APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Prepared for:

WASATCH INTEGRATED WASTE MANAGEMENT DISTRICT

Layton, Utah

Prepared by

IGES, INC.

4153 Commerce Drive

Salt Lake City, Utah 84107

December 5, 2005

ANNOTATED TABLE OF CONTENTS

Introduction

Includes summary of permit with technical and operational issues highlighted

Part I. General Data

Includes State of Utah Solid Waste Permit Application forms

Part II. General Report

Includes information required by Utah Administrative Rule R315-301 through R315-310

Part III. Technical and Engineering Report

Includes information required by Utah Administrative Rule R315-301 through R315-310

INTRODUCTION

This document presents an application to renew a permit to operate solid waste disposal facilities at the Davis Landfill, which is owned and operated by Wasatch Integrated Waste Management District (WIWMD). The Davis Landfill is currently operated under permit number 9419R1 issued by the Utah Solid and Hazardous Waste Control Board. This permit became effective on June 18, 2002 and expires at midnight on June 18, 2006.

In the three and a half years that have passed since the current permit was issued to the Davis Landfill, several changes to the site and operations have taken place. Changes in the location of landfill facilities and the resulting changes in landfill operations are reflected in this permit application. The following summarizes the current location of landfill activities at the Davis Landfill:

- Stage A of Final Cover – Phase I (the initial lined portion) of the Davis Landfill is to final design height over the eastern 2/3^{rds} of the footprint. This area will represent Stage A of the final landfill cover construction. Design of the final cover has started with construction anticipated in the summer of 2006.
- Current Disposal Area – Phase II, of the original landfill lined areas has been constructed and began accepting waste during August of 2002. Phase II is currently the area of the landfill that is accepting waste.
- Facility Relocation – the green waste recycling and compost operations have been relocated to accommodate the construction of other site support structures.
- Future Facility Changes – The maintenance shop, scale house, and scale facilities are being relocated to an area south of Phase II. In addition to the relocation of the shop and scale house (scales); WIWMD (Wasatch) is constructing a new citizen's drop-off facility Household Hazardous Waste (HHW) facility.
- Relocation of Wells – Monitor well (MW-5) will need to be relocated and the statistical water sampling performed. MW-5 will be relocated due west to a point near the property

line. MW-5 will be properly abandoned in accordance with the current water quality regulations.

This permit application contains conceptual level engineering sufficient for permitting purposes only. Detailed engineering documents (construction drawings, QA/QC plan, and specifications) for each of the remaining landfill related construction tasks; construction of Phase III liner, Phase IV liner, and all final landfill cover construction (Stage A, Stage B, and Stage C), will be engineered separately and submitted to the Division of Solid and Hazardous Waste (DSHW) for approval prior to construction. This permit application does not represent a lateral expansion to the Davis Landfill since it does not include lining over land that is outside of the property lines as defined in the original permit. It does, however, contain several changes in engineering and operational issues at the landfill. These changes include:

- Landfill Gas-to-Energy – Wasatch has constructed on-site facilities to ship landfill gas generated at the Davis Landfill to Hill Air Force base for beneficial use.
- Addition of Phase IV – a new perimeter access road which will run from the flare south along the exiting entrance and bends eastward toward the new support facilities allows for the addition of approximately 12 acres of lined landfill and provides for the construction of a perimeter stormwater ditch.
- Changes to Final Cover Geometry – the revised final cover represents slight modifications to the geometry of the final cover to accommodate the new perimeter road and the addition of Phase IV. The addition of the perimeter road (berm) along with changes in cover geometry will result in changes in stormwater and condensate management. The changes in the landfill geometry will result in changes in both available airspace and landfill life.
- Plan of Operation – The Plan of Operation has been revised to reflect the modifications to the operation practices. Some of the notable changes are:
  - Changes to site access and subsequent waste management routing will result in operational modifications.
  - Addition of the Citizen's Drop-Off facility will minimize noncommercial traffic at the working face of the landfill.

- Additions to the landfill gas collection system has changed operational procedures associated with landfill gas management.

The following items, which have been previously permitted and are part of the operating record of the landfill, will not be discussed in detail in this permit application:

- Alternate landfill liner system – an alternate liner consisting of 60mil High Density Polyethylene (HDPE) over a Geosynthetic Clay Liner (GCL) has been approved for use as an equivalent liner at the Davis Landfill. Phase III and Phase IV of the lined landfill cell will be constructed using the previously approved composite liner system.
- Leachate collection and removal system – the Phase I leachate collection and removal system has already been constructed. Phase I was designed for the total leachate flows associated with all lined landfill areas. The proposed Phase III and Phase IV will tie into the existing leachate collection system and will require minimal modifications to the existing leachate management plan.
- Leachate evaporation pond and leak detection system – due to the incremental size of the proposed Phase IV landfill cell and the current practice of leachate discharge to the sanitary sewer, the existing leachate evaporation and leak detection system will not need to be modified.
- Leachate disposal methods – in addition to evaporation, other leachate disposal methods have been previously approved for use at the Davis Landfill including surface application above lined areas of the landfill and discharge to a publicly owned treatment works. Phase III and Phase IV will use similar leachate disposal methods as required.

The application has been organized to follow the general outline of UAC R315-302 and R315-310. This organization results in some duplication and repetition of information, but it is intended to simplify the review and approval process. Part I of this document duplicates the standard form outlining general data pertaining to the site. Part II is a general report that includes a facility description, landfill operations plan, and closure and post-closure care plans. Part III is the Professional Engineering Report and includes details on the design and geohydrology of the site.

APPLICATION TO RENEW A PERMIT TO
OPERATE A CLASS I LANDFILL

Wasatch Integrated Waste Management District

PART I - GENERAL DATA

Part I General Information APPLICANT: PLEASE COMPLETE ALL SECTIONS.

Landfill Type		II. Application Type		
☒ Class I ☐ Class V		☐ New Application ☒ Renewal Application		☐ Facility Expansion ☐ Modification

For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number 9419R1

III. Facility Name and Location

Legal Name of Facility
Davis Landfill

Site Address (street or directions to site)				County
1997 East 3500 North				Davis
City Layton	State UT	Zip Code 84041	Telephone (801) 614-5600	
Township 4N	Range 1W	Section(s) 2,3,34,35	Quarter/Quarter Section	Quarter Section
Main Gate Latitude degrees 41	minutes 6	seconds 39	Longitude degrees 111	minutes 56 seconds 4

IV. Facility Owner(s) Information

Legal Name of Facility Owner
Wasatch Integrated Waste Management District

Address (mailing)
650 East Highway 193

City Layton	State UT	Zip Code 84041	Telephone (801) 614-5600

V. Facility Operator(s) Information

Legal Name of Facility Operator
Wasatch Integrated Waste Management District

Address (mailing)
650 East Highway 193

City Layton	State UT	Zip Code 84041	Telephone (801) 614-5600

VI. Property Owner(s) Information

Legal Name of Property Owner
Wasatch Integrated Waste Management District

Address (mailing)
650 East Highway 193

City Layton	State UT	Zip Code 84041	Telephone (801) 614-5600

VII. Contact Information

Owner Contact Mr. Nathan Rich, P.E.		Title Executive Director	
Address (mailing) 650 East Highway 193			
City Layton	State UT	Zip Code 84041	Telephone (801) 614-5600
Email Address nathanr@wiwmd.org		Alternative Telephone (cell or other)	(801) 726-5018
Operator Contact Mr. Nathan Rich, P.E.		Title Executive Director	
Address (mailing) 650 East Highway 193			
City Layton	State UT	Zip Code 84041	Telephone (801) 614-5600
Email Address nathanr@wiwmd.org		Alternative Telephone (cell or other)	(801) 726-5018
Property Owner Contact Mr. Nathan Rich, P.E.		Title Executive Director	
Address (mailing) 650 East Highway 193			
Layton	State UT	Zip Code 84041	Telephone (801) 614-5600
Email Address nathanr@wiwmd.org		Alternative Telephone (cell or other)	(801) 726-5018

Part I General Information (Continued)

VIII. Waste Types (check all that apply)

Waste Type	Combined Disposal Unit	Monofill Unit
☐ Municipal Waste	☒	☐
☒ Construction & Demolition	☒	☐
☒ Industrial	☒	☐
☒ Incinerator Ash	☒	☐
☒ Animals	☒	☐
☐ Asbestos	☐	☐
☐ PCB's (R315-315-7(3) only)	☐	☐
☐ Other _____	☐	☐

IX. Facility Area

Facility Area	225	acres
Disposal Area	60	acres
Design Capacity		
Years	22	
Cubic Yards	4,500,000	
Tons	3,555,000	

X. Fee and Application Documents

Indicate Documents Attached To This Application ☐ Application Fee: Amount $

☒ Facility Map or Maps ☒ Facility Legal Description ☒ Plan of Operation ☒ Waste Description
☒ Ground Water Report ☒ Closure Design ☒ Cost Estimates ☒ Financial Assurance

Class V Special Requirements

☐ Documents required by UCA 19-6-108(9) and (10)

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

Signature of Authorized Owner Representative	Title Executive Director	Date 12-7-2005
Nathan Rich Name typed or printed	Address 650 East Highway 193 Layton, Utah 84041	
Signature of Authorized Land Owner Representative (if applicable)	Title	Date
Name typed or printed	Address	
Signature of Authorized Operator Representative (if applicable)	Title	Date
Name typed or printed	Address	

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Wasatch Integrated Waste Management District

PART II - GENERAL REPORT

TABLE OF CONTENTS

SECTION 1 - FACILITY DESCRIPTION

Wasatch Integrated Waste Management District (Wasatch) formerly Wasatch Energy Systems (WES) owns and operates the Davis Landfill (located at 1997 East 3500 North in Layton, Utah) and the Davis Energy Recovery Facility (located at 650 East Highway 193 in Layton, Utah). The District operates an integrated solid waste management system which includes; recycling, composting, waste to energy (Davis Energy Recovery Facility) and landfill (Davis Landfill). District offices are located at 650 East Highway 193 in Layton, Utah.

Davis Landfill:

The Davis Landfill (Landfill) is a Class I Municipal Solid Waste (MSW) disposal facility used primarily for the disposal of MSW generated within the district and ash from the Davis Energy Recovery Facility (DERF). The landfill has been continually operated by Wasatch, WES, Davis County, or the North Davis Refuse Disposal Board (NDRD) since the late 1940s or early 1950s.

The Landfill is located in the northwest one-quarter of Section 2, the northeast one-quarter of Section 3, T 4 N, R 1 W, and in the southeast one-quarter of Section 34 and southwest one-quarter of the southwest one-quarter of Section 35, T 5 N, R 1 W, Salt Lake Base and Meridian (Drawing 1 – Appendix A). The landfill site consists of approximately 225 acres of land. Recent land sales and acquisitions to accommodate the development of neighboring properties and the establishment of a public park have reduced the total acreage associated with the landfill by approximately 5 acres from the last permit application.

The landfill site is situated on a terrace overlooking the Weber River valley. The bluff and terrace represent the eroded remains of a delta formed by the Weber River during the Lake Bonneville period. The Weber River has eroded through the ancient delta to form the current river valley. A higher terrace behind the bluff consists of interbedded clays and silts in a thick deposit of fine to medium-grained sand. Groundwater is found perched on continuous silt and clay layers at varying depths and a deep regional aquifer also exists at approximately 500 feet below ground surface.

There are two distinct landfill units located at the Landfill, the unlined landfill and the lined landfill. Waste placement in the area identified as the unlined landfill cell began sometime before 1952 and now fills much of a former canyon; however, the exact dates, physical limits, and methods of the early landfilling are undocumented. Active waste placement in the unlined landfill cell ceased in 1999 and final cover was placed over approximately 19 acres of the unlined landfill cell during the fall of 2000. The locations of the lined and unlined landfill units are as illustrated in the Drawings (Appendix A).

The lined landfill development is divided into Phases in order to describe separate construction events and to more easily describe the development of the lined landfill. Phase I of the lined landfill and associated facilities (leachate collection system and evaporation pond) were constructed in full compliance with RCRA subtitle D and State of Utah requirements for new facilities during 1998. Design details of approved and constructed facilities are part of the facility operating record and are not specifically included in this permit renewal application.

The landfill and support facilities are being modified to more efficiently accommodate the citizens and businesses within the district. The following changes to the operations at the landfill will be made by the spring of 2006:

- Relocation of the shop
- Relocation of the green waste processing area
- Relocation of the green waste composting area
- Relocation of the scale house
- Relocation of the landfill entrance
- Establishment of a Citizen Drop-Off facility
- Establishment of a Household Hazardous Waste (HHW) facility

Davis Energy Recovery Facility:

In 1984, Wasatch was formed to construct the DERF to process the solid wastes generated in most of Davis and all of Morgan Counties. The DERF consists of two incinerator hearths and appropriate appurtenant equipment. It was completed and first put into operation in 1986. Since

Wasatch was formed, the landfill has accepted a variety of non-hazardous wastes from residential, commercial, and industrial sources located within Wasatch's service boundaries or from neighboring communities. After construction of the energy recovery facility, the landfill also began accepting the non-hazardous combined residue (ash) from the incinerator. It has also accepted asbestos and Class IV wastes for separate disposal.

The DERF utilizes the energy (BTU's) contained in the MSW to generate steam. The steam generated from the MSW is sold to Hill Air Force Base for base operations. Approximately half of the MSW generated within the district are diverted to the (DERF) to extract energy while reducing the overall volume of the MSW needed to be managed at the Davis Landfill. The DERF is a separate operation from the Davis Landfill and is not addressed in this landfill permit application.

1.1 AREA SERVED

The service area for Wasatch includes all of Davis County, except for the City of Bountiful, and all of Morgan County. Wasatch's facilities currently serve approximately 227,000 people within the two counties.

In addition to waste from the district, waste from other Utah municipalities may be landfilled at the Davis Landfill in the future if the need arises. Regionalization of waste activities may cause the wastestreams from other counties to be combined. Wasatch also accepts lesser quantities of wastes from outside the district.

1.2 WASTE TYPES

1.2.1 Unlined Landfill

The unlined landfill cell has served parts of Davis County since the late 1940s or early 1950s. The exact date of first waste acceptance is not clear; however, a 1948 aerial photograph shows no development on the current site, while a 1952 aerial photograph shows end dumping of refuse into the upper end of the canyon dissecting the bluff. Based on the 1952 topographic survey, and the current topography of the site, IGES has estimated the volume of waste and soil disposed of in the unlined landfill cell at just over 3 million cubic yards.

Few records exist to assist Wasatch in determining the nature and quantities of wastes accepted at the landfill prior to the formation of the Wasatch in 1984. Therefore, the composition of the wastes disposed of in the existing landfill is unknown; it is assumed to consist of a combination of residential, agricultural, commercial, and industrial wastes.

1.2.2 Lined Landfill Cell

The landfill currently accepts approximately 117 tons per day of incinerator ash and approximately 404 tons per day of municipal solid waste with approximately 28 tons per day recycled. The waste disposed at the landfill consists primarily of: commercial front loaders and roll-off containers; wastes that are self-hauled to the landfill by private citizens and commercial facilities; waste loads that contain more than 60% unburnable materials; and wastes that bypass the DERF during planned or unplanned shutdown of either or both incinerator hearths. The quantities of solid wastes accepted into the system vary seasonally.

Hazardous wastes are not accepted at the DERF or at the landfill site. Wasatch has posted rules and requires that generators and transporters agree to the rules as a condition of use of the DERF and landfill facilities. Wasatch routinely inspects waste loads to confirm users' adherence to the rules and to detect unacceptable wastes. Fines and exclusions from this captive area landfill are penalties that can be imposed to ensure compliance. Wasatch further employs full-time spotters at tipping areas to catch and eliminate unacceptable wastes.

1.2 HOURS OF SITE OPERATION

The Davis Landfill is open to the general public and commercial haulers for solid waste disposal Monday through Saturday from 7:00 a.m. to 5:00 p.m. (7:00 p.m. in summer), year-round, excluding holidays. Wasatch controls public access to the landfill to prevent illegal dumping of wastes, public exposure to hazards, scavenging, and unauthorized traffic. Access control is a key element in preventing unauthorized scavenging or injury. Fences, locked gates, and natural barriers provide the basis of the site's access control system. During operating hours, District personnel monitor and control all access to facilities with at least two people on-site, one of which is at the active face.

1.3 LANDFILL EQUIPMENT

The following equipment is currently utilized at the Davis County Landfill:

- One (1) diesel generator, 30 hp (light tower)
- Two (2) diesel engine, 15 hp (air compressors)
- One (1) diesel engine, 5 hp (steam cleaner)
- One (1) diesel engine, 300 hp (tub grinder)
- Two (2) gasoline engine, 5 hp (water pumps)
- Three (3) diesel bulldozers
- Two (2) diesel compactors
- Three (3) diesel front-end loaders
- Two (2) diesel scrapers
- One (1) diesel grader
- One (1) diesel dump truck
- One (1) diesel roll-off truck
- One (1) diesel track hoe
- One (1) diesel water pull
- One (1) diesel compost windrow turner
- One (1) diesel trommel screen
- Landfill gas collections system – blowers, etc...
- Miscellaneous gasoline lightweight vehicles for transportation

The compactors are used to spread and compact solid waste disposed of at the landfill and for the placement of daily cover. The dozers are used to provide backup to the compactors and for general site work. Scrapers are used to excavate and haul daily and final cover materials as well as excavate material within proposed landfill expansion areas. The tub grinder, trommel, and compost turner are used to process yard wastes, wooden pallets, and other compostable wastes. The water pull is used for dust control and recycle/disposal of leachate. This equipment is sufficient for current operations and may be changed at any time to meet changing requirements of the District.

1.4 PERSONNEL

The following persons are responsible or available for on-site landfill operations for the Davis County Landfill:

- Landfill Manager – The Landfill Manager is responsible for all operations at the Landfill Facility. The Equipment Operator(s), and Spotter(s) report to the Landfill Manager, the Landfill Manager reports to the Executive Director of Wasatch. The Landfill Manager is a Solid Waste Association of North America (SWANA) certified manager of Landfill Operation with at least 5 years of landfill experience and/or equivalent professional experience.
- Equipment Operators – The Equipment Operator is responsible for daily operations at the working face of the landfill. Equipment Operators report directly to the Landfill Manager. There are typically four (4), and no less than two (2), Equipment Operators on duty at any given time.
- Mechanic – The Mechanic is responsible for routine maintenance of heavy equipment, landfill vehicles and auxiliary equipment located at the landfill. The Mechanic reports to the Landfill Manager. The Mechanic is on duty 8 hours per day, Monday through Friday.
- Spotter – The Spotters are responsible for inspecting incoming loads and those wastes disposed at the landfill working face to prohibit hazardous and other unacceptable materials from being unloaded. Spotters are also responsible for directing traffic and ensuring recyclable materials are placed in the proper location. The Spotters are trained in the identification of solid wastes and report to the Landfill Manager. There are typically two (2) Spotters on duty at any given time. Additional Spotters will be added as necessary to monitor the operations at the Citizen's Drop-Off facility.
- Scale House Attendants – The Scale House Attendants are responsible for screening incoming loads and collecting tipping fees at the landfill gate. The Attendants report directly to the Controller.

Temporary employees or contractors will report directly to the Landfill Manager, or his designee. These may include litter control, labor, operators, spotters, surveyors, and inspection.

SECTION 2 - LEGAL DESCRIPTION

Wasatch Integrated Waste Management District (Wasatch) officially changed its name, effective July 1, 2004 due to a state law, Utah Code Ann. 17A-1-204 (2001), requiring special districts to change their name (reference Utah Code Ann. 17-50-103, Use of "county" prohibited by January 1, 2005. The name of the District prior to this name change was *Davis County Solid Waste Management and Energy Recovery Special Service District dba Wasatch Energy Systems*. A resolution was passed at the June 2, 2004 board meeting by the administrative control board, authorizing the name change.

Wasatch was formed in 1984 by resolution of the County Commissioners (Resolution 84-200). This resolution designated Wasatch as responsible for managing the wastes generated in Wasatch's district. The North Davis Refuse Disposal board (NDRD) was formed in the 1950s to formalize the ownership and operation of the Landfill. Through a Tri-party Agreement in 1987, the North Area Refuse District (NARD) was established by Layton, Clearfield, and Wasatch. In that agreement, NARD transferred operational responsibility for the Davis Landfill to Wasatch. The members of NARD retained ownership of the property, with Layton holding an undivided 40.5% interest, Clearfield holding an undivided 15.8% interest, and Wasatch holding an undivided 43.7% interest. The Tri-party Agreement was rescinded in late 1995 and Wasatch currently holds an undivided 100% interest.

A copy of the legal description is included in Appendix B and location and general arrangement of the Davis Landfill is included in the Drawings included as Appendix A. Wasatch has the exclusive right to operate a landfill on the property.

SECTION 3 - OPERATIONS PLAN

On October 9, 1991, the U.S. Environmental Protection Agency (EPA) announced revisions to the Criteria for Classification of Solid Waste Disposal Facilities. These revisions were developed in response to Subtitle D of the 1984 Hazardous Waste Amendments to the Resource Conservation and Recovery Act (RCRA). The Subtitle D regulations set forth revised minimum federal criteria for municipal solid waste landfills (MSWLFs), including facility design and operating criteria. The Subtitle D regulations set forth differing requirements for existing and new units (e.g., existing units are not required to remove wastes in order to install liners).

Subtitle D established a framework for federal, state, and local government cooperation in controlling the management of non-hazardous solid waste. The federal role in this arrangement is to establish the regulatory direction by providing minimum nationwide standards for protection of human health and the environment and by providing technical assistance to States for planning and developing their own environmentally sound waste management practices. However, the actual planning, direct implementation, and enforcement of solid waste programs under Subtitle D remains largely a state and local function.

On November 5, 1995, the State of Utah Department of Environmental Quality (UDEQ) issued final Administrative Rules entitled Solid Waste Permitting and Management Rules (R315-301 through 320) implementing Subtitle D at the state level. UDEQ has received authorization from EPA to implement and enforce the solid waste program.

Wasatch has prepared this Landfill Operations Plan to guide the daily operations at the Davis Landfill. This document provides substantial discussion of operations at the landfill based on the operating criteria outlined in 40 CFR 258, Subpart C, and State of Utah Administrative Rules R315-301 through 310.

Portions of this Operations Plan are subdivided into separate discussions of the unlined landfill cell and the lined landfill cell. Since the unlined landfill accepted waste after October 9, 1993,

its closure and post-closure care must follow more stringent state and federal regulations than those facilities which were closed prior to October 9, 1993. Subtitle D regulations apply fully to the lined landfill cell. Where separate discussions are made, the regulations differ regarding the required design, operation, or closure between the unlined and lined facilities.

3.1 SCHEDULE OF CONSTRUCTION

All construction activities at the Davis Landfill will be made in general accordance with the concepts presented in the drawings that are included as Appendix A. The construction activities associated with the Davis Landfill are divided into liner Phases (the construction of bottom liner) and closure Stages (construction of final cover). The drawings show the conceptual configuration of the liner Phases as well as the closure Stages; detailed design for each of the remaining Phases and all of the closure Stages will be completed (and submitted to the DSHW for review) prior to each planned construction event.

The proposed configuration was developed based on geologic/hydrogeologic conditions, geotechnical considerations, environmental assessment data, and landfill operations. The landfill liner construction has been divided into four distinct phases. Phase I of the liner construction, including leachate and stormwater controls for the entire site, was completed in 1998. Phase II of the liner construction was completed in 2002. Each of the remaining landfill phases will be designed and constructed when the previous operational phase is nearing its intermediate or final design capacity. Phase III will be constructed as required to meet the near term disposal needs of Wasatch and is anticipated to occur in the summer of 2006. Phase IV is the final phase for the development of the Davis Landfill and is scheduled for the summer of 2009.

The remaining capacity (airspace) located under the area of the landfill identified by the final cover of Stage B plus the estimated capacity (airspace) defined by the Stage C final cover construction have airspace for approximately 23 years of disposal based on available fill volume, expected daily waste disposal rates, and an in-place density of 1,400 pounds per cubic yard (ppcy) of unburned waste and 3,000 ppcy of ash. Drawing 9 (Appendix A) details the waste, soil, and ash parameters along with consumption of airspace from the existing landfill surfaces.

Soil excavated from the Phase III area of the lined landfill cell will be utilized to construct a soil berm to the west of Phase III forming the foundation for portions of Phase IV. Surplus soil from the Phase III excavation will be utilized as daily cover or stockpiled for use as final cover.

3.2 DESCRIPTION OF HANDLING PROCEDURES

3.2.1 General

A waste control program designed to detect and deter attempts to dispose of hazardous and other unacceptable wastes will continue to be implemented at the Davis Landfill. The program is designed to protect the health and safety of employees, customers, and the general public, as well as to protect against contamination of the environment.

The landfill is open for public and private disposal. Signs posted near the landfill entrance clearly indicate (1) the types of wastes that are accepted; (2) the types of wastes not accepted at the site; and (3) the penalty for illegal disposal. As the new entrance becomes operational; all signage will be relocated.

All vehicles delivering wastes to the site must stop at the scale house. Commercial waste haulers are required to comply with the rules established by Wasatch and can lose the right to use the facilities if they violate these rules. Scale house personnel will inquire as to the contents of each incoming load to screen for unacceptable materials. Any vehicle suspected of carrying unacceptable materials (liquid waste, sludges, or hazardous waste) will be prevented from entering the disposal site unless the driver can provide evidence that the waste is acceptable for disposal at the site. Wasatch reserves the right to refuse service to any suspect load. Vehicles carrying unacceptable materials will be required to exit the site without discharging their loads. If a load is suspected of containing unacceptable materials, the following information will be recorded: date, time, name of the hauler, license plate, and source of waste. The scale house will then notify the tipping area attendants by radio that a load is suspect and that load will be further inspected at the landfill tipping area before final disposal is allowed.

After a vehicle leaves the scale house, the vehicle will be routed to the appropriate discharge location by site personnel. Loads will be regularly surveyed at the tipping area. If a discharged load contains inappropriate or unacceptable material, the discharger will be required to reload the material and remove it from the landfill site. If the discharger is not immediately identified, the area where the unacceptable material was discharged will be cordoned off if necessary. The unacceptable material will be moved to a designated area for identification and preparation for proper disposal. Section 3.10 discusses inspections of waste loads.

3.2.2 Sequence of Development

The following paragraphs describe the filling sequence for the lined landfill phases of the Davis Landfill. This sequencing will result in the planned placement of wastes to maximize the stability of the fill and protect the liner material at all times during the operation of the landfill. The Landfill Manager should not deviate substantially from the sequencing plan without concurrence of the Design Engineer.

The lined landfill will be constructed in four phases as shown on the Drawings in Appendix A. The constructed base of the entire lined landfill cell is sloped toward the leachate collection sump (the lowest point in the landfill). Leachate collection pipes (LCPs) are located at various spacing along the liner to assist transport of leachate to the leachate collection sump. Leachate is then pumped from the sump to the leachate evaporation pond for storage and disposal.

The unlined landfill cell was constructed without a liner or leachate collection system. Final cover has been placed on all slopes of the unlined landfill cell except the southern slope which will tie into Phase III and IV of the lined landfill. Waste added over the unlined landfills historical footprint, where it will tie in with Phase III of the lined landfill cell, will not be underlain by a liner.

3.2.2.1 Protective Soil Layer/Select MSW Placement

Following the installation of the liner components and leachate collection pipes for each liner construction Phase; a 2-foot-thick layer of protective soil is placed over the leachate collection system and liner components. The protective soil layer extends over the entire liner bottom and up

the side slopes. The first solid waste and ash placed in a newly constructed landfill phase will be placed in a layer approximately 3 feet thick. The 3-foot-thick select MSW layer will be constructed incrementally. The select MSW layer will consist of MSW with all large objects and objects with the potential to penetrate the protective soil layer removed. The select MSW layer and ash will be compacted as a single lift, with no intermediate compaction to provide a 5-foot-thick protective working surface over the liner and leachate collection systems.

Since the application of select waste over the 2-foot-thick layer of protective soil on the side slopes will take place incrementally as the level of MSW within the cell raises, specific measures will need to be followed to minimize the potential of liner damage. The following procedure will be followed to ensure protection of the liner over the side slopes:

- All Spotters and Equipment Operators involved with the placement of select MSW will have annual training delineating the screening and placement of the select MSW. The annual training documentation will identify the person receiving the training, date of training, and the name of the person providing the training. All training documents will be included in the operation record.
- General MSW will be placed in the new Phase only after the placement of the protective soil has been completed.
- As the waste is placed, landfill Equipment Operator will spread the MSW in a layer of approximately 1'-2' thick. The Equipment Operator will perform the initial screening of the MSW as he/she spreads the MSW into the 1'-2' thick layer.
- A dedicated Spotter will perform the second screening of the MSW for objects capable of causing damage to the liner by penetrating the protective soil layer. All materials with the potential of damaging the liner through the two (2) foot thick soil layer will be removed from the MSW.
- Once the MSW has been screened by the Spotter and deemed adequate for use as the select MSW layer, the Landfill Manager will be notified.
- The Equipment Operator will screen the MSW another time as he/she places the select MSW layer over the two (2) foot thick protective soil layer.

- The Landfill Manager will periodically observe the placement of the select MSW layer on the side slopes as a final screening of the select MSW.

3.2.2.2 Development of Phase I

Construction

Phase I was constructed during the spring and summer of 1998 and began accepting waste in August of 1998.

Waste Placement

Phase I was filled beginning at the east and working towards the west where possible. In general, filling from the east to the west resulted in the working face being sloped toward the west where it is less visible to the residences located to the east of the landfill property. Waste was placed in 10 to 20 foot thick lifts depending upon the volume being handled at the facility. Each lift was completed across the entire lined area of Phase I with an operational setback being established where Phase I liner would tie into the Phase II liner. At no time was waste placed within the Phase I at a slope exceeding 3H:1V.

The design and construction of the Phase II liner was completed far enough in advance to ensure that Phase II was fully operational prior to the Stage A closure elevations.

3.2.2.3 Development of Phase II

Construction

The Phase II liner construction was completed in the summer of 2002. Soil from the Phase II excavation was stockpiled in a temporary soil stockpile (North Soil Stockpile) located on the south slope of the unlined landfill cell within the Stage C closure area. The stockpiled soil, approximately 350,000 cubic yards, has been used for daily and intermediate cover during operations in Phase I and Phase II landfilling.

Phase II liner and leachate collection systems were constructed in accordance with detailed construction drawings and specifications submitted to the DSHW. The leachate collection

system installed in Phase II was connected to the leachate collection system of Phase I; which drains leachate to the leachate collection sump, installed within Phase I of the lined landfill.

Waste Placement

Phase II was filled in the same general fashion as Phase I. Filling began at the west end and proceeded down slope until waste tied into waste already placed in Phase I. In general, each lift was placed substantially across the bottom of the entire Phase II area before the next lift was started. At no time was waste placed within the landfill at a slope exceeding 3H:1V.

The construction of Phase III will commence at some point during filling of the Phase II area. The date of construction will be enough in advance to ensure that Phase III is fully operational prior to completion of the Stage B final cover.

3.2.2.4 Development of Phase III

The Phase III area will be excavated during filling within Phase I and II areas. Soil from the Phase III area will be stockpiled in a temporary soil stockpile or be used for daily and intermediate cover during operations in Phase I and Phase II landfilling.

Phase III liner and leachate collection systems will be constructed in accordance with detailed construction drawings and specifications which will be finalized and submitted to the DSHW for review and approval before construction begins. The leachate collection system installed in Phase III will report to the leachate collection sump, installed within Phase I of the landfill.

The Phase III liner will be constructed to connect the Phase II lined area to the base of the unlined landfill cell. Waste in Phase III will essentially tie the lined landfill into the unlined landfill. A portion of the waste placed in Phase III will actually be placed within the boundary of the unlined landfill cell, and will not be placed on top of a subtitle D liner system. All leachate generated from the Phase III lined area will report to the leachate collection sump, installed within Phase I of the landfill.

Phase III will be constructed and filled in the same general fashion described above. At no time should slopes within the landfill exceed 3H:1V.

3.2.2.5 Development of Phase IV

The Phase IV liner area will be the final liner constructed at the Davis Landfill. The Phase IV area will require no excavation of soils; only the placement of fill and some regrading of existing soil surfaces. Soil required to complete the Phase IV area will come from the excavation of Phase III or from on-site soil stockpiles.

Phase IV liner and leachate collection systems will be constructed in accordance with detailed construction drawings and specifications which will be finalized and submitted to the DSHW for review and approval before construction begins. The leachate collection system installed in Phase IV will report to the leachate collection sump, installed within Phase I of the landfill.

The Phase IV liner will be constructed to connect to the south and western edges of the Phase III lined area and terminate at the northern most extent; into the unlined landfill. All leachate generated from the Phase IV lined area will report to the leachate collection sump, installed within Phase I of the landfill.

Phase IV will be constructed and filled in the same general fashion described above. At no time should slopes within the landfill exceed 3H:1V.

3.2.3 Infectious Wastes

The Davis Landfill will occasionally accept infectious waste. The following procedures will be in effect to minimize the potential human contact with the infectious waste:

- Upon entering the landfill, the transporter of infectious waste shall notify the landfill operator that the load contains infectious waste.
- The infectious waste containers will be placed at the bottom of the working face with sufficient care to avoid breaking them.

- The infectious waste will be immediately and completely covered with a minimum of 12 inches of soil or MSW that contains no infectious waste.
- The infectious waste will not be compacted until the 12 inches of soil or MSW containing no infectious waste is in place.

The Davis Landfill will maintain on file an Infectious Waste Management Plan as required by Section R315-316 of the Rules.

3.3 LIQUIDS RESTRICTIONS

3.3.1 Bulk or Containerized Liquid Waste

Bulk or containerized liquid waste will not be disposed of in the Davis Landfill unless it is household waste (other than septic waste) or landfill gas condensate derived from the Davis Landfill. Liquids restrictions are necessary because the disposal of liquids into landfills can be a significant source of leachate generation. By restricting the introduction of free liquids into the landfill, Wasatch can minimize the leachate generation potential of the landfill. This should reduce the quantity of free liquids to be managed in the landfill. The ban on containerized free liquids will also reduce the problem of subsidence and possible damage to the final cover upon deterioration of the waste containers. Leachate may be placed onto the lined landfill from the evaporation pond as a dust suppression technique or when the capacity of the pond needs to be temporarily increased.

