratory analysis of borrow site materials indicates permeabilities between 1×10^{-5} cm/sec and 1×10^{-7} cm/sec and be achieved with densities of 90%-95% maximum laboratory compaction. The material is silty to clayey in nature and should be available for use, at the landfill.

GROUNDWATER

Groundwater is under water table conditions throughout the John's Valley sub-basin. Initial sampling of the landfill site indicated no groundwater to a depth of approximately 80 feet. However, installation and operation of three groundwater monitoring wells indicates groundwater closer to the surface, especially during spring months near the eastern property boundary. Historic groundwater levels indicate a minimum depth of approximately 50 ft. (elev. 7342) under the lined cell. The lowest elevation in Phase II exists at the bottom of the leachate collection trench (elev. 7360), eighteen feet above historic high groundwater levels. Preliminary analysis indicates Phase III also exceeds the five foot separation between the liner and groundwater as required by the Solid and Hazardous Waste Administrative Rules.

Groundwater has been analyzed on a quarterly basis since 1992 as part of the current groundwater discharge permit. The Groundwater Discharge Permit Application, original permit, monitoring well as built report and quarterly monitoring results are on file at the Utah Division of Water Quality. Recent testing indicates the water table is in need of additional testing. A groundwater monitoring plan accompanies this application as a separate document.

The flow rate of groundwater has not been determined. However, the general direction is north to northeast, with some northerly fluctuation along the eastern property boundary during the spring. As landfill construction progresses, additional monitoring well data will be collected and evaluated to verify the landfill meets regulatory requirements.

WELLS AND WATER RIGHTS

The only known wells in the vicinity are groundwater monitoring wells associated with the landfill. As part of the original permit, contact was made with the State Engineer's office to determine quantity, location, and construction of any private and public wells within 2,000 feet of the proposed site during the initial permitting process. No wells existed in the immediate proximity of the proposed landfill. The State Engineer's office indicated no wells existed in the proposed landfill section. Furthermore, no wells existed in the surrounding 8 sections. The nearest well was located more than 3 miles from the proposed site and is hydrologically upgradient. Known uses of the well are irrigation and domestic. It should also be noted that the closest well is located in a different geologic structure than the aquifer underlying the proposed landfill.

SURFACE WATERS

The proposed site is free from natural watercourses, washes, and run-on type surface waters. No live streams or intermittent water courses traverse the proposed site. Approximately ½ mile east of the proposed site is the East Fork of the Sevier River drainage channel. The channel is dry during a significant portion of the year. The 100-year flood plain has been mapped by the Federal Emergency Management Agency (F.E.M.A.) and does not fall within the proposed landfill. Maximum elevations for the 100 year flood do not exceed 7350 feet above mean sea level. A copy of the Federal Insurance Rate Map is on file with the Department. In addition to avoiding the flood plain, the proposed site will be further protected from flooding by the gently sloping terrain, perimeter roads, and berm-style stockpiling of cover material around the perimeter of the working area.

Although the proposed site is free from natural surface drainage channels, an irrigation ditch runs in an easterly direction through property acquired by Garfield County for future expansion of the landfill. The ditch is located approximately ½ mile north of the active area. Any impacts associated with the ditch are well beyond the life of the permit.

If future relocation of the ditch becomes unfeasible, the ditch would be encased in pipe at its present location, and a 50 foot buffer zone would be developed on each side of the pipe. No excavation, deposition, or landfill activities would occur within the buffer zone.

WATER MONITORING SYSTEM

As part of the original permit and in an effort to provide greater protection to groundwater, Garfield County has constructed three groundwater monitoring wells. The wells are currently sampled quarterly for constituents extracted from the original groundwater discharge permit. With the re-issuance of this permit, the John's Valley Landfill will implement an updated groundwater monitoring plan. The plan is a stand alone document that has been incorporated into the application process. The groundwater monitoring plan is under review by the Division of Solid and Hazardous Waste.

IMPACTS TO WATER RESOURCES

The Johns Valley Sanitary Landfill has been in operation for approximately 10 years. During that time, surface flows from the active area have been nonexistent. Therefore, there have been no impacts to surface waters. Recent groundwater monitoring results indicated constituents not normally found in the groundwater are present in concentrations of approximately two parts per billion. As a result, a revised groundwater monitoring program including required statistical analysis methods is being submitted under separate cover to further protect groundwater resources.

PRELIMINARY ENGINEERING REPORT

SITING CRITERIA

The John's Valley Sanitary Landfill complies with siting criteria currently mandated by Subtitle D and recognized by the State of Utah Solid and Hazardous Waste Committee. Specifically, no airport is located within 10,000 feet of the proposed landfill. The site is free from unstable areas and is not located within a 100-year flood plain or in any wetland. No residences, or federally designated parks, monuments, recreation areas, or wilderness areas exist within 1000 feet of the landfill. In addition to federal mandated criteria, the site is compatible with existing land uses, long-term landfill operation and is in a remote area free from dwellings and other incompatible structures such as churches, schools, hospitals, etc. At the time of construction, approximately 10 years ago, no scientifically significant areas or endangered species existed within the property boundaries. The active area has been previously disturbed, and landfill operations are not anticipated to exceed previously disturbed limits during the life of this permit. Cultural resources within the landfill have not been encountered. If discovered, cultural resources will be mitigated in accordance with SHPO requirements. Exhibit 7 is a copy of the F.E.M.A. flood zone map.

FACILITY LIFE

The anticipated facility life for the Johns Valley Landfill cannot be accurately estimated. Estimates conducted by The Division of Solid and Hazardous Waste during the landfill's initial stages predicted a life in excess of 300 years. To date less than 3% of the property is being used for active landfill operations, and managers are only approaching initial closure procedures. Based on the overall size of the property, relatively low waste volumes, and current efficiencies, facility life is estimated in excess of 50 years.

CELL DESIGN AND OPERATION

The John's Valley Sanitary Landfill is designed to minimize active areas and to reach final elevation as soon as practical in order to minimize infiltration and leachate generation. The cells are designed to accommodate from two to five years of waste and to expand in an orderly fashion from north to south.

Cells are approximately 50 - 80 feet in total depth, and bottom widths have been excavated to approximate 400 feet. Length of the cells will vary with volumes of waste, season of the year, and soil stockpile needs but are anticipated to be less than 200 feet. Current excavations provide a minimum of one-year capacity for growth and unexpected problems. The cell will continue in a northerly direction as needed. Interior side slopes will be 4:1 and will be developed as part of the daily covering operations. Exterior fill slopes will also be 4:1 and may extend above natural ground by 60 feet or more. Revised concept and construction plans are included with this application.

Near the close of each working day, waste will be spread, compacted and covered with 6 inches of

native soil or an alternate daily cover approved by the Executive Secretary. The alternate daily cover will consist of a plastic blanket meeting Executive Secretary requirements. If used, the blanket will be removed at least weekly, and waste will be covered with a minimum of 6 inches of earthen material. Historic use of the blanket has demonstrated it controls vectors, odors, blowing litter, and scavenging. The weekly application of 6 inches of earthen material creates a fire barrier to control fires. Cells which do not receive waste for more than 30 days will be covered with an intermediate cover consisting of a minimum of 12 inches of earthen material.

The 50 - 80 foot cell height described earlier is a nominal maximum dimension and does not consider final slopes necessary to promote drainage or additional covering requirements. Cells are anticipated to consist of solid waste compacted in lifts ranging from 7 feet to 12 feet and covered with 6 inches to 12 inches of daily or intermediate cover material. Seven to ten lifts may be accommodated in the nominal height. An addendum to the original plan is included as Exhibit 8.

LINER DESIGN

Currently John's Valley Landfill operates with an unlined cell. Operation in the unlined cell is anticipated to continue until final elevation is reached and a new cell is permitted and constructed. In an effort to upgrade the landfill to full Class I status and as part of the permit renewal process, operators will implement a liner design. The design consists of suitable subgrade material to provide structural support and prevent ruptures to the liner, a geosynthetic clay liner, a 60 mil high density polyethylene liner, a geosynthetic drainage net and 24 inches of earthen protective cover to prevent damage to the liner when material is deposited. The prepared subgrade will be free from protrusions and object that will damage the liner, and protective covers will consist of 1" minus material for areas in contact with the liner. Geosynthetic clay and plastic liners will meet minimum state standards. A quality assurance/quality control program has been developed as part of the construction process, and approval by the Executive Secretary will be required prior to the work.

LEACHATE COLLECTION SYSTEM

A leachate collection system has been sized and designed in accordance with water balance calculations and other accepted engineering principles. The system allows the discharge of leachate into a collection trench where it will be extracted and recirculated in lined cells. The system prevents the development of no more than one foot of leachate in the bottom of landfill cells. Landfill cells will be constructed with slopes draining to the north. Slopes in the bottom of the cell will be 2%, and composite liners will be covered with permeable, geosynthetic drainage net and granular materials. Leachate will be collected in a trench bordering the edge of the active cell. The collection trench will have 4:1 side slopes and will have a bottom width of 32 feet. With a depth ranging from 2.5 ft. to 4.16 ft., the trench has the capacity to contain twice the total volume produced by the 25 year storm event and 1.5 times the volume produced by the 100 year storm. Leachate will be allowed to collect in the trench until it encroaches on the freeboard required to accommodate the 25 year event, at which time the leachate will be pumped and recirculated. Recirculation efforts will occur via water distribution trucks or portable sprinklers as needed. The collection system has been designed with access piping to protect the trench liner during extraction operations. Recirculated leachate will be used in dust control and compaction operations only in the active, lined areas. Design calculations have been

included in the exhibits.

The collection and treatment option described above includes best management practices which minimize water infiltration. Components of the best management practices may include: (1) diversion of intermittent washes for storms smaller than the 25-year event, (2) berm-style construction and stockpiling operations, (3) final cover as described above placed as soon as practical after final elevation, (4) sloping of the final cover to promote run-off, (5) use of alternate daily covers which resist infiltration, and (6) providing adequate compaction to reduce void space and leachate development. Considering annual precipitation rates, proposed liner design, and water balance estimates, other leachate collection and treatment options may not be practical.

In anticipation of extraordinary events or severe storms which could occur during the initial stages of operation, analysis was conducted on granular material to be used in the protective cover operations. Conservative analysis indicates more than 20% of back to back 25 year storm events will be held in protective layer pore spaces. Capacity of the leachate trench exceeds quantity derived from required back to back storm events. Prior to final closure of the landfill an evaporation pond will be designed and constructed in accordance with state requirements. Post closure leachate will be collected in the pond and allowed to evaporate or disposed in an authorized wastewater facility

EQUIPMENT AVAILABILITY

Equipment operating at the John's Valley Sanitary Landfill includes a bulldozer, a landfill compactor, a scraper and a grader. In addition, a backhoe, loaders and other construction equipment owned by Garfield County may be used from time to time at the landfill. A variety of industrial equipment, vacuums, and pumps are also available on site. In addition, the landfill has access to the Public Works Department's full compliment of equipment.

BORROW SOURCES

For day to day operations requiring borrow, the John's Valley Landfill will utilize on-site sources. For construction of low grade impermeable covers and liners, a 40-acre borrow source has been acquired near the Landfill. Garfield County will utilize the borrow source as needed. Current estimates indicate that approximately 750,000 cubic yards of material is available at the borrow site. More than 10 million yards of native material is available within the property boundaries. If for any reason existing borrow sites become unsuitable, alternate borrow sources will be obtained.

LEACHATE COLLECTION, TREATMENT AND DISPOSAL

The John's Valley Sanitary Landfill is being permitted as a Class I facility located in an arid region with favorable soil conditions. Water balance calculations indicate a diminimus volume of leachate will be generated at the landfill. HELP Model simulations submitted as part of the original permit indicate an area left open to precipitation for 5 years would be at wilting point during October of each year. The model also demonstrated an absence of leachate during the 5-year simulation.

All leachate and run off liquids that contact waste and are developed within the landfill will be contained and collected on site. No off site collection, treatment , and/or disposal are planned for the active phases of the facility's life. Insufficient data exists to determine the volume of leachate generated during the post closure period of the landfill. Sufficient area exists for development of an evaporation pond, and Panguitch City has indicated that post closure leachate could be placed in the Panguitch City wastewater facility. Garfield County will collect leachate generation data as part of its regular inspection program at the landfill. In future phases, evaporation ponds will be designed and constructed to accommodate post closure leachate or formal agreements will be reached with local government wastewater facilities for disposal of leachate.

GROUNDWATER MONITORING

A groundwater monitoring plan was submitted as part of the original permit. The documentation include locations of wells, testing frequency, and other pertinent data. As part of the renewal process, Garfield County has submitted an updated plan under separate cover.

LANDFILL GAS CONTROL AND MONITORING

Due to the arid nature of the climate at the John's Valley Sanitary Landfill and the low volume of waste accepted at the facility, landfill gas concentrations are not anticipated to reach significant levels. The large area of the proposed facility is designed to accommodate dissipation of any landfill gases prior to reaching the property boundary.

Monitoring for landfill gases will be conducted as part of the quarterly inspections performed by landfill managers. Concentration will be measured at each on-site structure. In addition, landfill gas concentration will be evaluated at southwest corner of the property boundary and, for information purposes only, Garfield County may also measure gas concentrations randomly in the active area. Results will be recorded on quarterly inspection forms.

Garfield County has purchased a portable gas monitor and will be installing the unit in the facility weigh shack. As a safety precaution, landfill personnel will be instructed to check the detection device prior to entering the facility. This practice will continue to be a voluntary action by Garfield County and is aimed at encouraging safety-sensitive operations.

Should unacceptable levels of landfill gases be detected, contingency plans described in other areas of this permit will be implemented. If gas levels exceed 25% of the lower explosive limit in structures or the 100% of the lower explosive limit at property boundaries, immediate action will be taken to protect human health, and the Executive Secretary will be contacted within 24 hours. Additional state regulations, including operating record notations within seven days and implementation of a remediation plan within sixty days, will be completed.

SLOPE STABILITY

A stability analysis has been completed for the proposed Johns Valley landfill cells with excavations approximately 20 feet in depth and side slopes of four horizontal to one vertical. The landfill will be excavated into soils classified as well graded gravel with cobbles. Groundwater is projected to be at least 20 feet below the bottom of the landfill excavation.

The analysis was completed for the excavation side slopes for the newly constructed case, prior to deposition of any waste material. This will be the most critical configuration since there will not be any waste material to provide lateral support of the slopes. The well graded gravel material was modeled using a friction angle of 36 degrees and a cohesion value of 100 psf to account for slight cementation. A saturated unit weight of 130 pcf was also used.

Stability analyses were completed utilizing a Modified Bishop method. The program used performs a search for the lowest safety factors by generating 20 potential failure surfaces from 20 initiation points (total of 400 surfaces). The 10 circles or random surfaces with the lowest factors of safety are shown on the output. For this analysis two conditions were modeled: (1) stability under static conditions and (2) stability under pseudo-static (seismic) conditions. For the pseudo-static condition a horizontal acceleration value ranging from 0.4g to 0.5g was used. Algrmissen (1991) identified a horizontal acceleration of 0.4g for the area with a 90 percent probability of not being exceeded in 250 years. Figure R301.2(2) of the 2000 International Residential Code puts the area in a seismic design category D1, with 0.5g.

Graphical outputs of the stability analyses with the locations of the 10 failure surfaces with the lowest factors of safety were developed. Based on the analyses, the stability under static and seismic conditions are well within the generally accepted minimum safety factors. Results of the stability analysis are summarized below.

<u>Side Slope Configuration</u>	<u>Safety Factor (Static)</u>	<u>Safety Factor (Pseudo-static)</u>	<u>Minimum Required Factor of Safety</u>
4H:1 V	3.74	1.12 (0.5g) / 1.32 (0.4g)	1.5 (static)/1.0 (earthquake)

The final cap over the landfill consisting of 12 inches of soil overlain by a geosynthetic clay liner, or a 60 mil HDPE liner, and 12 to 30 inches of protective soil cover was also evaluated. The results indicated that due to the limited thickness of the soil cover, the cap will be more susceptible to erosion than to instability during seismic events. In order to maximize stability, the analysis recommended the cap extend beyond the excavation footprint.

Slope stability analysis was also requested at the waste working face near the top edge of the leachate collection trench. A similar analysis was performed at the Wasatch Regional Waste Facility. In a copyrighted report published by Kleinfelder Inc. and available on the Utah Solid and Hazardous Waste website, the evaluation considered waste placed on a 3:1 slope with a friction angle of 0 degrees and a cohesion value of 500 psf. Kleinfelder determined the waste slope is stable under both static and

seismic conditions with minimum factors of safety of 1.7 and 1.3 respectively. Slopes at the working face of the Johns Valley Landfill will be flatter than 3:1 and will have a greater factor of safety.

RUN ON / RUN OFF CONTROL

Run on and run off control are implemented through a series of best management practices and topographic features. A county road runs along the exterior perimeter of the active cells. This road prevents surface waters from entering the facilities. Inside property boundaries, interior perimeter roads and berm style stockpiling further prevent surface flows from contacting waste. Operational characteristics, contouring, ditching, and permeability of the waste contain precipitation which contacts waste within the active area. Surface flows from the 25 year storm which contact waste are prevented from entering or leaving the facility.