3.3.2 Household Waste

Restricting certain small volume liquids is impractical and unnecessary to protect human health and the environment. For example, small amounts of liquid will be present in household wastes when disposed of and is difficult to effectively identify, separate, and restrict from disposal. The regulations allow disposal of products normally and reasonably associated with households or household activities that are in household containers (5 gallons or less).

3.3.3 Leachate or MSWLF Gas Condensate

Leachate and gas condensate collected as part of the gas recovery operations at the Davis Landfill may be re-introduced on the surface of the lined landfill as a dust suppression technique or when the capacity of the Leachate Evaporation Pond needs to be temporarily increased. Since the installation of the double lined leachate disposal line from the Leachate Evaporation Pond to the POTW; the need for surface application of the leachate is minimal.

The historic operational experience of the leachate system over the past several years indicates that the leachate evaporation pond has more than adequate capacity to store leachate produced by the landfill during the winter months. It does not, however, have sufficient surface area to dispose the leachate through free surface evaporation alone. The historic practice of applying the leachate to the surface of the lined landfill cell during the high evaporation months of June, July and August has been a very effective disposal method. While this method has worked well, Wasatch installed a double lined leachate disposal line extending from the Leachate Evaporation Pond to the city of South Weber and ultimately to the Central Weber Sewer Improvement District for disposal.

3.3.3.1 Leachate Handling Procedures

The need for Equipment Operators or other landfill personnel to handle leachate is minimal. Leachate drains from the lined landfill to the leachate collection sump located in Phase I. The leachate is then pneumatically pumped from the sump to the Leachate Evaporation Pond. The leachate is then either evaporated or pumped into the leachate disposal line that takes the leachate to the Central Weber Sewer Improvement District.

Due to unforeseen upset conditions, leachate may need to be removed from the Leachate Evaporation Pond and applied to the landfill surfaces within the lined landfill or hauled off site for disposal. If the need arises, leachate will be removed as directed by the Landfill Manager. Leachate shall be applied only to lined portions of the landfill. Once leachate is loaded into the water pull, the entire load of leachate will be discharge onto the MSW located within the lined

landfill. The number of full loads of leachate will be reported to the Landfill Manager for volume documentation.

3.3.4 Containers Holding Liquid Waste

Containers holding liquid waste will not be disposed of in the Davis Landfill unless the container is similar in size to that normally found in household waste; the container is designed to hold liquids for use other than storage; or the waste is household waste (other than septic waste).

3.4 MONITORING AND INSPECTION SCHEDULE

3.4.1 Groundwater

Wasatch will continue to monitor groundwater in conformance with Ground Water Quality Standards of the State of Utah Department of Environmental Quality, Division of Solid and Hazardous Waste, Administrative Rules, Section R315-308. Groundwater sampling, analysis and statistical evaluation are done in strict accordance with the approved Groundwater Monitoring Plan (Bingham, 1997). Currently, the groundwater monitor well network for the lined landfill is in detection monitoring and is sampled on a semi-annual basis. The groundwater monitor well network for the unlined landfill cell is currently in assessment monitoring and is sampled quarterly.

3.4.2 Surface Water

Drainage control problems can result in accelerated erosion of a particular area within the landfill. Differential settlement of drainage control structures can limit their usefulness and may result in a failure to properly direct storm water off-site. The attached Davis Landfill Drawings (Appendix A) illustrate the location of the surface water drainage control system designed to incorporate both existing topographical features as well as changes to the overall site layout. District staff will inspect the drainage system monthly. Temporary repairs will be made to observed deficiencies until permanent repairs can be scheduled. Wasatch or a licensed general contractor will repair drainage facilities as required.

3.4.3 Leachate Collection

The leachate collection and recovery system (LCRS), installed in the lined landfill, must be maintained so that it operates during the post-closure maintenance period. Since the LCRS system is installed under the waste; quarterly inspection of individual system components is not possible. The operation of the system will be observed no less than quarterly by Wasatch staff for signs of deterioration. Wasatch or a licensed contractor will make required repairs as required. Cleanouts have been provided to aid Wasatch in maintaining continuous flow. The location and distance to cleanout ports have been designed to facilitate inspection and cleaning operations.

3.4.4 Landfill Gas

The landfill gas collection system will be inspected quarterly according to those specifications and parameters listed in Utah Administrative Rules R315-303-2, Standards for Performance. The system will be repaired and parts replaced as required to maintain system capabilities. The program described in Part II, Section 5.2.1.4 for inspecting and maintaining the gas monitoring system will be followed throughout the post-closure maintenance period.

3.4.5 Landfill Leachate Evaporation System

The Leachate Evaporation Pond is constructed using a triple liner system. The uppermost (primary) liner consists of 60 mil HDPE membrane underlain by a plastic drainage net and a secondary 60 mil HDPE liner to form a leak collection and removal system which breaks the hydraulic head on the lower liners (secondary and tertiary). Below the secondary liner is another drainage net overlying the tertiary liner which consists of 60 mil HDPE membrane in direct contact with a geosynthetic clay liner (GCL). This layer acts as a leak detection system to prevent leachate release to the environment from the leachate evaporation pond. Both the leak collection and removal system and the leak detection system drain to a collection sump which is monitored for the presence of liquid. Leakage through the primary liner reports to the leak collection and removal system sump where it is collected and pumped back into the leachate evaporation pond. Leachate returned to the leachate evaporation pond through the leak collection and removal system may not exceed 200 gallons per acre per day. Any leakage that may occur through the secondary liner will show up in the leak detection system.

During the operational life of the system no leachate has been detected in either the leak collection and removal sump or the leak detection sump.

The Leak Detection and Collection systems are monitored by an electronic system which provides continuous monitoring for the presence of fluids in both the leak collection and leak detection sumps. In the event that liquid is detected in either sump, Wasatch shall keep a weekly record of the volume of fluids removed from either sump. Monthly testing will take place on the function of the electronic detection system and results of each test will be kept in the operating record. Monitoring reports of the following activities will be submitted to the Executive Secretary of the Solid and Hazardous Waste Control Board on an annual basis with the annual report:

- Weekly measurements of the volume of fluids removed from the leak collection and removal sump.
- Dates of testing for all electronic leak detection equipment and results.
- These reports shall be submitted to the Executive Secretary with the annual report.

If any fluids are detected in the leak detection sump, or if the leakage in the leak collection and removal system exceeds 200 gal/acre/day, then the Division of Solid and Hazardous Waste shall be notified within 24 hours or the next business day and in writing within five working days. Within 30 days of discovery of fluid in excess of the above-described limits, a report to the Executive Secretary of the Solid and Hazardous Waste Board shall be submitted with the following information:

- A description of the source of the fluid in the sump
- The period that the fluid was entering the sump including dates and times
- A description of corrective measures taken
- If the leakage has not been corrected, the anticipated time it is expected to continue; and the steps already taken and plans to reduce, eliminate and prevent recurrence of the leakage.

A follow-up evaluation shall be performed to determine whether leachate or other contaminants have been released to the environment.

If monitoring or testing indicates that the permit conditions may be or are being violated, corrections shall be made to the system in accordance with UAC R 315 – Utah Solid Waste Permitting and Management Rules. In the event such a release occurs, all feasible action shall be taken to halt or mitigate any immediate risk to the environment or public health which may, but not necessarily, include:

- Eliminating the source of contamination.
- Immediate cleanup or containment of the surface contaminants.
- Erecting barriers to public access.
- Placing warning signs.

The Division of Solid and Hazardous Waste shall be notified within 24 hours or the next business day in the event of any contaminant release. Within 30 days of occurrence of such a release, written notice shall be submitted to the Executive Secretary of the Solid and Hazardous Waste Control Board describing the nature and extent of the release and the corrective action measures taken.

3.4.6 Inspection Documentation

The results of all routine inspections of site facilities will be recorded on inspection forms. The inspection forms will be submitted to the Landfill Manager for inclusion in the landfill operating records as required in Section R315-302-2(5) of the Rules. The forms utilized in the documentation of the landfill operations are included in Appendix C.

3.5 CORRECTIVE ACTION PLAN – GROUNDWATER

3.5.1 Assessment Monitoring Program

An assessment monitoring program (AMP) will be required whenever a statistically significant contaminant concentration, with respect to background levels has been detected for one or more of the constituents listed in R315-308-4 that has an associated groundwater protection standard during detection monitoring. If Wasatch determines that there has been a statistically significant increase in a contaminant concentration with respect to background, Wasatch will:

- Notify UDEQ Division of Solid and Hazardous Waste, in writing, within 14 days of obtaining laboratory results at:

  UDEQ - Division of Solid and Hazardous Waste
  288 North 1460 West
  Salt Lake City, Utah 84114-4880

- Identify the parameters that have shown statistically significant changes. This information will be included in the notification.
- Enter sampling analysis results into the operating record.
- Immediately re-sample the groundwater in all wells, or a subset of the wells as specified by the Executive Secretary, for all constituents listed in R315-308 and determine whether a statistically significant change has occurred such that the groundwater protection level has been exceeded. If a statistically significant change has occurred, Wasatch will report the sample analysis results, in writing, within 7 days of their receipt to the above-noted address.

Wasatch may demonstrate that a source other than the solid waste disposal facility caused the contamination according to R315-308. A demonstration report must be prepared by a qualified groundwater scientist and be approved by the Executive Secretary. If approved, Wasatch may continue to monitor according to the approved groundwater monitoring plan.

If, after 90 days, a demonstration has not been made that a source other than the facility caused the contamination, Wasatch will initiate the following:

- Take one sample from each downgradient well and analyze for all constituents listed in Appendix II in 40 CFR Part 258, 1991 edition.
- For any constituent from Appendix II, 40 CFR Part 258, detected in the downgradient wells, eight samples from the upgradient wells and four samples from the downgradient wells must be collected and analyzed to determine background levels.
- Within 14 days of receipt of the results, place a notice in the operating record and notify the Executive Secretary, in writing, of the detected constituents, their concentrations, and their background concentrations, at the address given above. The Executive Secretary will establish groundwater quality protection standards.
- Wasatch will then re-sample all wells on a quarterly basis for the constituents listed in R315-308 and the detected constituents from Appendix II of 40 CFR Part 258.
- Wasatch will also sample all downgradient wells on an annual basis for all Part 258 Appendix II constituents.

If, after two consecutive sampling events, the concentrations of all constituents are shown to be at or below established background levels, Wasatch must notify the Executive Secretary, in writing, within 14 days. After which, upon approval by the Executive Secretary, Wasatch may return to assessment monitoring under the approved groundwater monitoring plan.

If one or more of the constituents from R315-308-4 or Appendix II are detected at statistically significant levels above the groundwater protection standard in any sampling event, Wasatch must:

- Within 14 days of this finding, notify the Executive Secretary, the appropriate local governing agencies, and the local health department that groundwater quality standards have been exceeded
- Place a notice in the operating record identifying the constituents that have exceeded the groundwater protection standard and their concentrations
- Characterize the nature and extent of the release by installing additional monitoring wells, as necessary

- Install at least one well on the downgradient property line and sample and analyze for constituents in R315-308 and the detected constituents from Appendix II
- Notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination

If Wasatch can demonstrate that a source other than the solid waste disposal facility caused the contamination or that the statistically significant change resulted from error in sampling, analysis, statistical evaluation or groundwater quality, they may continue monitoring as specified in R315-308. To demonstrate this, Wasatch must prepare a report that is certified by a qualified groundwater scientist, must enter the report into the operating record, and must obtain approval of the report from the Executive Secretary.

3.5.2 Corrective Action Program

If a successful demonstration according to R315-308 has not been made within 90 days, indicating that a source other than the solid waste disposal facility may be the cause of contamination, a Corrective Action Program (CAP) (R315-308-3) will be required. The CAP requires Wasatch to:

- Continue to monitor as required in R315-308
- Take any interim measures as required by the Executive Secretary to protect human health and the environment
- Prepare a Corrective Action Plan to assess the current conditions and circumstances of the solid waste disposal facilities
- Select a remedial action based on the Corrective Action Plan and public comments
- Continue remedial action until Wasatch notifies the Executive Secretary, in writing, that the contaminant concentrations have been reduced to levels below the established background concentrations for a period of 3 years or an approved alternative length of time. Wasatch and a qualified groundwater scientist must sign and certify the report demonstrating the successful completion of remedial action. Upon Executive Secretary approval, Wasatch will terminate corrective action measures and continue to monitor according to R315-308

The Corrective Action Plan will address the following specific items at a minimum:

- Description of selected remedy
- Time required to begin and complete the remedy
- Cost of remedial action
- Public health and environmental requirements that may affect the implementation of the remedy
- Comments from a public meeting held to discuss the corrective action
- Performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control exposure to any residual contamination

The Corrective Action Plan will be submitted within 14 days after the selection of a final remedy. Wasatch must:

- Amend the Corrective Action Plan, as necessary, and submit a report to the Executive Secretary for approval describing the remedy and providing a schedule for implementation
- Put into place the financial assurance mechanisms as required by R315-309

In selecting a remedy, the owner or operator must consider:

- Nature and extent of contamination.
- Resource value of the groundwater.
- Long-term and short-term effectiveness and protectiveness of the remedy.
- Effectiveness of the remedy in controlling the source to reduce or eliminate further releases.
- Ease or difficulty of implementation.
- Practicable capability of owner or operator including technical or economic capability.

- Degree to which community concerns are addressed.
- Any other relevant factors.

All possible remedies will be evaluated including the no-action alternatives. Evaluation of the technical and economic items listed above will be demonstrated to the satisfaction of the Executive Secretary.

3.6 CONTINGENCY PLANS

Contingency operations will be implemented should specific or unusual situations occur. The following subsections discuss such contingencies as fire, explosion, release of explosive gases, and failure of run-off containment. The Landfill Manager has a cellular phone which will serve as the on-site mobile communications system for use in an emergency to communicate with the management offices and off-site personnel. Additional available communication is the telephone located in the scale house, which will serve as the back-up communication system.

3.6.1 Fire

3.6.1.1 Open Burning

Open burning of solid waste is prohibited. EPA Subtitle D, Subpart C requires that the Davis Landfill not violate applicable requirements of State Implementation Plans (SIPs) under Section 110 of the Clean Air Act (CAA). The CAA is the primary statutory authority for addressing air quality concerns. Section 111 of the CAA governs emissions from all MSWLF facilities.

3.6.1.2 Vehicle Fires

In the event that a disposal vehicle carrying a burning or smoldering load of waste enters the landfill site:

- The vehicle should be directed to a designated section of the landfill, away from any exposed waste, and allowed to deposit the material. The designated area will vary depending on operational areas in use. The area will be readily accessible and within 1 or 2 minutes of the tipping area. The designated area will be isolated

from the existing tipping area and will either be an excavated area with no underlying fill or at a location with a minimum of 1 foot of soil cover over underlying fill. In no case will a load thought to be burning be allowed to be dumped when the fill over the liner system is less than 10 feet thick.

- Once burning waste is removed from the vehicle, the application of cover soil by landfill earth-moving equipment or the application of water by the on-site water truck to extinguish the fire can be carried out. Smothering the fire with soil is the preferred method.
- The vehicle and any equipment in the "fire zone" should be sprayed with water while working to quell the fire.
- Precautions should be taken throughout the entire fire-fighting operation including using a hot spot observer.
- If, at any time, additional assistance is required, local fire-fighting units will be contacted.

3.6.1.3 Ground Fire/Below Cover Fire

In the event that waste placed on the ground or waste that was previously covered erupts into fire:

- It should be isolated from previously deposited waste as much as possible. This may be done by either moving burning wastes to another area or by concentrating the burning wastes using the landfill earth-moving equipment.
- Once burning material is separated from other exposed waste, the application of cover soil by landfill earth-moving equipment or the application of water by the on-site water tank truck to extinguish the fire can be carried out.
- Any vehicles and any equipment in the "fire zone" should be sprayed with water while working to quell the fire.
- Precautions should be taken throughout the entire fire-fighting operation, including using a hot spot observer.
- If, at any time, additional assistance is required, local fire-fighting units should be contacted as soon as possible.

3.6.2 Explosion

In the event that an explosion should occur at the landfill or in any structure associated with the landfill site:

- All personnel in the area, including those in surrounding buildings, will be evacuated immediately. In addition, site equipment will be moved away from the scene, if possible.
- All landfill personnel will be accounted for.
- Local emergency personnel (fire, police) will be contacted and informed of the situation.
- The Landfill Manager will be informed of the situation.
- The explosion area will be restricted to both landfill personnel and residents until cleared for re-entry by local emergency personnel.
- Precautions should be taken throughout the entire emergency response operation.
- Wasatch Executive Director will act as the Public Spokesman and will be the only employee authorized to make statements to the media.

3.6.3 Release of Explosive Gases

In the event that a release of explosive gases should occur at the landfill or in any structure associated with the landfill site:

- All personnel in the area, including those in surrounding buildings, will be evacuated immediately. In addition, site equipment will be moved away from the scene, if possible.
- All landfill personnel will be accounted for.
- Local emergency personnel (fire, police) will be contacted and informed of the situation.
- The Landfill Manager will be informed of the situation.
- The release area and surrounding area will be monitored with a combustible gas indicator (CGI) by landfill personnel and readings documented for placement into the operating record.

- The release area will be restricted to both landfill personnel and residents until cleared for re-entry by local emergency personnel.
- Precautions should be taken throughout the entire emergency response operation.
- Wasatch Executive Director will provide the necessary notices to the Executive Secretary.

3.6.4 Failure of Run-Off Containment

In the event of failure of the run-off containment system that has been designed to minimize the off-site release of surface water that contacts operational portions of the landfill:

- Landfill personnel will immediately suspend filling operations, if containment failure is in an active fill area.
- Landfill personnel will use earth-moving equipment to construct temporary earthen berms in an effort to divert the flow of surface water away from the failure area and toward a holding area.
- The Landfill Manager will conduct damage assessment. A decision will be made as to whether the damage can be rectified by on-site personnel.
- If the damaged area cannot be reconstructed by on-site personnel, WIWMD will contact a contractor to either re-design the containment system or initiate repairs to the existing system.
- Wasatch Executive Director will provide the necessary notices to the Executive Secretary.

3.7 CONTINGENCY PLAN FOR ALTERNATIVE WASTE HANDLING

Based on historical operations and a history of never needing to close down the site, landfilling operations should not have to be suspended due to inclement weather conditions or interruption of service. The site soils, including those planned for daily cover, consist of silty fine sands; these soils are easily placed over a wide range of moisture and weather conditions. If the need does arise for alternate waste handling; Wasatch will redirect the waste from landfill operations to the DERF. Wasatch believes that their past operating experience and cautious operating procedures will minimize the need for alternate waste handling plans.

3.8 MAINTENANCE PLAN

The following subsections offer a description of the maintenance of installed equipment including groundwater monitoring systems and leachate and gas collection systems.

3.8.1 Groundwater Monitoring System

All groundwater monitoring wells will be inspected for signs of failure or deterioration during each sampling event. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to replace or repair the well. Possible repairs include pump repair or replacement, redevelopment, chemical treatment, partial casing replacement or repair, sealing the annulus, or pumping and testing. If a well needs to be replaced, it will be properly decommissioned. Damaged wells will be scheduled for repair or replacement.

3.8.2 Leachate Collection and Recovery System

The LCRS, installed as part of the lined landfill design, must be maintained so that it operates during the operational life and closure and post-closure period. The system will be inspected no less than quarterly by District staff for signs of deterioration. Wasatch or a licensed contractor will make required repairs. Cleanouts can be used to internally inspect the main collection pipe using in-line camera equipment. If necessary, these cleanouts can also be used to jet the pipe clean to re-establish flow.

3.8.3 Gas Monitoring System

The landfill gas monitoring system will be inspected no less than quarterly. The system will be repaired and parts replaced as required to maintain system capabilities. The program described below for inspecting and maintaining the gas monitoring system will be followed during the post-closure maintenance period.

Preventive maintenance will be performed on all mechanical equipment at manufacturer-recommended intervals. These tasks include cleaning, lubrication, and replacement of worn parts.

3.9 DISEASE AND VECTOR CONTROL

Unsightliness, dust, and odor will be controlled by (1) timely placement of daily, intermediate, and final soil cover over the refuse fill; (2) proper maintenance of haul roads (grading and watering); (3) application of water spray or dust palliative on soil-covered work areas, soil excavation areas, and soil stockpile areas where conditions may result in fugitive dust; (4) application of water or planting of temporary vegetation on intermediate soil cover when conditions might create fugitive dust; and (5) planting and maintenance of vegetated cover on completed fill slopes.

While the landfill is in operation, placing daily and intermediate soil cover over will control odors from the refuse. Upon completion, the low-permeability layer used in the final soil cover and established vegetation should effectively control odors.

The Landfill Manager will continue the ongoing litter collection program in order to minimize the impacts of litter on and surrounding the site. This program consists of various activities designed to reduce windblown litter, as well as other site features and operations that help to reduce windblown litter. Activities specifically designed to reduce amounts of windblown litter include minimizing the size of the active face, thereby reducing the area of wastes exposed to wind, and erecting temporary litter fences downwind from the active face. The height and length of the fences can be adjusted to maximize their effectiveness in trapping windblown litter.

Other features and operating techniques that reduce windblown litter include perimeter fencing around the landfill site to back up the temporary litter fences; applying daily and intermediate soil cover; and compacting refuse layers at a maximum thickness of 2 feet to hold freshly deposited refuse to underlying landfill layers. Site and surrounding area inspections will be conducted routinely and any windblown litter found will be collected.

District landfill personnel will use appropriate technologies to prevent or control on-site populations of disease vectors (e.g., rodents, insects) in an effort to protect human health and the environment. District landfill personnel will be responsible for maintaining control of vectors at the landfill through continued use of appropriate daily cover procedures. Professional

extermination personnel and services may be used to control vectors if it is found that daily operations are insufficient.

The primary method of vector control is to eliminate conditions favorable for the production of vectors through proper compaction and daily covering as described in Part III of this plan. Should the landfill personnel notice the presence of vectors, cover material will be applied more frequently.

As with vector control, the preliminary method of controlling birds is to eliminate conditions favorable to their existence. This can be accomplished by utilizing, but not limited to, one or more of the following methods:

- Minimizing the size of the fill face, which is the most effective control method. This, along with more frequent and heavier compaction and frequent covering of the waste, will reduce the area available for the birds to feed.
- Avoiding the accumulation of water in depressions, ponds, or holding areas near the fill.
- Using noise-frightening techniques that provide a short-term solution.

Very strict control of birds is required at the Davis Landfill due to the proximity of Hill Air Force Base and the real threat that birds pose to aircraft. During times when the aforementioned control methods are not adequate Davis Landfill employees will use destructive methods of control. Davis Landfill employees may kill up to 250 seagulls per year as authorized under a permit issued by the United States Department of the Interior, U.S. Fish and Wildlife Service. The current permit states:

"Permittee, and subpermittees, are authorized to take, as specified in 50 CFR 21.41(2) and (3), transport and temporarily possess not more than two hundred and fifty (250) total California gulls (larus californicus) to alleviate damage done to aircraft and possible loss of human life.

Permittee, and subpermittees, shall carry and display, upon request, a copy of this permit whenever exercising its authority.

Failure to comply with any of these conditions listed may result in the immediate suspension of this permit.

Authorization granted herein shall not be exercised contrary to the laws of the appropriate State, County, Municipal, Tribal, or foreign government or any other applicable laws.

All required records relating to permitted activities shall be kept at the location as indicated in writing by permittee to the issuing office.

Dead Birds, or any parts thereof (except Bald and Golden eagles, endangered and/or threatened species), shall be promptly destroyed by burial or incineration if they are unsuitable for donation. With approval from the issuing office, dead birds, or any parts thereof, may be deposited with a qualified public educational or scientific institution as defined in 50 CFR 10.12".

Employees of the Davis Landfill shall exercise the taking of seagulls under the following conditions:

- Only persons authorized by Wasatch shall be allowed to take gulls.
- All persons authorized to take gulls shall have evidence of hunter safety training.
- All personnel authorized to take gulls shall receive "gull control training" annually which will include a discussion of the following topics, at a minimum:
- Review of the current permit contents and requirements
- Requirement for permit possession during exercising
- Alternatives to lethal force
- Proper use of lethal force
- Requesting lethal force
- Number of gulls which can be taken
- Where to position yourself while shooting
- When to shoot

- Which direction to shoot
- Firearms safety
- Wounded Gulls
- Handling
- Disposal
- Gulls may be taken only with a 10-gage or smaller shotgun. The landfill currently uses a 12-gage model.
- Records of the number, date, and disposition of all taken gulls will be maintained by Wasatch and submitted to the US Fish and Wildlife Service in an annual report, which is required by the permit. The annual report and permit renewal request shall be submitted to:

  US Fish and Wildlife Service
  Migratory Bird Permit Office
  P.O. Box 25486, DFC (69400)
  Denver, Co. 80225-0486

3.10 WASTE INSPECTION/EXCLUSIONS

A waste control program designed to detect and deter attempts to dispose of hazardous and other unacceptable wastes will continue to be implemented at the Davis Landfill. The program is designed to protect the health and safety of employees, customers, and the general public, as well as to protect against contamination of the environment.

The landfill is open for public and private disposal. Signs posted near the landfill entrance clearly indicate (1) the types of wastes that are accepted; (2) the types of wastes not accepted at the site; (3) the penalty for illegal disposal; and (4) the emergency phone number.

All vehicles delivering wastes to the site must stop at the scale house. Commercial waste haulers are required to comply with the rules established by Wasatch and can lose the right to use the facilities if they violate these rules. Scale house personnel will inquire as to the contents of each incoming load to screen for unacceptable materials. Any vehicle suspected of carrying unacceptable materials (liquid waste, sludges, or hazardous waste) will be prevented from

entering the disposal site unless the driver can provide evidence that the waste is acceptable for disposal at the site. Wasatch reserves the right to refuse service to any suspect load. Vehicles carrying unacceptable materials will be required to exit the site without discharging their loads. If a load is suspected of containing unacceptable materials, the following information will be recorded: date, time, name of the hauler, license plate, and source of waste. The scale house will then notify the tipping area attendants by radio that a load is suspect and that load will be further inspected at the landfill tipping area before final disposal is allowed.

After a vehicle leaves the scale house, site personnel will route the vehicle to the appropriate discharge location. Loads will be regularly surveyed at the tipping area. If a discharged load contains inappropriate or unacceptable material, the discharger will be required to reload the material and remove it from the landfill site. If the discharger is not immediately identified, the area where the unacceptable material was discharged will be cordoned off if necessary. The unacceptable material will be moved to a designated area for identification and preparation for proper disposal. If landfill personnel discover regulated hazardous or PCB waste, Wasatch will ensure that the wastes are treated, stored, or disposed of in accordance with RCRA, TSCA, and/or applicable State of Utah requirements.

Wasatch will also conduct detailed inspections of loads delivered to the landfill. The detailed inspections will be conducted on a random basis designed to detect illegal or inadvertent disposal of unacceptable wastes. Loads will be inspected at a frequency of no less than one load out of every 100 (1% of loads). The scale house attendant notifies the tipping face attendant and the driver of the selected load that an inspection of the load is required. The tipping face attendant will direct the driver to the proper location to dump the load and perform a detailed inspection of the contents.

The selected load will be spread using the compactor or dozer to a maximum thickness of 1 foot. District personnel trained in waste screening will perform a detailed inspection of the load to determine if unacceptable materials are present in the waste.

If there are unacceptable wastes in a load, the inspector will determine whether the driver should have been aware of the unacceptable wastes. If the driver could or should have recognized the unacceptable wastes, the inspector (through the Executive Director) will issue a violation notice to the hauler; if the driver could not reasonably have been aware of the unacceptable wastes no violation notice will be prepared; however, the driver will be consulted and the source of the waste determined. For commercial haulers, the first violation for unacceptable wastes will result in a warning to the hauler; the second violation will result in the imposition of a fine; the third violation will result in suspension of hauler privileges. Wasatch may suspend all disposal privileges at District facilities of companies that violate District rules. A suspended company may not use the Davis Landfill or DERF during the period of the suspension.

The UDEQ will be notified if an unacceptable waste is discovered at the facility. The Landfill Manager will be responsible for notifying the Executive Director of Wasatch who will then notify the Executive Secretary of the Division of Solid and Hazardous Waste, and the transporter of the waste within 24 hours of discovery. This notification will include the date of discovery, type of unacceptable waste, approximate volume, and depth and location within the landfill. A copy of notification will be retained in the landfill operating record. If hazardous or PCB-containing waste is discovered, the Landfill Manager will take appropriate steps to protect the public and landfill personnel and will assure proper cleanup, transport, and disposal of the waste.

Hazardous wastes, excepting wastes that are normally and reasonably associated with households or household activity that are in household containers (5 gallons or less). Examples of hazardous wastes include:

- Lead acid batteries (automobile, boat, RV).
- Paint thinner, degreasing solvents, used oil or kerosene, or unrinsed container thereof.
- Pesticides, herbicides, or unrinsed containers thereof.
- Fluorescent light ballasts, electrical transformers, or fluids from these.
- Radioactive materials or materials contaminated by radioactive substances.
- Acutely hazardous waste, per 40 CFR 261.33.
- Wastes containing PCBs.

- Friable asbestos containing materials.

3.11 RECYCLING PROGRAM

Davis Landfill maintains bins and segregates valuable recyclable materials at the landfill operating face. Wasatch currently maintains bins for segregation of steel, aluminum, tires, batteries and carpet pads. When the bins are full, they are all hauled from the site for recycling.

In addition, clean green waste is diverted to a green waste processing area and chipped using a tub grinder. The processed green waste is screened and either sold as a screened wood product or composted. Once the composted green waste has finished composting in windrows; the material is made available for sale to the general public.

3.12 HOUSEHOLD HAZARDOUS WASTE

Davis Landfill will provide a secure site for the collection of Household Hazardous Waste (HHW). The operations of the HHW are as follows:

- Used Oil Facility – Citizens drop off the containers of used oil (if they request the containers to be returned, they must wait until we empty the container). Each citizen is required to write their name and amount that is being dropped off.

  Wasatch employees empty the containers into large (approx 500 gal.) holding tanks. The oil is then picked up by Thermal Fluids and hauled off for disposal. The sign up sheet is picked up by the County Health Dept. and delivered to the State's Used Oil Dept. for reimbursement.

  Fuels and antifreeze are bulked into large containers (kept separate) also approx 500 gallons, these are also picked up by Thermal Fluids for disposal.

- Hazardous Waste – is accepted at household quantities only (20 gallons or less, at 5 gallon containers). Any thing that can be reused and is in an acceptable quantity and quality is placed in the reuse shed.

- E-Waste – Electronic Waste (E-Waste) is brought in and separated into wire, Monitors (Both TV and Computers), Household Electronics (Phones, Radios, etc.), computers. These items are then picked up for disposal by other qualified recycling companies.

- Reuse Shed – Items that are placed in here can be removed at no charge by citizens if they sign a sign out sheet for them. Items are kept that are of a certain quality and have enough product left that make it desirable for the citizens. No flammables or harmful products are to be available for reuse. We try to be conscious of products that may be used in the production of illegal substances.

3.13 TRAINING PROGRAM

Davis Landfill personnel will be trained on how to identify unacceptable waste including liquid wastes, sludge, potential regulated hazardous waste, and PCB wastes. Personnel to be trained will include the Landfill Manager, Equipment Operators, Spotters and Scale House Attendants. The training will emphasize methods of identifying containers and labels typical of hazardous and PCB waste. Training will also address the proper handling of unacceptable waste. All employees will receive on the job training in landfill operations and waste screening. This training will include operations and safety training. New employees will receive training during their first 3 months of employment. The Landfill Manager and at least one additional landfill employee will be trained and certified as a SWANA Manager of Landfill Operations. The Landfill Manager and all Spotters will be trained in waste screening using the Solid Waste Association of North America (SWANA) techniques.

3.14 RECORDKEEPING

Davis Landfill personnel will maintain an operating record which will be available at Wasatch offices located at 650 East Highway 193 in Layton Utah (at the DCERF). This record will include: any location restriction demonstrations; inspection records, training procedures, and notification procedures; methane monitoring results and remediation plans, if required; design documentation for placement of landfill leachate or condensate, if planned; groundwater monitoring results, certification, or demonstrations; closure and post-closure care plans; financial assurance documentation and cost estimates; and demonstration of small landfill exemption.

Records will be kept throughout the life of the facility, including post-closure care. Documents will be organized, legible, dated, and signed by the appropriate personnel. The information in the operating record will be available to citizens through the Utah Government Records Access Management Act (GRAMA).

3.14.1 Weights or Volumes of Incoming Waste

Wasatch will record and retain in the operating record all documentation made with respect to any weights or volumes of incoming wastes as allowed by State of Utah Administrative Rule R315-302-2. An annual summary of scale records will also be placed into the operating record.

3.14.2 Number of Vehicles Entering Facility

Wasatch will record and retain in the operating record all documentation made with respect to the number of vehicles entering the facility as allowed by State of Utah Administrative Rule R315-302.

3.14.3 Types of Wastes Received Each Day

Wasatch will record and retain in the operating record all documentation made with respect to the types of waste received each day at the facility as allowed by State of Utah Administrative Rule R315-302.

3.14.4 Deviation from Approved Operations Plan

At any time during the operational life or post-closure care period of the Davis Landfill, UDEQ may set alternative schedules for record keeping and notification. However, it is anticipated that any modifications to the schedule for record keeping will be discussed with Wasatch prior to official notice from the State of Utah.

3.14.5 Training Procedures

Wasatch will record and retain in the operating record all documentation made with respect to any training programs or procedures as allowed by State of Utah Administrative Rule R315-302.

3.14.6 Groundwater and Gas Monitoring Results

Wasatch will record and retain in the operating record all groundwater and gas monitoring results from monitoring and any remediation plans required by UDEQ, Administrative Rule R315-308.

3.14.7 Inspection Log or Summary

Wasatch will record and retain in the operating record all documentation made with respect to any inspection logs or summary sheets as allowed by State of Utah Administrative Rule R315-302

3.14.8 Documentation of Exemptions

Wasatch will record and retain in the operating record all documentation made with respect to any location standard or exemption per UDEQ, Administrative Rule 315-302

3.14.9 Design Documentation for Recirculation of Leachate or Gas Condensate

Wasatch will record and retain in the operating record all documentation made with respect to any recirculation of leachate or gas condensate as allowed by State of Utah Administrative Rule R315-303.

3.14.10 Closure and Post-Closure Care Plans

Wasatch will record and retain in the operating record all documentation made with respect to the closure and post-closure care plans as allowed by State of Utah Administrative Rule R315-302-3.

3.14.11 Cost Estimates and Financial Assurance Documentation

Wasatch will record and retain in the operating record all documentation made with respect to the cost estimates and financial assurance documentation as allowed by State of Utah Administrative Rule R315-309.

3.14.12 Other Records as Required by the Executive Secretary

Wasatch will record and retain in the operating record all documentation made with respect to other processes, variances, and violations as required by the State of Utah.

3.15 SUBMITTAL OF ANNUAL REPORT

Wasatch will submit a copy of its annual report to the Executive Secretary by March 1 of each year for the most recent calendar or fiscal year of facility operation. The annual report will include facility activities during the previous year and will include, at a minimum, the following:

- Name and address of facility.
- Calendar or fiscal year covered by the annual report.
- Annual quantity, in tons or volume, in cubic yards, and estimated in-place density in pounds per cubic yard of solid waste handled for each type of treatment, storage, or disposal facility, including applicable recycling facilities.
- Annual update of required financial assurances mechanism pursuant to Utah Administrative Code R315-309.
- Results of groundwater monitoring and gas monitoring.
- Results of leachate system monitoring and disposal.
- Training programs completed.

3.16 INSPECTIONS

The Landfill Manager, or his/her designee, will inspect the facility to prevent malfunctions and deterioration, operator errors, and discharges that may cause or lead to the release of wastes to the environment or to a threat to human health. These inspections will be conducted on a quarterly basis, at a minimum. An inspection log will be kept as part of the operating record. This log will include at least the date and time of inspection, the printed name and handwritten signature of the inspector, a notation of observations made, and the date and nature of any repairs or corrective actions. Inspection records will be available to the Executive Secretary or an authorized representative upon request.

3.17 RECORDING WITH COUNTY RECORDER AND THE STATE OF UTAH DIVISION OF SOLID AND HAZARDOUS WASTE

Plats and other data, as required by the County Recorder, will be recorded with the Davis County Recorder as part of the record of title no later than 60 days after certification of closure. Additionally, Davis Landfill will submit proof of record of title filing to the Executive Secretary.

3.18 STATE AND LOCAL REQUIREMENTS

The Davis Landfill will maintain compliance with all applicable state and local requirements including zoning, fire protection, water pollution prevention, air pollution prevention, and nuisance control.

3.19 ASBESTOS CONTAINING MATERIALS

The Davis Landfill does not accept friable asbestos containing waste materials.

SECTION 4 - CLOSURE PLAN

This section describes the final cover construction, site capacity, schedule of closure implementation, estimated costs for closure, and final inspection procedures for the existing landfill operations and future closure Stages of the Davis Landfill.

4.1 CLOSURE STRATEGY

The unlined landfill cell has been closed and was capped in the summer of 2000 with the exception of the south-facing slope, which will be capped in conjunction with closure Stage C of the lined landfill. Final cover will be placed over the lined landfill in a series of approximately 3 events. When sufficient area of the lined landfill cell has reached final elevation to allow for economical placement of final cover, approximately 20 acres, that portion of the cell will be closed. Sufficient intermediate cover will be placed over the areas that reach final design elevation prior to closure. The landfill cover construction Stages A, B, and C will be closed and capped along with the south face of the old landfill once all landfill airspace is utilized. The projected date of final closure of the entire landfill, based on current waste streams, is 2028. It is projected that approximately 5.6 million cubic yards of airspace capacity remains above the existing MSW surface the final cover contours indicated by the Stage B and C cover contours.

The Executive Secretary will be notified in writing at least 60 days prior to the anticipated last receipt of waste in accordance with R315-302. Implementation of the closure plan will begin within 30 days after last receipt of waste. Closure will be completed within 180 days of implementation of closure activities, unless an extension has been granted by the Executive Secretary.

4.2 FINAL COVER DESIGN AND INSTALLATION

The conceptual design of the final cover system associated with Stage A, B, and C of the lined landfill cell has been completed as part of the landfill permit renewal. A final design package consisting of specifications, QA/QC plan and drawings for construction of the cover system for each of the closure Stages will be prepared and submitted to the State of Utah DSHW for review

and approval prior to each cover placement event. A final design package will be issued for construction prior to closure of the facility to ensure compliance with federal and state regulations effective at the time of closure. The conceptual final cover design described herein is in accordance with current State of Utah regulations and RCRA Subtitle D criteria. The final cover system is designed to control the emission of landfill gas, promote the establishment of vegetative cover, minimize infiltration and percolation of water into the waste, and prevent erosion of the waste throughout the post-closure care period and beyond. Drawings showing the conceptual final cover contours are provided in Appendix A.

4.2.1 Unlined Landfill

The unlined landfill cell is located immediately north of proposed Phase III of the lined landfill cell. The unlined landfill cell has been closed and the majority of the landfill was capped in the summer of 2000. The unlined landfill extends to an approximate elevation of 4800 feet. Due to the date of waste placed in the old landfill, the landfill cap was only required to extend down to approximately the 4900-foot contour line. However, the cap was extended down to an approximate elevation of 4865 feet on the north side of the old landfill to ensure full compliance with regulations. The south face of the old landfill was not covered at that time but will be covered as part of the final cover associated with closure Stage C. The final cover for the old portion of the landfill consisted of the following constituents beginning from bottom to top:

- At least 12 inches of native soil cover.
- A 12-inch layer of native soil cover containing the landfill gas collection system.
- A 40 mil textured polyethylene liner (LLDPE).
- A geocomposite drainage layer (drain net sandwiched between two geotextile filter fabrics).
- A 24-inch soil protective cover layer, the upper of 6 inches of which consisted of native soils suitable for plant growth.

4.2.2 Stages A, B, and C

The final cover construction for the remainder of the landfill, will involve the south face of the unlined landfill and the area defined by the liner Phases I, II, III, and IV. The final cover

construction will be divided into approximately 3 Stages. Stage A is located at the eastern end of the lined landfill, Stage B will incorporate the southwestern area of the lined landfill and the final cover construction Stage C will extend from the crest of the unlined landfill south to Stage B. The general arrangement of the landfill closure Stages are as indicated in the Drawings (Appendix A). The following final cover constituents are conceptually planned, beginning from bottom to top:

- A minimum of 12 inches of intermediate native soil cover
- A reinforced GCL
- A 60 mil textured HDPE membrane
- A geocomposite drainage layer (geonet sandwiched between two geotextile fabrics)
- A 24-inch soil protective cover layer, the upper of 6 inches of which will consist of native soils suitable for plant growth.

The soil cover layers will consist of native soil materials placed and compacted to minimize maintenance efforts.

The top 24 inches of soil protective cover and in particular the upper 6 inches will be a vegetative cap capable of supporting vegetation.

4.2.3 Seed, Fertilizer and Mulch

The 6-inch vegetative layer of the cover will be seeded with a mixture of grasses suitable for fast growth in the region, fertilized and mulched. A local, experienced agronomist was retained to develop an appropriate seed mixture for the seeding of the final cover for the unlined landfill. The recommendations provided by the agronomist will also be used for the final cover Stages A, B, and C. The recommended seeding, fertilizing and mulching requirements are outlined below:

Proposed Seed Mixture:

Common Name	Scientific Name	Planting Rate (pls)
Grasses		
Slender Wheatgrass	Agropyron Trachucaulum	5.0

Crested Wheatgrass	Agropyron Cristatum	5.0
Western Wheatgrass	Agropyron Smithii	5.0
Thickspike Wheatgrass	Agropyron Dasystachyum	2.0
Streambank Wheatgrass	Agropyron Riparium	2.0
Sand Dropseed	Sporobolus Cryptandrus	2.0
Kentucky Bluegrass	Poa Pratensis	3.0
Sheep Fescue	Festuca Ovina	3.0
Mountain Brome	Bromus Marginatus	3.0
Forbs/Wildflowers		
Blue Flax	Linum Perenne Lewisii	2.0
Rocky Mountain Penstemon	Penstemon Strictus	1.0
Western Yarrow	Achillea Millefoium	2.0
Sterile Cover Crop	Triticum Elongatum	25.0
Total		**60**

The grass seed should be planted at a minimum rate of 60 pure live seed pounds (pls) per acre. These grass species were selected based on their capability of surviving in a low nutrient soil with little or no requirement for nutrient addition. These species also require little maintenance (mowing), provide protection for storm water runoff, and are hardy, fast growing species that are tolerant of poor site conditions such as steep slopes.

Fertilizing requirements based on the recommended seed mixture and an analysis of our on site soils should consist of 60 pounds of Phosphorus (P), 200 pounds of Potassium (K) and 50 pounds of Nitrogen (N) per acre. The fertilizer should have fifty percent of the elements derived from organic sources.

Mulch material should consist of oat, barley, rice or wheat straw, free from weeds, foreign matter detrimental to plant life and be relatively free from moisture. Hay or chopped cornstalks are not acceptable.

Where applicable, the side slopes will be initially covered with turf reinforcement mats (TRM) to prevent erosion and allow complete growth of the vegetative cover. TRM's will typically be placed in areas of concentrated runoff and over-steepened portions of the side slopes and/or drainage channels.

Early establishment of vegetation on the landfill's final slope surface will impede soil erosion and promote evapotranspiration. Wasatch personnel will periodically evaluate vegetative growth, vigor, and color so that the integrity of the final cover system is maintained. If signs of vegetative stress are observed to be caused by landfill gas or leachate seeps are noted, the problem will be corrected. Corrective procedures will be conducted based on current design recommendations and will be built consistent with construction specifications.

Wasatch personnel will inspect the vegetative cover during cover inspection. District staff or a licensed landscape contractor will make repairs, as necessary.

4.2.4 Landscaping

The landfill facility, including all surrounding grounds, will be maintained in conjunction with any scheduled maintenance activities (i.e., grass cutting, road improvements, etc.). The landscape of the landfill will be designed to be both functional and aesthetically pleasing.

4.2.5 Contouring

The landfill's final grades will be inspected and maintained in order to ensure its integrity and conformity with the conceptual final cover contours that are included in Appendix A.

Any areas where water has collected (ponded) will be regraded. Erosion damage resulting from extremely heavy rainfall will be repaired. Wasatch personnel will inspect the final grading no less than quarterly.

4.2.6 Quality Assurance/Quality Control (QA/QC) Procedures

Prior to the actual construction activities associated with each of the closure Stages of the final landfill cover; drawings, specifications and QA/QC procedures will be developed and submitted

to the State of Utah DSHW for review and approval. Drawings, specifications and QA/QC procedures will be similar to those completed and approved by the DSHW for the final cover of the unlined landfill.

4.3 CLOSURE COST ESTIMATES

Detailed cost estimates for the construction of closure Stages A, B, and C will be provided in the financial assurance portion of the annual report.

4.4 CERTIFICATION OF CLOSURE AND RECORD KEEPING

A civil engineer registered in the State of Utah will design and observe the closure of the lined landfill. The registered engineer will be employed by the District, or will be a District-hired contractor and will certify the landfill was closed according to the closure plan. Any amendment or deviation to the closure plan will be approved by the Executive Secretary and any associated permit modifications will be made. As part of the certification process, the engineer shall also provide closure as-built drawings to the Executive Secretary within 90 days following completion of closure activities.

Additionally, the final plats and the amount and location of waste will be recorded on the site title. The owner will file the notarized plat with the county recorder within 60 days following certification of closure.

SECTION 5 - POST-CLOSURE PLAN

Post closure activities will begin when closure is approved is approved by the Executive Secretary. The following presents the post-closure plan for the Davis Landfill.

5.1 MONITORING PROGRAM

The following subsections offer a description of the monitoring program, which includes groundwater monitoring systems and leachate and gas collection systems.

5.1.1 Groundwater Unlined and Lined Landfill

Groundwater is currently monitored as detailed in the approved Groundwater Monitoring Plan (Part III, Section 2). Wasatch will continue a groundwater monitoring program in conformance with Section R317-6-2, Ground Water Quality Standards of the State of Utah Department of Environmental Quality, Division of Solid and Hazardous Waste, Administrative Rules. Groundwater monitoring wells will be sampled in accordance with the approved Groundwater Monitoring Plan.

5.1.2 Surface Water - Existing and Proposed Landfill Expansion

Although no surface water sampling activities are scheduled for the landfill, Wasatch personnel will inspect the drainage system no less than quarterly. Temporary repairs to any observed damage will be made until permanent repairs can be scheduled. Wasatch or a licensed general contractor will replace drainage facilities, if necessary.

5.1.3 Leachate Collection and Treatment

5.1.3.1 Unlined Landfill

A leachate collection system was neither required nor installed during construction of the unlined landfill.

5.1.3.2 Lined Landfill

Leachate lateral collection pipes will be installed at a minimum 2% slope from the highest portion of each Phase to the lowest portion. Each lateral will be connected to a perforated leachate collection header which will be routed to the exiting leachate collection pipes associated with the Phase I and Phase II liner construction. The details and location of the leachate collection pipes will be as indicated in the detailed design for each liner Phase.

Once leachate is routed to the leachate collection sump in Phase I; leachate is pumped from the sump out of the leachate collection system to the leachate evaporation pond through a double-walled pipe. The lined landfill is equipped with a composite liner and leachate collection system that is designed and constructed to maintain less than 30 centimeters (12 inches) of leachate over the liner.

Leachate and gas condensate collected as part of any recovery operations at the Davis Landfill has historically been applied to the surface of the lined landfill cell to accelerate evaporation and augment free surface evaporation of leachate from the leachate collection pond during warm weather months. Since the construction of a double walled leachate disposal line from the leachate evaporation pond to the South Weber POTW; the need to surface apply the leachate over the lined landfill is minimal.

Leachate is disposed of through; surface application (dust control) within the boundaries of the lined landfill cell, evaporation from the leachate evaporation pond, or transport to a local wastewater treatment plant.

5.1.4 Landfill Gas

Soil gas monitoring probes have been installed around the entire landfill site to monitor explosive landfill gas emissions from both the unlined and lined landfill. The gas monitoring probes, as well as all structures at the site, are monitored quarterly to ensure compliance with State regulations regarding explosive landfill gas at landfills (R315-303-3). Wasatch has also developed an Explosive Landfill Gas Monitoring Plan for the Davis Landfill (Bingham, August 1997) which describes the monitoring network and sampling procedures in detail.

In addition to the explosive landfill gas monitoring network described in the Landfill Gas Monitoring Plan, Wasatch has installed several features to assist in controlling migration of landfill gas.

INSERT DESCRIPTION OF THE LANDFILL GAS MIGRATION MITIGATION of the property to the west of the landfill. Description from Preston's Papers

During post-closure, Wasatch landfill personnel will be responsible for the inspection and sampling of all methane gas monitoring stations, facility structures, and facility landmarks as described in accordance with the current Explosive Landfill Gas Monitoring Plan. Monitoring will occur no less often than quarterly and will be conducted more often if the need arises. In the event that a sample exceeds the regulatory level, Wasatch will notify the DSHW immediately and undertake appropriate corrective actions.

As outlined in R315-303, Wasatch will take all the necessary steps to protect human health and will immediately notify UDEQ of explosive gas levels detected above allowable levels and actions to be taken. Also, within 7 days of incident, Wasatch will place in the operating record documentation of the explosive gas levels detected and a description of the interim steps taken to protect human health. Within 60 days of detection, Wasatch personnel will implement a remediation plan for the explosive gas releases, place a copy of the plan in the operating record, and notify UDEQ that the plan has been implemented. The remediation plan will describe the nature and extent of the problem and the proposed remedy.

5.2 MAINTENANCE PROGRAM

The following subsections offer a description of the maintenance of installed equipment, including groundwater monitoring systems and leachate and gas collection systems.

5.2.1 Monitoring Systems

5.2.1.1 Groundwater

All current and future groundwater monitoring wells will be inspected for signs of failure or deterioration during each sampling event. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to replace or repair the well. Possible repairs include redevelopment, chemical treatment, partial casing replacement or repair, sealing the annulus, or pumping and testing. If a well needs to be replaced, it will be properly abandoned.

5.2.1.2 Surface Water

Drainage control problems can result in accelerated erosion of a particular area within the landfill. Differential settlement of drainage control structures can limit their usefulness and may result in a failure to properly direct storm water off-site.

Implementation of a post-closure maintenance program will maintain the integrity of the final drainage system throughout the post-closure maintenance period. The final surface water drainage system will be evaluated and inspected, no less than quarterly, for ponded water and blockage of and damage to drainage structures and swales. Where erosion problems are noted or drainage control structures need repair, proper maintenance procedures will be implemented as soon as site conditions permit so that further damage is prevented. Damaged drainage pipes and broken ditch linings will be removed and replaced.

Wasatch personnel will inspect the drainage system no less than quarterly. Temporary repairs will be made until permanent repairs can be scheduled. Wasatch or a licensed general contractor will replace drainage facilities.

5.2.1.3 Leachate Collection and Treatment

The leachate control and recovery system must be maintained so that it operates during the post-closure maintenance period. The system will be inspected no less than quarterly by Wasatch personnel for signs of deterioration. Wasatch or a licensed contractor will make required repairs.

5.2.1.4 Landfill Gas

The landfill gas monitoring system will be regularly inspected in conjunction with the scheduled monitoring tasks. The system will be repaired and parts replaced as required to maintain system capabilities. The landfill gas monitoring system will be inspected quarterly throughout the post-closure period.

5.2.2 Facility and Facility Structures

Drawings in Appendix A show the location of leachate and surface water management facilities. The leachate facilities consist of a network of collection pipes, a leachate sump (pump), underground leachate discharge piping and a leachate evaporation pond. All leachate piping outside of the composite lined landfill is double-walled to ensure leachate containment.

The leachate evaporation pond is constructed of a triple liner system. The uppermost (primary) liner consists of 60 mil HDPE membrane underlain by a plastic drainage net and a secondary 60 mil HDPE liner to form a leak collection and removal system which breaks the hydraulic head on the lower liners (secondary and tertiary). Below the secondary liner is another drainage net overlying the tertiary liner, which consists of 60 mil HDPE membrane in direct contact with a geosynthetic clay liner (GCL). This layer acts as a leak detection system to prevent leachate release to the environment from the leachate evaporation pond. Both the leak collection and removal system and the leak detection system drain to a collection sump, which is monitored for the presence of liquid. Leakage through the primary liner reports to the leak collection and removal system sump where it is collected and pumped back into the leachate evaporation pond

The storm water facilities will consist of surface water ditches and detention ponds. The surface water ditches will transmit storm water from the vicinity of the landfill to the on-site storm water detention ponds (Appendix A). The storm water detention ponds will allow settlement of sediments contained in the storm water run-off. Section 3.5 of Part III describes the details of the run-on and run-off control system

5.2.3 Cover and Run-On/Run-Off Systems

The final grades and capping system will incorporate features to manage storm water, minimize erosion, and provide for efficient removal of storm water collected in the drainage layer. The Drawings in Appendix A show proposed final grades and illustrate the extent of storm water collection and surface water and erosion control systems on the surface of the final cover.

The final cover will convey collected water via earthen dikes, swales, and drainage channels to the storm water detention basins.

Placement of all permanent drainage facilities will be completed in conjunction with the construction of the final cover.

5.3 SCHEDULE OF POST-CLOSURE ACTIVITIES

Post-closure activities, consisting of monitoring and maintaining the final cover and permanent drainage facilities, will be implemented periodically as areas of the landfill are filled to final grade.

5.4 CHANGES TO RECORD OF TITLE, LAND USE, AND ZONING

Wasatch will notify the Davis County Recorder's Office at any such time when there is a change to the Record of Title, land use plan, or zoning restrictions. In addition, Wasatch will notify the Recorder at that time when the post-closure care period has expired and when a final site use has been accepted by the State.

SECTION 6 – FINANCIAL ASSURANCE

6.1 CLOSURE COSTS

Cost estimates have been developed for the closure Stages at the Davis Landfill. Appendix D – Closure/Post-Closure Costs contains the most recent closure cost data for the Davis Landfill. Closure costs are updated each year and submitted with the Annual Report.

6.2 POST-CLOSURE COSTS

Cost estimates have been developed for the post-closure care period at the Davis Landfill. Appendix D – Closure/Post-Closure Costs contains the most recent post-closure cost data for the Davis Landfill. Post-Closure costs are updated each year and submitted with the Annual Report.

6.3 FINANCIAL ASSURANCE

The details for the financial assurance for the Davis Landfill are included in Appendix E.

APPLICATION TO RENEW A PERMIT TO
OPERATE A CLASS I LANDFILL

Wasatch Integrated Waste Management District

PART III - TECHNICAL AND ENGINEERING REPORT

TABLE OF CONTENTS

SECTION 1 - PROFESSIONAL ENGINEERING REPORT

1.1 PHASED DESIGN - PROPOSED LANDFILL LINER MODIFICATION

This permit application includes provisions for a single additional lined area. This, Phase IV, will be located immediately west and south of the existing Phase II. The Phase IV construction essentially extends the Phase II liner further up the existing slope below the current scale house and up the recently constructed berm. The land associated with the new liner phase is not newly acquired land, but is land owned by the District prior to the Subtitle D regulations, has been included in all prior permits, and does not represent a lateral expansion of the facility. Appendix A shows the location of the proposed Phase IV liner. The Phase IV landfill modification and the associated changes in the final cover are estimated to extend the operating life of the as follows:

1.1.1 Estimated Life

1.1.1.1 Remaining Stage A

Stage A of the landfill final cover construction is the area of the lined landfill located over the Phase I liner installation. Stage A has no MSW airspace remaining; the final cover for Stage A is currently being designed with a scheduled construction in the summer of 2006. Stage A final cover construction will consist of approximately 440,000 square feet.

1.1.1.2 Stage B

Stage B of the final cover construction is comprised primarily of the area of the lined landfill located over the Phase II liner installation. The current waste stream entering the Davis Landfill is approximately 78.5 cubic yards of ash from the DERF and 656 cubic yards of MSW delivered directly to the landfill. Along with the ash and MSW, approximately 116 cubic yards of soil are utilized as daily and intermediate cover. Based upon the number of operating days per year; approximately 204,000 cubic yards of airspace is consumed annually. Wasatch anticipates that recycling, composting, and

other waste diversion operations will offset waste stream increases. If additional areas are added to the district or recycling/composting activities are not enhanced, the resulting increase in the waste stream will need to be planned for.

The volume of airspace associated with Stage B cover construction provides approximately 3.3 million cubic yards of total airspace capacity resulting in approximately 14 years of operational time.

1.1.1.3 Stage C

Airspace consumption for the remaining life of the landfill is held constant at the approximately 204,000 cubic yards of airspace is consumed annually. If additional areas are added to the district or recycling/composting activities are not enhanced, the resulting increase in the waste stream will need to be planned for. Additionally, waste diversion to a regional landfill is a distinct possibility and the resulting impacts not able to be defined at this time; therefore the 204,000 cubic yards per year of airspace consumption is utilized.

The airspace associated with Stage C provides approximately 2.4 million cubic yards of total airspace capacity resulting in nearly 10 years of operational time. Drawing 9 (Appendix A) details the development of the landfill life calculations.

1.1.2 Liner (Construction Identified as Phases)

The landfill phases are designed with environmental controls (both a composite liner and a leachate collection system) that are intended to protect surface water and groundwater from contamination. The previously approved composite liner system consists of:

- Prepared subbase foundation.
- A geosynthetic clay liner (GCL).
- A geomembrane liner (60-mil HDPE, or equivalent synthetic material).

- A geocomposite drainage layer.
- A 24-inch protective soil layer.

This configuration was selected to provide a composite liner system that closely resembles the standard synthetic-over-clay composite liner system required by State of Utah Regulations (R315-303-3). This liner is an alternative system to the standard design and was selected for the following reasons:

- No source of clay acceptable for use is known to be available within a reasonable distance from the site (e.g., within 10 miles).

- Bentonite amendments to the on-site soils are not likely to achieve the regulatory hydraulic conductivity requirements at reasonable amendment ratios (e.g., less than 10% bentonite addition). This is partly due to the sandy texture of the on-site soils and to the general alkaline nature of Great Basin soils. Bentonite amendments at higher levels are both very difficult to achieve homogeneously and expensive.

- GCL utilization has become a widely used and accepted technology. The performance and associated QA/QC of the GCL materials is superior to compacted clay liners in this application.

This alternative liner system has been previously approved for use in the Davis Landfill by the DSHW.

The landfill remaining liner phases (Phase III and Phase IV) will be constructed to the contours indicated on the Drawings (Appendix A). All foundation soils underlying the GCL will be free of surface anomalies and uniformly graded. The alternate liner system will be installed according to the manufacturer's recommendations and will be inspected to ensure continuity. Construction plans, specifications and QA/QC program will be

submitted to the DSHW for review and approval prior to any construction related activities.

1.1.3 Leachate Collection and Treatment System

The leachate collection system (LCS) consists of a geocomposite drainage material to provide lateral drainage of leachate directly above the liner system. The geocomposite layer will be placed over the entire bottom of each of the lined landfill phases. The LCS is designed to minimize physical and biological clogging. The piping, grades, and materials of the LCS will be designed to maintain operation during landfilling operations. The geocomposite is designed to limit leachate depths on the liner to well less than one foot, even when clogged by sediments and biofouling that has been observed at similar facilities. Each leachate collection and header pipe has been oversized to allow maintenance cleaning. The geocomposite will be covered by a protective soil layer consisting of 24 inches of soil with an in-place permeability of between 10^{-3} and 10^{-5} cm/sec. This material serves to protect the liner system, including the leachate collection system, from damage during the placement of the first layer of select solid waste. The protective layer will be constructed of moderately permeable, sandy soils excavated from the landfill expansion and separately stockpiled during excavation. The protective soil layer will be track packed with landfill equipment prior to the placement of select waste.

The bottom of each of the landfill phases will be graded to provide a minimum slope of 2% from the highest side of the graded bottom to the lowest side. Perforated drainage pipes will be installed to prevent the localized buildup of head (leachate) and to transport collected leachate. Within each phase, the lateral pipes will terminate at a leachate header pipe (installed in Phase I), which will connect all leachate piping to the leachate sump. All leachate from Phase II, Phase III, and Phase IV will report into the existing leachate collection sump installed in Phase I. Leachate will be pumped from the sump to the leachate evaporation pond for final disposal. In the event of a power outage or equipment failure, a vacuum truck can be utilized to remove and transport leachate to

the pond or alternate disposal site. Standby pumps will also be available at the site to accommodate unexpected conditions.

Design of the LCS was based on a series of HELP model runs that simulate the generation of leachate within the landfill. To determine the maximum amount of leachate that the LCS would be required to transport, several computer runs were performed to evaluate the sensitivity of the model parameters with the Davis Landfill site. Using multiple configurations of final, intermediate, daily, and no covers and adding 25-year, 24-hour rainstorms at various stages of construction, the maximum amount of expected leachate flow was obtained. The LCS was evaluated for this flow using its designed and "clogged" conditions. For all anticipated flows, the LCS has been shown to be more than adequate to meet the design requirement of less than 12 inches of head on the liner. The piping and pump systems have been designed to allow long-term maintenance activities to be performed and are therefore oversized for the anticipated hydraulic flows.

The LCS, as designed, has been in operation within Phase I of the lined landfill cell for approximately 7.5 years with minimal operational problems being experienced to date.

1.1.4 Fill Method

The Davis Landfill uses an area fill method. In the area fill method, an area is excavated and prepared as a lined landfill phase with the soils being utilized for landfill cover. Waste is placed in the phase until the waste reaches the planned intermediate or final grade. During filling of the landfill phase, an adjacent area is excavated and prepared as the next lined landfill phase such that the new phase is ready to receive waste as the previous phase reaches intermediate or final grade. The soils excavated during preparation of the new phase are used as daily, intermediate, and final cover for the previous phase or placed in a soil stockpile for future use.

At the beginning of each new phase, a 2-foot-thick layer of protective soil is placed over the leachate collection system for the entire phase and over side slopes to protect the entire liner system. The first solid waste and ash placed in a newly constructed landfill phase will be placed in a layer approximately 3 feet thick over the entire bottom of the active area. Large objects will be removed from the deposited waste and the solid waste and ash will be compacted as a single lift, with no intermediate compaction to provide a 5-foot-thick protective working surface over the liner and leachate collection systems.

Subsequent layers of solid waste and ash will be placed in lifts of 10 to 20 feet in thickness. The solid waste and ash is spread and compacted in no more than 24-inch-thick layers on a working face 50 to 75 feet in width. The working face is sloped no steeper than 3H:1V (with a 5:1 slope being typical) to facilitate the compaction of the waste. The working face area is kept to the minimum size necessary for operations. This minimizes the area exposed for wind or vector related problems and also minimizes the quantity of daily cover material required.

To prevent bridging of surrounding waste, large, bulky wastes are typically placed at the toe of the working face and crushed thoroughly prior to placement of additional solid wastes.

Temporary berms are constructed on lifts to control surface water and vehicular traffic. These berms are constructed using the soil stockpiled for daily cover. In addition, the working face and lifts are sloped to minimize ponding of water.

1.1.5 Daily and Final Cover

1.1.5.1 Daily and Intermediate Soil Cover

Daily cover soils must meet the 6-inch State requirements. The borrow area for soil used as cover in Phase I was the excavation for the Phase II development. Daily and intermediate cover soils for Phase II has been from the excavation of the Phase III and

the operational cover soils for both Phase III and Phase IV will be from the various soil stockpiles.

Based upon the nature of available soil at the Davis Landfill crushing and screening is not required to produce cover soils meeting the required specifications.

Before the start of waste placement each day, cover soil on top of the previous lift will be stripped back and stockpiled for reuse as soil cover at the end of the day or as needed. At the end of the day; these recycled cover soils will be utilized as daily cover. The remainder of daily cover will be provided with clean soil obtained from onsite sources. Wastes will be covered with a minimum of 6 inches of soil or an approved alternate daily cover at the end of each working day.

Intermediate cover soil requirements are governed by R315-303-4. The borrow area for intermediate cover soils is the same for daily cover soils.

For intermediate soil cover a minimum of 12 inches of soil will be used. Soil will be placed on each partial lift if left inactive for 6 months or longer. After 30 days of inactivity on the intermediate cover, the slope will be protected against erosion and sedimentation.

1.1.5.2 Alternate Daily Cover

The use of alternate daily cover in a landfill can preserve airspace and extend landfill life. The Davis Landfill proposes to continue to utilize the ash generated from the DERF and excess wood chips generated from the green waste processing area as alternated daily covers. All the ash (currently approximately 78 cubic yards a day) generated from the DERF will be utilized as daily cover. The use of wood chips for daily cover is not a common practice (the wood chips are typically sold as part of the composting operation) but reserved if excess disposal of wood chips are necessary or advantageous. If wood chips are utilized as alternate daily cover; the use will be limited

to no more that 5 operational days then soil cover will be applied for at least 5 operational days to minimize the potential for landfill fires.

1.1.5.3 Final Cover (Construction Identified as Stages)

The Davis Landfill will initiate the design of its final cover system design within 30 days after disposal ceases in each of the landfill closure Stages. The design and construction of the final cover over each of the Stages will be completed within 180 days after initiation. It is anticipated that final cover will be placed over the lined landfill areas in a series of 3 separate events as sufficient area is brought to final elevation. The minimum area required for placement of final cover is approximately 20 acres, but also depends upon configuration (operational, drainage and gas collection issues).

The engineered final cover system will minimize surface water infiltration (thereby minimizing leachate generation), control gas migration, maintain slope stability, control surface water and erosion, and be capable of supporting vegetative cover. The vegetative cover has been selected with shallow root systems to prevent potential penetration into the drainage layer or geocomposites. The cover will be constructed as indicated on the drawings (Appendix A) that are included with this permit application. The final cover design will have a minimum of 2.5 feet of soil protection and topsoil over the synthetic cover materials. The 2.5 of soil cover minimizes the effect of frost (typical depth of influence between 20 to 30 inches as determined by UDOT guidance for the site) and also provides enough soil to protect the final cover components from damage. Side slopes will be maintained at 4H:1V and will typically have 10- to 15-foot-wide benches every 30 to 40 vertical feet to aid in constructing and maintaining the landfill cap slopes while providing areas for stormwater management. The benches will slope a minimum of 2% to 5% to provide a positive drainage while allowing for the anticipated settlement of the MSW. Each bench will consist of an access road and ditch located at the toe of the slope.

The landfill cover design allows for natural watershedding during a normal rainfall or snowmelt with little infiltration into the drainage layer. However, in the case of unusually high rainfall event, water will infiltrate to the underlying drainage layer (geonet). The geonet geocomposite will terminate or daylight into a perimeter ditch at the edge of the landfill cover and in the ditches associated with the landfill benches. The perimeter ditch will route all stormwater to the stormwater detention pond beyond the landfill perimeter.

The gas collection wells will help to direct the landfill gases generated from the MSW to the gas collections system and ultimately to the landfill gas flare or to Hill Air Force Base for beneficial use in the landfill gas-to-energy system.

1.1.6 Elevations of Bottom Liner and Final Cover

The bottom liner (previously installed as part of the Phase I and Phase II liner construction) was installed at elevations of between 4,822 and 4,844 feet above mean sea level (MSL). Based on historic sampling data, the highest groundwater elevation measured at the facility was recorded on September 1990 at a measured groundwater elevation was 4,806 feet (MSL). The minimum vertical separation from the groundwater and the lowest point of the bottom liner is more that the minimum 5 feet as specified in R315-302-1.