CLOSURE / POST CLOSURE

CLOSURE SCHEDULE

Closure operations at the John's Valley Sanitary Landfill will be performed on an ongoing basis. Adequate capacity exists at the landfill to continue operation for many years. A final closing date cannot be determined at this time. Ongoing closure operations will generally be performed from April to November, or as weather permits. No area larger than 8 acres that has achieved final elevation will remain open longer than 6 months. Within 60 days of final receipt of waste in a landfill unit, Garfield County will notify the Executive Secretary of their intent implement the closure plan. Landfill operators will implement closure operations within 30 days of receipt of final waste volumes. If weather or size limitations make closure operations impractical, closed units will be covered with a total of 18 inches of earthen materials and final closure will be implemented as soon as practical. Closure activities will be completed within 180 days of their actual starting date. Additionally, within 90 days of completion of closure operations, owners / operators of the Johns Valley Landfill will submit to the Executive Secretary as built drawings and certifications signed by a professional engineer indicating the unit has been closed according to the approved closure plan and modifications authorized by the Executive Secretary.

This renewal process contemplates developing the Johns Valley Landfill into a Class I facility. The existing unlined cell will continue in operation until it reaches its design elevation and the new lined cell is operational. Landfill operators will close the existing cell when it reaches final design elevation and will implement authorized closure plans within 30 days of final receipt of waste.

Each new cell constructed as described in this permit is anticipated to operate for a minimum of five to eight years. Each new lined cell will be closed as the subsequent cell is brought into operation. Consequently, closure operations will be cyclic and occur approximately every eight years.

FINAL COVER

Unlined cells will be covered with 18 inches of earthen material having a permeability of 1×10^{-5} cm/sec. and 6 inches of topsoil. Landfill operators have encountered difficulty constructing earthen covers while meeting stringent quality assurance guidelines. For this reason, a geosynthetic clay liner or a 60 mil HDPE liner may be used when permeability characteristics are equal or better than earthen materials. At present, a geosynthetic liner with a minimum of 1 ft. of earthen material is designed to meet permeability requirements for unlined cells at the Johns Valley Landfill.

For lined cells, cover will consist of materials with permeability rates equal to or better than 1×10^{-7} cm/sec. Generally, this will consist of a geosynthetic clay liner or a synthetic liner and additional earthen material to develop impermeable rates, protect non earthen materials and promote vegetation. In as much as lined units of the Johns Valley Landfill have leachate collection capabilities, no "bathtub effect" will occur. Data will be evaluated throughout the life of the landfill and post closure care for leachate collection and disposal will accommodate any precipitation which permeates the cap.

SITE CAPACITY

Site capacity for the entire John's Valley Sanitary Landfill cannot be accurately estimated. Assuming full development Phases II and III within the 24-acre fenced parcel and an average density of approximately 600 lbs. per cubic yard, waste volumes can be estimated at 1,062,000 cubic yards or 320,000 tons. Sufficient capacity exists to continue operations well beyond the life of this permit.

FINAL INSPECTION

The Johns Valley Landfill is anticipated to operate well beyond the life of this permit. At least 60 days prior to any closure, the Division of Solid and Hazardous Waste will be contacted, and a final inspection will be scheduled. The Executive Secretary will be informed of incremental closure of individual cells through routine state inspections, annual reports, and renewal applications. In addition, a QA/QC plan will be submitted for approval prior to any closure operations. Within 90 days of unit and/or facility closure, as built plans signed by a professional engineer shall be forwarded to the Executive Secretary.

Landfill owners and operators shall allow the Executive Secretary of the Utah Solid and Hazardous Waste Control Board or an authorized representative, including representatives from the local District Health Department, upon representation of credentials, to enter during operating hours and/or inspect at reasonable times any facilities, equipment, practices, or operations regulated or required under this permit.

A record of the inspection may be made by photographic, videotape, electronic or other reasonable means, and a copy of any such record shall be provided to the owner and the operator within a reasonable time.

SITE MONITORING

The only permanent monitoring devices proposed for the John's Valley Sanitary Landfill are the leachate collection system and the groundwater monitoring wells that have already been constructed. The John's Valley Sanitary Landfill has an expected life well in excess of 100 years. Sufficient data should be available by that time to limit groundwater monitoring samples to an annual basis. Data should also be available for leachate production and treatments. Sometime in the distant future, beyond the life of this permit, additional wells may be necessary to evaluate groundwater, but the wells are not anticipated to be needed in the foreseeable future.

The lysimeter that is currently in place in the southeast corner of the active area has served its useful purpose and no longer provides data. Therefore, it will not be considered in the post-closure plan. Landfill gas in closed sections will be monitored as described in the preliminary engineering report for active areas. Surface waters in closed portions of the landfill are evaluated as part of the annual inspection. Monitoring will be limited to eliminating situations which promote infiltration.

LAND TRANSFERS AND USES

Plats and a statement of fact concerning the location of any disposal site shall be recorded as part of the record of title with the County Recorder not later than 60 days after certification of closure. Upon recording, proof of the record of filing will be submitted to the Executive Secretary.

POST CLOSURE MAINTENANCE

Post-closure care of inactive sections of the landfill will consist of maintaining the integrity of the final and vegetative covers. Any areas subject to erosion will also be corrected; and appropriate measures will be implemented to identify and eliminate the source. No active or technical devices are proposed to control run-on and run-off systems at the John's Valley Sanitary Landfill. Best management practices will be implemented to minimize infiltration and assure the integrity of the run-on/run-off system. Evaluation of the system will be made during the quarterly inspections, and corrective measures, if any, will be implemented. Run-on and run-off from events smaller than the 25-year storm will be controlled.

Recent design changes and expansion to a Class I facility as part of the permit renewal process of 2007 has resulted in the construction of lined cells and the development of a leachate collection trench. As part of the future, final phase of the landfill and closure design process, leachate generation data will be evaluated, and an evaporation pond capable of dissipating leachate that will be generated over the closed period will be designed and constructed. Leachate management options may also include disposal at an approved wastewater treatment facility. Closed portions of the landfill will be inspected as part of the quarterly reviews performed by the landfill operator. Closed areas will also be inspected as part of the in-depth annual inspection. Any deficiencies will be repaired as soon as practical. For those failures which jeopardize the environmental integrity of the facility or permit the uncontrolled infiltration of significant amounts of moisture, corrective measures will be initiated immediately.

No alternate land use for closed sections has been developed to date. Closed cells will remain under the jurisdiction of the landfill manager. If alternate land use plans are developed they will be addressed during the permit renewal process, or a separate permit modification may be processed.

RESPONSIBLE PARTIES

The applicant, property owner, and responsible party for the post closure care period is:

Garfield County
Garfield County Courthouse
55 South Main
P. O. Box 77
Panguitch, UT 84759

Phone: (435) 676-8826

Fax: (435) 676-8239

It should be noted Garfield County is continually upgrading solid waste management services. Future agreements, potential special service district creation, the extended life of the landfill, and alternate ownership/operation scenarios may require modification of this section of the permit. In addition, the County may contract site operations with private entities. Garfield County will notify the Executive Secretary of any changes in responsible party status at least 30 days prior to their effective date. Other changes to the information listed above will be provided in annual reports and permit renewal documents.

FINANCIAL ASSURANCE PLAN

This section of the permit describes compliance with Subsection R315-309, Financial Assurance of the Solid Waste Permitting and Management Rules. Cost estimates consider the most expensive option during the period and are based on a third party performing closure and post-closure care.

CLOSURE / POST CLOSURE COST ESTIMATE

Closure and post-closure cost estimates were developed considering the largest area of the disposal facility requiring final cover during the operating period and using projections for a third party to perform the work. Estimates were developed using Utah State guidance, historical costs, project records and standardized rates for Garfield County. The worst case scenario for estimating closure costs varies during the life of the permit. Prior to accepting waste in the newly permitted lined cell, the worst case scenario considers closure of the existing facility. This is described as Phase I. Phase II exists when the existing unlined cell is closed and future closure activities consider only the lined cell. The size of the lined cell is smaller than the existing facility, so closure costs may be reduced by as much as \$70,000 to a total of \$130,000. A cost estimate summary identifying closure and post-closure components for each phase is included below, and detailed information regarding closure and post-closure costs is included as an Appendix.

Closure Costs Phase I

Survey / Site Evaluation	\$ 3,830.00
Project Management	24,746.00
Site Repair	6,006.00
Grading	7,732.00
Geosynthetic Cover	99,180.00
Soil Cover	20,000.00
Erosion Layer	7,500.00
Vegetation	2,400.00
Gas Collection	4,480.00
Groundwater Monitoring	<u>1,324.00</u>
Subtotal	\$177,198.00
Contingency	<u>22,802.00</u>
TOTAL	\$200,000.00

Closure Costs Phase II

Survey / Site Evaluation	\$ 3,830.00
Project Management	10,000.00
Site Repair	4,800.00
Grading	3,600.00
Geosynthetic Cover	65,000.00
Soil Cover	12,000.00
Erosion Layer	4,500.00
Vegetation	1,200.00
Leachate Collection	5,000.00
Gas Collection	2,000.00
Groundwater Monitoring	<u>2,000.00</u>
Subtotal	\$113,930.00
Contingency	<u>16,070.00</u>
TOTAL	\$130,000.00

Post-Closure Costs

Engineering	\$ 18,000.00
Groundwater Monitoring	36,000.00
Landfill Gas Monitoring	12,000.00
Cover Maintenance	600.00
Groundwater Well Maintenance	3,000.00
Leachate Collection System	3,000.00
Plugging Wells	4,000.00
General Maintenance	<u>3,000.00</u>
Subtotal	\$ 79,600.00
Contingency	<u>7,400.00</u>
TOTAL	\$ 87,000.00

In as much as closure costs vary significantly over the life of the permit and the maximum closure cost after the initial 18 month period is \$150,000.00, a nominal figure of \$237,000.00 has been established for 2007 closure and post-closure care.

MECHANISM

The financial assurance mechanism proposed for use at the John's Valley Sanitary Landfill is a dedicated escrow/capital improvement account. An account has been previously established with the State Treasurer's Office. However, as part of this permit, Garfield County is modifying the account to comply with specific landfill escrow account requirements. The modification is in process. In accordance with Executive Secretary approval, funds in excess of the estimate listed above may be

used for capital improvements, to offset rate increases, operational expenses and other items deemed necessary by landfill managers. The John's Valley Sanitary Landfill may alter the mechanism to include insurance, surety bonds, trust funds, governmental exemptions, or other options as they become feasible.

SCHEDULE OF PAYMENTS

A schedule of payments has been developed to insure the availability of sufficient funds within 5 years for closure and post-closure care. The payment schedule is:

Current Balance	\$ 7,700.00
December 31, 2006	46,000.00
December 31, 2007	46,000.00
December 31, 2008	46,000.00
December 31, 2009	46,000.00
December 31, 2010	<u>46,000.00</u>
5-Year Total	<u>\$ 237,700.00</u>

EXHIBITS

Exhibit 1 General Vicinity Map

Exhibit 2 Project Location Map

Exhibit 3a Proof of Ownership

Exhibit 3b Land Use/Zoning Map

Exhibit 4a Daily Record Form

Exhibit 4b Hazardous Waste/PCB Inspection Form

Exhibit 5 Quarterly Inspection Log

Exhibit 6 Geologic Map

Exhibit 7 F.E.M.A. Flood Zone Map

Exhibit 8 Phasing Plan

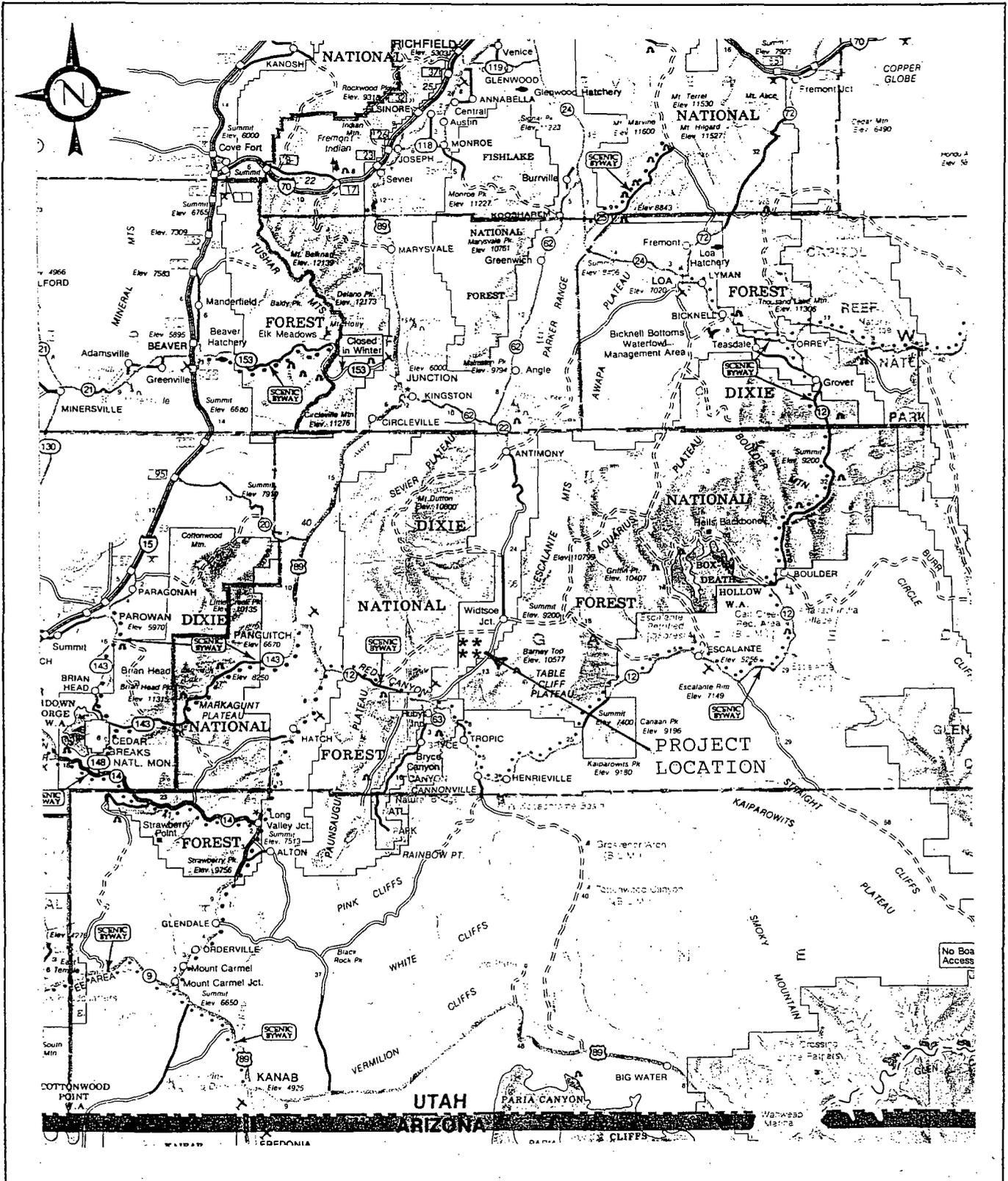
Exhibit 9 Topographic Map

Exhibit 10. Filling Sequence

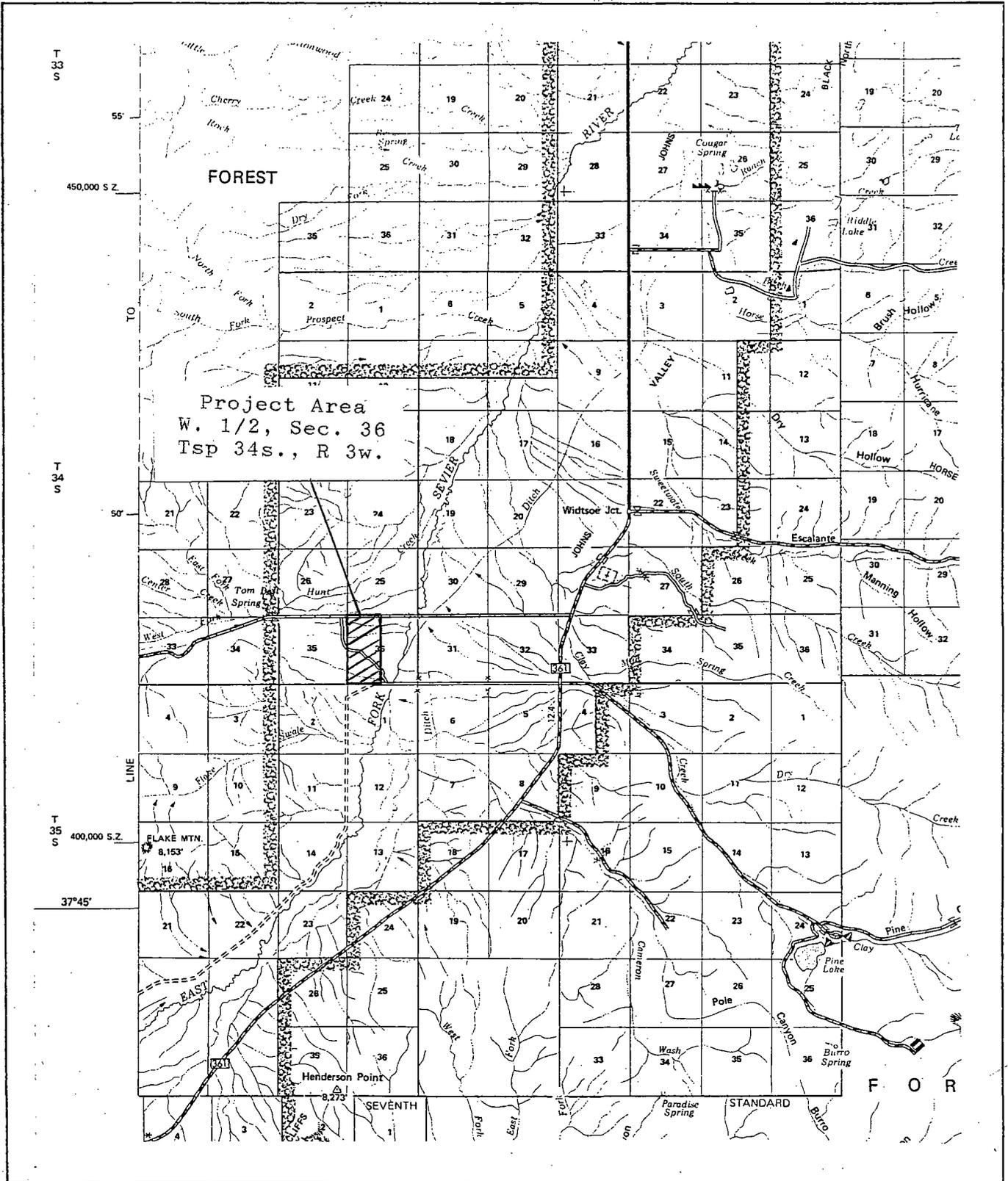
Appendix A Slope Stability

Appendix B Closure / Post-Closure Financial Assurance

Appendix C Leachate Trench Calculations



JOHNS VALLEY SANITARY LANDFILL
 Exhibit 1. General Vicinity Map



JOHNS VALLEY SANITARY LANDFILL

Exhibit 2. Project Location Map

WHEN RECORDED, MAIL TO:
MICHAEL GOTTFREDSON
848 SOUTH SECOND EAST
SALT LAKE CITY, UTAH 84111

201920
ENTRY NO. _____ RECORDED 8-24, 1989 AT 3:00 PM
AT REQUEST OF Garfield Co
FEE — Morris D. Hales
RECORDER GARFIELD COUNTY, UTAH
Space Above for Recorder's Use

Warranty Deed

MICHAEL GOTTFREDSON, grantor,
of Salt Lake City, County of Salt Lake, State of Utah,
hereby CONVEYS and WARRANTS to GARFIELD COUNTY

of Panguitch, County of Garfield, State of Utah,
for the sum of TEN AND NO/100----- DOLLARS,

the following described tract of land in Garfield County, State of Utah, to-wit:

The West half of Section 36, Township 34 South,
Range 3 West, Salt Lake Base and Meridian.

EXCEPTING THEREFROM all coal, oil, gas, mines, metals,
gravel and all other minerals of whatsoever nature or
kind in, on, or under said land, together with the right
of ingress and egress for the purpose of exploring and/or
removing the same.

Subject to existing rights-of-way and easements.

WITNESS the hand of said grantor, this 22nd day of August, 19 89

Signed in the presence of

Michael Gottfredson
MICHAEL GOTTFREDSON

STATE OF UTAH }
COUNTY OF } ss.

On the 22nd day of August, 19 89, personally appeared before me
MICHAEL GOTTFREDSON, the signer of the above instrument,
who duly acknowledged to me that he executed the same.

George A. N. Brown
Notary Public

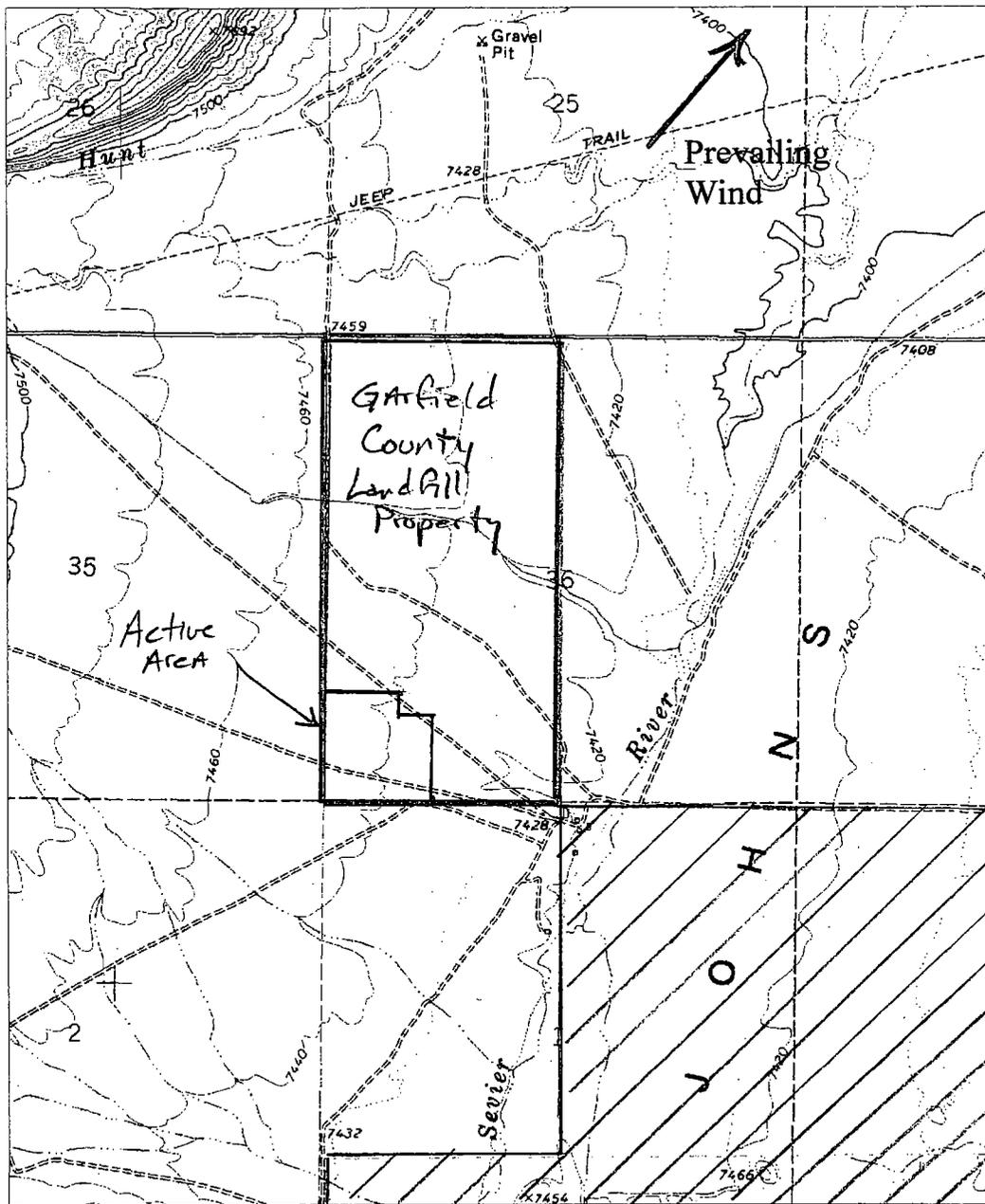
My Commission Expires: 10 July 1991

Residing at: Salt Lake City, Utah

FORM 101.1 - WARRANTY DEED - Kelly Co., 55 W. Ninth South, S.L.C., Utah

BOOK 301 PAGE 147

30-5203-6



Agricultural Zoned
All other property Multiple Use

No residences, parks, monuments, recreation area or wilderness within 1000 Ft of Garfield Co. Property

UTM
12 North
NAD 1927 (Conus)



Scale 1:24,000



Feet

8/14/2007

GPS Pathfinder® Office



JOHNS VALLEY SANITARY LANDFILL
Exhibit 3b. Land Use / Zoning Map

JOHN'S VALLEY SANITARY LANDFILL
Hazardous/PCB Record Form

Date _____ Time _____ Vehicle No. _____

Random Selection: Yes ___/No___ Suspicious Load: Yes ___/No___ Other: _____

Vehicle Owner: _____

Name

Address

City

State

Phone

Waste Origin: _____

Waste Types: _____

Describe any hazardous or PCB wastes encountered: _____

Action Taken: _____

Comments: _____

If hazardous waste or PCB waste is encountered, contact the Division of Solid and Hazardous Waste at (801) 538-6170.

Signature _____ Date _____

JOHN'S VALLEY SANITARY LANDFILL
Quarterly Inspection Log

This document is the official form required for compliance with R315-301-7(5)(a) for the John's Valley Sanitary Landfill.

Date _____ Time _____ Weather _____

Inspection Team: _____

Observations: _____

Explosive Gas readings (% LEL) Structures - 25% max _____ SW Corner - 100% max _____

Other Locations / Readings _____

Leachate Generation: Current _____ inches Estimated Quarterly Maximum _____ inches

Date and Nature of Repairs/Corrective Action: _____

Other: _____

Name of Inspector

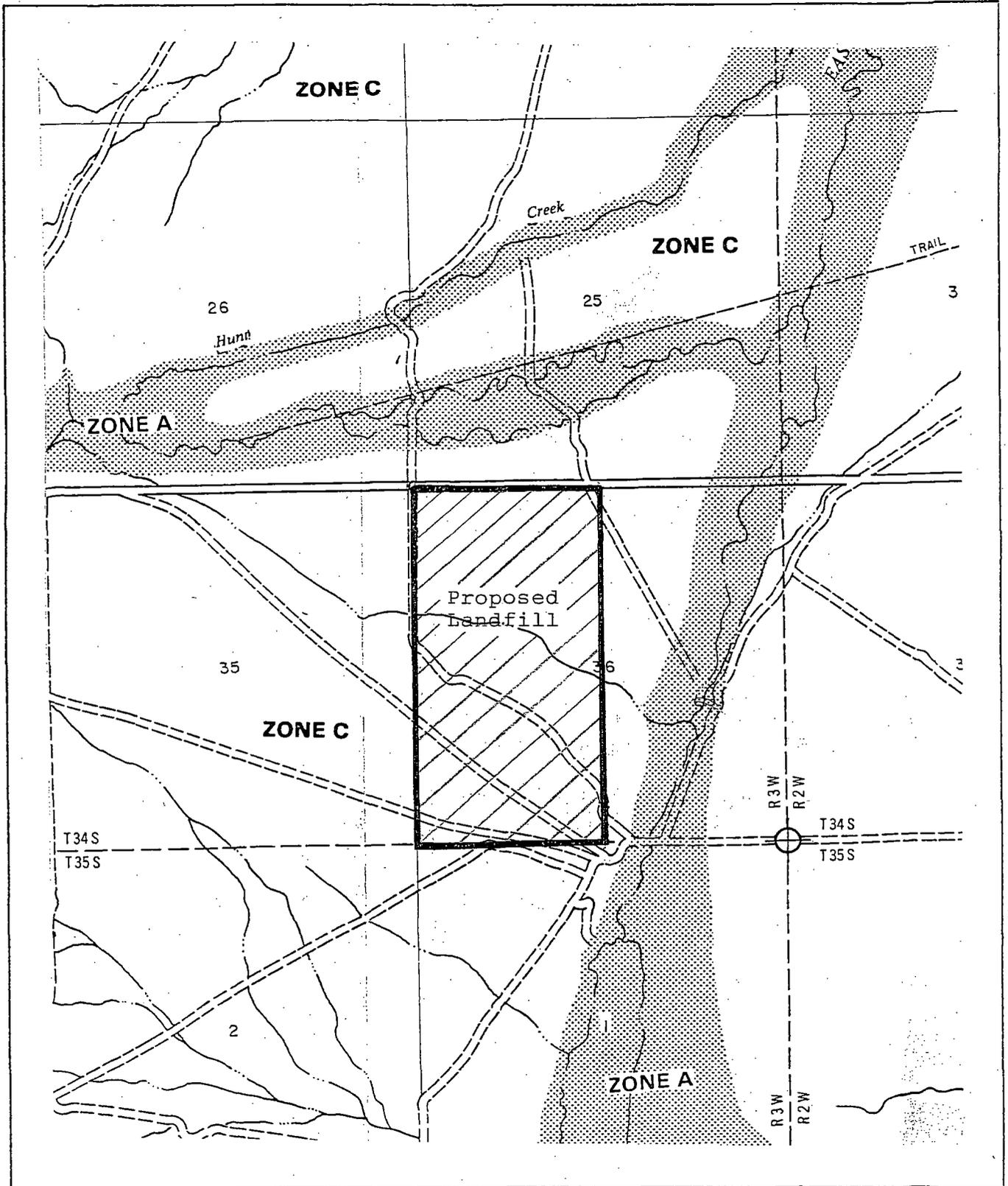
Signature

This form shall be kept on site (or at another convenient location if no permanent office facilities exist) for a minimum of 3 years.



JOHNS VALLEY SANITARY LANDFILL

Exhibit 6. Geologic Map & Description



JOHNS VALLEY SANITARY LANDFILL

Exhibit 7. Floodplain Map

GARFIELD COUNTY LANDFILL
SECTION 36, T. 34 S., R. 3 W., S.L.B.&M.
GARFIELD COUNTY, UTAH
AUGUST 22, 2006

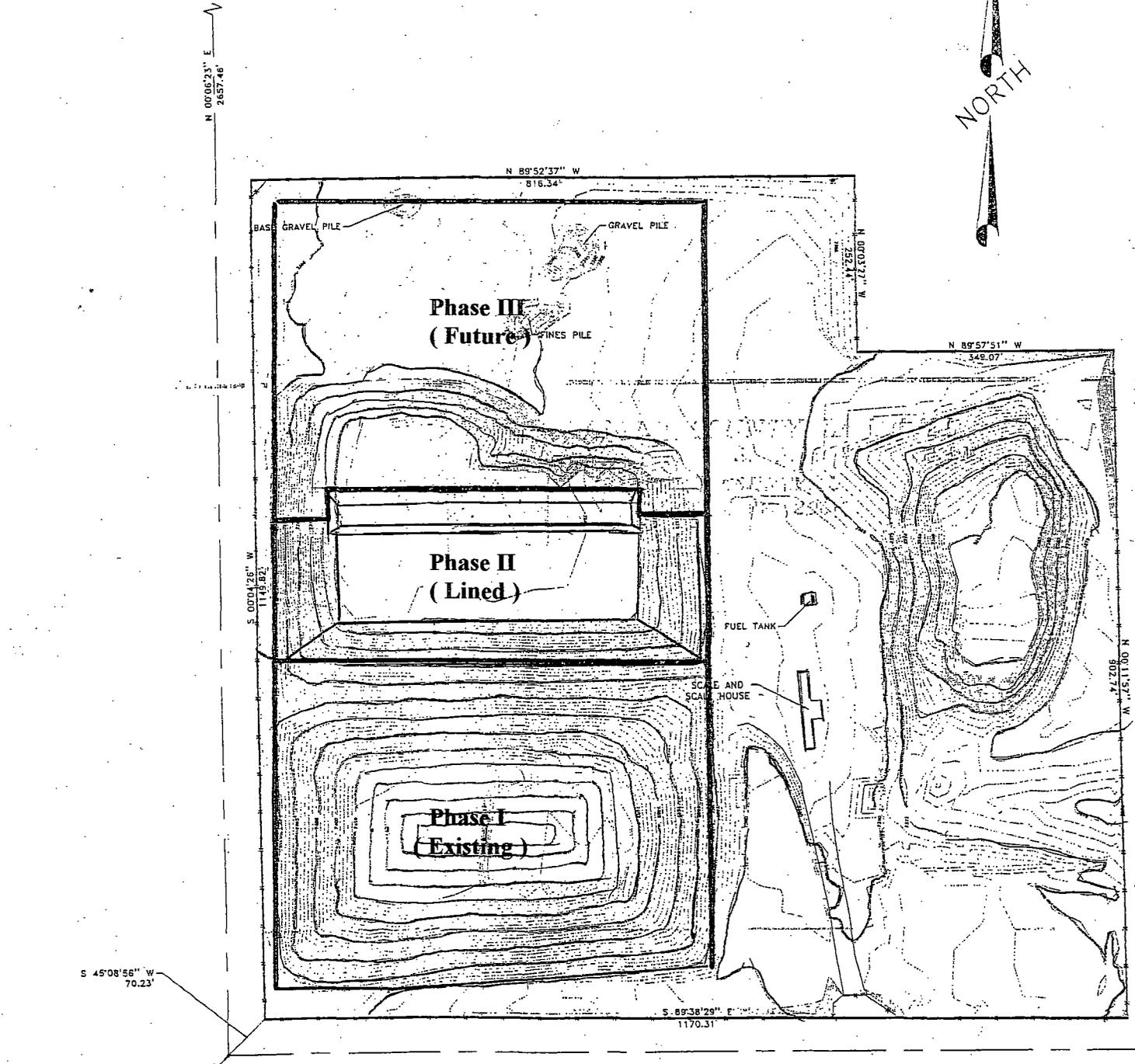
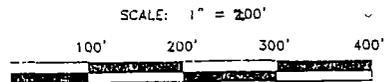
WEST QUARTER CORNER SECTION 36
BASED ON REFERENCE MARKERS