1.1.7 Unlined Landfill Closure

Final cover for the unlined landfill was installed in the summer of 2000.

1.2 MONITORING SYSTEM DESIGN - EXISTING AND PROPOSED LANDFILL EXPANSION

1.2.1 Groundwater Monitoring System

The groundwater monitoring plan is in accordance with R315-308 and is designed to monitor the potential impacts of the unlined landfill and the recently constructed lined landfill phases on both the shallow perched groundwater system and the deep perched

groundwater system beneath the site. Monitor wells are installed in locations that are estimated to be both upgradient and downgradient of the unlined landfill and the lined landfill phases. The specifics of the groundwater monitoring system are provided in the approved Groundwater Monitoring Plan for the Davis County Landfill (Bingham Environmental, Inc., June 1997).

1.2.2 Landfill Gas

The decomposition of solid waste produces methane, a potentially flammable and explosive gas. The accumulation of methane in structures can result in fire and explosions that can injure employees and property, users of the landfill, and occupants of nearby structures. In accordance with Subtitle D and Utah rules, Wasatch will conduct subsurface and facility structure gas monitoring at least quarterly for methane detection. The concentration of methane gas generated by the landfill must not exceed 25% of the lower explosive limit (LEL) in the facility structures (excluding gas control or recovery system components). The concentration of methane gas generated by the landfill must not exceed the LEL at the facility boundary. As outlined in EPA Subtitle D, Subpart C and the State of Utah Regulations, Wasatch will take all the necessary steps to protect human health and will immediately notify UDEQ of methane levels detected above required limits and actions taken, if any. Within 10 days of an incident, Wasatch will place in the operating record documentation of the methane gas levels detected and a description of the interim steps taken to protect human health. Within 60 days of detection, Davis Landfill personnel will implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify UDEQ that the plan has been implemented. The remediation plan will describe the nature and extent of the problem and describe the proposed remedy.

The specifics for monitoring landfill gas at the Davis Landfill are detailed in the Explosive Landfill Gas Monitoring Plan for the Davis County Landfill (Bingham Environmental, Inc. August 1997).

1.3 DESIGN AND LOCATION OF RUN-ON/RUN-OFF CONTROL SYSTEM(S)

1.3.1 Run-On from a 24-Hour, 25-Year Storm

Design standards for the Davis Landfill incorporate a run-on control system that minimizes precipitation flow onto the active portion of the landfill during the peak discharge of a 24-hour, 25-year storm (2.83 inches of precipitation). The purpose of the run-on standard is to minimize the amount of surface water contacting the MSW and becoming leachate. Run-on controls prevent: (1) erosion, which may damage the physical structure of the landfill; (2) surface discharge of wastes in solution or suspension; and (3) downward percolation of run-on through wastes, creating leachate. The design of the run-on control system is described in more detail in Section 3.4.1.

District personnel will be responsible for the maintenance of the slopes and drainage systems so as to ensure all conditions of the run-on standards are met.

1.3.2 Run-Off from a 24-Hour, 25-Year Storm

Design standards for the Davis Landfill incorporate a run-off control system that will collect and contain the water volume from the portion of the landfill with intermediate and final covers (non-contact water) resulting from a 24-hour, 25-year storm (2.83 inches of precipitation) in detention basins. Run-off from closed areas will be controlled using ditches associated with access roads on the final cover of the landfill. Proposed road locations have been selected to create smaller drainage sub-areas and increase time of concentration/reduce peak discharge rates which will be conveyed to detention ponds. The locations and alignments of proposed access roads were also selected to minimize overloading of the drain-net component of the composite landfill cover. The TR-55 Graphical Peak Discharge Method was utilized to determine times of concentration and peak discharges for individual (and where necessary, combined) drainage sub areas. Peak discharge rates varied from 4.5-66.7 cubic feet per second (cfs). Storm conveyance ditches and culverts have been sized to convey run-off to detention basins. For purposes

of simplification during construction, only three channel sizes have been recommended; meaning that some of the channels are conservatively large.

Run-off water from the active portion of the existing and proposed landfill expansion which contacts the working face, solid waste materials, or enters the leachate collection system (contact water) will be handled in accordance with R315-303-3 in order to ensure that the Clean Water Act (CWA) is not violated. Appendix F contains the calculations for the various stormwater structures.

The upper stormwater detention basin has been sized to accommodate the run-off from a 100-year storm. The upper pond is connected to the lower stormwater pond with a 4-inch drain line. The lower stormwater pond is sized and operated to percolate 50% and evaporate 50% of the received water. The majority of the stormwater system has been in operation since 1998 and is working as designed.

SECTION 2 - GEOHYDROLOGICAL ASSESSMENT

2.1 HYDROGEOLOGY AND GEOLOGY

The site geology and hydrogeology has been investigated since the early 1980s. Data and interpretative reports have been prepared by EMCON, Roy F. Weston and Bingham Environmental. The hydrogeologic interpretations of the historic groundwater information, is provided in the Groundwater Monitoring Plan for the Davis County Landfill (Bingham Environmental, Inc., June 1997) and the Supplemental Hydrogeologic Evaluation (Bingham Environmental, Inc., 1999).

The Groundwater Monitoring Plan provides a detailed description of the local and regional geology and hydrology including a site map, potentiometric maps of the upper perched and intermediate perched aquifers, cross sections and all available on-site drill hole logs and monitor well completion details. The Groundwater Monitoring Plan also provides a detailed description of the currently approved groundwater monitoring system, direction of flow and depth to groundwater beneath the site and surrounding areas.

When changes are required to the approved Groundwater Monitoring Plan it will be updated to include the most recently available information and interpretation of the site hydrogeology.

2.2 WATER RIGHTS

A search of the Utah Division of Water Rights database indicates that two water rights (permitted wells) and no points of surface water diversion constituting a surface water right are within 2,000 feet of the facility boundary. One of the permitted wells is the NDRD water well (water right #31-2989) used as a water supply for the landfill facility. This well is 544 feet deep and obtains water from the Delta Aquifer. The Delta Aquifer is generally confined in the vicinity of the landfill and, therefore, the use of this well

should not impact, nor will this well be impacted by, any of the shallower perched groundwater zones of concern beneath the landfill. The NDRD well will be appropriately abandoned prior to the construction of the Phase III liner.

The second permitted well lies approximately 1,500 feet west of the landfill facility and is 243 feet deep. This well (water right #31-2790) is designated for irrigation/domestic/stock watering use and appears to be screened in the shallow perched groundwater zone found at approximately 4,800 feet MSL and is below the landfill bottom. This is based on the depth and location of the well, and the westerly dip of the clay layer. Monitor well DMW-2 is located between this well and the existing landfill and indicates that the permitted well is upgradient of the landfill facilities.

The Supplemental Hydrogeologic Evaluation focuses on the deeper aquifers beneath the site to expand upon information contained in the Groundwater Monitoring Plan and includes the location of all wells and water rights within 10,000 feet of the center of the landfill property. The Groundwater Monitoring Plan and Supplemental Hydrogeologic Evaluation are not included in this permit application.

2.3 SURFACE WATER

The following bodies of surface water are located within one mile of the landfill:

Surface Water	Location	Owner
Davis-Weber Canal	1/4 mile northeast	Stockholders including: Weber Basin Water, LDS Church, and Roy Water Conservancy
Hobbs Reservoir	1 mile southeast	Kays Creek Irrigation
Irrigation Pond	1/8 mile north	South Weber Water Improvement District

The Davis-Weber Canal is located just to the north of the landfill property. The canal provides irrigation water for agricultural purposes. Water is diverted into the canal from the Weber River near the mouth of Weber Canyon northeast of the landfill. Water flow in the canal is seasonal, generally running in the summer months. The current landfill property boundary abuts the canal along the northwest portion of the site. The elevation of the canal in relation to the elevation of groundwater in the vicinity of the northwest property boundary indicates that there is no contribution from groundwater to the flow in the canal.

Hobbs Reservoir is located approximately 1 mile south southeast of the landfill and is not impacted by landfilling operations.

The Irrigation Pond is located on the slope immediately north of the landfill see Drawing 1 Appendix A. The concrete-lined pond serves as a storage facility for irrigation water, which is delivered under pressure to the reservoir. The pond is utilized on a seasonal basis. Landfilling operations do not impact this pond. Surface water rights data is included in Appendix G.

2.4 GROUNDWATER QUALITY

2.4.1 Groundwater Data

The establishment of groundwater monitoring program at the Davis Landfill was initiated by the following distinct sampling programs. 1) Monitor wells identified as DMW-2, MW-4, MW-5, MW-7, and MW-8 were sampled six times by Emcon between September 1989 and May 1994. 2) Wasatch Environmental sampled the same set of wells eleven times between March 1995 and March 1996. 3) Monitor wells identified as DMW-4, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-16R have been sampled in addition to the previous five wells between September 1996 and present by Bingham Environmental, IGES or Wasatch. Each of the historical groundwater sampling events have been reviewed to determine acceptability of the data generated for determination of background groundwater

quality. A summary of the sampling periods, sampling company, sampling techniques, and resulting QA/QC as well as a determination of the acceptability of data generated during each of the historic groundwater sampling programs (mentioned above) is provided in the *Report of Background Groundwater Quality* (Bingham Environmental, Inc., October 1998).

A summary of the most recent ground water sampling results and analysis, for both the unlined cell and lined cell groundwater monitoring networks, is provided as Appendix H – *2004 Results of Groundwater Monitoring, Davis Landfill* of this permit application.

2.4.2 Statistical Analysis

Statistical analysis of background groundwater quality data was performed and submitted in the *2004 Results of Groundwater Monitoring, Davis Landfill.* The conclusion of the *2004 Results of Groundwater Monitoring, Davis Landfill* are as follows:

Field and laboratory data meet the requirements of Utah Administrative Code R315-308-4 and all results above laboratory detection limits are acceptable in determining groundwater quality of the shallow perched and deep perched aquifers with the exceptions indicated.

The direction of groundwater flow in the shallow perched aquifer is generally toward the north-northeast; consistent with previous measurements. The direction of groundwater flow in the deep perched aquifer is toward the north-northeast, which is also consistent with previous measurements.

Statistical analysis of available water quality data for the lined landfill cell indicates that there has not been a significant change in groundwater quality as compared to background.

Statistical analysis of groundwater quality data for the unlined landfill cell, including the November 2004 event, indicates that there is a statistically significant change, as compared to background, for several constituents. The monitor well network for the unlined landfill cell will continue in assessment monitoring.

Statistical analysis also indicates that no constituent has shown a statistically significant change such that the established groundwater protection level has been exceeded.

Assessment Monitoring at the Unlined Landfill Cell will include the constituents for Detection Monitoring (UACR315-308-4) and the following Part 258 Appendix II constituents: Cyanide, bis (2-ethylhexyl)phthalate, 2,4,5,-T, Anthracene, Benzo(a)pyrene, 2,4-D, and Pentachlorophenol.

With the seventeen consecutive non-detect for Tin and nine consecutive non-detect for sulfide, these two constituents will no longer be included in Assessment Monitoring. Detailed description of the statistical methods and analysis are provided in Appendix H – *2004 Results of Groundwater Monitoring, Davis Landfill.*

SECTION 3 - ENGINEERING REPORT

3.1 LOCATION STANDARDS - EXISTING AND PROPOSED LANDFILL EXPANSION

In addition to the Subtitle D criteria, UDEQ has adopted specific location standards. The Utah location standards for Municipal Solid Waste Landfills (MSWLFs), as presented in the Solid Waste Permitting and Management Rules (R315-302-1), are outlined below.

1 — Land Use Compatibility (UAC R315-302-1(2)a)

Not to be located within 1000 feet of Parks and protected areas
Not to be located in an ecologically and scientifically significant area
Not to be located on prime or unique farmland
Not to be located within ¼ mile of existing dwellings, incompatible or historical structures, unless allowed by local land use planning or zoning
Not to be located within 5,000 feet of airport runways
Not to be located on archeological sites

2 — Geology (UAC R315-302-1(2)b)

Proximity to a Holocene Fault
Considerations for constructing in a seismic impact zone
Consideration given to unstable areas

3 — Surface Water (UAC R315-302-1(2)c)

Will not affect public water system
Will not affect existing lakes, reservoirs and ponds
Cannot be located in a floodplain unless certain criteria are met

4 — Wetlands (UAC R315-302-1(2)d) Not allowed unless:

Alternative location has been denied previously
Will not violate state water quality standard or Clean Water Act
Will not jeopardize threatened or endangered species
Will not cause or contribute to significant degradation of the wetlands

5 — Groundwater (UAC R315-302-1(2)e)

Groundwater/landfill cell separation
Sole source aquifer
Groundwater quality
Source protection areas

The following sections present the Utah MSWLF location standards and discuss the status of the Davis Landfill's compliance with those requirements.

3.1.1 Land Use Compatibility

The UDEQ Division of Solid and Hazardous Waste's Solid Waste Permitting and Management Rules state that no MSWLF will be located within:

1. One thousand feet of a national, state or county park, monument, or recreation area; designated wilderness or wilderness study area; or wild and scenic river area.

2. Ecologically and scientifically significant natural areas, including wildlife management areas and habitat for listed or proposed endangered species, as designated pursuant to the Endangered Species Act of 1982.

3. Farmland classified or evaluated as prime, unique, or of statewide importance by the U.S. Department of Agriculture, Soil Conservation Service, under the Prime Farmland Protection Act.

4. One-quarter mile of existing permanent dwellings, residential areas, and other incompatible structures, such as, schools, churches, and historic structures or properties listed or eligible to be listed in the State or National Register of Historic Places.

5. Proximity to an airport.

6. Areas with respect to archeological sites.

3.1.1.1 Davis Landfill Status

1. The Davis Landfill is not located within 1,000 feet of a national, state, or county park, monument, or recreation area; designated wilderness or wilderness study area; or wild and scenic river area.

2. Ecologically or scientifically significant natural areas have not been observed within or adjacent to the current site. This site is an active landfill and has been used as such since the 1940s.

3. There are no soils within the landfill property boundaries that are classified prime soil types for farmland use according to the Soil Conservation Service (SCS) maps of Davis County. There are no irrigation water sources on-site and none of the property is cultivated. Mr. Darryl Trickler, a SCS representative, indicated that to be considered prime farmland the area also must have an irrigated water supply and be actively cultivated. Therefore, the site is not considered within a unique or important farmland zone.

4. There are no schools, churches, historic structures, or properties eligible to be listed in the State or National Register of Historic Places currently located within one-quarter mile of the property line that encloses the area currently being operated as a landfill. There are residential dwellings that have encroached within this one-quarter-mile zone since the landfill began operating. The landfill has been in continuous operation under the direction of various governmental authorities since the 1940s or early 1950s. The properties that comprise the area of this permit application have been designated for landfill use for this same period. A Master Plan prepared for the District in 1984 also identifies the precise location of anticipated filling operations. Construction of the dwelling units within one-quarter mile of the property boundary occurred after the development of the landfill Master Plan. At the time of the Master Plan, no residences were located within the one-quarter-mile buffer. Therefore, the location standard with respect to residential dwellings has been substantively met by the District and should not limit the District's use of its facility.

5. The Davis Landfill is not located within 10,000 feet of a public-use airport runway used by turbojet aircraft. However, the landfill is located within 10,000 feet of a runway at Hill Air Force Base (AFB), which is not under the jurisdiction of the FAA or UDEQ. Therefore, the District's site does comply with the specific airport runway restrictions.

6. The District and its predecessors have been in continuous occupancy at the site since the 1940s. During that period, no archaeologically significant discoveries have been made at the site, nor are any known to exist.

3.1.2 Geology

3.1.2.1 Geologic Hazards

The Utah State Regulations indicate "No new facility or lateral expansion of an existing facility shall be located in a subsidence area, a dam failure flood area, above an underground mine, above a salt dome, above a salt bed, or on or adjacent to geologic features which could compromise the structural integrity of the facility".

Neither the unlined landfill nor the lined landfill cell (all phases) are located in a subsidence area, a dam failure flood area, above an underground mine, above a salt dome, or above a salt bed as mentioned in the Utah State Regulations. However, the landfill area is located in the southeast portion of the Salt Lake Basin along the western side of the Wasatch Front Mountains and is built on and into a bluff overlooking the Weber River. This area may be considered to be geologically hazardous due to the steep side slopes and the associated potential for landslides and erosion. In order to address the concern for potential instability, site analyses were conducted to evaluate the slope stability and design criteria for the existing landfill and the proposed expansion. Much of the analysis, conducted previously by others (Roy F. Weston, Inc. 1996 and Bingham Environmental, Inc. 1997) remains appropriate in representing site conditions and has been so referenced. Additional static and pseudo-static (seismic) slope stability analysis has been performed by IGES to evaluate modifications to the final design. This information is presented in the following sections.

Proposed Phase II and Phase III are to be developed away from the bluff overlooking the Weber River. Native cut slopes or existing landfill structures buttress Phase II and Phase III.

3.1.2.2 Fault Areas

The landfill site is not located over or within 200 feet of any known Holocene fault, as indicated in the geologic site description contained in Part II of this application however

it is located about 1.5 miles from the Wasatch Fault Zone. This fault zone is considered active and capable of producing 7 to 7 ½ magnitude earthquake.

3.1.2.3 Seismic Impact Zone

The EPA and the UDEQ define a seismic impact zone as any location where the expected peak bedrock acceleration from earthquake activity exceeds 0.1 times the acceleration due to gravity (g).

The MHA in lithified earth material is defined in 40 CFR part 258.14 (EPA 1991) as the "maximum expected horizontal acceleration depicted on a seismic hazard map with a 90% or greater probability that the acceleration will not be exceeded in 250 years, or the maximum expected horizontal acceleration based on site specific seismic risk assessment." This definition was adopted in full by the UDEQ. This ground motion is often termed the MCE (maximum considered earthquake) seismic hazard level and associated with a 2% chance of exceedance in 50 years. The acceleration value of approximately 0.6g was obtained from the United States Geologic Survey's (USGS) Earthquake Hazards Program – National Seismic Hazard Mapping Project. The value is an estimated ground surface acceleration of a "firm rock" site, which is identified as having a shear-wave velocity of 760 m/sec in the top 30 meters; sites with different soil types may amplify or de-amplify this value. Section 3.1.2.4 discusses the analyses performed for this permit application and makes reference those performed by others.

3.1.2.4 Seismic Impact Zone Analysis

A seismic response analysis and a dynamic deformation analysis were performed by Roy F. Weston, Inc., 1996 and Bingham Environmental, Inc. 1997. Both firms used similar input values, the same computer software (SHAKE91 and DSPLMT) and in general came up the same results. The analysis and results from these previous permit documents has been reviewed and agreed with by IGES and in our opinion no further analysis is required.

In summary, the seismic response at the site was evaluated by Roy F. Weston, Inc., using the computer program SHAKE91, with the Loma Prieta motion being scaled using the 0.6g MHA value obtained for the site. Four soil/refuse conditions for the site were modeled representing 0, 40, 60 and 80 feet of refuse overlying native soils. Acceleration time histories were then selected and used in the displacement analysis.

Displacement analysis was performed using the computer program DSPLMT. Weston and Bingham each performed a separate displacement analysis using the SHAKE91 time histories created by Weston in 1996. The time histories, static factor of safety, and the yield acceleration were input to evaluate the potential displacement. Based on the results of their analysis, the predicted displacements were approximately equal to or less than 1.0 foot.

Additional slope stability and deformation analysis were performed by IGES to evaluate areas where modifications have been made to the final design. Input information for the stability analyses was evaluated and modified as appropriate prior to performing additional evaluation. A discussion of these values follows.

Soil and refuse strength parameters			
Material	Cohesion (psf)	Friction Angle (degrees)	Unit Weight (pcf)
Foundation Soils (Sandy Silt, Silty Sand)	50	32	110
MSW	200	30	85
Final Cover Soils	50	32	110

The parameters for the MSW were obtained from published results as part of a seismic design review performed by IGES in February of 2000. Withiam et al. (1995) found a friction angle of 30 degrees and a cohesion of 209 based on large-scale insitu direct

shear tests. Kavazanjian et al. (1995) suggested a friction angle of 33 degrees based on the back-analysis of several landfills. Based on this review a friction angle of 30 degrees and a cohesion of 200 psf were selected to define the strength properties of the MSW. These values were also used for the stability evaluation pertinent to this permit application.

The strength values used for the foundation and cover materials have been used by IGES in several studies for the Wasatch site and substantiated with field and laboratory testing and observation. The strength parameters used in this assessment are considered slightly conservative based on the values obtained from laboratory test, however the values is consistent with previous modeling.

Static and pseudostatic stability assessments on typical worst-case excavation and final cover areas were performed as part of this permit application. The analysis was analysis was performed with the software SLIDE version 5.016 using the Bishop's method of slices option for the computations. In general, excavation slopes for the landfill bottom are proposed to be 3H:1V (horizontal to vertical) and final cover slopes are proposed to be 4H:1V. The results of our stability analyses indicate the proposed slopes are stable under static and seismic conditions. A summary of the results is presented in the following table. Output for the analyses, including plots of the most critical failure surfaces is provided in Appendix I:

Section	Condition	Static Minimum Factor of Safety
Phase IV Liner	Global stability with liner	2.27
Stage A Cover	Global stability with liner and cover	3.34
Stage C Cover	Global stability with liner and cover	2.91

The seismic parameters used in our analysis were the same as those presented and used by Weston in 1996, which were based on a maximum horizontal acceleration (MHA) of

0.6g. Weston performed an attenuation analysis to estimate the effects on the MHA as the motion propagates up through the soil profile to the surface. The results of the attenuation analysis indicated peak ground base accelerations ranging from 0.41g to 0.47g with an average of about 0.44g. IGES has reviewed this analysis and agrees with the findings. The deformation analysis performed as part of this study used the average value (0.44g) in the deformation assessment.

The internal friction angle of the reinforced GCL liner and the interface friction angle of the GCL to the textured polyethylene liner were also reviewed. Bingham had compiled relatively extensive test results pertaining to both of these parameters for the Bentomat ST product. These parameters are consistent with information obtained by IGES for the same product. This information is summarized below:

SHEAR STRENGTH DATA OF BENTOMAT ST AS A FUNCTION OF OVERBURDEN*

Overburden Stress (psf)	Internal Fricton Angle (degrees)	Cohesion (psf)
<3000	34.9	280
>3000	24.5	450

* These values are an average of direct shear test data on hydrated bentonite.

INTERFACE SHEAR STRENGTH DATA OF BENTOMAT ST AGAINST A TEXTURED POLYEHYLENE LINER AS A FUNCTION OF OVERBURDEN*

Overburden Stress (psf)	Internal Fricton Angle (degrees)	Cohesion (psf)
<1200	29.5	25
>1200	17.6	200

* These values are an average of direct shear test data on hydrated bentonite.

Bingham Environmental, Inc., used these values to analyze a shear failure within the geosynthetic clay liner (GCL) and along the interface using an infinite slope analysis.

Based on our review of their analysis, we confirmed their factor of safety of 1.7 on a 3H:1V slope under low confining pressures.

IGES previously evaluated the interface between a textured polyethylene liner and a geonet (drain net) composite, which consists of a standard geonet sandwiched between two non-woven geotextile fabrics. An interface friction angle of 27 degrees was obtained from the manufacturer and was used in our slope stability evaluation. Using an infinite slope analysis a factor of safety of 1.52 was obtained. Based on this evaluation we anticipate the interface to be stable under static conditions.

Previous studies performed by Weston and Bingham also contained a deformation evaluation of the landfill. Based on their findings, a yield acceleration of 0.29g or greater predicted a displacement of one foot or less. According to EPA guidance documents, a maximum permissible displacement of one foot is considered acceptable for liners and caps.

IGES completed pseudo-static analysis to obtain yield accelerations for the proposed sections (Phase IV Liner and Stage A and C Covers). Yield accelerations for these sections ranged from 0.35 to 0.45. These yield accelerations were normalized by the anticipated average attenuated ground motion to obtain estimates of slope deformation. These normalized values were multiplied by an amplification factor to account for the increase in horizontal acceleration as the ground motion propagated up through the landfill slopes. Singh and Sun (2000) recommend using the amplification relationship given by Harder (1991) as an upper bound estimate for the seismic response of landfills. Using this relationship an amplification factor of 1.6 was obtained. This value was used to scale the normalized accelerations and the anticipated permanent displacements were obtained using the upper bound curve given by Hynes-Griffin and Franklin (1984). Based on this analysis we anticipate permanent deformations less than 1.0 foot. The results of the deformation analysis are summarized below. Output for the analyses,

including plots of the most critical failure yield acceleration and sliding surfaces are given in Appendix I:

Section	Condition	Yield acceleration (g)	Amplification factor	Anticipated permanent displacement (ft)	
				Upper bound	Lower bound
Phase IV Liner	Global stability with liner	0.35	1.6	0.7	0.2
Stage A Cover	Global stability with liner and cover	0.45	1.6	0.5	0.1
Stage C Cover	Global stability with liner and cover	0.41	1.6	0.6	0.2

Based on our evaluation, the interface was stable under static conditions and the deformations associated with seismic event are anticipated to be less than 1.0 foot.

3.1.2.5 Unstable Areas

We understand the existing landfill is established in an area suspected of being an erosional and land movement area. We further understand studies have been conducted to determine the stability of the existing landfill and its foundation soils. Historic slope inclinometers set in the area did not detected lateral or rotational movements within the existing landfill mass. Surface erosional features and surface sloughs have been observed along some the temporary slopes, apparently due to lack of vegetation.

The last two lined landfill Phases are planned for an area where unstable ground has not been observed. The site has been physically observed on numerous occasions by Professional Engineers and Professional Geologists, and, to the best of their information, does not include areas of instability that would impact the proposed improvements.

Erosional instability will be addressed during final cover design and erosion of temporary slopes during excavation, etc., will be corrected.

3.1.3 Surface Water and Wetlands

UDEQ has adopted Subtitle D location restrictions for floodplains and wetlands. The status of the site is discussed in Section 3.1 of Part II. The landfill site does not currently fall within a delineated 100-year flood zone. There are no known or designated wetlands within the limits of the landfill boundary. There are no known endangered or threatened species within the landfill area. The following bodies of surface water are located within 1 mile of the landfill:

Surface Water	Location
Davis-Weber Canal	1/4 mile northeast
Hobbs Reservoir	1 mile southeast
Irrigation Reservoir	1/8 mile north

3.1.4 Groundwater

UDEQ location restrictions with respect to groundwater protection include the following:

1. No new facility shall be located at a site where the bottom of the lowest liner is less than 5 feet above historical high level of groundwater in the uppermost aquifer.

2. No new facility shall be located over a sole source aquifer as designated in 40 CFR 149.

3. No new facility shall be located over groundwater classified as IB under Section R317-6-3.3 (an irreplaceable aquifer).

4. A new facility located above any aquifer containing groundwater which has a total dissolved solids (TDSs) content below 1,000 milligrams per liter (mg/l) and does not exceed applicable groundwater quality standards for any contaminant is permitted only where the depth to groundwater is greater than 100 feet. For a TDS content

between 1,000 and 3,000 mg/l, the separation must be 50 feet or greater. These separation distance requirements are waived if the landfill is constructed with a composite liner.

5. No new facility shall be located in designated drinking water source protection areas or, if no such protection area is designated, within a distance to existing drinking water wells or springs for public water supplies of 250-day groundwater travel time.

3.1.4.1 Davis Landfill Status

The lowest point of the bottom of the new landfill expansion (4,822 feet MSL) is at least 5 feet above the highest observed groundwater elevation in the shallow perched groundwater (4,806 feet MSL) and approximately 300 feet above the highest usable aquifer. The bottom liner for all lined Phases will be the equivalent of a composite system, using a GCL overlain by a 60-mil HDPE membrane. Therefore, the future landfill liner phases do meet the requirements of the groundwater protection location restrictions.

Groundwater beneath the landfill area is of Class I quality, with a TDS of less than 500 mg/l. It is not a sole source or Class IB (irreplaceable aquifer). Usable drinking water wells are generally drilled to greater than 400-foot depths within a 1-mile radius of the site. A groundwater transport study was not conducted as part of this investigation.

The shallow perched groundwater at the site has been found to contain contaminants that may have originated from the unlined landfill. The contaminants were detected at low concentrations. The groundwater issues at the site are discussed in detail in Section 2.

3.2 LANDFILL DESIGN - PROPOSED LANDFILL EXPANSION

The following sections discuss individual components and details involved in the landfill expansion design and the closure of the landfill.

3.2.1 General Daily Operation

Section 3 of Part II details the general daily operations plan proposed for the Davis Landfill.

3.2.1.1 Current Landfilling Operations

The initial phase (Phase I) of the lined landfill has been filled to capacity over the eastern 2/3^{rds} of the initial liner footprint. The active disposal area is located over the second phase (Phase II) of lined landfill. Phase II will continue to operate during construction of the Phase III lined area. Material removed from the excavation of Phase III will be used as daily cover in Phase II operations, stockpiled for use as final cover or utilized in the foundation construction for Phase IV.

3.2.1.2 Future Landfill Liner Construction

The liner system for the final lined landfill Phases (Phase III and Phase IV) will be the same alternative design approved and used both Phase I and Phase II and is intended to provide the same or better environmental protection as the standard composite liner specified in UDEQ regulations. The approved alternate liner system consists of a prepared foundation soil, a geosynthetic clay liner (GCL), a geomembrane liner overlain by a leachate drainage layer. The GCL will consist of sodium bentonite sandwiched between needle-punched geotextiles. The GCL creates a uniform clay seal layer that has a significantly lower hydraulic conductivity compared to a compacted clay liner (CCL). As such, although thinner, the GCL out performs the 2 foot, 10^{-7} cm/sec clay standard. In addition, a GCL is easier to construct, has more stable properties, has higher tensile strength, is less susceptible to desiccation cracking, is relatively easy to repair, and is less vulnerable to freeze/thaw damage than a CCL. Furthermore, native clays are not found in the vicinity of the site (within 10 miles) of suitable volume or quality to construct a CCL, thus the cost of importing a foreign clay source of sufficient volume to line the future lined areas is prohibitive.

The filling operation is specified in Section 3, Part II, of this application. It will include placing a 24-inch-thick layer of soil as a liner protection layer across the entire landfill bottom and side slopes to protect leachate collection system and liner system. Progressive area filling techniques will be utilized to raise the landfill to its designed final grade elevation prior to closure.

3.2.2 Sources for Daily, Intermediate and Final Cover

3.2.2.1 Daily and Intermediate Soil Cover

There are presently three stockpiles of soil on the Davis Landfill site. One located immediately east of Phase I containing approximately 591,500 cubic yards, another located north of Phase III of the lined landfill (stockpiled in a veneer on the south face of the unlined landfill) containing approximately 100,000 cubic yards and a third stockpile located directly east of the new shop. This third stockpile, in combination with the required excavation for Phases III contains an additional 700,000 cubic yards of material. These surplus soils will be used for daily, intermediate and final cover. The soil generated from the excavation for Phase III will be utilized for daily cover (in Phase II) while Phase III is being excavated (approximately 6 months) with the excess being stockpiled. The stockpile located on the south face of the existing landfill will be used as operational cover in Phase III due to the stockpiled proximity. Any final requirements for soils will then come from the stockpile located to the east of the new shop.

The utilization of the land immediately south of the lined landfill (former vineyard property) for a landfill support facility has generated additional landfill cover soils. The quantities of soil generated by the site grading of the support area (shop, green waste processing, citizens drop-off facilities, and HHW operation) has more than offset the previously projected soil shortfall.

All exposed waste will be covered daily with a minimum of 6 inches of the on-site stockpiled or excavated soils as required in R315-303-4(4) to isolate the waste from vectors and to reduce nuisance odors. Before the start of waste placement each day, a

portion of the previously placed daily cover will stripped back. Removed soils will be stockpiled in the working area for use as soil cover at the end of the day or as needed. These recycled cover soils will be used first, then the remainder of daily cover will be provided by stockpiled or excavated soils.

If areas of the working face will not receive waste for a period longer than 30 days, an intermediate cover will be placed. The intermediate cover will be a minimum of 12 inches thick as required in R315-303-4(4). The intermediate cover will be repaired as necessary with additional soil due to damage caused by erosion or other occurrences.

Alternate daily cover of ash generated from the operation of the DERF or wood chips generated from the green waste processing are propose to be utilized as alternate daily cover. The alternative daily cover (wood chips) would be utilized for no more than 5 operational days in a row to minimize the potential for landfill fires to spread.

3.2.2.2 Final Cover

The Wasatch will initiate its final cover system design within 30 days after waste disposal ceases in the final lift of a particular closure Stage and construction will be completed on the final cover within 180 days. The designed cover for all landfill closure Stages (Stage A, B, and C) are as follows from the top of waste:

- A geosynthetic clay liner (GCL)
- A 60 mil textured HDPE geomembrane.
- A geo-composite drainage layer consisting of a relatively high transmissivity geonet sandwiched between non-woven geotextiles.
- A minimum of 24 inches of soil protective cover.
- A minimum of 6 inches of soil suitable for plant growth.

This engineered final cover system will serve to minimize surface water infiltration (thereby minimizing leachate generation), control gas migration, maintain slope stability, control surface water and soil erosion, and be capable of supporting vegetative cover. This cover system has been provided as an assembly that will be compliant with

Utah regulations. The for construction plans, specifications and QA/QC plan will be submitted to the DSHW for approval prior to the start of construction.

3.2.3 Sources for Soil Liners

No soils exist on the site or within approximately 10 miles of the site that are suitable for use as a compacted clay liner (CCL). The lack of suitable site soils and the proven application of GCL's have resulted in the incorporation of a GCL in the landfill liners and final covers.

3.2.4 Equipment Requirements and Availability

The following equipment is currently utilized at the Davis Landfill:

- One (1) diesel generator, 30 hp (light tower)
- Two (2) diesel engine, 15 hp (air compressors)
- One (1) diesel engine, 5 hp (steam cleaner)
- One (1) diesel engine, 300 hp (tub grinder)
- Two (2) gasoline engine, 5 hp (water pumps)
- Three (3) diesel bulldozers
- Two (2) diesel compactors
- Three (3) diesel front-end loaders
- Two (2) diesel scrapers
- One (1) diesel grader
- One (1) diesel dump truck
- One (1) diesel roll-off truck
- One (1) diesel track hoe
- One (1) diesel water pull
- One (1) diesel compost windrow turner
- One (1) diesel trommel screen
- Landfill gas collections system – blowers, etc...
- Miscellaneous gasoline lightweight vehicles for transportation

The compactors are used to spread and compact solid waste disposed of at the landfill and for the placement of daily cover. The dozers are used to provide backup to the compactors and for general site work. Scrapers are used to excavate and haul daily and final cover materials as well as excavate material within proposed landfill expansion areas. The tub grinder is used to chip yard wastes, wooden pallets, and other compostable wastes. The water pulls are used for dust control and recycle/disposal of leachate. This equipment is sufficient for current operations and may be changed at any time to meet changing requirements of the District.

3.3 DESIGN AND OPERATION OF LEACHATE COLLECTION, TREATMENT, AND DISPOSAL SYSTEM – LINED LANDFILL CELL

The Leachate Collection System (LCS) in the final lined landfill Phases (Phase III and Phase IV) will be the same general components (only the geometry and specific locations will change) as the approved leachate collection system installed in Phase I and Phase II. The LCS consists of a geocomposite drainage material to provide lateral drainage of leachate directly above the liner system. The geocomposite is to be placed over the entire bottom of the each lined landfill Phase. The LCS is designed to minimize physical and biological clogging. The piping, grades, and materials of the LCS will be designed to maintain operation during landfilling operations. The geocomposite is designed to limit leachate depths on the liner to well less than one foot, even when clogged by sediments and biofouling that has been observed at similar facilities. Each leachate collection and header pipe has been oversized to allow maintenance cleaning. The geocomposite will be covered by a protective soil layer consisting of 24 inches of soil with an in-place permeability of between 10^{-3} and 10^{-5} cm/sec. This material serves to protect the liner system, including the leachate collection system, from damage during the placement of the first layer of solid waste. The protective layer is/will be constructed of moderately permeable, sandy soils excavated from the landfill expansion and separately stockpiled during excavation.

The bottom of the waste phases will be graded to provide a minimum slope of 2% from the highest side of the graded bottom to the lowest side. Perforated drainage pipes will be installed to prevent the localized buildup of head (leachate) and to transport collected leachate. Within each phase, the lateral pipes will terminate at a leachate header pipe (installed in Phase I), which will traverse the base of the landfill, connecting to each leachate lateral pipe. Leachate from Phase III and Phase IV will report into the existing leachate collection sump near the northeast end of the landfill. Leachate will be pumped from the sump to a leachate evaporation pond. In the event of a power outage or equipment failure, a vacuum truck can be utilized to remove and transport leachate to the pond or alternate disposal site. Standby pumps will also be available at the site to accommodate unexpected conditions.

The LCS, as designed, has been in operation within Phase I and Phase II of the lined landfill with no operational problems having been experienced with the design to date.

All leachate generated within the lined landfill will flow by gravity to a common collection sump, where it is pumped to the lined leachate evaporation pond. The location of the leachate collection sump, leachate transfer pipe, and leachate evaporation pond is indicated on the Drawings in Appendix A. The leachate evaporation pond is approximately one acre in surface area, with a maximum capacity of over 2,000,000 gallons. The pond has been sized to include the maximum amount of leachate per month (268,570 gallons) and rainfall from a 25-year, 24-hour storm and to maintain 2 feet of freeboard. Since the submittal of the previous permit application; Wasatch Integrated has installed a dual walled pipe to transfer leachate from the leachate pond to a POTW located in South Weber.

Leachate is disposed of through: 1) free surface evaporation, 2) surface application/dust control within the lined landfill cell and 3) discharge to the local POTW. Any residues removed from the pond and will be placed in the operating

landfill. The leachate evaporation pond is lined with a double geosynthetic membrane and leak detection system.

3.4 DESIGN OF RUN-ON AND RUN-OFF CONTROL SYSTEMS – LINED LANDFILL

3.4.1 Run-On from a 24-Hour, 25-Year Storm

The design for the lined areas of the Davis Landfill incorporates a run-on control system that is capable of directing the flow away from the active portion of the landfill during the peak discharge of a 24-hour, 25-year storm (2.83 inches, NOAA Atlas 14). The purpose of the run-on control is to minimize the amount of surface water entering the landfill facility. Run-on controls prevent: (1) erosion, which may damage the physical structure of the landfill; (2) surface discharge of wastes in solution or suspension; and (3) downward percolation of run-on through wastes, creating leachate. The detention ponds will collect and evaporate minor storm events.

The upper stormwater detention pond is designed to protect the homes along the north edge of the landfill from unintended surface water discharges. Discharge will be directed to the lower pond by a pipe connected to the upper stormwater detention pond drain box.

Run-on/run-off from the south, uncapped face of the old landfill into Phase III of the lined landfill will be controlled by a temporary large ditch along the access road. This ditch will carry the stormwater to the upper stormwater detention pond on the northeast side of the landfill. As Phase IV is developed all drainage off the south face of the unlined landfill will be directed into the Phase III lined area where it will report as leachate to the leachate detention pond. Once Phase IV grading has been complete; all runoff from the west side of the landfill (over both lined and unlined landfills) will report to a perimeter ditch that will direct all storm waters to the stormwater detention pond system.

District personnel will be responsible for the maintenance of the slopes and drainage systems to keep the run-on control systems operable.

3.4.2 Run-Off from a 24-Hour, 25-Year Storm

The design for the final phases of the lined landfill will incorporate a run-off control system that will collect and contain the water volume resulting from a 24-hour, 25-year storm that falls on the active landfill area but does not contact the working area. Preliminary calculations of the run-off totals used for preliminary design of the stormwater collection ditches are provided in Appendix F. The stormwater collection ditches were designed assuming virtually of the precipitation would reach the ditches via the drain net or along the ground surface. Preliminary stormwater collection ditch and pipe design calculations are also included in Appendix F. Final design calculations for the run-off control system will be included in the final construction documents associated with each closure Stage.

Run-off water from the portion of the landfill with intermediate cover will be directed to either the upper or lower stormwater detention pond. Twelve inches of intermediate cover will be maintained and provided with erosion control features to minimize the amount of sediment eroding from the cover during a storm event. Weekly inspections of the intermediate cover will be conducted to ensure that the surface water flows off the intermediate cover without contacting waste. Surface water that flows off the intermediate cover will be intercepted by control berms and will be treated as noncontact run-off. Water that percolates through the intermediate cover and that water which contacts the solid waste materials will be treated as leachate and will be collected in the leachate collection system. The intermediate cover will be graded to provide the maximum slopes consistent with slope stability to minimize the amount of precipitation that would infiltrate into the waste materials.

Berms and ditches will be incorporated into the active landfill areas to direct the precipitation away from the working faces and leachate collection system. This will

greatly reduce the volume of precipitation that will need to be treated as leachate. Temporary berms and liners may be incorporated to divert rainwater from entering the leachate system. Temporary, movable construction pumps will be used to dewater confined areas if necessary.

District personnel will be responsible for the maintenance of the slopes and drainage systems to ensure the efficient operation of the run-off system. Precipitation that contacts the working face or otherwise enters the leachate collection system will be treated as leachate.

The Davis Landfill is designed and will be constructed so as not to cause point or non-point source discharges to surface waters, including wetlands, in violation of the CWA or in violation of State of Utah water quality management plans approved under section 208 or 319 of the CWA.

3.4.3 Landfill Gas Control

Landfill gases will be monitored using a handheld monitor along the perimeter of the landfill and in landfill structures. Should routine monitoring indicate gas conditions exceeding regulatory requirements or should federal guidelines or regulations regarding landfill gas collection systems be issued, a gas extraction system will be designed and implemented.

Landfill gasses are currently being colleted and directed to HAFB as a source of fuel for a landfill gas-to-energy project.

3.5 CLOSURE AND POST-CLOSURE DESIGN – CLOSURE STAGES A, B, & C

Sections 4 and 5 of Part II detail the closure and post-closure design of the Davis Landfill.

3.6 CLOSURE AND POST-CLOSURE MAINTENANCE – CLOSURE STAGES A, B, & C

3.6.1 Final Cover

During the active years of the landfill operations, the landfill supervisor will inspect all closed landfill areas and will correct any erosion or settlement deficiencies observed during this inspection. The final cover will be inspected and evaluated for any evidence of erosion, ponded water, odor, disposed, disposed refuse, cracks, settlement, slope failure, and leachate seeps no less than quarterly and more frequently should such evidence exist.

Following the construction of closure Stage A, Stage B, and Stage C of the final landfill cover; a post-closure maintenance program will be implemented at the landfill in order to maintain the integrity of the landfill's final cover. The final cover areas will be evaluated no less than quarterly for any evidence of erosion, ponded water, odor, disposed refuse, cracks, settlement, slope failure, and leachate seeps.

Erosion features in the final cover will be regraded and recompacted (additional soil added) as necessary to minimize the future potential for erosion. Any erosion damage, which may be caused by extremely heavy rainfall, will be repaired and fortified as necessary. Temporary berms, ditches, and straw mulch will be used to prevent further erosion damage to soil cover areas until site conditions permit the final cover and vegetation to be reestablished. Preventive maintenance to the final cover systems should preclude problems resulting from infiltration of surface water, gas venting through the cover, and vectors attracted by exposed refuse.

3.6.2 Drainage System

Drainage control problems can result in accelerated erosion of a particular area within the landfill. Differential settlement of drainage control structures can limit their usefulness and may result in a failure to properly direct stormwater off-site.

Implementation of the post-closure maintenance program will maintain the integrity of the final drainage system throughout the post-closure maintenance period. The final drainage system will be evaluated no less than quarterly and inspected for ponded water and blockage of and damage to drainage structures and swales. Where erosion problems are noted or drainage control structures need repair; proper maintenance procedures will be implemented as soon as site conditions permit so that further damage is prevented and the cause of the damage is eliminated. Damaged drainage pipes and drainage structures will be removed and replaced as necessary.

District staff will inspect the drainage system no less than quarterly. Temporary repairs will be made until permanent repairs can be scheduled. Wasatch or a licensed general contractor will replace drainage facilities.

3.6.3 Vegetative Cover

Early establishment of vegetation on the landfill's final slope surface will impede soil erosion and promote evapotranspiration. Wasatch will evaluate vegetative growth, vigor, and color during final cover inspections so that the integrity of the final cover system design is maintained. If stress signs on vegetation caused by landfill gas and leachate seeps are noted, the problem will be corrected. Corrective procedures will be conducted based on current design recommendations and will be built consistent with construction specifications.

District personnel will inspect the vegetative cover no less than quarterly. Wasatch staff or a licensed landscape contractor will make repairs.

3.6.4 Leachate Collection System

The leachate collection system must be maintained so that it operates during the post-closure maintenance period. The system will be inspected no less than quarterly by District staff for signs of deterioration. As conditions warrant, the leachate evaporation pond will be cleaned, and residues will be disposed of at an appropriate disposal facility.

Wasatch or a licensed contractor will make required repairs. The leachate collection piping system has been provided with cleanout piping at the end of all piping runs to facilitate its cleaning and maintenance. The pump stations have removable pumps on tracks to limit the amount of confined-space work necessary for periodic maintenance activities.

3.6.5 Gas Monitoring / Collection System

The landfill gas monitoring / collection system will be regularly inspected but no less than quarterly, in conjunction with the scheduled monitoring tasks. The system will be repaired, and parts will be replaced as required to maintain system capabilities. The program described below for inspecting and maintaining the gas monitoring system will be followed during the post-closure maintenance period.

The landfill gas monitoring system will be inspected no less than quarterly. Quarterly maintenance will include cutting weeds in a 2-foot radius around each monitoring point. Preventive maintenance will be performed on all mechanical equipment at manufacturer-recommended intervals. These tasks include cleaning, lubrication, and replacement of worn parts.

3.6.6 Groundwater Monitoring System

All groundwater monitoring wells will be inspected for signs of failure or deterioration during each sampling event. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to replace or repair the well. Possible repairs include redevelopment, chemical treatment, partial casing replacement or repair, sealing the annulus, or pumping and testing. If a well needs to be replaced, it will be properly abandoned. Damaged wells will be scheduled for repair or replacement within 1 month after the problem is identified.

3.6.7 Final Grading

The landfill cover final grade will be inspected no less than quarterly and maintained in order to maintain its integrity. Evaluation and inspection of the cover final grades will include the items specified in Part II. At the completion of closure activities, the surface of the final cover will be surveyed to provide a reference point for the monitoring of landfill settlement and the movement of drainage structures.

Areas where water has collected (ponded) will be regraded to establish positive drainage. Erosion damage resulting from extremely heavy rainfall will be repaired as necessary.

3.7 POST-CLOSURE LAND USE – CLOSURE STAGES A, B, & C

District staff or a designated engineer will design a post-closure end use plan for the landfill at the time of final closure. Wasatch will select an end use that will be limited to those that do not threaten the integrity of the existing control systems. All activities will be approved by Davis County (or the municipality that has annexed the landfill) prior to implementation. Typical end uses range from recycling operations (which complement existing operations) to recreational activities. Since the closure of the site may be over 20 years away, it is not currently possible to develop those land use plans to be consistent with surrounding land uses and the needs of the county that may be relevant at that future time.

SECTION 4 – REFERENCES

Bingham Environmental, Inc., June 1997, *Groundwater Monitoring Plan, Davis County Landfill, Layton*, Utah. Unpublished consultant's report.

Bingham Environmental, Inc., August 1997, *Landfill Gas Monitoring Plan, Davis County Landfill, Layton, Utah,* Unpublished consultant's report.

Bingham Environmental, Inc., December 1997, *Supplemental Engineering Report, Davis County Landfill, Layton, Utah*, Unpublished consultant's report.

Bingham Environmental, Inc., October 1998, *Report of Background Groundwater Quality, Davis County Landfill, Layton, Utah*, Unpublished consultant's report.

Bingham Environmental, Inc., 1999, *Supplemental Hydrogeologic Evaluation, Davis County Landfill, Layton, Utah*, Unpublished consultant's report.

EMCON, 1982, *Preliminary Geotechnical Investigation and Waste Management Studies,* NDRD Disposal Site, Davis County, Utah, Unpublished consultant's report.

EMCON, 1991. *Southwest Geologic and Hydrogeologic Characterization Report,* North Davis Refuse District Landfill, Davis County Utah. Unpublished consultant's report.

EMCON, 1991. *Geologic and Hydrogeologic Characterization Report ¾ North Davis Refuse District Landfill, Davis County, Utah.* EMCON Southwest, Project 558-02.05, July, Unpublished consultant's report.

Harder, Jr., L.S., 1991, *Performance of Earth Dams During the Loma Prieta Earthquake,* Proceedings Second International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics.

Hecker, S., 1993, Quaternary Tectonics of Utah with Emphasis on Earthquake-Hazard Characterization: Utah Geological Survey Bulletin 127, 157p.

Hynes-Griffen, M.E. and Franklin, A.G., 1984, *Rationalizing the Seismic Coefficient Method,* Department of the Army, Miscellaneous Paper GL-84-13.

Intermountain GeoEnvironmental Services (IGES), Inc., February 2000, *Slope Stability Analyses of Working Face and Exterior Closure Slope*, Wasatch Energy Systems, Unpublished consultant's report.

Kavazanjian, Jr., E., Matasovic, N., Bonaparte, R., Schmertmann, G.R., 2000, *Evaluation of MSW Properties for Seismic Analysis,* Geotechnical Special Publication No. 46, ASCE.

NOAA, Atlas 14, Hydrometeorological Design Studies Center – Precipitation Frequency Data Server, National Oceanic and Atmospheric Administration –

National Weather Service, **URL:http://hdsc.nws.noaa.gov/hdsc/pfds/sa/ut_pfds.html**

Singh, S. and Sun, J.I., 2000, *Seismic Evaluation of Municipal Solid Waste Landfills,* Geotechnical Special Publication No. 46, ASCE.

State of Utah Department of Environmental Quality, Division of Solid and Hazardous Waste, 2000, *R315-301 through R315-311 Utah Solid Waste Permitting and Management Rules.*

U.S. Environmental Protection Agency. 1995. *RCRA Subtitle D (258) Seismic Design Guidance for Municipal Solid Waste Landfill Facilities.* Richardson and Kavazanjian. EPA/600/R-95-051, April 1995.

USGS, Earthquake Hazards Program–National Seismic Hazards Mapping Project, United States Geological Survey, Golden, Colorado, **URL:http://earthquake. usgs.gov/ hazmaps/**

Wasatch Energy Systems, February 2000, *1999 Groundwater monitoring Results, Davis County Landfill,* Unpublished Report

WESTON (Roy F. Weston, Inc.), 1993, *Landfill Master Plan, Davis County Landfill.* Unpublished consultant's report.

WESTON (Roy F. Weston, Inc.), 1994. *Hydrogeological Characterization Report.* Unpublished consultants report.

WESTON (Roy F. Weston, Inc.), 1995, Letter Report to Jack Schmidt dated 8 May.

WESTON (Roy F. Weston, Inc.), 1996, *Application for a Permit to Operate a Class I Landfill,* Davis County Solid Waste Management and Energy Recovery Special Service District.

Withiam, J.L., Tarvin, P.A., Bushell, T.D., Snow, R.E., Germann, H.W., 2000, *Prediction and Performance of Municipal Landfill Slope,* Geotechnical Special Publication No. 46, ASCE.

APPENDIX A

Drawings

Exhibit A B
Page 1

LILD * * * DAVIS COUNTY LAND INFORMATION SYSTEM * * *

PROPERTY SERIAL #: G-2296 09:004:0002
OWNER NAME: NORTH DAVIS REFUSE DISPOSAL
LEGAL DESCRIPTION:

BEG AT A PT S 0^16'50"W 990.0 FT ALG SEC LN FR NE COR SEC 3, T4N-R1W; TH N 89^56'10"W 1287.0 FT PAR TO N LN OFSD-SEC TO E LN OF A 2 RD ROAD; TH 50' E 990.0 FT ALG SD ROAD TO N LN OF SD SEC; TH N 89^56'10"W 60.89 FT COR OF E1/2 OF NE1/4 SEC 3; TH S 0^12' 05"W 2640.25 FT ALG W LN OF E1/2 E 1/4 TO THE S LN OF SD NE 1/4; TH S 89^46'40" E 286.55 FT M O L, ALG S LN NE 1/4 TO A PT 1057.7 FT N 89^46'40" W OF E 1/4 COR OF SD SEC 3; TH N 0^1 E 48.7 FT; TH S 89^46'40" E 130.0 FT; TH S 0^13'20" W 48.7 FT; TH S 89^46' 927.7 FT, M O L, ALG SD S LN TO E 1/4 COR OF SD SEC 3; TH N 0^16'50" E 1311 T ALG E LN OF SD SEC TO SW COR OF N 1/2 OF NW 1/4 OF SEC 2-4N-1W, TH N 89^4 E 2639.74 FT ALG S LN OF LOTS 3 & 4 OF SD SEC 2, TO SE COR OF SD LOT 3; TH 2'20" E 1317.82 FT TO NE COR SD LOT 3; TH W 1317.88 FT ALG N LN SEC 2, TO N SD LOT 3; S 0^16'50" W 990.0 FT; TH W 1320.0 FT TO POB. CONT. 102.017 ACR SS TO 793-787 9.16 ACRES REMAINDER CONT 92.857 ACRES

LD * * * DAVIS COUNTY LAND INFORMATION SYSTEM * * * YEAR:

PROPERTY SERIAL #: G-2294-4 09:004:0003
WNER NAME: DAVIS COUNTY
EGAL DESCRIPTION:

PART OF SW1/4 OF NW1/4 OF SEC 2:T4N- R1W; SLM: BEG AT NW COR OF SD SW1/4 ^41'14" E 1319.86 FT TO NE COR OF SD SW1/4 TH S 0^14'37" W 176.89 FT TH S 3'W 196.48 FT TH S 74^30'10" W 341.60 FT TH S 71^05'10" W 156.64 FT TH S 4- 30" W 217.41 FT TH S 88^10'30" W 497.11 FT TO SEC LN TH N 0^16'50" E 516. TO POB CONT. 11.01 ACRES MOL

* * * DAVIS COUNTY LAND INFORMATION SYSTEM * * * YEAR:

RTY SERIAL #: 13:033:0005
NAME: DAVIS COUNTY
SCRIPTION:

AT SE COR OF SEC 34, TH W 1340.16 FT TO SW COR OF SE 1/4 OF SE 1/4 OF SEC -R1W SLM, TH N 1279.9 FT; TH S 73^57' E 1405.95 FT M/L TO E SEC LN TO POB. CONT. 33.53 ACRES.

_ILD * * * DAVIS COUNTY LAND INFORMATION SYSTEM * * * YI

PROPERTY SERIAL #: G-2296-2 09:117:0004
OWNER NAME: DAVIS COUNTY
LEGAL DESCRIPTION:

BEG AT A PT 80 RDS W & 60 RDS S OF NE COR OF SEC 3, T4N-R1W; SLM: S 100
2 RDS, TH N 100 RDS, TH W 2 RDS TO THE PT OF BEG: CONTAINING 1.25 ACRES

D * * * DAVIS COUNTY LAND INFORMATION SYSTEM * * * YEAR:1

ROPERTY SERIAL #: G-2296-1 09:117:0002
)WNER NAME: DAVIS COUNTY
EGAL DESCRIPTION:

EG AT THE NE COR OF SEC 3, T4N-R1W; SLMW 80 RDS, TH S 60 RDS, TH E 80 RDS, TH
? RDS TO PT OF BEG. CONT. 30.00 ACRES

LD * * * DAVIS COUNTY LAND INFORMATION SYSTEM * * * YEAR:19

OPERTY SERIAL #: G-2289-1 09:004:0001
NER NAME: DAVIS COUNTY
AL DESCRIPTION:

; AT NW COR OF SEC 2, & RUN E ALG TH N LN OF SD SEC 2, 1320.0 FT; TH S 990.
TH W 1320.0 FT TO W LN OF SD SEC 2: TH N ALG SD W LN 990.0 FT TO POB CONT.
0 ACRES SEC 2; T4N-R1W; SLM:

APPENDIX B

Legal Description & Proof of Ownership

APPENDIX C

Landfill Forms

Wasatch Integrated Waste Commercial Screening Form

Inspection Information

Truck Tag Number: _____ Inspector: _____

Hauling Company: _____ Date: _____

Driver's Name: _____ Time: _____

Vehicle Type: _____

License Plate Number: _____ Inspector signature _____

Route identification _____

Type Waste: _____

Driver's signature* _____ Date: _____

* Driver's signature hereon denotes His/her presence during the inspection and does not admit, confirm, or identify liability.

SCREENING CHECKSHEET

		YES	NO		YES	NO
CONTAINERS				POWDERS/DUST		
Full	If yes #			Identified		
Partially full	If yes #			Unknown		
Empty	If yes #			**Biohazardous Waste**		
Crushed	If yes #			**Radioactive Waste**		
Punctured	If yes #			**Sod/Soil**		
End Removed	If yes #			**Ash**		
FREE LIQUIDS				**Hazardous (labeled)**		
MEAT				**ODORS** (unusual)		
HAZARDOUS MATERIALS				Strong		
PCB'S				Faint		

ITEMS FOUND	QUANTITY
Lead Acid Batteries	
Auto or Truck Tires	
Metal	
Appliances	
(other)	

Load is Considered (mark one):

Non-Hazardous	
Suspect	
Probable	
Confirmed	

= No Answer Required

= A mark here means the load is hazardous or a reject

If load is considered Suspect/Probable or Confirmed. The following questions should be answered: To answer these questions a conversation with the Driver may be needed. Look for materials that can identify the source, either through material, labels, container markings, shipping papers or other evidence. Be cautious if you decide to use evidence that is in a load that has come from more than one firm. You could misidentify the source.

What led to the decision that the material was suspect/probable/confirmed:

_____

_____

Source/Suspected Source _____

Source Notification Date/Time _____ Person notified _____

	Yes	No	How many	Date Out	Date In
Samples					
Sample #'s					

Results: hazardous _____ non hazardous _____

Attach Sample Results to this Sheet

11/10/1999

Hazardous Material Handling Worksheet

Hazardous Material: _____ Quantity _____

Source/Suspected Source _____ (See info. on first page)

State/County Agencies Notified

Agency	Who	Date	Memo

Special Handling Requirements _____

Disposal Requirements _____

Proposed Chain of Custody and Schedule (for planning purposes only)

Company			
From:	Date:	To:	Date:
From:	Date:	To:	Date:
From:	Date:	To:	Date:

Actual Chain of Custody

Signature/Company		Signature/Company	
From:	Date/Time	To:	Date/Time
From:	Date/Time	To:	Date/Time
From:	Date/Time	To:	Date/Time

Date Closed: _____ Closed by: _____

Reviewed by:

Quality Review _____ Remarks _____

Landfill Manager _____ Remarks _____

Facility Manager _____ Remarks _____

- **DAVIS LANDFILL**
- **GREEN and HOUSEHOLD HAZARDOUS WASTE RECYCLING FACILITIES**

Monthly Operations Checklist

Date: _____

Inspector : _____

√ = Adequate

X = Action Necessary

Entrance

- ☐ Signs Posted
- ☐ Acceptable Appearance/Cleanliness
- ☐ Entrance Secured When Facility Closed

Personnel

- ☐ Attendant Present When Facility Open
- ☐ Safety Equipment Available and In Use

Disposal Area

- ☐ Unloading Area Clearly Marked
- ☐ Public and Commercial Operation Separated
- ☐ Is the Working Face As Small As Possible
- ☐ Litter Fences in Use
- ☐ Odor Problems
- ☐ Dust or Litter Blowing
- ☐ Daily Cover Applied
- ☐ Final Cover and Vegetation In Place

Fire Protection

- ☐ No Smoking Rules in Force
- ☐ Water Available at Working Face
- ☐ Stockpile Soil Available
- ☐ Fire Extinguishers on All Equipment
- ☐ Radio or Telephone On-Site

Green Waste

- ☐ Yes ☐ No Acceptable Appearance/Cleanliness?
- ☐ Yes ☐ No Products Processing Acceptable?
- ☐ Yes ☐ No Re-Sale Products Available?

Salvage Practices

- ☐ No Scavenging Policy Enforced
- ☐ Non-Process Area Free of Litter and Vermin

Water Quality

- ☐ Working and Filled Areas Graded to Prevent Pooling
- ☐ Run-Off From Adjoining Areas Diverted From Site
- ☐ Leachate Collection Performing as Intended
- ☐ Leachate Discharge Performing as Intended

Vector Controls

- ☐ Ye ☐ No Rodent Problem
- ☐ Ye ☐ No Bird Problem
- ☐ Ye ☐ No Insect Problem

Gas Collection

- ☐ Condensate System Performing as Intended
- ☐ Air-Supply Performing as Intended
- ☐ No Odors or Leaks Detected

Documents

- ☐ Permit or License on Display
- ☐ Development Plans Available
- ☐ Operational Plans Available

Other

- ☐ Gas Extraction Records On File
- ☐ Gas Migration Records On File
- ☐ Compost Readings On File
- ☐ On-Site Training Available
- ☐ Waste Screening Records on File

APPENDIX D

Closure / Post-Closure Costs

LANDFILL POST-CLOSURE COSTS (30 YEARS)

Section 1.0 - Engineering

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost	
1.1	**Post-Closure Plan**	NA			$0	
1.2	**Annual Report** (including results from gas, leachate, and ground water sampling - details of maintenance performed)	LS	$5,000	30	$150,000	
a	Semiannual Site Inspections	LS	$320	60	$19,200	(1 day of time)
b	Plan Update	LS	$200	30	$6,000	
				Engineering Subtotal	$175,200	

Section 2.0 - Gas Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost	
2.1	**Sample Collection**	LS	$320	120	$38,400	QUARTERLY SAMPLING (Documentation)
2.2	**Sample Analysis**	NA			$0	(4 hours of time)
2.3	**Report** (Part of Annual Report)					
				Gas Collection System - Sampling Subtotal	$38,400	

Section 3.0 - Leachate Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost	
2.1	**Sample Collection**	LS	$80	60	$4,800	SEMI-ANNUAL SAMPLING (Documentation)
2.2	**Sample Analysis**	NA	$400	60	$24,000	(2 field hours, minimal analytical work)
2.3	**Report** (Part of Annual Report)					
				Leachate Collection System - Sampling Subtotal	$28,800	

Section 4.0 - Ground Water Monitoring System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost	
3.1	**Sample Collection**	LS	$640	60	$38,400	QUARTERLY SAMPLING (2 days/event)
3.2	**Sample Analysis**	LS	$6,000	120	$720,000	
3.3	**Report** (Part of Annual Report)					
				Ground Water Collection System - Sampling Subtotal	$758,400	

Section 5.0 - Facility Operations and Maintenance

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost	
4.1	**Cover**					
a	Soil Replacement	LS	$1,000	30	$30,000	
b	Vegetation/Reseeding	LS	$500	30	$15,000	
4.2	**Storm Water Protection Structures**					
a	Ditch and Culvert Maintenance	LS	$500	30	$15,000	
b	Berm and Basin Maintenance	LS	$500	30	$15,000	
4.3	**Gas Collection System**					
a	System Operation	NA	$240	3120	$748,800	(4 hours @ $60/hr every week)
b	System Repair	LS	$2,000	30	$60,000	
4.4	**Leachate Collection System**					
a	System Operation	NA		30	$0	
b	System Repair	NA		30	$0	
4.5	**Ground Water Monitoring System**					
a	System Operation	NA		30	$0	
b	System Repair	LS	$500	30	$15,000	
4.6	**Site Security**					
a	Lighting, signs, etc...	LS	$500	30	$15,000	
b	Fencing and Gates	LS	$500	30	$15,000	
4.7	**Miscellaneous**					
a						
b						
				Facility Operations and Maintenance Subtotal	$928,800	

Total	$1,929,600
10% Contingency	$192,960
Total Post-Closure Cost	$2,122,560

LANDFILL CLOSURE COSTS

Section 1.0 - Engineering

Item	Description	STAGE A (ESTIMATED DATE OF CLOSURE= 2006, AREA= 440,000 FT SQ) Unit/Measure	Cost/Unit	No. Units	Total Cost	STAGE B (ESTIMATED DATE OF CLOSURE=2019, AREA=1,200,000 FT SQ) Unit/Measure	Cost/Unit	No. Units	Total Cost	STAGE C (ESTIMATED DATE OF CLOSURE=2028, AREA=1,470,000 FT SQ) Unit/Measure	Cost/Unit	No. Units	Total Cost
1.1	**Topographic Survey**	LS	$5,000	0	$0	LS	$5,000	1	$5,000	LS	$5,000	1	$5,000
1.2	**Boundary Survey for Closure**	NA				NA				LS	$7,500	1	$7,500
1.3	**Site Evaluation**	NA		1	$0	NA		1	$0	LS			$0
1.4	**Development of Plans** (Cover and Gas Collection)	LS	$40,000	1	$40,000	LS	$50,000	1	$50,000	LS	$60,000	1	$60,000
1.5	**Contract Administration** - (Bidding and Award)	LA	$5,000	1	$5,000	LA	$5,000	1	$5,000	LA	$5,000	1	$5,000
1.6	**Administrative Costs** - (Certification of Final Cover and Closure Notice)	LS	$5,000	1	$5,000	LS	$5,000	1	$5,000	LS	$5,000	1	$5,000
1.7	**Project Management** - (Construction Observation and Testing)	LS	$20,000	1	$20,000	LS	$20,000	1	$20,000	LS	$20,000	1	$20,000
1.8	**Monitor Well Consultant Cost**	NA			$0	NA			$0	NA			$0
1.9	**Other Environmental Permit Costs**	NA			$0	NA			$0	NA			$0
				Engineering Subtotal	$70,000			**Engineering Subtotal**	$85,000			**Engineering Subtotal**	102,500

Section 2.0 - Construction

Item	Description	STAGE A Unit/Measure	Cost/Unit	No. Units	Total Cost	STAGE B Unit/Measure	Cost/Unit	No. Units	Total Cost	STAGE C Unit/Measure	Cost/Unit	No. Units	Total Cost
2.1	**Final Cover System**												
	area	440,000				1,200,000		1		1,470,000			
2.1.1	*Site Preparation/ Site Regrading*	ACRE	$1,000	10.1	$10,101	ACRE	$1,000	27.5	$27,548	ACRE	$1,000	33.7	$33,747
2.1.2	*Gas Collection Layer/Pipes*	Included below			$0	Included below				Included below			$0
2.1.3	*Low permeability Layer (Soil - If Applicable)*												
a	Soil Purchase	NA			$0	NA			$0	NA			$0
b	Soil Processing (load)	NA			$0	NA			$0	NA			$0
c	Soil Transportation	NA			$0	NA			$0	NA			$0
d	Soil Placement	NA			$0	NA			$0	NA			$0
e	Soil Amendment (compact)	NA			$0	NA			$0	NA			$0
2.1.4	*Low permeability Layer (Synthetic - If Applicable)*												
a	Geotextile	NA			$0	NA			$0	NA			$0
b	GCL	SQ FT	$0.60	440,000	$264,000	NA	$0.60	1,200,000	$720,000	NA	$0.60	1,470,000	$882,000
c	Geomembrane (HDPE,PVC,LLDPE,etc...)	SQ FT	$0.55	440,000	$242,000	NA	$0.55	1,200,000	$660,000	NA	$0.55	1,470,000	$808,500
2.1.5	*Drainage Layer (Soil - If Applicable)*												
a	Geotextile	NA			$0	NA			$0	NA			$0
b	Sand/Gravel	NA			$0	NA			$0	NA			$0
2.1.6	*Drainage Layer (Synthetic - If Applicable)*												
a	Geotextile	NA			$0	NA			$0	NA			$0
b	Geonet/Geocomposite	SQ FT	$0.60	440,000	$264,000	NA	$0.60	1,200,000	$720,000	NA	$0.60	1,470,000	$882,000
2.1.7	*Erosion Protection Soil Layer*												
a	Soil Purchase	NA			$0	NA			$0	NA			$0
b	Soil Processing (load)	CY	$0.75	24,444	$18,333	CY	$0.75	66,667	$50,000	CY	$0.75	81,667	$61,250
c	Soil Transportation	CY	$1.25	24,444	$30,556	CY	$1.25	66,667	$83,333	CY	$1.25	81,667	$102,083
d	Soil Placement	CY	$1.00	24,444	$24,444	CY	$1.00	66,667	$66,667	CY	$1.00	81,667	$81,667
e	Soil Amendment (compact)	CY			$0	CY			$0	CY			$0
2.1.8	*Topsiol Layer*												
a	Soil Purchase	NA			$0	NA			$0	NA			$0
b	Soil Processing (load)	CY	$0.75	8,148	$6,111	CY	$0.75	22,222	$16,667	CY	$0.75	27,222	$20,417
c	Soil Transportation	CY	$1.25	8,148	$10,185	CY	$1.25	22,222	$27,778	CY	$1.25	27,222	$34,028
d	Soil Placement	CY	$1.00	8,148	$8,148	CY	$1.00	22,222	$22,222	CY	$1.00	27,222	$27,222
e	Soil Amendment	NA			$0	NA			$0	NA			$0
2.1.9	*Revegetation*												
a	Seeding	ACRE	$800	10.1	$8,081	ACRE	$800	27.5	$22,039	ACRE	$800	33.7	$26,997
b	Fertilizing	ACRE	$800	10.1	$8,081	ACRE	$800	27.5	$22,039	ACRE	$800	33.7	$26,997
c	Mulch	ACRE	$200	10.1	$2,020	ACRE	$200	27.5	$5,510	ACRE	$200	33.7	$6,749
d	Tacifier	ACRE	$200	10.1	$2,020	ACRE	$200	27.5	$5,510	ACRE	$200	33.7	$6,749
2.2	**Stormwater Protection Structures**												
a	Culverts	NA			$0	NA			$0	NA			$0
b	Pipes	NA			$0	NA			$0	FT	$40	2,100	$84,000
c	Ditches/Berms	FT	$16	5,100	$81,600	FT	$16	4,200	$67,200	FT	$16	5,700	$91,200
d	Detention Basins	NA			$0	NA			$0	NA			$0
2.3	**Gas Collection System**												
a	Design	Included In Section 1.0			$0	Included In Section 1.0			$0	Included In Section 1.0			$0
b	Additional Gas Collection Wells and Connection	EA	$25,000	10	$252,525	LS	$25,000	28	$688,705	NA	$25,000	34	$843,664
2.4	**Leachate Collection System**												
a	Design	NA			$0	NA			$0	NA			$0
b	Additional Equipment / Installation	NA			$0	NA			$0	NA			$0
2.5	**Groundwater Monitoring System**												
a	Monitor Well Installation	NA			$0	NA			$0	NA			$0
b	Monitor Well Abandonment	NA			$0	NA			$0	NA			$0
2.6	**Site Security**												
a	Lighting, signs, etc...	NA			$0	NA			$0	NA			$0
b	Fencing and Gates	NA			$0	NA			$0	NA			$0
2.7	**Miscellaneous**												
a	Performance Bonds	LS	$10,000	1	$10,000	LS	$10,000	1	$10,000	LS	$10,000	1	$10,000
b	Contract/Legal fees	LS	$5,000	1	$5,000	LS	$5,000	1	$5,000	LS	$5,000	1	$5,000
				Construction Subtotal	$1,247,206			**Construction Subtotal**	$3,220,217			**Construction Subtotal**	$4,034,270

	Total	$1,317,206	**Total**	$3,305,217	**Total**	$4,136,770
	10% Contingency	$131,721	**10% Contingency**	$330,522	**10% Contingency**	$413,677
	Subtotal Closure Cost	$1,448,927	**Subtotal Closure Cost**	$3,635,738	**Subtotal Closure Cost**	$4,550,447

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET

ASSUMPTIONS
Ditch has 10 sq ft per lineal foot
Ditch has gravel in geocell over GCL
One gas collection well per acre

APPENDIX E

Financial Assurance

August 15, 2005

Mr. Dennis Downs, Director
Utah Division of Solid and Hazardous Waste
288 North 1460 West
Salt Lake City, Utah 84114-4880
Attention: Jeff Emmons, Environmental Scientist

Re: Financial Assurance as of June 30, 2005 for the Davis Landfill and Energy Recovery Facility.