GARFIELD CO. REFERENCE MARKER
AL. CAP DATED 1997
ELEVATION OF MONUMENT 7396.92'

S 45°07'02" W
60.00'

GARFIELD CO. REFERENCE MARKER
AL. CAP DATED 1997
ELEVATION OF MONUMENT 7396.60'

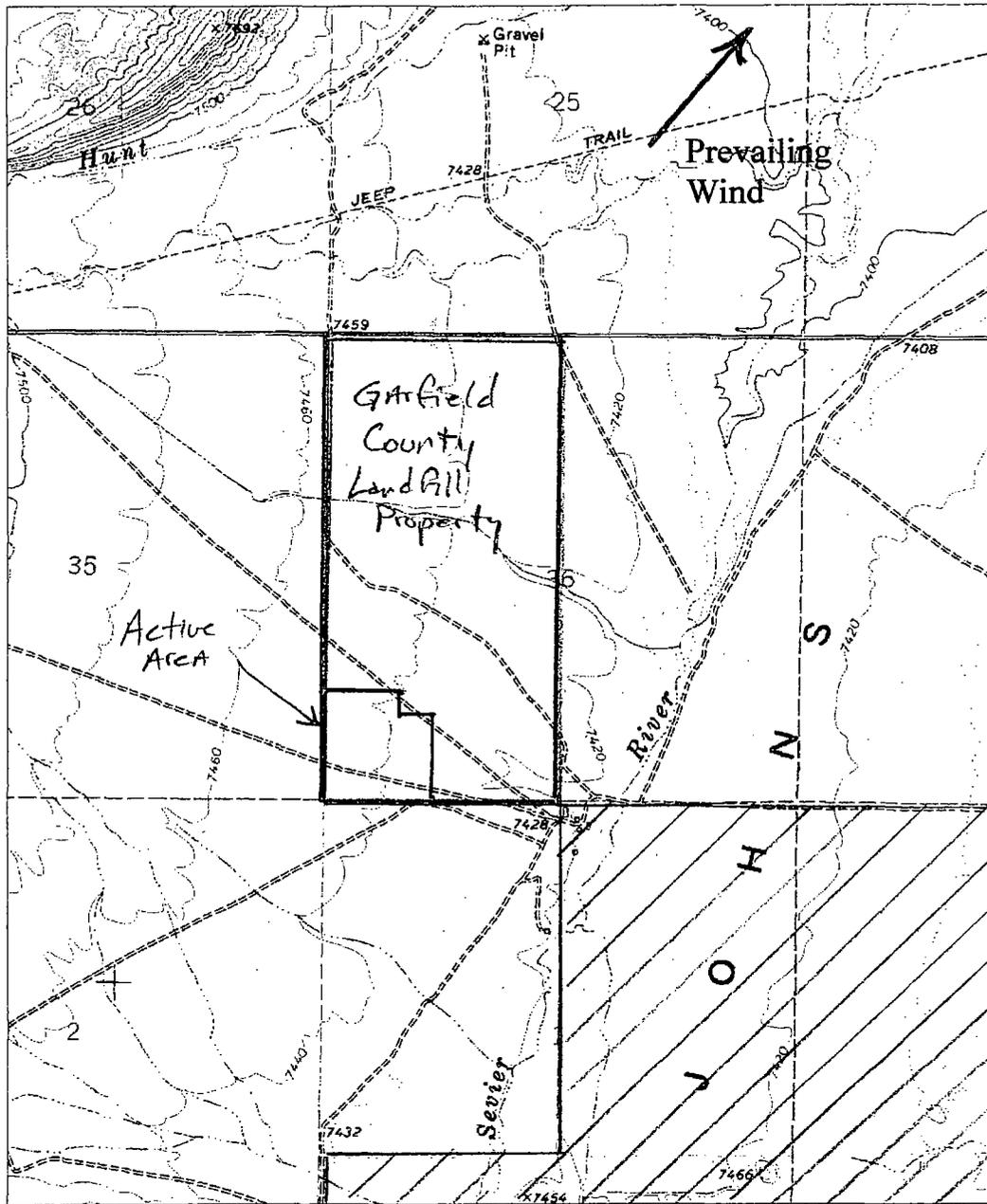
N 44°56'54" W
60.00'



OUTWEST CORNER SECTION 36
C BLM BRASS CAP DATED 1965
ELEVATION OF MONUMENT 7390.27'

JOHNS VALLEY SANITARY LANDFILL
Exhibit 8. Phasing Plan

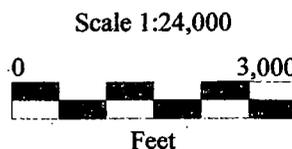
S 89°55'14"
2652.90'



Agricultural Zoned
 All other property Multiple Use

No residences, parks, monuments, recreation areas or wilderness within 1000 Ft of Garfield Co. Property

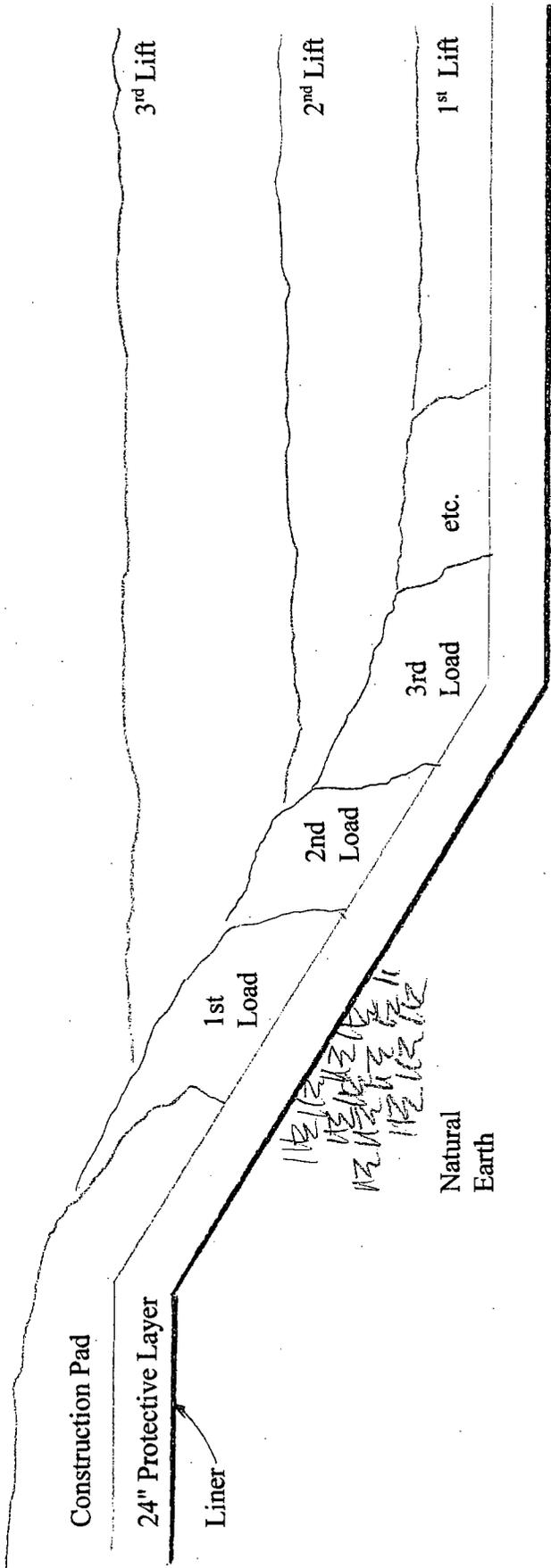
UTM
 12 North
 NAD 1927 (Conus)



8/14/2007

GPS Pathfinder[®] Office
 Trimble.

JOHNS VALLEY SANITARY LANDFILL
 Exhibit 9. Topographic Map



Filling Sequence

The first lift will begin in the Southeast Corner of the lined and will be deposited near the end of a construction pad. Waste will then be carefully pushed off the end of the pad and covered. Subsequent loads will be brought onto the previous waste and carefully deposited, pushed and covered. Operations will continue in this manner progressing in a westerly and northerly direction until the lined cell is covered with one lift of waste.

Additional lifts will begin at the toe of slope at the Southeast corner and progress in a westerly and northerly direction to cover the bottom area of the cell. When waste reaches natural ground level, operations will begin moving from west to east and / or construction of Phase II b will be initiated.

JOHNS VALLEY SANITARY LANDFILL
Exhibit 10. Filling Sequence

APPENDIX A
SLOPE STABILITY



JOHNS VALLEY LANDFILL
SLOPE STABILITY EVALUATION

INTRODUCTION

A stability analysis has been completed for the proposed Johns Valley landfill. We understand that the landfill will be approximately 20 feet in depth with excavation sideslopes of four horizontal to one vertical (4H:1V). The landfill will be excavated into soils classified as well graded gravel with cobbles. Groundwater is projected to be at least 60 feet below the bottom of the landfill excavation.

Our analysis was completed for the excavation sideslopes for the end of construction case, prior to deposition of any waste material. This will be the most critical configuration since there will not be any waste material to provide lateral support of the slopes. The well graded gravel material was modeled using a friction angle of 36 degrees and a cohesion value of 100 psf to account for slight cementation. A saturated unit weight of 130 pcf was also used.

Stability analyses were completed utilizing a Modified Bishop method. The program used performs a search for the lowest safety factors by generating 20 potential failure surfaces from 20 initiation points (total of 400 surfaces). The 10 circles or random surfaces with the lowest factors of safety are shown on the output.

For this analysis two conditions were modeled, (1) stability under static conditions and (2) stability under pseudo-static (seismic) conditions. For the pseudo-static condition a horizontal acceleration value ranging from 0.4g to 0.5g was used. Algermissen (1991) identified a horizontal acceleration of 0.4g for the area with a 90 percent probability of not being exceeded in 250 years. Figure R301.2(2) of the 2000 International Residential Code puts the area in a seismic design category D1, with 0.5g.

Graphical outputs of the stability analyses with the locations of the 10 failure surfaces with the lowest factors of safety are presented on the attached figures. The figures are for the static and pseudo-static case using a horizontal coefficient of 0.5g. Results of the stability analysis are summarized below.

<u>Configuration</u>	<u>Safety Factor (Static)</u>	<u>Safety Factor (Pseudo-static)</u>		<u>Minimum Required F.O.S.</u>
4H:1V	3.74	1.12 (0.5g)	1.32 (0.4g)	1.5 (static)/1.0 (earthquake)

Based on our analyses, the stability under static and seismic conditions well exceeds the generally accepted minimum safety factors.

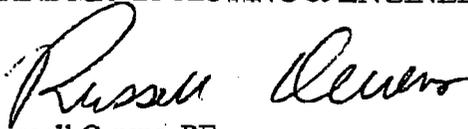
We understand the final cap over the landfill will consist of 12 inches of soil overlain by a synthetic clay liner. The clay liner will in turn be overlain by a 60 mil HDPE liner that will be covered by 12-inches of soil. The slopes for the liner will be six horizontal to one vertical. We recommend that the maximum cap section extend over the entire landfill and that the cap slope be outside of the landfill excavation footprint. The cap will be more susceptible to erosion than

instability since it will be on the order of 2.5 feet thick. Therefore, the cap was not included in the stability analysis.

We appreciate the opportunity of providing this evaluation. If you have any questions, please do not hesitate to call.

Sincerely,

LANDMARK TESTING & ENGINEERING

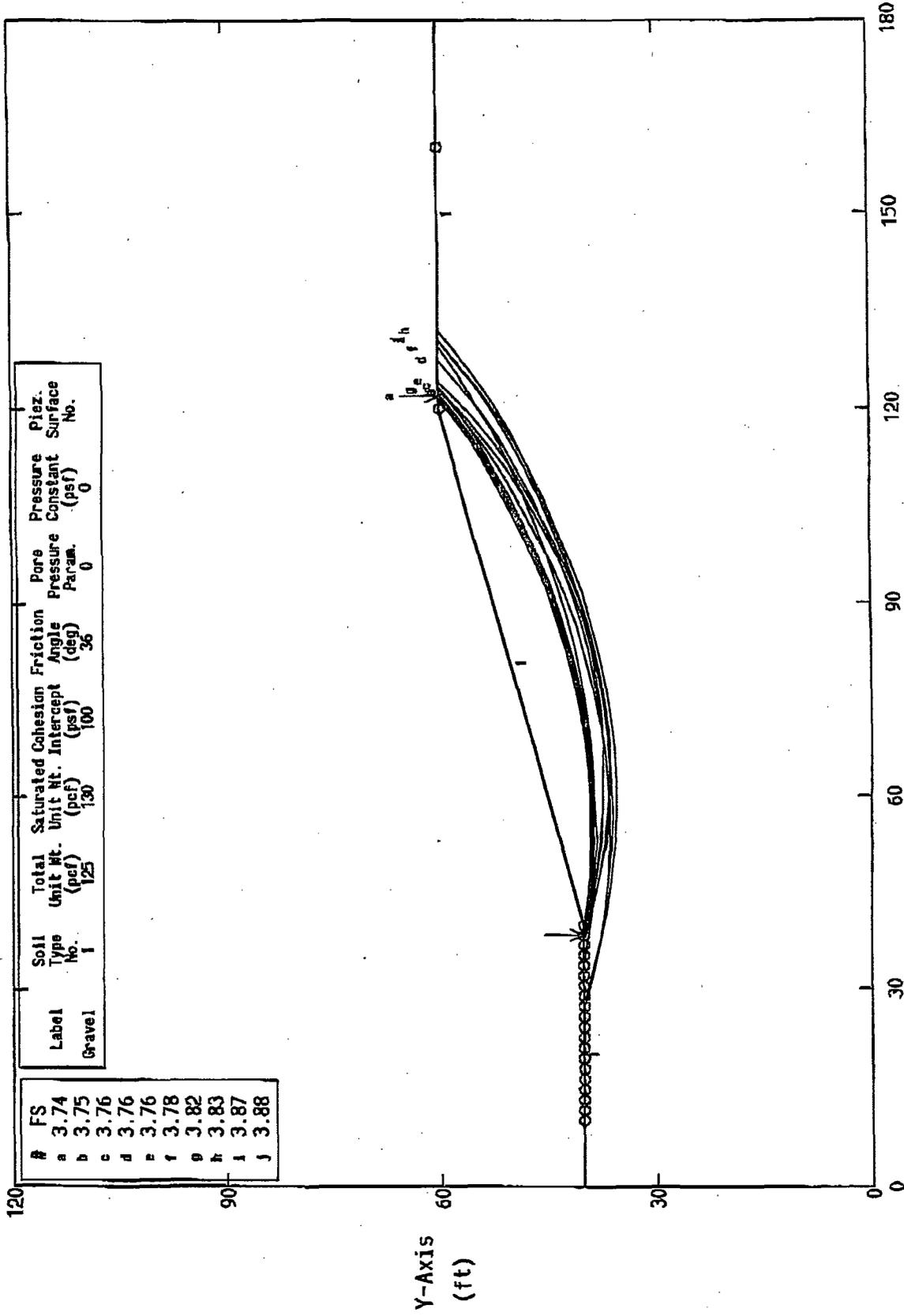


Russell Owens, PE
Geotechnical Manager

Attachments:

Johns Valley Landfill Landfill excavation stability analysis

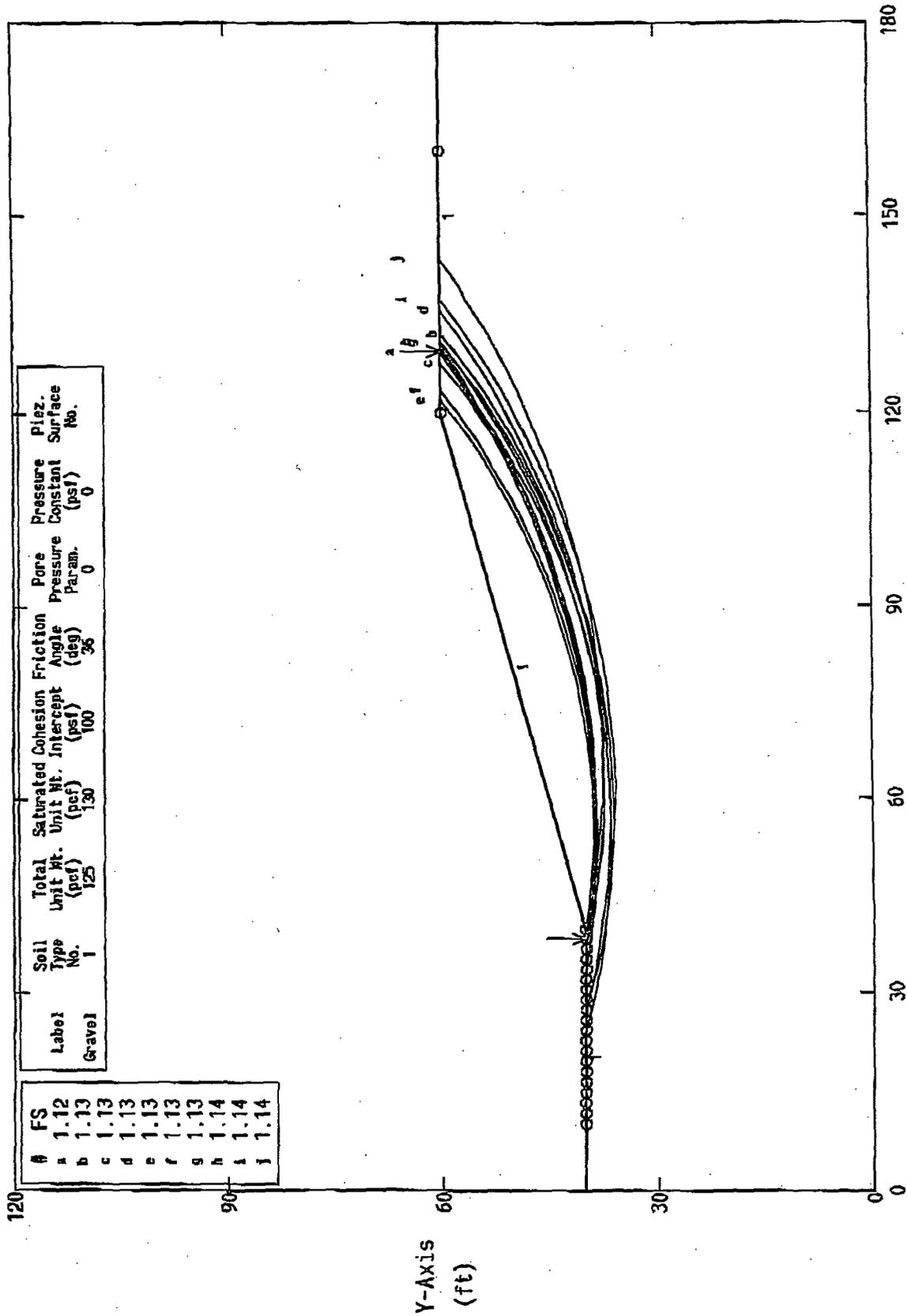
Ten Most Critical. C:JOHNSQ.PLT By: Russell Owens 08-27-03 8:30am



STABL6H FSmin=3.74 X-Axis (ft)
 Factors Of Safety Calculated By The Modified Bishop Method

Johns Valley Landfill with Earthquake Landfill excavation stability analysis

Ten Most Critical. C:JOHNSQ.PLT By: Russell Owens 08-27-03 8:29am



STABL6H FSmin=1.12 X-Axis (ft)
Factors Of Safety Calculated By The Modified Bishop Method

The state of Utah, Department of Environmental Quality (DEQ) requested that we evaluate the stability of the working face of the waste during placement at a slope of 3:1 (H:V). The properties of the waste were modified from previous analyses to reflect this condition. In this evaluation, a friction angle of 0 degrees and a cohesion value of 500 psf were used to represent lower stress, short-term loading conditions. Figures E7 and E8 illustrate the analyses for this condition. These analyses indicate the waste slope is stable under both static and seismic conditions to a height of 50 feet with minimum factors of safety of 1.7 and 1.3, respectively.

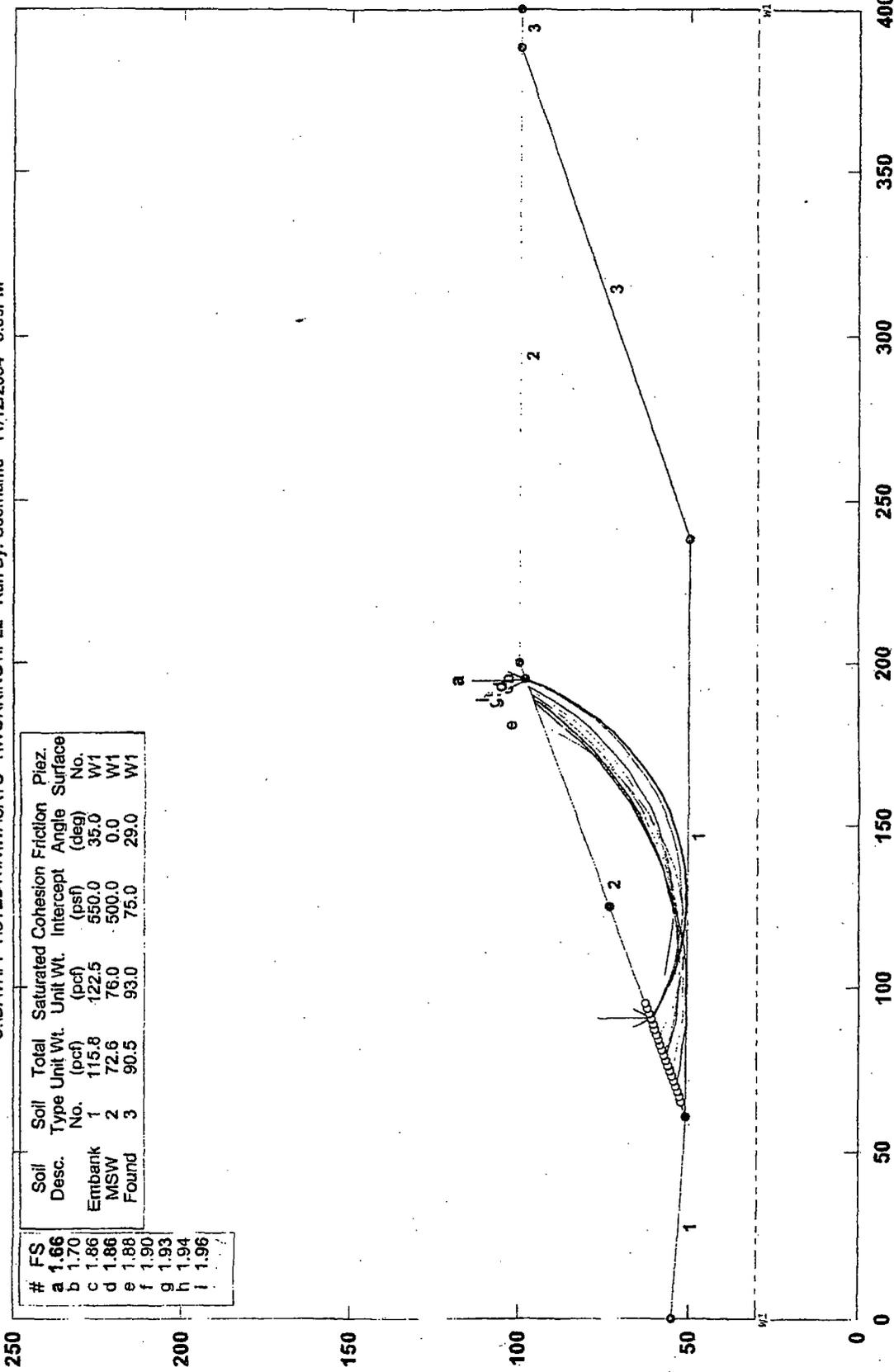
In addition, the DEQ requested that we evaluate stability of the inward slope of the berm under full cell conditions. Since the berm itself is stable under both static and seismic conditions, the addition of waste will serve to buttress the inward slope of the berm, thereby enhancing stability. Therefore, a computer analysis was not performed for this scenario.

Once the landfill liner and cap material components are selected, additional stability analyses will be performed as part of the final design investigation to address stability of the liner components themselves and their influence on stability of the berm and waste. We understand that a geomembrane combined with geocomposite liner materials may comprise the final soil cover for the landfill. In addition, the liner underlying the landfill may be sloped to facilitate leachate collection. Typical friction angle values for slick membranes (i.e. HDPE material) can range from as low as 10 degrees to as much as 20 degrees or higher. We recommend using textured geomembrane materials to increase the stability of the liner system. The geomembranes should be anchored to provide adequate stability.

Temporary construction excavation slopes will likely be stable at 1.5H:1V or flatter at heights up to 20 feet, provided the slope is not exposed for more than a week and it is not subjected to loads at the top of the slope or to water infiltrating the slope face.

Wasatch Regional Landfill, Waste WorkingFace, 3:1 Waste Slope, Static Condition

C:\DATAFI-1\STEDWINWASATC-1\WORKING1.PL2 Run By: Useiname 11/12/2004 3:09PM



#	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion (psf)	Friction Angle (deg)	Piez. Surface No.
a	Embankment	1	115.8	122.5	550.0	35.0	W1
b	MSW	2	72.6	76.0	500.0	0.0	W1
c	Found	3	90.5	93.0	75.0	29.0	W1

d	1.66
e	1.70
f	1.86
g	1.88
h	1.90
i	1.93
j	1.94
k	1.96

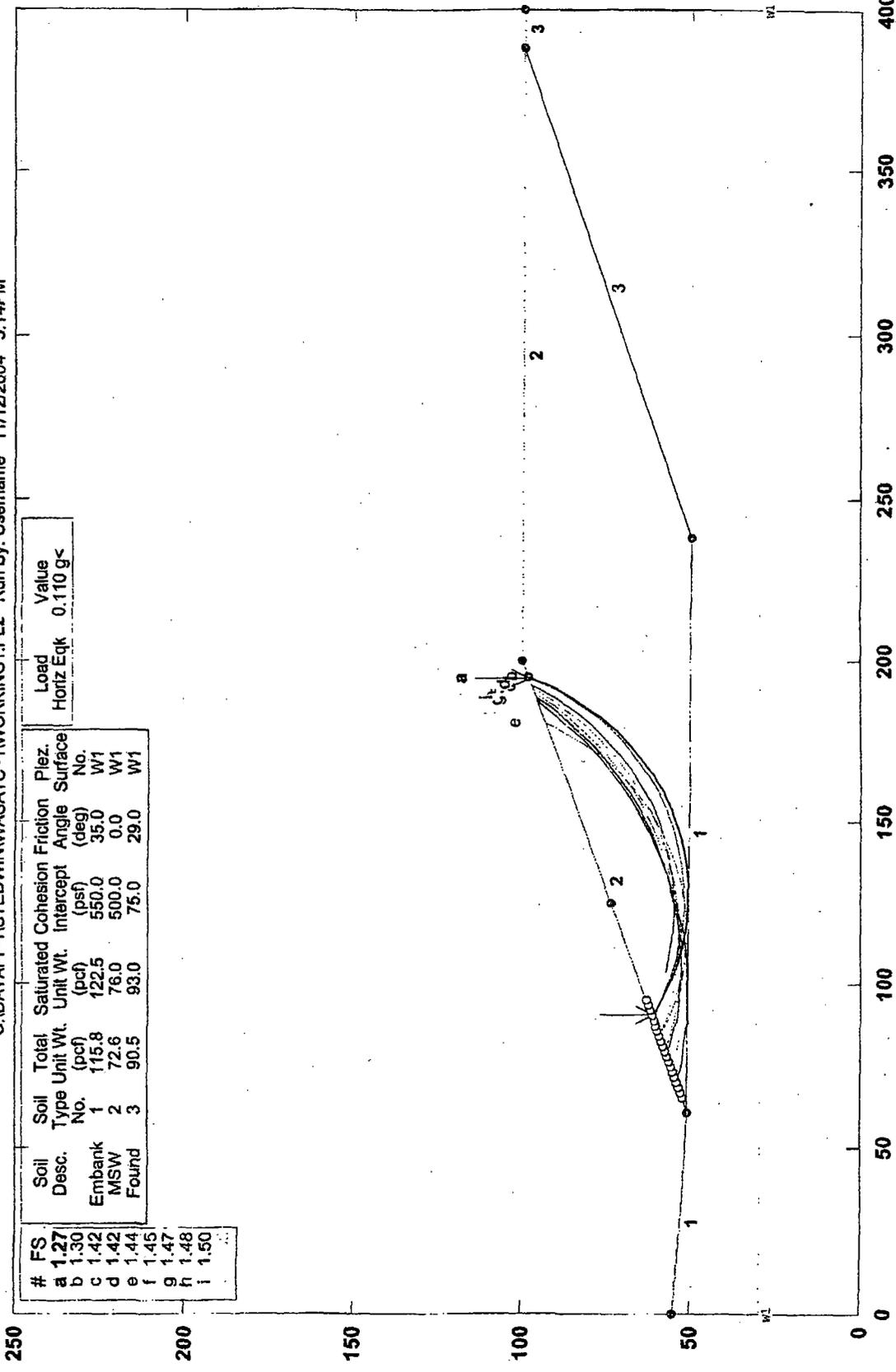
GSTABL7 v.2 FSmin=1.66

Safety Factors Are Calculated By The Modified Bishop Method



Wasatch Regional Landfill, Waste WorkingFace, 3:1 Waste Slope, Seismic Condition

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#	FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
a	1.27	Embank	1	115.8	122.5	550.0	35.0	W1
b	1.30	MSW	2	72.6	76.0	500.0	0.0	W1
c	1.42	Found	3	90.5	93.0	75.0	29.0	W1
d	1.44							
e	1.45							
f	1.47							
g	1.48							
h	1.48							
i	1.50							

Load Horiz Eqk	Value
Load Horiz Eqk	0.110 g

GSTABL7 v.2 FSmin=1.27

Safety Factors Are Calculated By The Modified Bishop Method



APPENDIX B
CLOSURE / POST-CLOSURE
FINANCIAL ASSURANCE

Preparation of Solid Waste Facility Closure and Post-Closure Cost Estimates for Johns Valley Class I Landfill

Introduction

This document was prepared in accordance with guidelines developed by the Utah Division of Solid and Hazardous Waste to comply with financial assurance rules associated with landfill closure and post closure cost estimates. The cost estimates contained herein comply with Utah Administrative Code (UAC) R315-302-3. Where questions arose regarding the estimates, the text of the rule governed.

Owners or operators of the Johns Valley Class I Landfill are required to provide cost estimates, in current dollars, for a third party to conduct and complete closure activities (i.e., hiring qualified contractors to perform closure activities). Estimates equal the maximum closure and post closure costs at any time during the life of the facility or cell; or the permit life, whichever is shorter. Estimates are included for each closure activity. If closure will be conducted in phases, cost estimates for completing each phase is provided. A worksheet for estimating costs is contained herein.

The costs shown were developed after examining, local construction costs, UDOT's annual summary of construction costs, and the Oklahoma Department of Environmental Quality data and adjusting prices to reflect cost differences between Garfield County, Utah and Oklahoma. In developing cost estimates, Garfield County enlisted the assistance of local contractors that could perform closure or post-closure activities. Selected contractors were provided with costs and asked to evaluate the estimates based on experience. Copies of documentation of the contractors' estimates should be included in the permit application.

Closure

Basic closure cost items include:

- Cost to provide construction details for the closure.
- Ground water monitoring costs.
- Gas control system installation.
- Costs for any additional equipment.
- Final cover installation and material cost including:
 - a. Material acquisition, placement, and compaction.
 - b. Vegetative layer material acquisition, placement and grading or placement of any other approved layer to protect the compacted soil layer.
 - c. Geomembranes, drainage layers or other cover layers as required by the permit and closure plan.
 - d. Seeding, fertilization, soil amendments and mulch.
- Installation of any additional control or monitoring features as necessary.

Post-Closure

The basic post-closure cost items include:

- Final cover maintenance and repair. The following were used for estimating the amount of work to be done each year.
 - a. Erosion repair; use one half foot of cover over 3% of the landfill area per year for the first five years.
 - b. Vegetation repair; use 5% of the landfill area per year for the first five years.
- Leachate collection, treatment, disposal and maintenance including costs for:
 - a. Operation
 - b. Sampling and analyses
 - c. Maintenance and repair
- Ground water monitoring including costs for:
 - a. Sampling
 - b. Analyses
 - c. Maintenance and repair
- Gas monitoring including costs for:
 - a. Sampling
 - b. Analyses (if necessary)
 - c. Maintenance and repair
- Passive Gas control systems do not require any expenditures.
- Other monitoring or sampling required by other environmental programs.
- Record keeping and reporting is required by UAC R315-302-2.
- Site inspections to oversee repairs and post-closure care.
- Costs associated with demonstrating that the site is stable and that the post-closure care period can be terminated.

Adjustments

Landfill owners or operators will annually adjust their final closure and post-closure costs for inflation or facility modifications that would affect closure or post-closure care costs (R315-309-2(2)). The first annual adjustment will occur the first year after the permit is approved by the Executive Secretary and each following year unless the actual closure costs are recalculated. The first adjustment will be made by multiplying the closure and post-closure care costs given in the permit application by the US Department of Commerce inflation factor corrected for Garfield County pricing. Subsequent adjustments will be made annually on the same basis. This process of adjustment will be utilized until the actual closure and post-closure care costs are recalculated. At the time of permit renewal and at the ten year anniversary of the permit issuance, the closure and post-closure care costs will be recalculated using the current approved design and current construction costs.