Dear Mr. Downs:

This letter is provided to update the financial assurance sufficient to assure adequate closure and post-closure care of the Davis Class I Landfill and Energy Recovery Facility operated by Wasatch Integrated Waste Management District (The District) as of June 30, 2005. Closure and post-closure costs as of June 30, 2005 have been updated by multiplying the previous years estimate by the consumer price index to account for likely cost inflation.

As required under Utah Administrative Code **(UAC) R315-309** the District estimates total closure and post-closure costs for the entire Davis Landfill and Energy Recovery Facility as follows:

Closure and Post Closure-Costs as of: **% Change = 2.4% (CPI-U 1 Jun 05 year change)**	**June 30, 2004**	**June 30, 2005**
Landfill		
Unlined Cell Closure Costs	Closed	Closed
Phase 1 Closure Costs	$2,599,707	$ 2,662,100
Phase 2 Closure Costs	$2,136,275	$ 2,187,546
Phase 3 Closure Costs	$3,031,422	$ 3,104,176
Landfill Closure Costs	$7,767,404	$ 7,953,822
Entire Landfill Post-Closure Costs	$2,225,631	$ 2,279,046
Total Landfill Closure and Post-Closure Costs	$9,993,035	$10,232,868
Energy Recovery Facility		
Total Energy Recovery Facility Closure Costs	$ 77,394	$ 79,251
Total Closure and Post-Closure Costs (Landfill & Facility)	$10,070,429	$10,312,119

Landfill Capacity (Cubic Yards)	**Total**	**Used**	**%Used**	**Remaining**
Unlined Cell	2,463,782	2,463,782	100%	0
Lined Cells	5,217,850	1,010,416	19%	4,207,434
Total Landfill	7,681,632	3,474,198	45%	4,207,434

Energy Recovery Facility Estimated Life

	Costs	Accumulated Depreciation	Percent Used
Energy Recovery Facility (Building, Boilers, Pollution Eq. & GSA)	$44,123,550	$29,193,132	66%

Closure and Post-Closure Liability

	June 30, 2005 Total Costs	% Used	June 30, 2005 Total Liability
Landfill Closure	$ 7,953,822	19%	$1,511,226
Landfill Post-Closure	$ 2,279,046	45%	$1,025,571
Total Landfill Closure & Post-Closure	$10,232,868		$2,536,797
Energy Recovery Facility Closure	$ 79,251	66%	$ 52,306
Total Closure & Post-Closure	$10,312,119		$2,589,103

Financial Assurance General Requirements

For the financial assurance **(UAC) R315-309-2(3) (a)** states:

> The closure cost estimate shall be based on the most expensive cost to close the largest area of the disposal facility ever requiring a final cover at any one time during the active life in accordance with the closure plan...

The District in accordance with **(UAC) R315-309-2(3)** estimates closure cost for the Energy Recovery Facility and the Davis Landfill's largest area ever requiring a final cover at any one time during the active life in accordance to the closure plan to be:

Largest Area Closure Costs:	**June 30, 2005**
Landfill Largest Area Closure Costs	
Phase 1 Closure Costs	$2,662,100
Phase 2 Closure Costs	$2,187,546
Largest Area Post-Closure Costs	$2,279,046
Landfill Subtotal	$7,128,692
Energy Recovery Facility Closure Costs	$ 79,251
Total Largest Area Closure and Post-Closure Current Costs	**$7,207,943**

The District estimates are provided in current dollars and based on the costs for a third party contractor(s) to perform the work in accordance with the final closure plan.

Financial Assurance Mechanisms

The District, in accordance with **(UAC) R315-309-3(4),** intends to provide financial assurance for the period ending June 30, 2005 by a combination of mechanisms that together meet the **$7,207,943** requirements of subsection **(UAC) R315-309-1(1).** The financial assurance mechanisms chosen by the District are:

(UAC) R315-309-4 Trust Fund

The District has established an escrow account with the Utah State Treasurer invested in the Utah Public Treasurers" Investment Fund which has been accepted by the Utah Division of Solid and Hazardous Waste meeting the requirements of **(UAC) R315-309-4.** The balance as of June 30, 2005 is **$3,000,530.**

(UAC) R315-309-8 Local Government Financial Test

The District intends to provide the remaining required balance of **$4,207,413** for closure and post-closure financial assurance through the Local Government Financial Test.

The Local Government Test requires:

- **(UAC) R315-309-8(2)(a)**
  In January 1999 the District defeased all of the 1993 revenue bond issue and issued $30,840,000 in insured revenue bonds with ratings of AAA+ by Standard and Poor's and Aaa by Moody's. As of June 30, 2005 the District had $4,830,000 in revenue bonds outstanding.

- **(UAC) R315-309-8(2)(c)**
  The District's financial statements are prepared in conformity with Generally Accepted Accounting Principles for governments. Crane, Christensen & Ambrose an independent certified public accounting firm has audited the June 30, 2005 Financial Statements.

- **(UAC) R315-309-8(2)(d)**
  The District has placed a reference to the closure and post-closure costs in each audited financial report since 1994. The District current fiscal year comprehensive annual financial report as of June 30, 2005 also contains a reference to closure and post-closure care costs. All subsequent comprehensive annual financial reports during the time in which closure and post-closure care costs are assured through the financial test will include a reference to the closure and post-closure care costs assured through the financial test. The reference to the closure and post closure care cost include:

  (i) the nature and source of the closure and post-closure care requirements
  (ii) the reported liability at the balance sheet date
  (iii) the estimated total closure and post-closure care costs remaining to be recognized
  (iv) the percentage of landfill capacity used to date
  (v) the estimated landfill life in years

- **(UAC) R315-309-8(6)(a)**
  "If the local government does not assure other environmental obligations through a financial test it may assure closure, post-closure, and corrective action costs that equal up to 43% of the local government's total annual revenue."

  The cost of closure and post-closure care of the Davis Landfill and Energy Recovery Facility are the only current costs that the District is assuring by the Local Government Financial Test. In accordance with **(UAC) R315-309-2(3)** the District estimates the current cost to be covered by the Local Government Financial Test is **$4,207,413.**

As required by **(UAC) R315-309-8(4)(a)(i)(ii)** I certify that Wasatch Integrated Waste Management District currently exceeds the requirements of Subsections **(UAC) R315-309-8(2)** and **(6)** for closure and post-closure care costs of the Davis Landfill. Evidence for this statement is calculated as of fiscal year ended June 30, 2005:

Total revenue:	$16,446,646
Less gain (Loss) on sale of assets: FY 2005:	(33,473)
Total annual revenue for fiscal year 2005:	$16,480,119
43% of the local government's total annual revenue:	43%
Maximum allowable assurance by financial test:	**$ 7,086,451**

Based on this calculation the District meets the requirements and can provide the $4,207,413 through the Local Government Financial Test.

- **(UAC)R315-309-8(4)(b)**
  Wasatch Integrated Waste Management's audited financial statements audited by Crane Christensen & Ambrose for the fiscal year ending June 30, 2005 are attached to this letter.

- **(UAC)R315-309-8(4)(c)**
  A report to the District's Administrative Control Board from a independent certified public accountant stating the procedures performed and the findings relative to the requirements of Subsections UACR315-309-8(2)(c) and UACR315-309-8(3)(c) and (d) is attached to this letter.

- **(UAC)R315-309-8(2)(d)**
  The District will include a reference to the closure and post-closure care costs assured through the financial test into the next comprehensive annual financial report and in every subsequent comprehensive annual report during the time in which closure and post-closure costs are assured through the financial test.

If you have any questions or require any additional information please feel free to contact us at 801-614-5600.

Sincerely,

Wasatch Integrated Waste Management District

Nathan Rich, P.E.
Executive Director

David Van De Graff
Controller

Cc: Steve Crane

WASATCH INTEGRATED WASTE MANAGEMENT DISTRICT
(A Component Unit of Davis County)

Financial Statements - June 30, 2005 and 2004

(With Auditors' Report Thereon)

CRANE, CHRISTENSEN & AMBROSE
Certified Public Accountants
A Professional Corporation

298 24th Street, Suite 300 • Ogden, Utah 84401

RANE, CHRISTENSEN & AMBROSE
Certified Public Accountants
A Professional Corporation

Steven F. Crane, CPA
Kent R. Christensen, CPA
Jeffrey L. Ambrose, CPA
Chuck Palmer, CPA

Independent Auditors' Report

Administrative Control Board
Wasatch Integrated Waste Management District

We have audited the accompanying statement of net assets of Wasatch Integrated Waste Management District (a Component Unit of Davis County) as of June 30, 2005 and 2004, and the related statements of revenues, expenses and changes in net assets and cash flows for the years then ended. These financial statements are the responsibility of the District's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America, and Government Auditing Standards issued by the Comptroller General of the United States. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Wasatch Integrated Waste Management District at June 30, 2005 and 2004, and the results of its operations and cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Management's discussion and analysis is not a required part of the basic financial statements but is supplementary information required by the Governmental Accounting Standards Board. We have applied certain limited procedures, which consisted principally of inquiries of management regarding the methods of measurement and presentation of the supplementary information. However, we did not audit the information and express no opinion on it.

Our audits of the basic financial statements were made primarily to form an opinion on such financial statements taken as a whole. The supplementary information contained in Schedules 1 and 2 is presented for the purposes of additional analysis and, although not required for a fair presentation of financial position, results of operations, and cash flows, was subjected to the audit procedures applied in the audits of the basic financial statements. In our opinion, the supplementary information is fairly presented in all material respects in relation to the basic financial statements taken as a whole.

In accordance with Government Auditing Standards, we have also issued a report dated August 10, 2005 on our consideration of the District's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts and grants. That report is an integral part of an audit performed in accordance with Government Auditing Standards and should be read in conjunction with this report in considering the results of our audit.

Crane Christensen & Ambrose

August 10, 2005

298 24th Street, Suite 300 • Ogden, Utah 84401 • Telephone (801) 627-2060 FAX 627-2182
Member Division of CPA Firms, American Institute of Certified Public Accountants

Wasatch Integrated Waste Management District
(A Component unit of Davis County)

Management Discussion and Analysis

As Management of Wasatch Integrated Waste Management District (the "District"), we offer readers of the District's financial statements this narrative overview and analysis of the financial activities of the District for the year ended June 30, 2005. We encourage readers to consider the information presented here in conjunction with additional information that we have furnished in the independent Auditor's report.

History and Background

The District was formed in 1984 under the name of Davis County Solid Waste Management and Energy Recovery Special Service District. In the mid 1990s the District created a dba name of Wasatch Energy Systems. On July 1, 2004 the District changed its name to Wasatch Integrated Waste Management District. The change was made as required by Utah law, to remove the word "County" from the name.

The District was established on September 24, 1984, by Resolution No. 84-200 adopted by the Board of County Commissioners of Davis County, Utah (the "County"), pursuant to the provisions of the Utah Special Service District Act, Title 17A, Chapter 2, Part 13, Utah Code Annotated 1953, as amended (the "Special Service District Act"). Under the Special Service District Act the District constitutes a separate body politic and corporate and a quasi municipal public corporation distinct from each county or municipality in which the District is located. Following the establishment of the District, in accordance with the provisions of the Special Service District Act, the governing body, of each of the cities now included within the boundaries of the District, adopted a resolution electing to be included within the District.

The Special Service District Act provides that the District may not be dissolved nor may any area within the District be withdrawn from the District if any bonds, notes or other obligations of the District are outstanding and unpaid or if any contractual obligation of the District to provide services exists. The boundaries of the District include all of the municipalities in Davis County (other than certain areas within the City of Bountiful), the unincorporated area of Davis County, Morgan City and the unincorporated area of Morgan County, Utah. The District's present boundaries encompass an area of approximately 268 square miles with an estimated population of 210,000 persons.

The Utah Special Service District Act, as applied to the District, provides that the Board of County Commissioners of Davis County shall control, and have supervisory authority over, all activities of the District, but that the Board of Davis County Commissioners may delegate to an administrative control board the governance of the District and the exercise

of certain powers of the District under the Special Service District Act. Pursuant to Resolution No. 84-200 and Resolution No. 87-130, adopted by the Board of Davis County Commissioners (collectively, the "County Resolution"), the governance and the exercise of the powers of the District were delegated to the Administrative Control Board. So long as the County Resolution is not repealed by the Board of County Commissioners, the Administrative Control Board is the governing authority of the District. Upon any repeal of the County Resolution, the Board of Davis County Commissioners would become the governing authority of the District.

The Administrative Control Board is presently composed of nineteen members; including the three Davis County Commissioners and one member from each of sixteen other political subdivisions of the State of Utah that are included within the District. Each member of the Administrative Control Board is appointed by the Governing body of the member's respective political subdivision for a four-year term. As of June 30, 2005 members of the Administrative Control Board are:

Board Member	**Position**	**Representing**
Allan Hansen	Commissioner	Davis County
Dan McConkie	Commissioner	Davis County
Carol Page	Commissioner	Davis County
Michael Deamer	Mayor	Centerville City
Tom Waggoner	Mayor	Clearfield City
Lori Miller	Councilmember	Clinton City
Larry Haugen	Councilmember	Farmington City
Rick Miller	Mayor	Fruit Heights City
Brian Cook	Mayor	Kaysville City
Jerry Stevenson	Mayor	Layton City
Tony London	Councilmember	Morgan City
Dan Hancock	Commissioner	Morgan County
Kay Briggs	Mayor	North Salt Lake City
Val Peterson	Councilmember	South Weber City
Jan Galbraith	Mayor	Sunset City
Jon Jepperson	Councilmember	Syracuse City
Carl Martin	Mayor	West Bountiful City
JP Petroff	Mayor	West Point City
Jerry Larrabee	Mayor	Woods Cross City

The Administrative Control Board annually elects an executive committee including; Chairman, Vice Chairman, and Secretary. As of June 30, 2005 members of the executive committee are:

Jerry Stevenson	Chairman
Jerry Larrabee	Vice-Chairman
Dan McConkie	Secretary

Daily operations of the District are supervised by the Executive Director, Nathan Rich, who is appointed by, and serves at the pleasure of the Administrative Control Board. District Staff currently consists of 58 full time employees and 1 part time employee.

The District operates an integrated solid waste disposal system which consists of; a waste to energy facility (the "WTE Facility"), a subtitle D landfill (the "Landfill"), a composting operation (the "Green Waste Recycling Facility"), and a household hazardous waste drop-off facility (the "HHW Facility").

The WTE Facility is located on a tract of land in unincorporated Davis County located adjacent to Hill Air Force Base (HAFB) and Layton City, Utah. The WTE Facility includes two mass burn municipal waste combustion units, each with a nameplate capacity of 210 tons per day. The combustors are equipped with refractory wall furnaces and heat recovery boilers. The WTE Facility is equipped with a back pressure turbine generator rated at 1600 kW. Steam generated from the combustion of waste is exported to HAFB for process and heating uses pursuant to the terms and conditions of the Utility Service Contract. Construction of the Facility was completed and final acceptance of the Facility occurred in October 1988.

The Landfill is located approximately 1.5 miles east of the WTE Facility and consists of two landfill cells. The historic landfill (unlined) cell began accepting waste in about 1952 and was closed in 1999. The historic landfill cell does not have a bottom liner component or leachate recovery system. The new (lined) landfill cell was constructed in 1998 to meet Federal Standards under the Resource Conservation Recovery Act (RCRA) Subtitle D and includes an engineered bottom liner and leachate collection system.

During 2004 the District installed equipment at the landfill to compress and ship landfill gas, via pipeline, to HAFB for use in generating electricity. In January 2005 the project came on line and started putting waste gas, produced from decaying garbage, to beneficial use while reducing air pollution. The project was completed in partnership with HAFB, the U.S. Department of Energy, and the Utah Energy Office and produces up to 1,200 kW of electricity (power for about 900 homes).

The Green Waste Recycling Facility is located adjacent to the landfill and became operational in the fall of 2002. Recycling consists of processing of vegetative wastes to produce wood chip, mulch, and compost products which are available to the general public for sale at modest prices.

The HHW Facility became operational during 2003 and provides a place for residents of the District to dispose of household quantities of potentially hazardous waste at no charge. Services provided include; 1) recycling of used oil, batteries, and antifreeze, 2) product reuse, and 3) proper disposal for potentially hazardous materials.

Current expected life of WTE Facility and the Davis Landfill is approximately 20 years. Replacement of this disposal capacity will need to be acquired in the 10 to 15 year time frame. The District is currently putting into place a long term plan to provide for continued service beyond the life of the current facilities.

Financial Highlights

- A substantial rate reduction of approximately $2.5 million was implemented at the beginning of the most recent fiscal year. The rate reduction was made in anticipation of final bond payment in June 2006 and was designed to reduce cash reserves of the District by $5 million over the following two years.

- The assets of the District exceeded its liabilities at the close of the most recent fiscal year by $46,894,315 (net assets). Of this amount $16,382,383 is temporarily restricted to meet 1999 Revenue Refunding Bond requirements, landfill closure and post closure requirements, and District Title 9, Application of Funds requirements as set by resolution by the Administrative Control Board. The remaining balance of $30,511,932 may be used to meet the District's ongoing services and obligations to customers, employees, and creditors.

- The District's total net assets increased by $1,524,957 due primarily to payment of bonds payable, higher than budgeted revenues in energy sales, recycling & salvage and outside district waste. Increased household growth in the district and stronger than expected interest revenue due to higher interest rates were also a factor to higher than budgeted revenues.

- At the close of the current fiscal year the District's combined ending funds cash balances were $20,458,922, a decrease of $1,015,726 in comparison with the prior year as a direct result of the rate reductions.

- The Green Waste Recycling Facility completed its second full year of operation adding value for customers of the District. The facility diverted 9,941 tons from the landfill and generated $66,643 in sales of compost and mulch products. Also completing its second full year of operation this year was the HHW Facility which provides for collection of potentially hazardous wastes from residents at no charge. The LF Gas to Energy Facility, after five months of operations has generated $23,879 in revenue and used thousands of pounds of landfill gas for electrical power generation.

- The Districts total liabilities decreased by $2,848,537 during the most recent fiscal year. The key factors being the payment of $4,515,000 in bonds payable and an increase in closure/post closure liabilities of $441,693.

- The District purchased approximately 7 acres of land east of the WTE Facility and deeded approximately 2 acres north of the WTE Facility to Layton City for

the construction of a public road to access a new east gate entrance for HAFB and providing additional access to surrounding District property.

Overview of the Financial Statements

The District's financial statements consist of:

- **The Statement of Net Assets** present information on all of the District's assets and liabilities, with the difference between the two reported as net assets. Over time, increases or decreases in net assets may serve as a useful indicator of whether the financial position of the District is improving or deteriorating.

- **The Statement of Revenues, Expenditures, and Changes in Net Assets** present information showing how the District's net assets changed during the most recent fiscal year. All changes in net assets are reported as soon as the underlying event giving raise to the change occurred, regardless of the timing of related cash flows. Thus, revenues and expenses are reported in these statements for some items that will only result in cash flows in future fiscal periods (e.g., uncollected fees charged and earned but unused vacation leave).

- **The Statement of Cash Flows** presents the activities of the District on a cash-received and cash paid basis. This statement shows how cash was spent and reconciles the change in the cash accounts for the District from the prior year to the current year.

- **Notes to the Financial Statements** The notes provide additional information that is essential to a full understanding of the data provided in the financial statements.

- **Other Information** In addition to the basic financial statements and accompanying notes, this report presents certain supplementary information concerning the District's bond requirements as well as closure and post-closure care requirements for the Landfill and WTE Facility.

Financial Analysis

As noted earlier, net assets may serve over time as a useful indicator of a government's financial position. In the case of the District, assets exceeded liabilities by $46,894,315 at the close of the most recent fiscal year.

By far the largest portion of the District's net assets (58 percent) reflects its investment in capital assets (e.g. land, buildings, machinery and equipment); less any related debt used to acquire those assets that is still outstanding. The District uses these capital assets to provide services to citizens; consequently, these assets are not available for future spending. Although the District's investments in capital assets is reported net of related debt, it should be noted that the resources needed to repay this

debt must be provided from other sources since the capital assets cannot be used to liquidate these liabilities.

In comparison with the prior year, the following items should be noted:

- Total operating revenues decreased by $3,334,406. This decrease was planned with rate reductions, but partially offset by strong energy sales.
- Total operating expenses increased by $2,673,901. This increase resulted largely from an accelerated maintenance schedule at the WTE Facility.
- Non operating revenues increased by $231,832
- Non operating expenses decreased by $247,099
- Net assets increased by $1,524,957, compared to a $7,054,333 increase the prior year.

The following tables summarize information presented in the financial statements:

Wasatch Integrated Waste Management Districts' Net Assets

	2005	2004	Total Change 2005-2004
Current and other assets	$23,692,942	$24,866,272	$(1,173,330)
Capital assets	32,687,442	32,837,693	(150,251)
Total assets	56,380,384	57,703,965	(1,323,581)
Current and other liabilities	6,896,966	5,357,196	1,539,770
Long-term liabilities	2,589,103	6,977,410	(4,388,307)
Total liabilities	9,486,069	12,334,606	(2,848,537)
Net assets:			
Net assets invested in Capital assets, net of debt	27,857,442	23,492,693	4,364,749
Restricted – temporary	16,382,383	5,078,115	11,304,268
Unrestricted	2,654,490	16,798,551	(14,144,061)
Total net assets	$46,894,315	$45,369,359	$1,524,957

Wasatch Integrated Waste Management Districts' Change in Net Assets

	2005	2004	Total Change 2005-2004
Operating revenue	$15,917,808	$19,252,214	$(3,334,406)
Operating expenses	14,534,370	11,860,469	2,673,901
Net operating income	1,383,438	7,391,745	(6,008,307)
Non operating revenues (expenses)	141,519	(337,412)	478,931
Change in net assets	1,524,957	7,054,333	(5,529,376)
Net assets – beginning of year	45,369,359	38,315,026	7,054,333
Net assets – end of year	$46,894,316	$45,369,359	$1,524,957

Revenues

District revenues are generated from user fees and energy sales. No tax dollars are used in financing District operations. Pursuant to the provisions of the Special Service District Act and the Solid Waste Management Act, the District has the authority to control, supervise, and regulate the collection, transportation, and disposition of all solid waste generated within its jurisdiction and to require that all solid waste generated within its jurisdiction be delivered to a solid waste management facility. The District collects a monthly container fee for residential household (automated side-load) containers and commercial (automated side-load) containers. A tipping fee is charged for all other waste received. The District also has entered into a utility service contract with the government of the United States providing for the delivery of steam to HAFB. A summary of the District's Revenues are:

	Amount	Percent
Operating Revenues:		
Tipping fees	$12,197,254	75%
Steam / Energy sales	3,496,126	21%
Recycling and other	224,428	1%
Total operating revenue	15,917,808	97%
Non operating revenues	562,312	3%
Total revenues	$16,480,120	100%

Capital Assets

The District acquired capital assets totaling $2,207,775 most of which was attributed to the acquisition of the following items:

- Komatsu WA320-5L Loader
- International Roll off Truck
- Landfill Gas to Energy Project
- Expansion of Landfill Gas Collection
- Site Development for New Landfill Facilities
- Computer Equipment and Software
- Ash Extractor Replacement Project at WTE Facility
- Land
- Diesel Backup Generator at WTE Facility
- Windrow Turner
- Komatsu Dozer

Debt Administration

The District paid off $4,515,000 on the outstanding 1999 Series Revenue Bonds outstanding. At the end of the fiscal year the District had bonded debt outstanding of $4,830,000. The remaining debt is scheduled to be retired by June 2006.

Economic Factors and Next Year's Budget and Rates

- The District prepared its 2006 budget anticipating nominal growth in households and tonnage of waste handled over the next year. The District will continue to provide good customer service by maintaining and expanding District facilities and continually improving customer service. The District will continue to promote an integrated waste management system for the handling of waste in the District that includes; waste to energy, modern landfill technology, recycling, and composting.

- The District has planned a $9,117,000 capital budget for fiscal year 2006 which includes construction at the landfill of a maintenance shop, scale facilities, citizen drop-off facility, HHW facility and green waste recycling area. These facilities are being built for increased customer service and safety. Also replacement of some heavy equipment and vehicles is planned.

Request for Information

The financial report is designed to provide a general overview of the District's finances for all those with an interest in the District's finances. Questions concerning any of the information provided in this report or requests for additional financial information should be addressed to the District Executive Director, Nathan Rich, 650 East Highway 193, Layton, Utah 84041.

WASATCH INTEGRATED WASTE MANAGEMENT DISTRICT
(A Component Unit of Davis County)

Statement of Net Assets

June 30, 2005 and 2004

	2005	2004
ASSETS		
Current assets:		
Cash (note 2)	$ 478,335	787,880
Temporary cash investments (note 2)	18,043,061	18,749,242
Accounts receivable less allowance for doubtful accounts of $20,000 (note 7)	1,675,576	1,981,961
Inventory (note 1)	913,000	1,145,288
Prepaid expenses and deposits	526,464	86,983
Total current assets	21,636,436	22,751,354
Water rights	50,000	50,000
Bond reserve fund investments (notes 2, 3 and 5)	1,937,526	1,927,334
Property, plant and equipment (notes 1, 4, 5 and 6)	71,365,074	68,355,734
Less accumulated depreciation	38,677,632	35,518,041
Property, plant and equipment - net	32,687,442	32,837,693
Bond issuance costs, less accumulated amortization of $440,869 ($372,265 in 2004) (note 1)	68,980	137,584
Total assets	56,380,384	57,703,965
LIABILITIES		
Current liabilities:		
Current bond maturities (note 5)	4,830,000	4,515,000
Accounts payable	829,426	326,138
Other accrued liabilities	1,228,359	498,762
Total current liabilities	6,887,785	5,339,900
Liabilities payable from assets held by trustee:		
Accrued interest payable	9,181	17,296
Long-term debt:		
Bonds payable	-	4,830,000
Land fill closure and post closure care costs (note 10)	2,589,103	2,147,410
Total long-term debt	2,589,103	6,977,410
Total liabilities	9,486,069	12,334,606
NET ASSETS		
Invested in capital assets, net of related debt	27,857,442	23,492,693
Restricted - temporary for bond and capital project requirements	16,382,383	5,078,115
Unrestricted	2,654,490	16,798,551
Total net assets	$46,894,315	45,369,359

See independent auditors' report and notes to financial statements.

WASATCH INTEGRATED WASTE MANAGEMENT DISTRICT
(A Component Unit of Davis County)

Statement of Revenues, Expenses and Changes in Net Assets

Years Ended June 30, 2005 and 2004

	2005	2004
Operating revenues:		
Tipping fees	$12,197,254	15,971,029
Steam sales	3,496,126	3,104,230
Recycling	129,657	145,224
Other	94,771	31,731
Total operating revenues	15,917,808	19,252,214
Operating expenses:		
Professional services	170,068	200,409
Insurance	513,524	535,054
Salaries and wages	2,853,735	2,664,767
Payroll taxes and fringe benefits	1,110,082	1,096,916
Miscellaneous	252,645	268,110
Utilities and telephone	303,818	399,840
Maintenance and repairs	4,254,946	1,951,678
Permits, licenses and fees	48,922	46,392
Operating supplies	958,896	867,908
Depreciation and amortization	3,626,041	3,422,045
Landfill closure and post closure adjustment (note 10)	441,693	407,350
Total operating expenses	14,534,370	11,860,469
Net operating income	1,383,438	7,391,745
Non-operating revenues (expenses):		
Gain (loss) on sale of equipment	(33,473)	(56,745)
Interest revenue	562,312	330,480
Interest expense	(386,445)	(610,050)
Financing costs	(875)	(1,097)
Total non-operating revenues (expenses)	141,519	(337,412)
Change in net assets	1,524,957	7,054,333
Net assets - beginning of year	45,369,359	38,315,026
Net assets - end of year	$46,894,316	45,369,359

See independent auditors' report and notes to financial statements.

WASATCH INTEGRATED WASTE MANAGEMENT DISTRICT
(A Component Unit of Davis County)

Statement of Cash Flows

Years Ended June 30, 2005 and 2004

	2005	2004
Cash flows from operating activities:		
Receipts from customers	$16,223,318	19,072,464
Payments to suppliers	(6,790,831)	(4,362,927)
Payments to employees	(3,882,998)	(3,717,984)
Net cash provided by operating activities	5,549,489	10,991,553
Cash flows from investing activities:		
Interest received	562,312	330,480
Sale (purchase) of investments	(10,192)	3,662
Net cash provided by investing activities	552,120	334,142
Cash flows from capital and related financing activities:		
Interest paid	(394,560)	(617,586)
Purchase of capital assets	(2,207,775)	(1,068,204)
Principal paid on bonds payable	(4,515,000)	(4,245,000)
Net cash used by capital and related financing activities	(7,117,335)	(5,930,790)
Net (decrease) increase in cash and temporary cash investments	(1,015,726)	5,394,905
Cash and temporary cash investment - beginning of year	19,537,122	14,142,217
Cash and temporary cash investment - end of year	$18,521,396	19,537,122
Reconciliation of operating income to net cash provided by operating activities:		
Net operating income	$ 1,383,438	7,391,745
Adjustments to reconcile net operating income to net cash provided by operating activities:		
Depreciation and amortization	3,626,041	3,422,045
Decrease (increase) decrease in accounts receivable	305,510	(179,750)
Decrease (increase) in inventory	232,288	(46,273)
(Increase) in prepaid expenses	(439,481)	(21,348)
Increase in other current liabilities	-	17,784
Increase in land closure and post closure care costs	441,693	407,350
Net cash provided by operating activities	$ 5,549,489	10,991,553

See independent auditors' report and notes to financial statements.