Additional Information

The initial closure and post-closure plans are submitted as part of a permit application and become part of the approved permit. Subsequent changes due to permit modifications, regulatory changes, operational changes, or unforeseen circumstances (e.g., increase/decrease in fill rate or premature closure with less than the total acreage utilized) which substantially affect the time schedule or

costs of closure and post-closure will necessitate closure and post-closure plan and cost estimate modifications. These modifications will be submitted to the Executive Secretary for approval. In addition, adjustments to the cost estimates will be submitted with the annual report to be approved by the Executive Secretary. Any change in the financial assurance mechanism will be submitted to, and receive Executive Secretary approval.

DESCRIPTION OF LINE ITEMS

Closure Costs

1.0 Engineering

1.1 Topographic Survey

A topographic survey will generally be required to ascertain the existing height and top slope of the landfill so that permit compliance can be evaluated and the final closure system, drainage system and final grading can be engineered. Costs were developed by phone quote with a local licensed surveyor.

1.2 Boundary Survey

A Boundary survey is a metes and bounds description that is required for filing the closure notice and making the required changes on the record of title or deed. Costs were developed by phone quote with a local licensed surveyor.

1.3 Site Evaluation

The site evaluation includes a site inspection to identify waste disposal areas, analyze drainage and erosion protection needs, and to determine other site operational features that may not be in compliance with the permit. Analysis of ground water samples, landfill gas analysis, operation records, etc. should also be included. Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report*.

1.4 Development of Plans

The final closure plan includes the final cover system design and specifications, grading and drainage plans, specifications for revegetation, design of any other site improvements required, and preparation of a closure schedule. This item also includes the coordination of the closure plan with the Utah Division of Solid and Hazardous Waste, including the required notifications and reporting. Included in Item 1.7.

1.5 Contract Administration

Included in Item 1.7.

1.6 Administrative Costs

Included in Item 1.7.

1.7 Project Management, Observation and Testing

Project Management, Observation and testing costs include the cost of a Professional Engineer to observe the closure construction, perform appropriate cover thickness and permeability verifications, and prepare an evaluation report upon completion of the closure. Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report* and use a 12.5% multiplier.

1.8 Ground Water Monitor Well Consultant Costs

Consultant costs for monitor well installation include preparation of work plans, well installation observation, well development, and the data analysis report. Included in Item 1.7.

1.9 NPDES Construction Storm Water Permit Compliance Package

The consultant is to prepare all necessary plans, specifications, and other documents necessary for compliance with all applicable federal and state laws and requirements necessary for the closure of the site. One of these required steps is compliance with the Federal Clean Water Act. Included in Item 1.7.

1.10 Disposal of Final Wastes

Any onsite waste that is not in the disposal cell must be placed in the cell or disposed of at a permitted facility if the waste can not be placed in the current open cell. Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report*.

1.11 Remove Temporary Buildings

Onsite buildings that are not being used for post-closure care operations at the site must be removed and disposed of. Not Applicable.

1.12 Remove Equipment

Onsite equipment that is not being used for post-closure care operations at the site must be removed and disposed of. Not Applicable.

1.13 Repair/Replace Perimeter Fencing

Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report*.

1.14 Clean Leachate Lines

Not Applicable

2.0 Construction Costs

Closure construction costs include those for construction of the final cover system, site grading, and drainage improvements. Other construction costs may be necessary to correct on-site problems.

2.1 Final Cover System

The standard final cover system at Class I, Class II, and some Class V Landfills is an infiltration layer that is a minimum of 18 inches of earthen material that has a permeability less than or equal to the permeability of any bottom liner system or if there is no liner in the landfill unit, no greater than the permeability of the natural soils, or a permeability of no greater than 1×10^{-3} cm/sec, whichever is less, and an erosion layer of a minimum of 6 inches of earthen material that is capable of sustaining plant growth. Garfield County intends to use a Geosynthetic clay cover that develops a permeability less than 1×10^{-9} cm/sec when covered with a minimum of 12 inches of earthen material. Any diminimus infiltration will be accommodated in the Post-Closure leachate handling procedure. The earthen material will also serve the drainage / holding layer for any precipitation not removed through evapotranspiration. Also, a 6 inch vegetative layer is included to protect the entire final cover system along with vegetation of all disturbed areas.

2.1.1 Completion of the Sidewall Liner

Completion of the sidewall liner is necessary when the waste is not placed at a permanent grade or when no sidewall liner has been placed. In general, if the waste is not placed at a final grade and new final grades have been assumed, the completion of this sidewall liner is required. Included in 2.2.1a, 2.2.2a, 2.2.4c, 2.3, and 2.4.1.

2.1.2 Drainage Layer on Sidewall (if required)

For ease of construction, this drainage layer along the sidewall area to be developed could consist of a "geonet" or "geogrid" system and is measured in terms of square yards of placement.

Included in 2.2.1a, 2.2.2a, 2.2.4c, 2.3, and 2.4.1.

2.2 Completion of the Top Cover

2.2.1 Infiltration Layer (Compacted Clay)

The infiltration layer of the final cover system consists of an 18-inch thick layer of compacted soil or other earthen materials with a permeability matching that of the bottom liner or native soils, but not greater than 1×10^{-5} cm/sec. Included in 2.2.1a, 2.2.2a, 2.2.4c, 2.3, and 2.4.1.

2.2.2 Geosynthetic Clay Layer

A compacted clay liner may be used at certain landfill sites to meet the permeability requirements of the rules. Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report* and after discussions with in-state suppliers/installers.

2.2.3 Flexible Membrane Cover

A flexible membrane cover will be necessary at certain landfill sites where the required permeability cannot be attained in the infiltration layer by earthen materials alone. Similar material is used for the FMC as is used for the FML, but typically requires more flexibility and less chemical resistance. Not Applicable

2.2.4 Drainage Layer

A drainage layer is commonly used between the erosion layer and the infiltration layer. Geosynthetic clay cover manufacturers require a 12 inch layer of 1" minus material to develop permeability rates. The material is located on site, is free draining and will serve as the drainage layer and the protective cover. In addition, the material will allow capillary forces to hold water in the vegetative layer for plant uptake. Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report* after analysis of local pricing and are included in item 2.2.4c.

2.3 Erosion Layer Placement

The erosion layer must be a minimum of 6 inches of earthen material capable of sustaining plant growth. The existing site topsoil is generally acceptable for this application, and additional material is available at County owned property adjacent to the landfill. Costs were developed by utilizing data for on site soils from the *Solid Waste Financial Assurance Program Report* after analysis of local pricing and are included in item 2.3.

2.4 Revegetation

Revegetation includes the activities necessary to provide vegetative erosion protection over the surface of the completed final cover. Limited moisture for germination and growth exists at the landfill. Costs are based on local vegetation practices and seeding with grasses or other shallow rooted plants that are native to the area. Success rates will be dependant on available moisture. Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report* after analysis of local pricing and are included in item 2.4.1.

2.5 Site Grading and Drainage

Site grading and drainage include the final grading of the site, drainage improvements and sedimentation controls for proper closure of the site. This activity will be limited to cleaning ditches necessary to protect cells from run on surface waters. Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report* after analysis of local pricing and are included in item 2.5.

2.6 Site Fencing and Security

Site fencing and security are to be added to secure any area of the landfill which has received waste and is undergoing closure but may not have been fenced. This item is not applicable to the

Johns Valley Landfill.

2.7 Leachate Collection System Completion

In the event of forced closure, there may be circumstances where the leachate collection system has not been completed. No leachate collection system is established as part of Phase I of the landfill closure. Phase II considers leachate collection activities as part of regular operations. A leachate collection trench has been designed to accommodate back to back 25 year events. Long term leachate collected in the post-closure period is anticipated to be considerably less than maximum capacity and will be disposed through evaporation. Over the life of the landfill leachate generation will be observed and data will be used to verify design capacities are sufficient. Cost estimates for Phase II closure consider best information at this time. They may be revised as part of the annual financial assurance evaluation. Leachate collection system costs for Phase II are included in Item 2.7

3.0 Gas Collection System

Some landfill closures may require the installation of a gas collection system. The system for this landfill consists of passive vents to dispose of landfill gas before it can build up pressures that may damage the cover. Costs were developed by utilizing data from the *Solid Waste Financial Assurance Program Report* and are described below.

3.1 System Design

Where closure is required prior to the complete filling of the cell or site, changes in the design of the gas collection system may be required. These costs were estimated using standard percentages from the *Solid Waste Financial Assurance Program Report*.

3.2 Completion of Gas Collection System

In the event of forced closure, there may be circumstances where the gas monitoring system, if required, has not been installed completely in association with the unit to be closed. The gas monitoring system will include the installation of passive vents where necessary to conduct the required monitoring.

3.3 Equipment and Installation

These costs include placing passive vents in the crest of the landfill cells. Intermediate cover is granular and conducive to landfill gas transmission. Costs for the vents were estimated using known pricing for materials and adding conservative figures for installation.

4.0 Monitor Well Installation

A ground water monitoring well has been installed prior to the beginning of any waste disposal operations. In the event of forced closure of a site, it will not be necessary to relocate any monitoring wells. Installation of gas monitoring wells at the site is not required. Monitoring for landfill gas is anticipated to be conducted throughout the active life and post closure period for the landfill using the proposed passive system. Data collected in this fashion will eliminate the installation of methane monitoring wells or the relocation or reworking of existing methane monitoring wells.

4.1 Ground Water Monitor Well Installation, Reworking, or Replacement

Although groundwater monitoring well installation is not anticipated for the Johns Valley Landfill, estimates for a limited amount of improvements to the existing network has been included. Costs were derived from the *Solid Waste Financial Assurance Program Report* and are slightly higher for Phase II to account for future requirements.

4.2 Install, rework, or Replace Methane Probe/s or Wells

Not Applicable.

4.3 Monitor Well or Methane Probe/Well Plugging

Not Applicable.

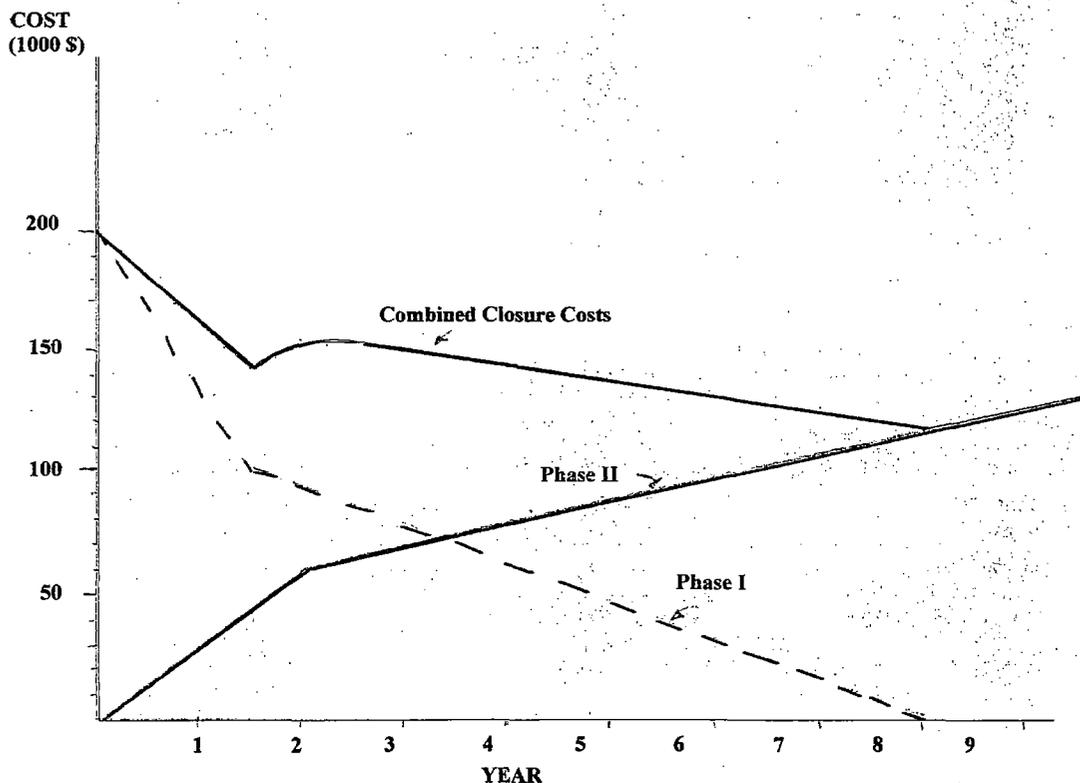
Contingency Costs and Legal Fees

An estimated 10 percent contingency cost for all closure activities has been included. In addition a bond cost reflective of qualified contractors has been added to account for a performance bond at the time of construction. In as much as the State of Utah regulates the permitting, operation and closure of the Johns Valley Landfill, no legal costs are anticipated to be applicable.

Phasing / Cost Schedule

A phasing plan and cost schedule have been identified for the landfill. Closure costs for Phase I of the process contemplate closing 50% of the existing cell in the first 18 months of operation and the remaining 50% over an additional 78 month period. Closure costs for Phase II of the landfill are anticipated to increase rapidly over the first two years of operation in the lined cell and then increase linearly for the remainder of its life. Cell life and permit life coincide to expire in ten years. The graph included below indicates Closure costs will decrease from \$150,000 at year 2 to \$120,000 at year 8 and then increase to \$130,000 by year 10. In as much as Closure costs vary over the life of the landfill, a figure of \$150,000 will be used as the nominal Closure cost.

COMBINED CLOSURE COSTS



Post-Closure Care

The post-closure care period is established to be 30 years or as long as the Executive Secretary determines is required for the facility or unit to become stabilized and to protect human health and the environment. During this period, maintenance must be ongoing to assure the integrity and effectiveness of the final cover and other required systems. Also included in this section is the cost for disposal of leachate, since leachate may still be generated during the post-closure care period. The costs for post-closure care are divided into engineering costs, construction costs and leachate disposal costs.

1.0 Engineering Costs

Engineering costs include the amendment of a post-closure plan, site inspections, site monitoring, preparation of a post-closure permit, and preparation of correctional plans if required.

1.1 Post-Closure Plan

The post-closure plan provides a schedule for routine maintenance of the final cover system, the landfill security system, and the gas and groundwater monitoring systems. It also contains a schedule for the sampling and analysis of ground water and gas monitoring. When properly closed, the Johns Valley Landfill will need a minimum of routine maintenance. A majority of the final cover system will be in place for more than five years and is assumed to have stabilized. The gas and groundwater monitoring systems will have been analyzed for 10 to 25 years, and sufficient data will be available to make accurate decisions. The stabilized nature of the facility is reflected in the post-closure costs. The permit and any Executive Secretary approved modifications provide sufficient detail to be considered the initial post-closure plan. Costs for any additional planning are included in Items 1.2 and 1.3.

1.2 Site Inspections

Site inspections should be performed at least quarterly. Inspections will include identification of areas experiencing settlement or subsidence, identification of erosion or other drainage-related problems, inspection of the fencing, and inspection of the leachate collection system and monitoring systems. Considering the long term nature of the facility prior to post-closure activities, it is not anticipated that significant corrective measures will be necessary. Costs for this item were derived from the *Solid Waste Financial Assurance Program Report* and adjusted for site complexity.

1.3 Correctional Plans and Specifications

Correctional plans and specifications include the costs for an engineering consultant to prepare plans and specifications to correct problems identified during the site inspections. This cost is dependent upon the quality of care taken during the closure of the site and ongoing maintenance during previous post-closure care years. Higher costs typical of early post-closure years will occur while the landfill is still operational. This item is assumed to have tapered down to zero prior to the beginning of the official post-closure care period. However, in an effort to provide a factor of safety, it is assumed that a minimal corrective plan will be required during 10% of the closure period.

1.4 Site Monitoring

Site monitoring is the cost to perform semiannual ground water sampling and analysis for each on-site monitoring well. Gas monitoring is performed on a quarterly basis during the post-closure care period and is included. Considering the data that will be available prior to the post-closure period, it is anticipated that limited value will be achieved through the normal monitoring process

and that Executive Secretary approved modifications may be implemented. Costs reflect simplified nature of the monitoring systems at the Johns Valley Landfill and consider combined sampling efforts, indicator testing and other reasonable practices.

2.0 Maintenance Costs

Post-closure maintenance costs include the costs to correct any problems determined by the site inspections and as specified by the engineer's correctional plans and specifications. These costs will also include any ongoing site maintenance that is needed throughout the post-closure care period. Maintenance costs are dependent upon the quality of care taken during the closure of the site and ongoing maintenance during previous post-closure care years. It is assumed that proper closure and post-closure care have been conducted and that maintenance costs are minimal.

2.1 Cover Maintenance Costs

Subsidence and erosion of the cover may occur. These areas must be repaired and the vegetation reestablished. Also any damage to the protective soil layer or the cover must be repaired. Most of the landfill will have been closed for a considerable period of time prior to post-closure activities and higher costs associated with early maintenance will not occur. Cover maintenance is assumed to consist of minimal seeding in 20% of the post-closure years.

2.2 Equipment Maintenance

Equipment at the Johns Valley Landfill is limited to sampling systems associated with the groundwater monitoring wells. All other systems are passive in nature. The previous 15 years of operation at the landfill indicate the groundwater monitoring system is reliable and has not required any significant maintenance. In order to provide a conservative factor of safety, it is assumed that two maintenance events will occur associated with groundwater monitoring. Other maintenance costs associated with monitoring systems are not applicable.

3.0 Final Plugging of Monitoring Wells

At the end of the post-closure care period the monitoring wells must be plugged in accordance with Utah Division of Water Rights rules. Costs identified for this activity have been included.

4.0 Leachate Disposal

The State of Utah recommends that owners or operators base cost estimates on an average rate of leachate generation during the past few years of active life of the landfill unit and the cost of treatment that may be available or developed. No leachate quantities are available for the Johns Valley Landfill. In addition, during the post-closure period, the volume of leachate being generated will decrease substantially because the landfill unit has received a final cover. The leachate collection trench is designed to accommodate worse case scenarios, and it is assumed that sufficient surface area exists for disposal by evaporation. Therefore no leachate disposal costs are applicable. Leachate volumes will be observed and analyzed as part of ongoing operations at the landfill to verify this assumption.

5.0 Site Maintenance

General maintenance of the site will continue throughout the post-closure period. Maintenance for fences and gates or other access controls, buildings and access roads is assumed to be minimal. Costs for these items has been included.

6.0 Demonstration of Stability

Although the post-closure care period is not automatically ended at the end of 30 years, it is anticipated that the landfill will be shown to be stable and not present a threat to health or the environment. It is assumed the demonstration be supported by analysis of data collected during

the active life and post-closure period. Inclusion of new information. Costs for this item has been included.

Landfill Closure Cost Estimate Worksheet

Cost estimate worksheets for the Johns Valley Landfill have been included below for documentation purposes.

Phase I

1 of 4

Utah Division of Solid and Hazardous Waste
Solid Waste Program
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Landfill Closure Cost Estimate Worksheet

A brief description of each line item, as numbered in the tables, is given immediately following this series of tables.

Item	Unit Measure	Cost/Unit	No. Units	Total Cost	
1.0	Engineering and Preliminary Site Work				
1.1	Topographic Survey	Hr	135 ⁰⁰	6	810 ⁰⁰
1.2	Boundary Survey for Closure	Hr	135 ⁰⁰	2	270 ⁰⁰
1.3	Site Evaluation	Lump	2750 ⁰⁰	1	2,750 ⁰⁰
1.4	Development of Plans	See 1.7		0	
1.5	Contract Administration Bidding and Award	See 1.7		0	
1.6	Administrative Costs for the Certification of Final Cover and Closure Notice	See 1.7		0	
1.7	Project Management; Construction Observation and Testing	Lump	24,746	1	24,746
1.8	Monitor Well Consultant Cost			0	
1.9	Other Environmental Permit Costs			0	
1.10	Disposal of Final Wastes			0	
1.10.1	Disposal Cost	Ton	\$ 50 ⁰⁰	90	4500
1.11	Remove Temporary Buildings	Lump	\$ 1,000	0	0
1.12	Remove Equipment	Lump	\$ 1,000	0	0
1.13	Repair/Replace Perimeter Fencing	Ln Ft	2 ²⁰	230	506 ⁰⁰
1.14	Clean Leachate Lines	Ln Ft	\$ 3 ⁰⁰	0	0
	Subtotal			33,600	
	10 % Contingency			3,400	
	Engineering Total			37,000	

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
2.0	Construction			
2.1	Final Cover System			
2.1.1	Completion of Sidewall Liner	See 2.2.1		

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1.1a	Soil Placement	See 2.21		
2.1.1b	Soil Processing	See 2.21		
2.1.1c	Soil Amendment	See 2.21		
2.1.1d	Soil Purchase	See 2.21		
2.1.1e	Soil Transportation	See 2.21		
2.1.2	Drainage Layer on Sidewall	See 2.21		
2.1.2a	Geotextile Filter Fabric	See 2.21		
2.1.2b	Geonet/Geotextile Composite	See 2.21		
2.1.2c	Geomembrane Sidewall Liner	See 2.21		
2.2	Completion of Top Cover			
2.2.1	Infiltration Layer (Compacted Clay)			
2.2.1a	Soil Placement (Compacted)	Acres \$ 1122	6	\$ 6732 ⁰⁰
2.2.1b	Soil Processing	in 2.2.1a		0 ⁰⁰
2.2.1c	Soil Amendment	N/A		0 ⁰⁰
2.2.1d	Soil Purchase	on site		0 ⁰⁰
2.2.1e	Transportation	on site		0 ⁰⁰
2.2.2	Geosynthetic Clay Layer			
2.2.2a	Geosynthetic Clay Installation	sq Ft 261,000	\$ 0 38	\$ 99,180
2.2.3	Flexible Membrane Cover			
2.2.3a	Flexible Membrane Installation	0 ⁰⁰	0 ⁰⁰	0 ⁰⁰
2.2.4	Drainage Layer			
2.2.4a	Geonet/Geotextile	NA		
2.2.4b	Sand Layer			
2.2.4c	Soil Cover	cu yd 2 ⁰⁰	10,000	\$ 20,000
2.2.4d	Geonet/Geotextile Composite	NA		
2.3	Erosion Layer Placement	cu yd 1 ⁵⁰	5,000	\$ 7,500
2.4	Revegetation			
2.4.1	Seeding	Acres 4 ⁰⁰	6	2400

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
2.4.2 Fertilize	in 2.4.1			0
2.4.3 Mulch	in 2.4.1			0
2.5 Site Grading and Drainage	Ln Ft	\$1.00	1000	1000
2.6 Site Fencing and Security	N/A			0
2.7 Leachate Collection System Completion	Lump	1000	0	0
Subtotal				\$136,812
10% Contingency				13,688
Construction Total				150,500

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
3.0 Gas Collection System				
3.1 System Design	Lump	480 ⁰⁰ (12%)	1	480 ⁰⁰
3.2 Completion of Gas Collection System	in 3.3.3			
3.3 Equipment and Installation				
3.3.1 Place Sand	N/A			
3.3.2 Install Geonet and Geotextile	N/A			
3.3.3 Install Passive Vents	Acres	\$500 ⁰⁰	8	4000
3.3.4 Install, Rework or Replace Gas Control Equipment	N/A			
Subtotal				4,480
10% Contingency				520
Gas Collection Total				5,000

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
4.0 Monitor Well Installation Cost				
4.1 Ground Water Monitoring Well Installation, Reworking, or Replacement	Ln Ft	\$41 ⁴⁰	32	\$1,324
4.2 Install, Rework, or Replace Methane Probe/s	N/A			
4.3 Monitor Well, or Methane Probe Plugging	N/A			
Subtotal				1,324

Phase I

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Utah Division of Solid and Hazardous Waste
Solid Waste Program

7.

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
10% Contingency				\$133.00
Monitor Well Installation Total				1457

Calculation of Total Closure Costs

Engineering Total: 37,000

Construction Total: 150,500

Gas Collection Total: 5,000

Ground Water Total: 1457.00

2 % Contract
Performance Bond: 4,000

SUBTOTAL: 198,000

Legal Fees
(0 % Of Subtotal): 0

TOTAL CLOSURE COSTS: \$198,000

use \$200,000

Phase I Closure Schedule

50% First 1 1/2 yrs

remaining 50% spread over 6 1/2 yrs

Utah Division of Solid and Hazardous Waste
Solid Waste Program

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Landfill Closure Cost Estimate Worksheet

A brief description of each line item, as numbered in the tables, is given immediately following this series of tables.

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
1.0 Engineering and Preliminary Site Work				
1.1 Topographic Survey	Hr	135 ⁰⁰	6	810 ⁰⁰
1.2 Boundary Survey for Closure	Hr	135 ⁰⁰	2	270 ⁰⁰
1.3 Site Evaluation	Lump	2750 ⁰⁰	1	2750 ⁰⁰
1.4 Development of Plans	See 1.7			
1.5 Contract Administration Bidding and Award	See 1.7			
1.6 Administrative Costs for the Certification of Final Cover and Closure Notice	See 1.7			
1.7 Project Management; Construction Observation and Testing	Lump	10,000	1	10,000
1.8 Monitor Well Consultant Cost				
1.9 Other Environmental Permit Costs				
1.10 Disposal of Final Wastes				
1.10.1 Disposal Cost	Ton	50	90	4500
1.11 Remove Temporary Buildings	Lump	1000	0	0
1.12 Remove Equipment	Lump	1000	0	0
1.13 Repair/Replace Perimeter Fencing	Ln Ft	3 ⁰⁰	100	300
1.14 Clean Leachate Lines	Ln Ft	3 ⁰⁰	0	0
Subtotal				18,360
10 % Contingency				1,840
Engineering Total				20,200

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
2.0 Construction				
2.1 Final Cover System				
2.1.1 Completion of Sidewall Liner	See 2.2.1			

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1.1a Soil Placement	See 2.2.1			
2.1.1b Soil Processing	See 2.2.1			
2.1.1c Soil Amendment	See 2.2.1			
2.1.1d Soil Purchase	See 2.2.1			
2.1.1e Soil Transportation	See 2.2.1			
2.1.2 Drainage Layer on Sidewall	See 2.2.1			
2.1.2a Geotextile Filter Fabric	See 2.2.1			
2.1.2b Geonet/Geotextile Composite	See 2.2.1			
2.1.2c Geomembrane Sidewall Liner	See 2.2.1			
2.2 Completion of Top Cover				
2.2.1 Infiltration Layer (Compacted Clay)				
2.2.1a Soil Placement (Compacted)	Acres	\$ 1200 ⁰⁰	3	3600 ⁰⁰
2.2.1b Soil Processing	See 2.2.1a			
2.2.1c Soil Amendment	N/A			
2.2.1d Soil Purchase	ON site			
2.2.1e Transportation	ON site	1.50		
2.2.2 Geosynthetic Clay Layer				
2.2.2a Geosynthetic Clay Installation	sq ft	130,000	\$ 0.50	\$ 65,000
2.2.3 Flexible Membrane Cover				
2.2.3a Flexible Membrane Installation	N/A			
2.2.4 Drainage Layer				
2.2.4a Geonet/Geotextile	N/A			
2.2.4b Sand Layer	N/A			
2.2.4c Soil Cover	cu yd	2 ⁰⁰	6,000	\$ 12,000
2.2.4d Geonet/Geotextile Composite	N/A			
2.3 Erosion Layer Placement	N/A	1.50	3,000	4,500
2.4 Revegetation				
2.4.1 Seeding	Acres	400	3	\$ 1200

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
2.4.2 Fertilize	See 2.4.1			
2.4.3 Mulch	See 2.4.1			
2.5 Site Grading and Drainage	See 2.2.4c			
2.6 Site Fencing and Security	N/A			
2.7 Leachate Collection System Completion	Lump	5000	1	5000
Subtotal				91,300
10% Contingency				9,700
Construction Total				101,000

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
3.0 Gas Collection System				
3.1 System Design	Lump	500	1	500
3.2 Completion of Gas Collection System	See 3.3.3			
3.3 Equipment and Installation				
3.3.1 Place Sand	N/A			
3.3.2 Install Geonet and Geotextile	N/A			
3.3.3 Install Passive Vents	Acres	500	3	1500
3.3.4 Install, Rework or Replace Gas Control Equipment	N/A			
Subtotal				2000
10% Contingency				200
Gas Collection Total				2200

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
4.0 Monitor Well Installation Cost				
4.1 Ground Water Monitoring Well Installation, Reworking, or Replacement	LN FT	\$50.00	40	2000
4.2 Install, Rework, or Replace Methane Probe/s	N/A			
4.3 Monitor Well, or Methane Probe Plugging	N/A			
Subtotal				0

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
10% Contingency				200
Monitor Well Installation Total				2200

Calculation of Total Closure Costs

Engineering Total: 20,200

Construction Total: 101,000

Gas Collection Total: 2,200

Ground Water Total: 2,200

2% Contract Performance Bond: 2500

SUBTOTAL: 128,100

Legal Fees
(1.5% Of Subtotal): 1900

TOTAL CLOSURE COSTS: \$130,000

50% required in years 1-2
Remaining 50% accrued in
years 3-8

Phase I and II

Utah Division of Solid and Hazardous Waste
Solid Waste Program
8

Landfill Post-Closure Care Cost Estimate Worksheet

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
1.0	Engineering Costs			
1.1	Post-Closure Plan and Post-Closure permits			
1.2	Site Inspection and Record keeping (annual)	Each 400 ⁰⁰	30	12,000
1.3	Correctional Plans and Specifications (annual)	Each 2,000 ⁰⁰	3	6,000 ⁰⁰
1.4	Site Monitoring			
1.4.1	Ground Water Monitoring			
1.4.1a	Ground Water Sample Collection	Each 100	60	6,000
1.4.1b	Ground Water Sample Analysis	Each 400	60	24,000
1.4.1c	Ground Water Sample Analysis Review and Reporting	Each 100	60	6,000
1.4.2	Landfill Gas Monitoring			
1.4.2a	Gas Monitoring Data Collection	Each 70	120	8,400
1.4.2b	Gas Monitoring Data Review and Reporting	Each 30	120	3,600
2.0	Maintenance Costs			
2.1	Cover Maintenance Costs			
2.1.1	Soil Replacement	Each 300	0	0
2.1.2	Vegetation Reseeding	Each 100	6	600
2.2	Equipment Maintenance			
2.2.1	Ground Water well Maintenance and Replacement	Each 1500	2	3,000
2.2.2	Methane Probe Maintenance and Replacement	N/A		
2.2.3	Gas Collection System Operation	N/A		
2.2.4	Gas Collection System Maintenance and Repair	N/A		
2.2.5	Leachate Collection System			
2.2.5a	Leachate Collection System Repair and Maintenance	Each 200	15	3,000
2.2.5b	Clean Leachate Lines	N/A		

Item	Unit Measure	Cost/Unit	No. Units	Total Cost
3.0	Final Plugging of Monitoring Wells			
3.1	Final Plugging of Methane Probes	N/A		
3.2	Final Plugging of Ground Water Monitoring Wells	Each	4	4000
3.3	Gas Control Equipment Removal	N/A		
4.0	Leachate Disposal	See 2.2.5a		
5.0	Site Maintenance			
5.1	Repair of Surface Water Diversion Structures	N/A		
5.2	Repair of Fences and Gates	N/A		
5.3	General Maintenance	Each	30	3,000
6.0	Demonstration of stability	N/A		
Subtotal				79,600
10% Contingency				7,400
Post-Closure Care Total				87,000

Phase I + Phase II

Total Closure and Post-Closure Costs

Total Closure Costs: 150,000

Total Post-Closure Care Costs: 87,000

Total Cost: \$237,000

Phase I

Existing $620 \times 420 = 6$ Acres

New $600 \times 200 = 2.8$ Acres

COST ESTIMATE CALCULATION WORKSHEET

The following tables from Chapter 5 of the December 22, 2000 *Solid Waste Financial Assurance Program Report* may be used to calculate cost estimates for closure and post-closure.

Table 5.1 Site Data

FACILITY NAME:

PERMIT NUMBER:

DESCRIPTION	QUANTITY	UNITS
Total Permitted Area	40	acres
Active Portion		
Composite Lined	2.8	acres
Soil Lined	6.0	acres
Final Cover Area		
Composite Lined	0.5	acres
Soil Lined	6.0	acres
Perimeter Fencing	4600	linear feet
Groundwater Monitoring Wells	4	linear feet
Methane Gas Probes	0	linear feet
Terraces	0	linear feet
Letdown Channels	0	
Perimeter Drainage Ditches	2000	linear feet

Alternate Analysis for Phase I

Numbers check

5.2 Calculating Closure Costs

Table 5.2 can be used to calculate closure cost estimates for landfills for which site specific data are available. The table is designed to be executed as a computer spreadsheet, but will work equally as well using hand calculations.

The following procedures may be utilized to reach the estimated closure cost:

- Input site specific quantities from Table 5.1 into Table 5.2, making sure the requisite units are used. Some quantities are already given by the table.
- Multiply the value input for quantity by the multiplier and unit cost given by the table, and enter the resultant value in the subtotal column to compute values for Tasks/Services listed in Items 1 through 4.
- Add subtotals for Task/Service Items 1 through 4 to determine a Subtotal for Task/Services, and enter the sum as the value Item 5.
- Compute Administrative Services, Technical and Professional Services and Closure Contingency costs, Items 6, 7 and 8, by multiplying the Subtotal (Item 5) by the multiplier for each respective Item. Enter the resultant values.
- Compute the sum of Items 5,6,7,and 8 and enter the resultant as a value for Total Final Closure, Item 9. The value for Total Final Closure is the estimated Closure Cost for the facility for which data was entered.