(1) Organization and Summary of Significant Accounting Policies

A. Nature of Operations

Wasatch Integrated Waste Management District was established on September 24, 1984 by a resolution adopted by the Board of County Commissioners of Davis County, Utah, pursuant to the provisions of the Utah Special Service District Act.

The District is engaged in the operation of a solid waste disposal and resource recovery co-generation facility (the Facility). In the process of burning solid waste, the Facility generates steam which is sold as an energy source to the United States Government (Hill Air Force Base).

During fiscal year 1987, various cities deeded to the District property on which the District now operates a landfill. The landfill property, was deeded without charge to the District. Because fair market value was not determinable (and is deemed to be minimal), this land has not been reflected in the accompanying financial statements.

B. Financial Reporting Model

The District has implemented a new financial reporting model, as required by the provisions of GASB Statement No. 34, *Basic Financial Statements--and Management's Discussion and Analysis--for State and Local Governments.*

C. Accounting Policies

Fund Accounting - The accounts of the District are organized as one proprietary fund type specifically as an enterprise fund. Proprietary funds account for the flow of economic resources and use the accrual basis for accounting. Under this method, revenues are recorded when earned and expenses are recorded at the time the liabilities are incurred. The District applied all applicable FASB pronouncements in accounting and reporting for its proprietary operations. Enterprise funds account for operations that are financed and operated in a manner similar to private business or where the intent of the governing body is that costs of providing services to the general public on a continuing basis be financed or recovered primarily through user charges.

Reporting Entity - In evaluating how to define the government for financial purposes, management has considered all potential component units. The decision to include a potential component unit in the reporting entity was made by applying the criteria set forth in accounting principles generally accepted in the United States of America. The basic - but not the only - criterion for including a potential component unit within the reporting entity is the governing body's ability to exercise oversight responsibility. The most significant manifestation of the ability is financial interdependency. Other manifestations of this ability to exercise oversight responsibility include, but are not limited to, the selection of governing authority, the designation of management, the ability to significantly influence operations and accountability of fiscal matters. A second criterion used in evaluating potential component units is the scope of public service. Application for this criterion involves considering whether the activity benefits the government and/or its citizens, or whether the activity is conducted within the geographic boundaries of the government and is generally available to its citizens. A third criterion used to evaluate potential component units for inclusion or exclusion from the reporting entity is the existence of special financing relationships, regardless of whether the government is able to exercise oversight responsibilities. Based upon the application of these criteria, the District has no component units. The District has been determined to be a component unit of Davis County. The County has a minority position in the District's management in that three of the nineteen trustee positions are held by the County Commission. The County is considered to be the primary government for the District because the County was the creating entity and also has the statutory authority of dissolution.

Deposits and Investments - The District's cash and cash equivalents are considered to be cash on hand and demand deposits. Investments are stated at cost.

Inventory valuation - Inventory is stated at lower of cost (average cost) or market. Market is considered to be net realizable value.

(1) Organization and Summary of Significant Accounting Policies - Continued

Property, plant and equipment - The property, plant and equipment are recorded at cost of purchase or construction plus capitalized interest on qualifying property until October 15, 1988 (commercial operation date) in accordance with Statement of Financial Accounting Standards No. 62.

Depreciation - All property, plant and equipment is depreciated on the straight-line method over the following estimated useful lives: buildings 15-30, pollution equipment 20, improvements and landscaping 15-30, boilers and burning equipment 3-20, computer equipment 3-5, heavy mobile equipment 3-15, other equipment 3-20.

Bond issue costs - Amortization of bond issue costs is computed on the straight-line method over the term of the related Revenue Bonds.

Estimates - The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect certain reported amounts and disclosures. Accordingly, actual results could differ from those estimates.

(2) Cash and Investments

The District's cash and investments are categorized as either (1) insured or registered or for which the securities are held by the District or its agent in the District's name, (2) uninsured and unregistered for which the securities are held by the counter-party's trust department or agent in the District's name or (3) uninsured and unregistered for which the securities are held by the counterparty or by its trust department or agent but not in the District's name. Interest earnings are included in the values shown. The District also invested in the Utah Treasurers Investment Fund which is not subject to credit risk classification. The following schedule details the distribution of the District's cash and investments.

	Categories			Carrying	Fair
	1	2	3	Amount	Value
Investments in the Utah Public Treasurers Investment Fund	$ -	-	-	$19,980,587	19,980,587
Cash	100,000	-	378,335	478,335	478,335
Total cash and investments				$20,458,922	20,458,922

The cash and investments is reconciled to the June 30, 2005 and 2004 balance sheet as follows:

	2005	2004
Cash	$ 478,335	787,880
Temporary cash investment	19,543,061	20,264,531
Assets held by trustee	437,526	412,045
	$20,458,922	21,464,456

(3) Assets Held by Trustee

The balance of assets held by the trustee in each fund (more fully described in note 5), at June 30, 2005 and 2004 were as follows:

	2005	2004
Debt service fund (note 4)	$ 437,526	412,045

(3) Assets Held by Trustee - Continued

The assets held by the trustee consisted of the following at June 30, 2005 and 2004:

	2005	2004
Utah Public Treasurer Investment Fund	$ 437,526	412,045

(4) Property, Plant and Equipment

Changes in property, plant and equipment are as follows:

	Balance June 30, 2004	Additions	Deletions	Balance June 30, 2005
Land	$ 5,028,301	386,840	28,427	5,386,714
Capital projects - in process	534,197	3,933,978	3,086,603	1,381,572
Buildings	13,557,767	62,228	-	13,619,995
Improvements and landscaping	8,530,334	657,801	160	9,187,975
Pollution equipment	19,438,287	-	-	19,438,287
Boilers and burning equipment	13,471,499	-	-	13,471,499
Computer equipment	1,484,631	138,437	225	1,622,843
Heavy mobile equipment	4,960,796	750,787	374,753	5,336,830
Other equipment	1,349,922	594,735	25,298	1,919,359
	$68,355,734	6,524,806	3,515,466	71,365,074

(5) Long-Term Debt

The District has $4,830,000 in revenue refunding bonds outstanding, with an average interest rate of 4.45%. The final payment is due in 2006 and will be financed from District operations. The debt maturity is as follows:

Year Ended June 30,	Principal	Interest	Total Debt Service
2006	$ 4,830,000	209,445	5,039,445

(6) Commitments

On July 6, 1998, the District entered into a utility service contract with the United States Government for the sale of steam generated by the Facility. The contract shall continue in effect for three years with seven one-year renewal options thereafter. The contract may be terminated at the option of either party by giving written notice of not less than 180 days in advance of the effective date of termination. Estimated annual revenue is $2,737,000.

On June 28, 1993, the District entered into an agreement to purchase 1,120 acres in Box Elder County. Box Elder County was issued a solid waste plan approval (the Permit) for the construction and operation of a municipal solid waste landfill on the property by the Utah State Department of Environmental Quality (DEQ). The District has requested that the DEQ transfer the Permit to the District. Upon that transfer, the District has agreed to the following: pay Wangsgard Associates $50,000; pay Wangsgard Associates 30 cents for each ton of solid waste delivered to the landfill for a period of 25 years; pay Wangsgard Associates $100,000 in $2,777.77 equal monthly installments without interest; upon operation of a non-hazard solid waste facility pay Box Elder County $157,000.

(6) Commitments - Continued

Because of actions taken by the 1994 Utah State Legislature, a committee was formed to locate an alternative site in Box Elder County for a solid waste landfill for the District. Several alternative sites have been evaluated and other potential options are being looked at. The District has completed the purchase of the original 1,120 acres in the White's Valley area but the permit has not been transferred and the site has not been developed as a landfill at that location. Consequently, the agreements with Wangsgard Associates and Box Elder County have not gone into effect.

(7) Related Party Transactions

The District received revenues from various cities and local counties whose mayors/representatives are on the Administrative Control Board of the District. These revenues for the year ended June 30, 2005 totaled $7,263,453 and $7,372,965 for fiscal year 2004. The District had receivables from these parties totaling $1,015,204 as of June 30, 2005 and $662,210 as of June 30, 2004.

(8) Pension Plans and Retirement Benefits

Plan Description

The Wasatch Integrated Waste Management District (District) contributes to the Local Governmental Noncontributory Retirement System, a cost-sharing multiple-employer defined benefit pension plan administered by the Utah Retirement Systems (Systems). Utah Retirement Systems provide refunds, retirement benefits, annual cost of living adjustments and death benefits to plan members and beneficiaries in accordance with retirement statutes.

The System is established and governed by the respective sections of Chapter 49 of the Utah Code Annotated 1953 as amended. The Utah State Retirement Office Act in Chapter 49 provides for the administration of the Utah Retirement Systems and Plans under the direction of the Utah State Retirement Board (Board) whose members are appointed by the Governor. The Systems issue a publicly available financial report that includes financial statements and required supplementary information for the Local Governmental Noncontributory Retirement System. A copy of the report may be obtained by writing to the Utah Retirement Systems, 540 East 200 South, Salt Lake City, Utah, 84102 or by calling 1-800-365-8772.

Funding Policy

In the Local Governmental Noncontributory Retirement System the District is required to contribute 11.09% of its annual covered salary. The contribution rate is actuarially determined. The contribution requirements of the System is authorized by statute and specified by the Board.

The District's contributions to the Noncontributory Retirement System for June 30, 2005, 2004 and 2003 were $261,803, $210,838 and $185,481 respectively, and 401(K) contributions for June 30, 2005, 2004 and 2003 were $134,497, $109,014 and $100,430 respectively. The contributions were equal to the required contributions for each year.

(9) Cash and Temporary Cash Investment

On the statement of cash flows, cash and temporary cash investments includes the following balance sheet amounts:

	2005	2004
Cash	$ 478,335	787,880
Temporary cash investments	18,043,061	18,749,242
	$18,521,396	19,537,122

(10) Closure and Post-Closure Care Cost

The District is required by State and Federal Law to provide both closure and post-closure care of the landfill facility and energy recovery facility. Closure costs that will be realized by the District when the landfill is no longer accepting waste include engineering and construction of a final cover system. Post-closure costs include: site inspection, record keeping, groundwater monitoring, gas monitoring and systems maintenance. Post-closure care of the closed facility is required for a minimum of 30 years.

The District is required by State and Federal Law to establish financial assurance sufficient to assure adequate closure, post-closure care and corrective action, if required, of the facility by compliance with one or more financial assurance mechanisms acceptable to and approved by the Executive Secretary of the Utah State Division of Solid and Hazardous Waste. The District currently provides financial assurance through the Local Government Financial Test UACR315-309-3(7) and a trust fund UACR315-309-4. The financial assurance mechanism is designed to provide for closure of the largest area of the facility ever requiring final cover at any one time during the active life of the landfill as specified in UACR315-309-2(3).

The District accounts for closure and post-closure care costs in accordance with Statement 18 of the Governmental Accounting Standards Board. Statement 18 requires reporting a portion of these closure and post-closure care costs as an operating expense in each period based on landfill capacity used as of each balance sheet date. At the balance sheet date of June 30, 2005:

- The closure and post-closure liability was **$2,589,103**
- The estimated total closure and post-closure costs remaining to be recognized was **$7,723,015**
- The percentage of the landfill used to date was **45%**
- The estimated future life of the landfill was **18 years** (expected closure in the year 2024)

The estimated total closure and post-closure cost at June 30, 2004 was increased by 2.4% for June 30, 2005. This increase was based on the change in the consumer price index.

(A Component Unit of Davis County)

Schedule of Insurance Policies in Force

June 30, 2005

Description	Insurance Company	Policy Number	Limits	Expiration Date
Property	Travelers Insurance Co.	KTJCMB122D829303		July 1, 2005
Policy limits			$85,000,000	
Earthquake			10,000,000	
Flood			10,000,000	
In transit			1,000,000	
Ordinance or law			5,000,000	
Contractors equipment			5,243,459	
Extra expense			1,000,000	
Business interruption			7,120,000	
General liability	Chubb Insurance Co.	35830687 DAL	$ 1,000,000/Occurrence 2,000,000/Aggregate	July 1, 2005
Employee benefit liability			1,000,000/Occurrence 2,000,000/Aggregate	
Automobile	Chubb Insurance Co.	0473528617		July 1, 2005
Liability			$ 1,000,000	
Physical damage			Varies	
Hired physical damage			50,000	
Workers compensation	Workers Compensation Fund	1167054	Statutory	October 1, 2005
Umbrella liability	St. Paul Insurance Co.	QK07200040	$20,000,000	July 1, 2005
Crime - employee theft	Fidelity & Deposit Ins. Co.	CCP106042310	$ 800,000	July 1, 2005
Public officials bond	Cincinnati Insurance Co.	850860	$ 944,600	July 1, 2005
Equipment Breakdown	Travelers Insurance Co.	BM21229D3979TIL04		July 1, 2005
Policy limits			$83,621,000	
Property damage			77,701,000	
Business interruption			7,120,000	
Expediting expenses			1,000,000	
Comprehensive General Liability (Including Public Officers Errors and Omissions)	Utah Local Governments Trust	14660-GL274-2004	$ 5,000,000	Continuous

(A Component Unit of Davis County)

Statement of Cash Receipts and Disbursements - By Bond Fund

Year Ended June 30, 2005

	Total (Memo Only)	Revenue Fund	Debt Service Account	Extension and Repair Fund	Stabilization Fund	Capital Projects Fund
Cash balance - June 30, 2004	$ 21,464,257	2,627,046	412,045	1,515,290	15,409,876	1,500,000
Receipts	39,140,003	23,217,399	4,935,040	-	370,034	10,617,530
Disbursements	(40,145,338)	(23,673,101)	(4,909,559)	(15,290)	(11,547,388)	-
Cash balance - June 30, 2005	$ 20,458,922	2,171,344	437,526	1,500,000	4,232,522	12,117,530

RANE, CHRISTENSEN
& AMBROSE
Certified Public Accountants
A Professional Corporation

Steven F. Crane, CPA
Kent R. Christensen, CPA
Jeffrey L. Ambrose, CPA
Chuck Palmer, CPA

Independent Auditors' Legal Compliance Report

Administrative Control Board
Wasatch Integrated Waste Management District

We have audited the financial statements of Wasatch Integrated Waste Management District for the year ended June 30, 2005, and have issued our report thereon dated August 10, 2005. The District received the following non-major grant which is not required to be audited for specific compliance requirements: (However, this program was subject to test work as part of the audit of the District's financial statements.)

Landfill - Gas to Electricity Project (State of Utah Department of Natural Resources)

Our audit included test work on the District's compliance with those general compliance requirements identified in the State of Utah Legal Compliance Audit Guide, including:

Public Debt
Cash Management
Purchasing Requirements
Budgetary Compliance
Truth in Taxation and Property Tax Limitations
Other Compliance Requirements
Special District Compliance Issues

The District did not receive any major or non-major state grants during the year ended June 30, 2005.

The management of the District is responsible for the District's compliance with all compliance requirements identified above. Our responsibility is to express an opinion on compliance with those requirements based on our audit.

We conducted our audit in accordance with auditing standards generally accepted in the United States of America, and Government Auditing Standards issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether material noncompliance with the requirements referred to above occurred. An audit includes examining, on a test basis, evidence about the District's compliance with those requirements. We believe that our audit provides a reasonable basis for our opinion.

The results of our audit procedures disclosed no instances of noncompliance with the requirements referred to above.

In our opinion, Wasatch Integrated Waste Management District complied, in all material respects, with the general compliance requirements identified above for the year ended June 30, 2005.

Crane Christensen & Ambrose

August 10, 2005

298 24th Street, Suite 300 • Ogden, Utah 84401 • Telephone (801) 627-2060 FAX 627-2182
Member Division of CPA Firms, American Institute of Certified Public Accountants

RANE, CHRISTENSEN
& AMBROSE
Certified Public Accountants
A Professional Corporation

Steven F. Crane, CPA
Kent R. Christensen, CPA
Jeffrey L. Ambrose, CPA
Chuck Palmer, CPA

Report on Compliance and on Internal Control over Financial Reporting
Based on an Audit of Financial Statements Performed in
Accordance with Government Auditing Standards

Administrative Control Board
Wasatch Integrated Waste Management District

We have audited the financial statements of Wasatch Integrated Waste Management District as of and for the year ended June 30, 2005, and have issued our report thereon dated August 10, 2005. We conducted our audit in accordance with auditing standards generally accepted in the United States of America, and the standards applicable to financial audits contained in Government Auditing Standards issued by the Comptroller General of the United States.

Compliance

As part of obtaining reasonable assurance about whether the District's financial statements are free of material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts and grants, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit and, accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance that are required to be reported under Government Auditing Standards.

Internal Control Over Financial Reporting

In planning and performing our audit, we considered the District's internal control over financial reporting in order to determine our auditing procedures for the purpose of expressing our opinion on the financial statements and not to provide assurance on the internal control over financial reporting. Our consideration of the internal control over financial reporting would not necessarily disclose all matters in the internal control over financial reporting that might be material weaknesses. A material weakness is a condition in which the design or operation of one or more of the internal control components does not reduce to a relatively low level the risk that misstatements in amounts that would be material in relation to the financial statements being audited may occur and not be detected within a timely period by employees in the normal course of performing their assigned functions. We noted no matters involving the internal control over financial reporting and its operation that we consider to be material weaknesses.

This report is intended for the information of the management and Board of Directors. However, this report is a matter of public record and its distribution is not limited.

Crane Christensen & Ambrose

August 10, 2005

298 24th Street, Suite 300 • Ogden, Utah 84401 • Telephone (801) 627-2060 FAX 627-2182
Member Division of CPA Firms, American Institute of Certified Public Accountants

RANE, CHRISTENSEN & AMBROSE
Certified Public Accountants
A Professional Corporation

Steven F. Crane, CPA
Kent R. Christensen, CPA
Jeffrey L. Ambrose, CPA
Chuck Palmer, CPA

Independent Auditors' Solid Waste Management Revenue
Refunding Bonds - Series 1999 - Resolution Compliance Report

U.S. Bank
Bond Trustee

We have audited the financial statements of Wasatch Integrated Waste Management District for the year ended June 30, 2005 and have issued our report thereon dated August 10, 2005. These financial statements are the responsibility of the District's management. Our responsibility is to express an opinion on these financial statements.

We conducted our audit in accordance with auditing standards generally accepted in the Unites States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Wasatch Integrated Waste Management District as of June 30, 2005, and the results of its operations and its cash flows for the year then ended in conformity with accounting principles generally accepted in the United States of America.

In connection with our audit, nothing came to our attention that caused us to believe that the District failed to comply with provisions of the Solid Waste Management Revenue Refunding Bonds Series 1999 Resolution in so far as it relates to accounting matters. However, our audit was not directed primarily toward obtaining knowledge of such noncompliance.

We found the District's net revenues and other available funds for the year ended June 30, 2005 exceeded the rate covenant requirement for the year.

This report is intended solely for the information and use of the Bond Trustee and should not be used for any other purpose.

Crane Christensen & Ambrose

August 10, 2005

298 24th Street, Suite 300 • Ogden, Utah 84401 • Telephone (801) 627-2060 FAX 627-2182
Member Division of CPA Firms, American Institute of Certified Public Accountants

APPENDIX F

Stormwater

IGES

Intermountain GeoEnvironmental Services, Inc.

Project No. 00169-032
WIWMD- 2005 Landfill Perm
Date _____ by _____
Ckd by _____ on _____

Upper Storm Water Pond Capacity

Max fill elevation 4813 ft

Volume calculated w/ LDD Terrain Model Explorer

55,341 yd^3 ⇒ 1,494,207 ft^3 ⇒ **34.3 acre-ft** pond capacity

Direct Run-off

Q_{100} = 2.311 in (based on P_{100} = 3.45 in, CN = 89)

Total Drainage Area = 173.2 acres

$$173.20 \text{ acres} \times \frac{2.311 \text{ in}}{12 \text{ in/ft}} =$$

33.34 acre-ft Total Runoff from 100 yr Storm

Channel Calculator
Area 1

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0500 ft/ft
Manning's n	0.0280
Depth	0.7230 ft
Height	1.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	0.5000 ft/ft (V/H)
Right slope	0.5000 ft/ft (V/H)

Computed Results:

Flowrate	5.8446 cfs
Velocity	5.5905 fps
Full Flowrate	13.8799 cfs
Flow area	1.0455 ft2
Flow perimeter	3.2334 ft
Hydraulic radius	0.3233 ft
Top width	2.8920 ft
Area	2.0000 ft2
Perimeter	4.4721 ft
Percent full	72.3000 %

Critical Information

Critical depth	0.8810 ft
Critical slope	0.0174 ft/ft
Critical velocity	3.7647 fps
Critical area	1.5525 ft2
Critical perimeter	3.9401 ft
Critical hydraulic radius	0.3940 ft
Critical top width	3.5242 ft
Specific energy	1.2087 ft
Minimum energy	1.3216 ft
Froude number	1.6392
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	AREA 1
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.8300 in
Drainage area	2.8759 ac
Runoff curve number, CN	89
Time of concentration, Tc	14.3539 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.2472 in
Ia/P	0.1000
Unit peak discharge, qu	744.7961 csm/in
Runoff, Q	1.7469 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	5.8465 cfs

Graphical Peak Discharge method

Given Input Data:

Description	AREA 2
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.8300 in
Drainage area	3.0296 ac
Runoff curve number, CN	89
Time of concentration, Tc	28.4670 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.2472 in
Ia/P	0.1000
Unit peak discharge, qu	543.5165 csm/in
Runoff, Q	1.7469 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	4.4945 cfs

Channel Calculator
Area 2

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0500 ft/ft
Manning's n	0.0280
Depth	0.6553 ft
Height	1.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	0.5000 ft/ft (V/H)
Right slope	0.5000 ft/ft (V/H)

Computed Results:

Flowrate	4.4967 cfs
Velocity	5.2358 fps
Full Flowrate	13.8799 cfs
Flow area	0.8588 ft2
Flow perimeter	2.9306 ft
Hydraulic radius	0.2931 ft
Top width	2.6212 ft
Area	2.0000 ft2
Perimeter	4.4721 ft
Percent full	65.5300 %

Critical Information

Critical depth	0.7933 ft
Critical slope	0.0180 ft/ft
Critical velocity	3.5724 fps
Critical area	1.2587 ft2
Critical perimeter	3.5478 ft
Critical hydraulic radius	0.3548 ft
Critical top width	3.1733 ft
Specific energy	1.0813 ft
Minimum energy	1.1900 ft
Froude number	1.6126
Flow condition	Supercritical

Channel Calculator
Area 3

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0500 ft/ft
Manning's n	0.0280
Depth	0.9950 ft
Height	1.2500 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	0.5000 ft/ft (V/H)
Right slope	0.5000 ft/ft (V/H)

Computed Results:

Flowrate	13.6956 cfs
Velocity	6.9168 fps
Full Flowrate	25.1659 cfs
Flow area	1.9801 ft2
Flow perimeter	4.4498 ft
Hydraulic radius	0.4450 ft
Top width	3.9800 ft
Area	3.1250 ft2
Perimeter	5.5902 ft
Percent full	79.6000 %

Critical Information

Critical depth	1.2386 ft
Critical slope	0.0156 ft/ft
Critical velocity	4.4638 fps
Critical area	3.0682 ft2
Critical perimeter	5.5391 ft
Critical hydraulic radius	0.5539 ft
Critical top width	4.9543 ft
Specific energy	1.7385 ft
Minimum energy	1.8579 ft
Froude number	1.7288
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	AREA 3
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.8300 in
Drainage area	6.0802 ac
Runoff curve number, CN	89
Time of concentration, Tc	11.0601 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.2472 in
Ia/P	0.1000
Unit peak discharge, qu	825.0926 csm/in
Runoff, Q	1.7469 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	13.6931 cfs

Channel Calculator
Area 4

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0500 ft/ft
Manning's n	0.0280
Depth	1.0920 ft
Height	1.5000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	0.5000 ft/ft (V/H)
Right slope	0.5000 ft/ft (V/H)

Computed Results:

Flowrate	17.5514 cfs
Velocity	7.3593 fps
Full Flowrate	40.9225 cfs
Flow area	2.3849 ft2
Flow perimeter	4.8836 ft
Hydraulic radius	0.4884 ft
Top width	4.3680 ft
Area	4.5000 ft2
Perimeter	6.7082 ft
Percent full	72.8000 %

Critical Information

Critical depth	1.3678 ft
Critical slope	0.0150 ft/ft
Critical velocity	4.6908 fps
Critical area	3.7417 ft2
Critical perimeter	6.1169 ft
Critical hydraulic radius	0.6117 ft
Critical top width	5.4711 ft
Specific energy	1.9337 ft
Minimum energy	2.0517 ft
Froude number	1.7559
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	AREA 4
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.8300 in
Drainage area	9.5762 ac
Runoff curve number, CN	89
Time of concentration, Tc	18.2895 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.2472 in
Ia/P	0.1000
Unit peak discharge, qu	671.3290 csm/in
Runoff, Q	1.7469 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	17.5473 cfs

Graphical Peak Discharge method

Given Input Data:

Description	AREA 5
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.8300 in
Drainage area	16.6836 ac
Runoff curve number, CN	89
Time of concentration, Tc	21.2716 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.2472 in
Ia/P	0.1000
Unit peak discharge, qu	626.5879 csm/in
Runoff, Q	1.7469 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	28.5334 cfs

Channel Calculator
Area 5

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0100 ft/ft
Manning's n	0.0280
Depth	1.7720 ft
Height	2.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	0.5000 ft/ft (V/H)
Right slope	0.5000 ft/ft (V/H)

Computed Results:

Flowrate	28.5411 cfs
Velocity	4.5448 fps
Full Flowrate	39.4137 cfs
Flow area	6.2800 ft2
Flow perimeter	7.9246 ft
Hydraulic radius	0.7925 ft
Top width	7.0880 ft
Area	8.0000 ft2
Perimeter	8.9443 ft
Percent full	88.6000 %

Critical Information

Critical depth	1.6614 ft
Critical slope	0.0141 ft/ft
Critical velocity	5.1699 fps
Critical area	5.5207 ft2
Critical perimeter	7.4301 ft
Critical hydraulic radius	0.7430 ft
Critical top width	6.6457 ft
Specific energy	2.0930 ft
Minimum energy	2.4921 ft
Froude number	0.8512
Flow condition	Subcritical

Graphical Peak Discharge method

Given Input Data:

Description	AREA 6
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.8300 in
Drainage area	6.9950 ac
Runoff curve number, CN	89
Time of concentration, Tc	15.1937 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.2472 in
Ia/P	0.1000
Unit peak discharge, qu	727.4113 csm/in
Runoff, Q	1.7469 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	13.8883 cfs

Channel Calculator

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0500 ft/ft
Manning's n	0.0280
Depth	1.0000 ft
Height	1.5000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	0.5000 ft/ft (V/H)
Right slope	0.5000 ft/ft (V/H)

Computed Results:

Flowrate	13.8799 cfs
Velocity	6.9399 fps
Full Flowrate	40.9225 cfs
Flow area	2.0000 ft2
Flow perimeter	4.4721 ft
Hydraulic radius	0.4472 ft
Top width	4.0000 ft
Area	4.5000 ft2
Perimeter	6.7082 ft
Percent full	66.6667 %

Critical Information

Critical depth	1.2452 ft
Critical slope	0.0155 ft/ft
Critical velocity	4.4757 fps
Critical area	3.1012 ft2
Critical perimeter	5.5688 ft
Critical hydraulic radius	0.5569 ft
Critical top width	4.9809 ft
Specific energy	1.7485 ft
Minimum energy	1.8678 ft
Froude number	1.7303
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	South 1,3,5,6,7
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.8300 in
Drainage area	42.4000 ac
Runoff curve number, CN	89
Time of concentration, Tc	25.3235 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.2472 in
Ia/P	0.1000
Unit peak discharge, qu	576.3018 csm/in
Runoff, Q	1.7469 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	66.6957 cfs

Channel Calculator
Combined 1,3,5,6,7

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0100 ft/ft
Manning's n	0.0280
Depth	2.4360 ft
Height	3.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	0.5000 ft/ft (V/H)
Right slope	0.5000 ft/ft (V/H)

Computed Results:

Flowrate	66.6868 cfs
Velocity	5.6190 fps
Full Flowrate	116.2048 cfs
Flow area	11.8682 ft2
Flow perimeter	10.8941 ft
Hydraulic radius	1.0894 ft
Top width	9.7440 ft
Area	18.0000 ft2
Perimeter	13.4164 ft
Percent full	81.2000 %

Critical Information

Critical depth	2.3330 ft
Critical slope	0.0126 ft/ft
Critical velocity	6.1262 fps
Critical area	10.8855 ft2
Critical perimeter	10.4334 ft
Critical hydraulic radius	1.0433 ft
Critical top width	9.3319 ft
Specific energy	2.9267 ft
Minimum energy	3.4995 ft
Froude number	0.8976
Flow condition	Subcritical

APPENDIX G

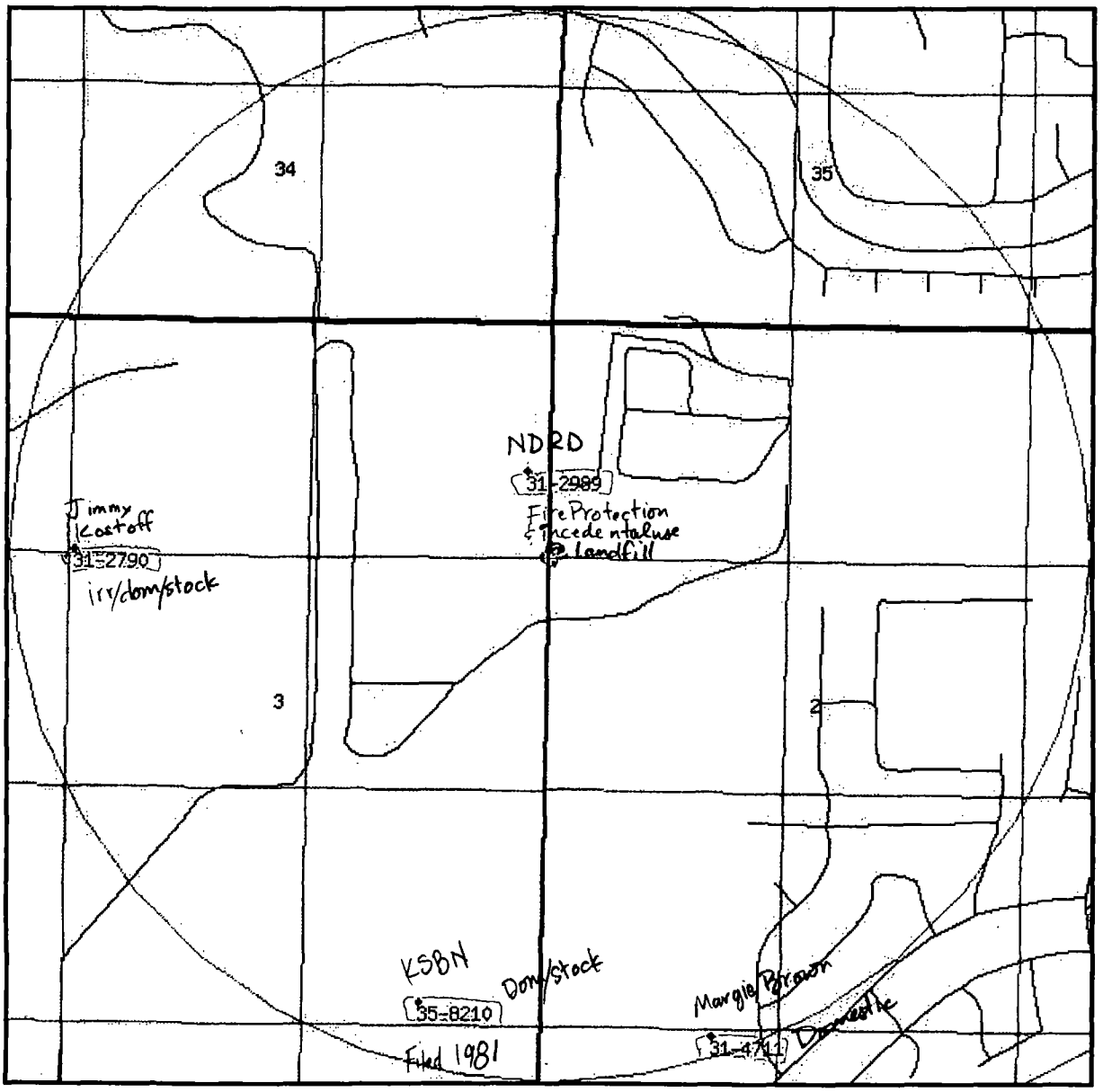
Surface Water Rights

UTAH DIVISION OF WATER RIGHTS

WRPLAT Program Output Listing

Version: 2004.12.30.00 Rundate: 11/01/2005 11:22 AM

Radius search of 3000 feet from a point S1265 W15 from the NE corner, section 03, Township 4N, Range 1W, SL b&m Criteria:wrtypes=W,C,E podtypes=all status=U,A,P usetypes=all