Table 5.2 Closure Cost Estimate

FACILITY NAME:

FACILITY TYPE:

FACILITY LOCATION:

	Task/Service	Quantity	Units	Multiplier	Unit Cost	Subtotal
1	PRELIMINARY SITE WORK					
<input checked="" type="checkbox"/>	a Conduct Site Evaluation	1	lump sum	1	\$2,750.00	2750
<input type="checkbox"/>	b Dispose Final Wastes					
	Average Daily Flow	18	tons/day			
<input checked="" type="checkbox"/>	c Disposal Cost	50	\$/ton	5 days of waste		4500
<input checked="" type="checkbox"/>	d Remove Temporary Building(s)	0	lump sum	1	\$2,450.00	0
<input type="checkbox"/>	e Remove Equipment	0	lump sum	1	\$2,000.00	0,000.00
<input checked="" type="checkbox"/>	f Repair/Replace Perimeter Fencing	4600	linear feet	25% of fencing 5%	\$2.20	506 ⁰⁰
<input type="checkbox"/>	g Clean Leachate Line(s)	0	lump sum	1	\$1,250.00	0 \$1,250.00
2	MONITORING EQUIPMENT					
<input checked="" type="checkbox"/>	a Rework/Replace Monitoring Well(s)	320	VLF	25% of wells 10	\$41.40	1,324
<input type="checkbox"/>	b Plug Abandoned Monitoring Well(s)	0	VLF	25% of wells 0	\$17.75	0
<input type="checkbox"/>	c Rework/Replace Methane Probe(s)	0	VLF	25% of probes	\$35.75	0
<input type="checkbox"/>	d Plug Abandoned Methane Probe(s)	0	VLF	25% of probes	\$14.00	0
<input type="checkbox"/>	e Rework/Replace Remediation and/or Gas Control Equipment	5% of equipment capital cost	lump sum	1	\$0 ⁰⁰	0

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3	CONSTRUCTION					
✓ a	Complete Site Grading	6	acres	1	\$1,122.00	6732
b	Construct Final Cap					
	Compacted On-site Clay Cap or	0	cubic yards	1	\$3.20	0
	Compacted Off-site Clay Cap or	0	cubic yards	1	\$5.17	0
✓	Install Geosynthetic Clay Liner Cap	261,000	square feet	1	\$0.38	99,180
c	Construct Landfill Gas Venting Layer	0		0	0	0
	Place Sand or	0	acres	1	\$30,000.00	0
	Install Net and Geotextile	0	square feet	1	\$0.27	0
✓ d	Install Passive Landfill Gas Vents	3	acres	1	\$500.00	4,000
e	Install Flexible Membrane Liner		square feet	1	\$0.32	0
f	Drainage Layer				\$2.00	
✓	Place Sand or	10,000	yds	1	\$30,000.00	20,000
	Install Net and Geonet		square feet	1	\$0.27	0
✓ g	Place On-site Topsoil	5,000	cubic yards	1	\$1.50	7,500
	Place Off-site Topsoil		cubic yards	1	\$12.00	0
✓ h	Establish Vegetative Cover	6	acres	1	\$400.00	2400
4	DRAINAGE/EROSION CONTROL					
a	Construct Terraces	0	linear feet	1	\$7.24	0
b	Construct Letdown Channels	0	linear feet	1	\$5.55	0
c	Clean Perimeter Drainage Ditches	2000	linear feet	50% of ditches	\$4.70 \$1.00	1,000
5	SUBTOTAL					149,892
6	ADMINISTRATIVE SERVICES	1	lump sum	1	10%	15,000
7	TECHNICAL and PROFESSIONAL SERVICES	1	lump sum	1	12%	18,108
8	CLOSURE CONTINGENCY	1	lump sum	1	10%	15,000
9	TOTAL FINAL CLOSURE					198,000

APPENDIX C
LEACHATE TRENCH
CALCULATIONS

Leachate Trench Calculations

25 yr 24 hr Precipitation = 2.8"

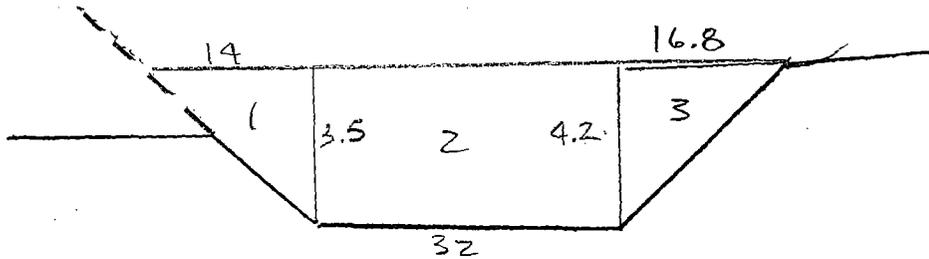
Lined Area 143,000 sq Ft

Max Volume $\frac{2.8}{12} (143,000) = 33,367 \text{ cu Ft.}$

25 yr Storm

Back to Back 25 yr Storm = $33,367 \times 2 = 66,734 \text{ FT}^3$

Trench Capacity



Area 1 $\frac{1}{2} 14(3.5) = 24.5$

Area 2 $32 \left(\frac{3.5+4.2}{2} \right) = 123.2$

Area 3 $\frac{1}{2} (16)(4.2) = 33.6$

Total $\underline{\hspace{10em}} 181.3 \text{ FT}^2$

$181.3 \text{ FT} (370 \text{ FT trench}) = 67081 > 66734 \text{ ok}$

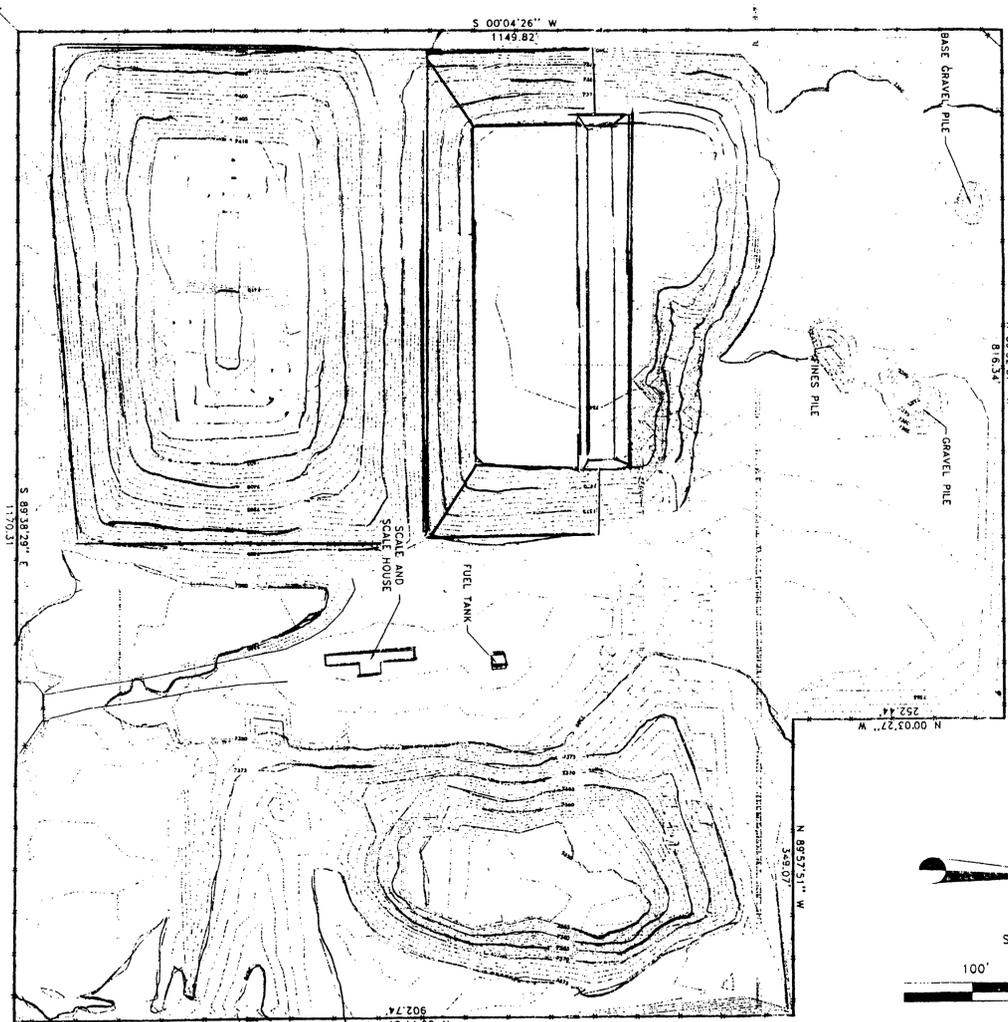
Lab analysis indicates protective cover holds 20% - 40% of 5" 10 mm storm. Safety factor is therefore 120% - 140%

Depth of 25 yr storm w/ 20% porosity

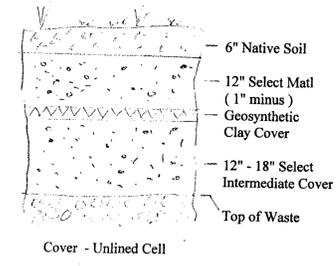
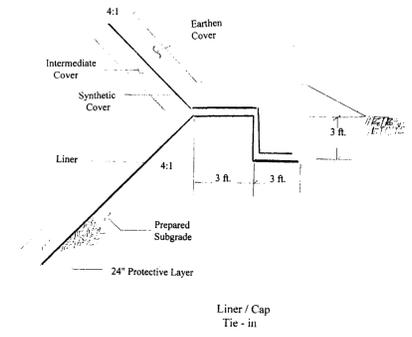
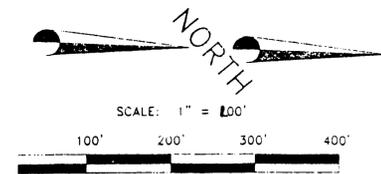
$$\left(\frac{1}{2} 4h^2 + 32(h) + \frac{1}{2} 4(h-0.64)^2 \right) 370 = 26,700$$

$h = 1.92$ Water depth varies 1.28' - 1.92'

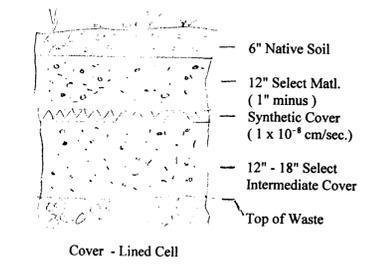
Johns Valley Landfill
 Section 36, Tsp. 34 S., Range 3W, SLB&M
 Garfield County, Utah
 October, 2007



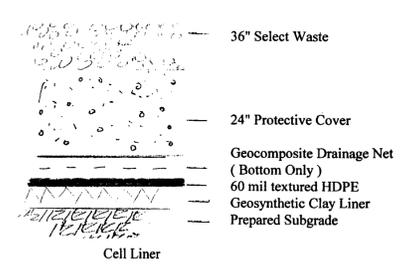
Plan



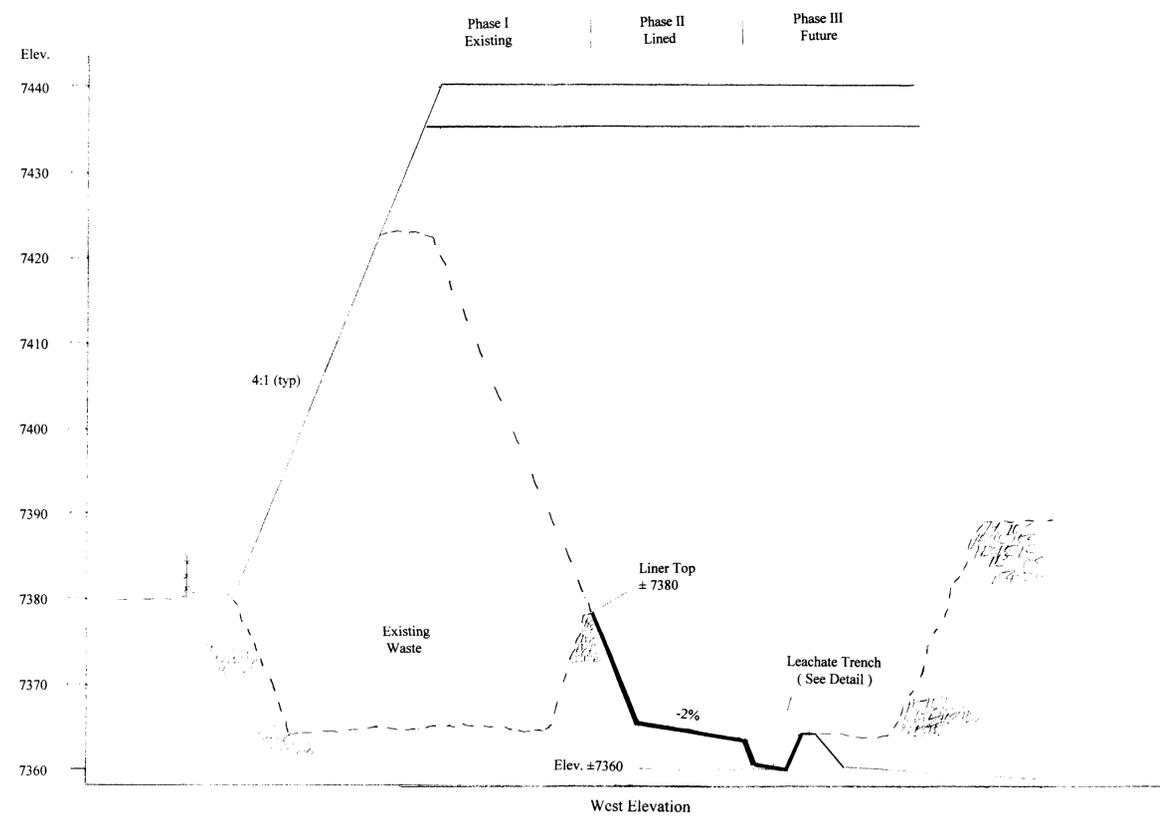
Cover - Unlined Cell



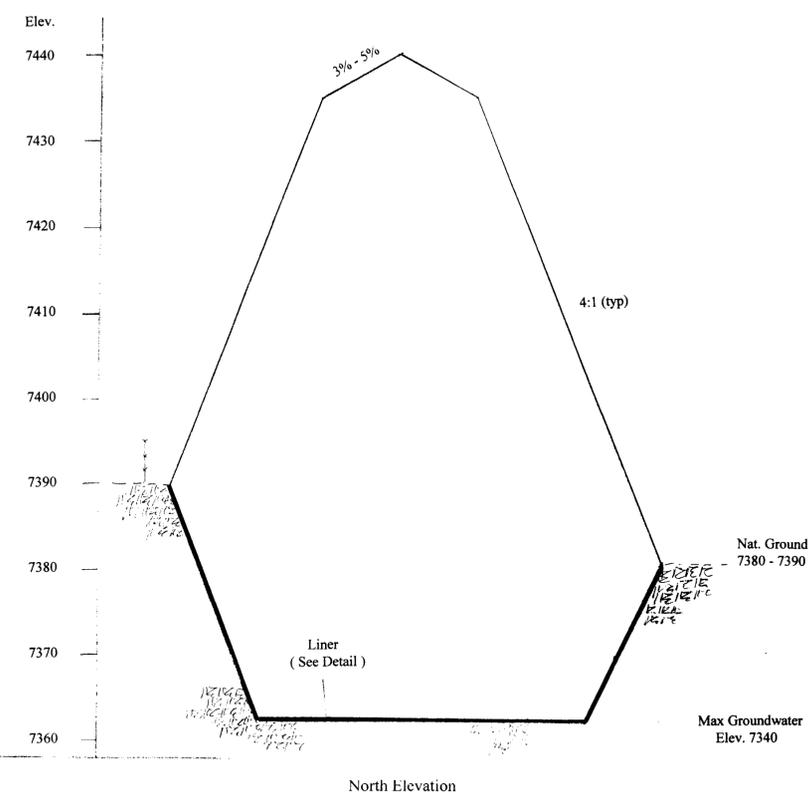
Cover - Lined Cell



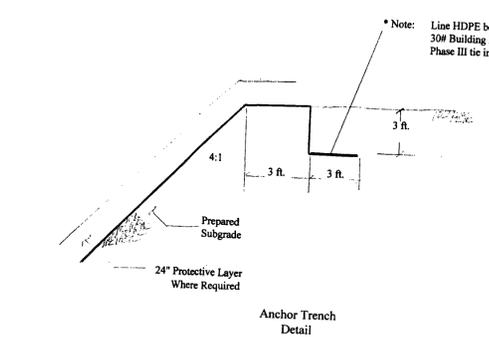
Cell Liner



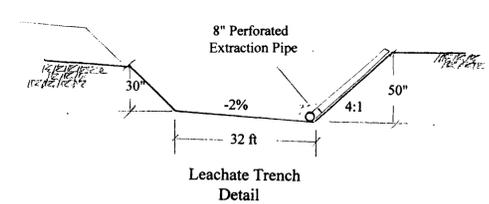
West Elevation



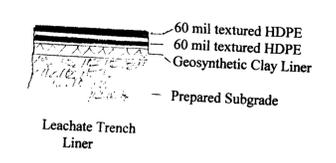
North Elevation



Anchor Trench Detail



Leachate Trench Detail



Leachate Trench Liner

* Note: Line HDPE both sides with 30# Building Paper for Future Phase III tie in on North Edge