Water Rights

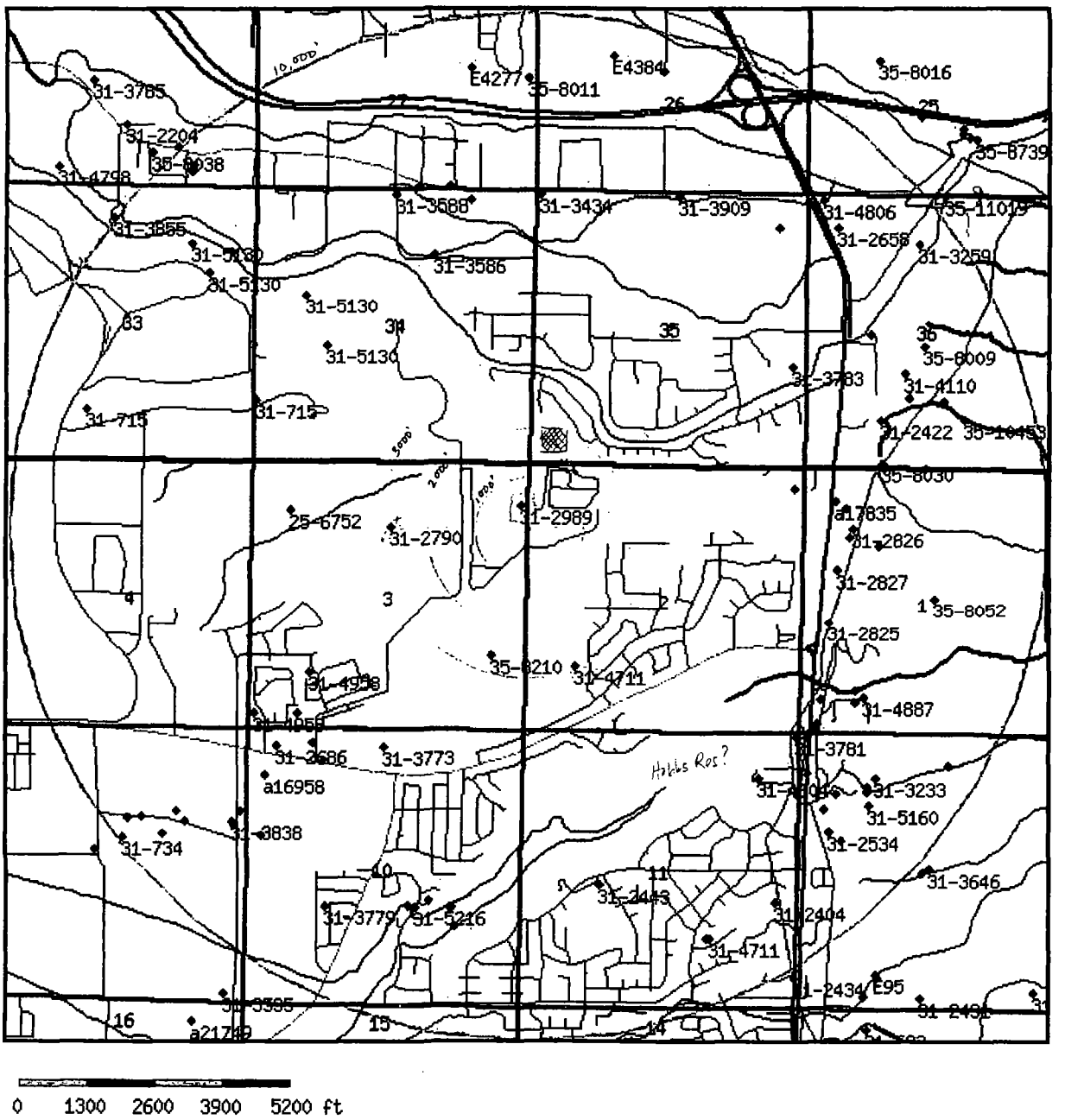
WR Number	Diversion Type/Location	Well Log	Status	Priority	Uses	CFS	ACFT	Owner
31-2790	Underground S1295 0 N4 03 4N 1W SL		P	19650329	DIS	0.015	0.000	JIMMY KOSTOFI 821 POLK AVENI
31-2989	Underground S840 W150 NE 03 4N 1W SL		P	19650715	O	0.100	0.000	NORTH DAVIS R DISPOSAL C/O GLEN W. FLI
31-4711	Underground N1263 E981 NW 11 4N 1W SL	well info	P	19811106	D	0.015	0.000	MARGIE M. BRO 2287 NORTH CHI
35-8210	Surface S3734 W37341 NE 02 4N 1E SL		P	1874	DS	0.000	0.000	KSBN ENTERPRI PARTNERSHIP A WYOMING LIM PARTNERSHIP

UTAH DIVISION OF WATER RIGHTS

WRPLAT Program Output Listing

Version: 2004.12.30.00 Rundate: 11/01/2005 10:50 AM

Radius search of 10000 feet from a point S1265 W15 from the NE corner, section 03, Township 4N, Range 1W, SL b&m Criteria:wrtypes=W,C,E podtypes=all status=U,A,P usetypes=all



Water Rights

WR Number	Diversion Type/Location	Well Log	Status	Priority	Uses	CFS	ACFT	Owner
31-3115	Point to Point 0 0 12 4N 1W SL		P		O	0.015	0.000	USA FOREST SEI 324 - 25TH STREI
25-6752	Surface S990 E730 NW 03 4N 1W SL		P	19030000	IS	0.125	0.000	BYRON HANSOI CORNISH UT 843
31-1036	Surface N601 E1587 SW 12 4N 1W SL		P	19280419	I	0.000	1162.000	STATE OF UTAH WATER RESOUR P.O. BOX 146201
31-1196	Surface S1236 W504 NE 33 5N 1W SL		P	19230307	O	0.004	0.000	DAVIS COUNTY DISTRICT BOAR EDUCATION FARMINGTON U
31-1712	Surface 0 E160 SW 01 4N 1W SL		P	19211129	I	0.004	0.000	LLOYD GARRIS(UT
31-1982	Surface N608 E1584 SW 12 4N 1W SL		P	19480305	I	2.000	0.000	LAYTON CITY C ATTN: BILL FLA
31-2204	Surface S4077 E50 N4 28 5N 1W SL		P	19360402	DI	0.006	0.000	ELIZABETH A. P OGDEN UT
31-2208	Underground S1452 E462 NW 12 4N 1W SL		P	19380118	DIS	0.011	0.000	JAMES R. POTTE C/O JAMES & BE TRUSTEES
31-2304	Surface S750 E140 NW 12 4N 1W SL		P	19400525	DIS	0.015	0.000	GLEN CHYNOWI RT. 2, BOX 237
31-2305	Surface N240 E1320 SW 12 4N 1W SL		P	19400618	DIS	0.089	0.000	JOHN A. & CARC 3193 EAST FERN
31-2325	Surface S617 E2847 NW 12 4N 1W SL		P	19420815	DIS	0.006	0.000	WILLIAM A. PET LAYTON UT 840
31-2404	Surface N2080 W390 SE 11 4N 1W SL		P	19430911	DIS	0.020	0.000	HAROLD J. DAW LAYTON UT 840
31-2422	Surface N895 E1440 SW 36		A	19451227	D	0.060	0.000	J. FORD ANDERS

	5N 1W SL					BOX 601 A ROUT
31-2426	Surface	P	19460312 DIS	0.016	0.000	RONALD S AND
	S844 E1467 NW 12 4N 1W SL					2778 NORTH HIG
31-2431	Underground	P	19460810 DIS	0.015	0.000	JAY S. MCDONA
	N212 E2429 SW 12 4N 1W SL					5570 SOUTH 205(
31-2434	Underground	P	19460709 S	0.015	0.000	MARVIN E. HOC
	N595 W20 SE 11 4N 1W SL					ROUTE #2 BOX 2
31-2443	Underground	P	19470317 S	0.015	0.000	ADAM J. WELKE
	S280 E1465 W4 11 4N 1W SL					4471 JEFFERSON
31-2464	Underground	P	19490629 D	0.015	0.000	FANNIE BIRD
	N100 E290 SW 01 4N 1W SL					28 EAST 2ND NO
31-2465	Underground	P	19490920 D	0.015	0.000	JAMES M. NICH(
	S66 E125 NW 12 4N 1W SL					66 SUNSET DRIV
31-2473	Underground	P	19500531 IS	0.015	0.000	WALDON GUNN
	N1055 W110 E4 09 4N 1W SL					ROUTE #2, BOX 2625 NORTH
31-2485	Surface	P	18890000 M	0.000	0.000	KAYS CREEK IR COMPANY
	N862 E1065 SW 01 4N 1W SL					C/O WOODROW
31-2485	Surface	P	18890000 M	0.000	0.000	KAYS CREEK IR COMPANY
	S386 E1376 NW 13 4N 1W SL					C/O WOODROW
31-2485	Surface	P	18890000 M	0.000	0.000	KAYS CREEK IR COMPANY
	N608 E1584 SW 12 4N 1W SL					C/O WOODROW
31-2489	Underground	P	19520415 D	0.015	0.000	HERBERT F. SCH
	N366 W286 SE 12 4N 1W SL					0-13 VERDELAN
31-2495	Underground	P	19520709 DIS	0.015	0.000	WAYNE I. PENT
	S588 W1212 N4 10 4N 1W SL					ROUTE #2, BOX
31-2518	Underground	P	19530630 IS	0.023	0.000	WALDON GUNN
	S1800 W1240 NE 09 4N 1W SL					669 EAST 2655 N(
31-2520	Surface	P	19530708 DIS	0.015	0.000	MARK LYNN W/

	N625 E840 W4 12 4N 1W SL						2548 NORTH VAI DRIVE
31-2524	Underground	well info	P	19530801 M	0.550	0.000	SOUTH WEBER
	N46 E453 S4 27 5N 1W SL						1600 EAST SOUT
31-2534	Underground		P	19540514 DIS	0.015	0.000	BERNICE P. POT
	N777 E608 W4 12 4N 1W SL						2568 NORTH VAI DRIVE
31-2563	Underground		P	18750000 DIO	0.111	0.000	KENNETH C. & I FREELAND
	N80 E300 SW 01 4N 1W SL						ROUTE #1 BOX 2
31-2563	Underground		P	18750000 DIO	0.111	0.000	KENNETH C. & I FREELAND
	N210 E310 SW 01 4N 1W SL						ROUTE #1 BOX 2
31-2575	Underground		P	19550604 DS	0.015	0.000	BEVERLY J. ALL
	S75 E1231 W4 36 5N 1W SL						2764 EAST 7825 S
31-2590	Underground	well info	P	19551008 MO	10.000	0.000	USA BUREAU OI RECLAMATION
	S618 W60 N4 33 5N 1W SL						302 EAST 1860 SC
31-2592	Underground		A	19551008 O	10.000	0.000	USA BUREAU OI RECLAMATION
	S905 E302 NW 10 4N 1W SL						302 EAST 1860 SC
31-2644	Underground		P	19580830 DI	0.022	0.000	CARL D. HILL
	N1245 E917 W4 01 4N 1W SL						RFD 4 BOX 601
31-2658	Abandoned Well	well info	P	19590429 O	0.250	0.000	CLARENCE WAT COMPANY
	S634 W558 NE 35 5N 1W SL						P. O. BOX 228
31-2658	Underground	well info	P	19590429 O	0.250	0.000	CLARENCE WAT COMPANY
	S634 E573 NE 35 5N 1W SL						P. O. BOX 228
31-2686	Underground		P	19600606 D	0.015	0.000	DON REAY
	S350 E542 NW 10 4N 1W SL						BOX 222 RFD
31-2770	Underground		P	19640401 DIO	0.100	0.000	RONALD S. AND RANKIN
	S1125 E1300 NW 12						2778 NORTH HIG

	4N 1W SL					
31-2790	Underground	P	19650329 DIS	0.015	0.000	JIMMY KOSTOFI
	S1295 0 N4 03 4N 1W SL					821 POLK AVENI
31-2801	Underground	P	19280900 DIS	0.018	0.000	JOSEPH F. STAPI
	N65 W1640 SE 27 5N 1W SL					R.F.D. #4
31-2822	Surface	P	18800000 IS	0.040	0.000	RAY JAMES HILI
	N630 E660 W4 01 4N 1W SL					3544 QUINCY AV
31-2823	Surface	P	18800000 DI	0.021	0.000	CALVIN L. AND HUBBLE
	N1085 E1472 W4 01 4N 1W SL					2700 EAST 7800 S
31-2825	Surface	P	18800000 IS	0.096	0.000	RAY JAMES HILI
	S444 E492 W4 01 4N 1W SL					3544 QUINCY AV
31-2826	Surface	P	18800000 IS	0.001	0.000	CARL D. HILL
	N1433 E962 W4 01 4N 1W SL					RFD #4, BOX #60
31-2827	Surface	P	18800000 I	0.040	0.000	RAY JAMES HILI
	N630 E660 W4 01 4N 1W SL					3544 QUINCY AV
31-2833	Surface	P	18810000 DI	2.000	0.000	WILLIAM MARC
	N1320 E2000 SW 36 5N 1W SL					ROUTE #4, BOX 3
31-2989	Underground	P	19650715 O	0.100	0.000	NORTH DAVIS R DISPOSAL
	S840 W150 NE 03 4N 1W SL					C/O GLEN W. FLI
31-3026	Underground	P	19200000 DIS	0.013	0.000	MELVIN R. MAY
	S206 W1237 NE 34 5N 1W SL					RFD #4
31-3054	Underground	P	19151200 DS	0.111	0.000	W. J. THORNLEY
	S264 E1254 NW 10 4N 1W SL					LAYTON UT 840
31-3215	Underground	P	19650831 DIS	0.100	0.000	FLOYD D. AND M SIDDOWAY
	S1125 E1300 NW 12 4N 1W SL					2778 NORTH VAI DRIVE
31-3233	Underground	P	1895 DIS	0.033	0.000	RONALD S AND
	S844 E1467 NW 12 4N 1W SL					2778 NORTH HIG
31-3259	Underground	P	19230000 DS	0.009	0.000	WILLIAM E. COF

	S983 E2118 NW 36 5N 1W SL					RFD #4
31-3294	Underground	P	19150000 DIS	0.022	0.000	JAY G. LOVE
	N1060 W1345 E4 09 4N 1W SL					643 EAST 2625 N
31-3325	Underground	P	19320000 DIS	0.022	0.000	JAY G. LOVE
	N635 W1610 E4 09 4N 1W SL					643 EAST 2625 N
31-3385	Underground	P	19060000 DIS	0.015	0.000	GEORGE LOVE
	N600 E295 W4 10 4N 1W SL					2588 NORTH FAI
31-3434	Underground	P	19250000 DIS	0.111	0.000	MARCIA A. SAU
	S102 E95 NW 35 5N 1W SL					2362 LINCOLN A
31-3435	Underground	P	19100000 DIS	0.033	0.000	EDWARD T. SAU
	N800 W1520 SE 28 5N 1W SL					2362 LINCOLN A
31-3496	Underground	P	19250000 DS	0.009	0.000	GEORGE H. POL
	N355 W1270 SE 28 5N 1W SL					RFD #4
31-3535	Underground	P	18850000 D	0.022	0.000	CATHERINE NA
	N200 W407 SE 09 4N 1W SL					LAYTON UT 840
31-3558	Underground	P	19250000 DIS	0.009	0.000	GEORGE ALLAN
	N490 W1245 SE 28 5N 1W SL					SOUTH WEBER U
31-3586	Underground	P	19270000 DS	0.022	0.000	OSCAR C. STAR
	S1275 W1925 NE 34 5N 1W SL					RFD #4
31-3588	Underground	P	19290000 DIS	0.013	0.000	ROBERT BRYAN
	S140 E2652 NW 34 5N 1W SL					RFD #4
31-3619	Underground	P	19200000 DS	0.027	0.000	PARLEY RAY
	N1910 E1550 SW 10 4N 1W SL					LAYTON UT 840
31-3646	Underground	P	19290800 DIS	0.022	0.000	EARL DEE JAQU
	S2570 W2275 NE 12 4N 1W SL					LAYTON UT 840
31-3658	Underground	P	19170000 DIS	0.178	0.000	D. D. HARRIS
	N215 E2393 W4 09 4N 1W SL					LAYTON UT 840
31-3773	Underground	P	19000000 DS	0.067	0.000	MELVIN J. JAQU
	S350 W60 N4 10 4N 1W SL					1333 EAST HIGH

31-3777	Surface N1980 W1350 SE 10 4N 1W SL		P	19030000 IS	0.022	0.000	OLIVE C. FINDL/ BOX 213 ROUTE
31-3778	Surface N1980 W1320 SE 10 4N 1W SL		P	19030000 D	0.016	0.000	OLIVE C. FINDL/ BOX 213 ROUTE
31-3779	Underground N1910 E1551 SW 10 4N 1W SL		P	19200000 DS	0.027	0.000	JEFFERY DALE I 2070 NORTH CHI
31-3780	Underground S50 W75 NE 11 4N 1W SL		P	19200000 DS	0.089	0.000	PHYLIS BIRD M/ ROUTE 2, BOX 2:
31-3781	Underground S50 W75 NE 11 4N 1W SL		P	19200000 DS	0.089	0.000	AMEDIO DE PEII 4202 MADISON A
31-3783	Underground S715 W295 E4 35 5N 1W SL		P	19240000 S	0.022	0.000	NORMAN L. FOV BOX 251, ROUTE
31-3785	Underground S611 E2108 W4 28 5N 1W SL		P	19080601 DIS	0.025	0.000	DAVID H. COOK RFD #4
31-3788	Underground S1155 E680 NW 12 4N 1W SL		P	19000000 IS	0.100	0.000	FLOYD D. AND I SIDDOWAY 2778 NORTH VAI DRIVE
31-3815	Underground S1880 W280 NE 09 4N 1W SL		P	19340000 DI	0.045	0.000	DONALD D. & M P.O. BOX 507
31-3838	Underground S1800 W320 NE 09 4N 1W SL		P	19000000 DI	0.015	0.000	DONALD D. & M P.O. BOX 507
31-3843	Surface N1259 E2672 SW 36 5N 1W SL		P	18880000 D	0.000	0.000	MARY KATE AT UT
31-3855	Underground S618 W60 N4 33 5N 1W SL		P	19551008 M	10.000	0.000	USA BUREAU OI RECLAMATION 302 EAST 1860 S(
31-3909	Underground S80 E130 N4 35 5N 1W SL		P	19300000 S	0.011	0.000	MARY E. BYBEE R.F.D. #4
31-4110	Underground S850 E1880 W4 36 5N 1W SL	well info	P	19720901 DIS	0.060	0.000	RONALD J. SMIT 174 EAST SOUTH

31-4131	Underground N610 E1060 SW 01 4N 1W SL	well info	P	19730213 DIS	0.015	0.000	CHRIS AND MAI 3172 NORTH HIG
31-4233	Underground S805 E790 NW 01 4N 1W SL	well info	P	19750305 DI	0.015	0.000	DENNIS AND MU LIGGETT 3820 WEST 5850 S
31-4388	Underground N280 E930 SW 03 4N 1W SL	well info	P	19770226 M	1.827	0.000	LAYTON CITY C 437 NORTH WAS
31-4395	Surface S700 W2200 E4 10 4N 1W SL		P	18950000 DIS	0.200	0.000	ALJOE T. MARTI 1229 EAST 991 SO
31-4395	Surface S600 W1800 E4 10 4N 1W SL		P	18950000 DIS	0.200	0.000	ALJOE T. MARTI 1229 EAST 991 SO
31-4462	Underground N1100 E1160 SW 03 4N 1W SL	well info	P	19770818 M	1.448	0.000	LAYTON CITY C 437 NORTH WAS
31-4522	Underground N610 E1060 SW 01 4N 1W SL		P	19780524 DI	0.015	0.000	MELVIN WEST 3180 NORTH HIG
31-4523	Underground N610 E1060 SW 01 4N 1W SL		P	19780525 DI	0.015	0.000	BLAINE HANNE 3172 NORTH HIG
31-4525	Surface S450 W195 NE 02 4N 1W SL		P	19780601 IS	0.200	0.000	RAMONA H. LOV 2577 EAST HIDD
31-4604	Underground S850 W800 NE 11 4N 1W SL		A	19790928 DI	0.015	0.000	MIYOKO H. PRIC 3023 YATES ST.
31-4711	Underground N1263 E981 NW 11 4N 1W SL	well info	P	19811106 D	0.015	0.000	MARGIE M. BRO 2287 NORTH CHI
31-4711	Abandoned Well N1363 E941 S4 11 4N 1W SL	well info	P	19811106 D	0.015	0.000	MARGIE M. BRO 2287 NORTH CHI
31-4711	Abandoned Well N1383 E991 S4 11	well info	P	19811106 D	0.015	0.000	MARGIE M. BRO

	4N 1W SL						2287 NORTH CHI
31-4750	Underground	well info	P	19830614 DI	0.015	0.000	SHERRI HOLMES
	N670 E400 SW 01 4N 1W SL						3178 NORTH HIG
31-4798	Surface		P	18980000 D	0.060	0.000	DONALD E. AND BYRAM
	N320 E1480 SW 28 5N 1W SL						R.F.D. #4 BOX 28
31-4806	Underground		A	19831220 DO	3.000	0.000	GENEVA ROCK I
	S100 E300 NW 36 5N 1W SL						C/O CARL CLYD
31-4887	Underground	well info	P	19870424 DIS	0.045	0.000	NOLA JEAN ROE
	N708 E1228 SW 01 4N 1W SL						3186 NORTH HIG
31-4958	Underground		U	19890314 M	3.453	2500.000	LAYTON CITY C
	N280 E93 SW 03 4N 1W SL						437 NORTH WAS
31-4958	Underground	well info	U	19890314 M	3.453	2500.000	LAYTON CITY C
	N1100 E1160 SW 03 4N 1W SL						437 NORTH WAS
31-4958	Underground		U	19890314 M	3.453	2500.000	LAYTON CITY C
	S1100 W1300 E4 10 4N 1W SL						437 NORTH WAS
31-5126	Surface		A	19940211 IS	0.300	0.000	RAMONA H. LO\
	S660 E600 NW 01 4N 1W SL						2497 EAST 8200 S
31-5130	Surface		P	18890000 S	0.100	0.000	POLL INVESTME
	S1062 W1281 NE 33 5N 1W SL						C/O BRENT POLI
31-5130	Surface		P	18890000 S	0.100	0.000	POLL INVESTME
	S1611 W930 NE 33 5N 1W SL						C/O BRENT POLI
31-5130	Surface		P	18890000 S	0.100	0.000	POLL INVESTME
	N565 E960 W4 34 5N 1W SL						C/O BRENT POLI
31-5130	Surface		P	18890000 S	0.100	0.000	POLL INVESTME
	S408 E1378 W4 34 5N 1W SL						C/O BRENT POLI
31-5147	Underground		P	19950713 DI	0.015	1.450	RONALD S. & CA
	S1033 E1291 NW 12 4N 1W SL						2892 VALLEY VI
		well					JAMES R. AND B

31-5160	Underground S1400 E1320 NW 12 4N 1W SL	info	A	19960725	DI	0.000	1.000	POTTER TRUSTS JAMES R. POTTE POTTER,JOINT T
31-5216	Underground N1956 W2024 SE 10 4N 1W SL		A	20000928	I	0.000	1.000	DEAN PATELLI 2348 NORTH 145(
31-683	Surface S389 E1375 NW 13 4N 1W SL		P	19131223	I	0.000	937.000	STATE OF UTAH WATER RESOUR PO BOX 146201
31-687	Underground N859 E3277 W4 09 4N 1W SL		P	19500928	DI	0.015	0.000	KATIE CHRISTEI 438 EAST 2625 N(
31-701	Underground N834 E2998 W4 09 4N 1W SL		P	19501102	D	0.015	0.000	WANDA M. MAL ROUTE #2 BOX 1
31-715	Underground S1632 W3275 E4 33 5N 1W SL		P		M	13.223	0.000	USA DEPARTME FORCE BASE CIVIL ENC
31-715	Underground N1160 E60 SW 34 5N 1W SL		P		M	13.223	0.000	USA DEPARTME FORCE BASE CIVIL ENC
31-734	Underground N471 E2923 W4 09 4N 1W SL		P	19510200	IS	0.015	0.000	CLYDE HALLS 628 HILL VILLA
35-10453	Surface N918 E426 S4 36 5N 1W SL		P	19970729	DIOS	0.048	2.664	CHARLES D. AN 8102 SOUTH HW
35-10486	Surface S2574 E2475 NW 01 4N 1W SL		P	1874	I	0.000	34.286	LETHA JAQUES PROTECTION PA C/O SALLY PETT
35-10597	Rediversion N1 E1 S4 25 5N 1W SL		P	19240825	I	0.000	3.000	WEBER RIVER W ASSOCIATION 138 WEST 1300 N
35-10657	Rediversion N1 E1 S4 25 5N 1W SL		P	19240825	I	0.000	10.000	FAMILY LINK LI 2399 SHADOW W
35-10760	Rediversion N1 E1 S4 25 5N 1W SL		P	19240825	IO	0.000	1.000	WEBER RIVER W ASSOC. (FOR JOAN H. NI

35-10811	Rediversion	P	19240825 I	0.000	1.000	MARK N. AND K FAMILY LIVING
	N1 E1 S4 25 5N 1W SL					MARK N. AND K TRUSTEES
35-10818	Rediversion	P	19240825 I	0.000	1.000	WEBER RIVER W ASSOCIATION
	N1 E1 S4 25 5N 1W SL					138 WEST 1300 N
35-11019	Rediversion	P	19240825 IO	0.000	1.000	STEPHEN V. ANI JACOBSEN
	N1 E1 S4 25 5N 1W SL					PO BOX 778
35-11184	Rediversion	P	19240825	0.000	3378.830	WEBER RIVER W ASSOC.
	N1216 E323 S4 25 5N 1W SL					138 W. 1300 N.
35-11184	Rediversion	P	19240825	0.000	3378.830	WEBER RIVER W ASSOC.
	N1155 W2045 SE 25 5N 1W SL					138 W. 1300 N.
35-11209	Rediversion	P	19240825 I	0.000	27.000	WEBER RIVER W ASSOCIATION
	N1216 E323 S4 25 5N 1W SL					C/O FLOYD BAH MANAGER
35-11209	Rediversion	P	19240825 I	0.000	27.000	WEBER RIVER W ASSOCIATION
	N1155 W2045 SE 25 5N 1W SL					C/O FLOYD BAH MANAGER
35-11392	Rediversion	P	19240825 IO	0.000	1.000	JOSEPH D. AND I MCFARLANE
	N1216 E323 S4 25 5N 1W SL					2510 WEST OLD ROAD
35-11392	Rediversion	P	19240825 IO	0.000	1.000	JOSEPH D. AND I MCFARLANE
	N1155 W2045 SE 25 5N 1W SL					2510 WEST OLD ROAD
35-11409	Rediversion	P	19240825 IO	0.000	1.000	WEBER RIVER W ASSOCIATION
	N1216 E323 S4 25 5N 1W SL					138 WEST 1300 N
35-11409	Rediversion	P	19240825 IO	0.000	1.000	WEBER RIVER W ASSOCIATION
	N1155 W2045 SE 25 5N 1W SL					138 WEST 1300 N
35-11411	Rediversion	P	19240825 IO	0.000	2.000	WEBER RIVER W ASSOCIATION

	N1216 E323 S4 25 5N 1W SL					138 WEST 1300 N
35-11411	Rediversion	P	19240825 IO	0.000	2.000	WEBER RIVER W ASSOCIATION
	N1155 W2045 SE 25 5N 1W SL					138 WEST 1300 N
35-11493	Rediversion	P	19240825 IO	0.000	2.000	USA BUREAU OI RECLAMATION
	N1216 E323 S4 25 5N 1W SL					302 EAST 1860 S(
35-11493	Rediversion	P	19240825 IO	0.000	2.000	USA BUREAU OI RECLAMATION
	N1155 W2045 SE 25 5N 1W SL					302 EAST 1860 S(
35-11501	Rediversion	P	19240825 IO	0.000	12.000	USA BUREAU OI RECLAMATION
	N1216 E323 S4 25 5N 1W SL					302 EAST 1860 S(
35-11501	Rediversion	P	19240825 IO	0.000	12.000	USA BUREAU OI RECLAMATION
	N1155 W2045 SE 25 5N 1W SL					302 EAST 1860 S(
35-11519	Rediversion	P	19240825 IO	0.000	1.000	USA BUREAU OI RECLAMATION
	N1216 E323 S4 25 5N 1W SL					302 EAST 1860 S(
35-11519	Rediversion	P	19240825 IO	0.000	1.000	USA BUREAU OI RECLAMATION
	N1155 W2045 SE 25 5N 1W SL					302 EAST 1860 S(
35-11537	Rediversion	P	19240825 IO	0.000	171.000	USA BUREAU OI RECLAMATION
	N1216 E323 S4 25 5N 1W SL					302 EAST 1860 S(
35-11537	Rediversion	P	19240825 IO	0.000	171.000	USA BUREAU OI RECLAMATION
	N1155 W2045 SE 25 5N 1W SL					302 EAST 1860 S(
35-11639	Rediversion	P	19240825 IO	0.000	1.000	USA BUREAU OI RECLAMATION
	N1216 E323 S4 25 5N 1W SL					302 EAST 1860 S(
35-11639	Rediversion	P	19240825 IO	0.000	1.000	USA BUREAU OI RECLAMATION
	N1155 W2045 SE 25 5N 1W SL					302 EAST 1860 S(

35-5180	Underground N2344 W168 S4 26 5N 1W SL	P	19800204	DIS	0.015	0.000	BRUCE E. BYBEI 6750 SOUTH 227
35-5564	Surface S50 E1510 NW 01 4N 1W SL	P	18970000	DIS	0.015	1.340	CHARLES D. AN 8102 SOUTH HW
35-8008	Surface S1 W1 N4 01 4N 1W SL	P	1850	DIS	0.100	0.000	ARCHIE T. HILL UT
35-8009	Surface S2840 W3055 NE 36 5N 1W SL	P	1850	DIOS	0.430	0.000	USA DEPARTME ARMY ARSENAI UT
35-8011	Surface N2178 W136 SE 27 5N 1W SL	P	1851	IS	2.860	0.000	PIONEER IRRIGA CO. UT
35-8014	Surface N1216 E323 S4 25 5N 1W SL	P	1852	IS	2.100	0.000	WEBER BASIN W CONSERVANCY 2837 EAST HWY
35-8015	Surface N1216 E323 S4 25 5N 1W SL	P	1852	IS	9.450	0.000	SOUTH WEBER I CANAL COMPAI SOUTH WEBER I
35-8016	Surface N1 E1321 W4 25 5N 1W SL	P	1852	I	0.033	0.000	BYRON L. BYBE UT
35-8017	Surface N1250 E2950 SW 25 5N 1W SL	P	1852	DIS	0.000	0.000	UINTAH CENTR C/O RULON DYE
35-8025	Surface N1210 W2180 SE 25 5N 1W SL	P	1856	DIS	2.500	0.000	DAVIS AND WEI CANAL COMPAI 138 WEST 1300 N
35-8030	Surface N50 E1500 SW 36 5N 1W SL	P	1865	I	0.920	0.000	MARY KATE AT UT
35-8034	Surface N1216 E323 S4 25 5N 1W SL	P	1869	IS	3.040	0.000	WEBER BASIN W CONSERVANCY 2837 EAST HWY
35-8037	Surface N1216 E323 S4 25	P	1870	DIS	3.390	0.000	DAVIS AND WEI CANAL COMPAI

	5N 1W SL							138 WEST 1300 N
35-8038	Surface		P	1871	DS	0.010	0.000	ELIZABETH A PI
	N660 E660 S4 28 5N 1W SL							UT
35-8039	Surface		P	1872	DIS	3.040	0.000	WEBER BASIN W CONSERVANCY
	N1216 E323 S4 25 5N 1W SL							2837 EAST HWY
35-8040	Surface		P	1874	DIS	0.120	7.314	L. D. STARKS
	S2574 E2475 NW 01 4N 1W SL							UT
35-8045	Surface		P	1882	IS	0.370	0.000	SOUTH WEBER I CANAL COMPAI
	N1216 E322 S4 25 5N 1W SL							SOUTH WEBER I
35-8049	Surface		P	1890	I	0.270	0.000	SOUTH WEBER I CANAL COMPAI
	N1470 E2180 SW 25 5N 1W SL							SOUTH WEBER I
35-8052	Surface		P	1890	DIS	0.120	7.314	L. D. STARKS
	S2574 E2475 NW 01 4N 1W SL							UT
35-8055	Surface		P	1897	IS	0.630	0.000	SOUTH WEBER I CANAL COMPAI
	N1216 E323 S4 25 5N 1W SL							SOUTH WEBER I
35-8210	Surface		P	1874	DS	0.000	0.000	KSBN ENTERPRI PARTNERSHIP
	S3734 W37341 NE 02 4N 1E SL							A WYOMING LIN PARTNERSHIP
35-8739	Rediversion		P	19240825	IMOS	0.000	70121.220	USA BUREAU OI RECLAMATION
	N1216 E323 S4 25 5N 1W SL							302 EAST 1860 S(
35-8739	Rediversion		P	19240825	IMOS	0.000	70121.220	USA BUREAU OI RECLAMATION
	N1155 W2045 SE 25 5N 1W SL							302 EAST 1860 S(
a16958	Underground	well info	A	19920826	M	10.000	0.000	USA BUREAU OI RECLAMATION
	S905 E302 NW 10 4N 1W SL							ATTN: JONATHA
a17835	Surface		U	19940211	IS	0.200	0.000	RAMONA H. LOV
	S660 E600 NW 01 4N 1W SL							2577 EAST HIDD

a21749	Underground	well info	A	19971212	19.000	13756.000	LAYTON CITY C
	S350 W1014 NE 16 4N 1W SL						437 NORTH WAS
E4277	Surface		A	20021204 I	0.000	5.000	CANAAN HAY C
	S155 W1241 W4 26 5N 1W SL						2201 SUMMERW
E4384	Surface		A	20031208 DIS	0.000	1.000	DOUGLAS AND
	N50 E1500 W4 26 5N 1W SL						6778 SOUTH 215
E95	Surface		A	19610531 I	6.000	0.000	USA BUREAU OI RECLAMATION
	N670 E1550 SW 12 4N 1W SL						ATTN: JONATHA

APPENDIX H

2004 Results of Groundwater Monitoring
Davis Landfill

February 28, 2005

Dennis R. Downs, Director
Utah Division of Solid and Hazardous Waste
288 North 1460 West
Salt Lake City, Utah 84114-4880
Attention: Jeff Emmons

Re: 2004 Results of Groundwater Monitoring, Davis Landfill

Dear Mr. Downs:

On July 1, 2004 Wasatch Energy Systems' name was changed to Wasatch Integrated Waste Management District (Wasatch). This letter summarizes the results of groundwater monitoring performed during 2004 at the Davis Landfill located in Layton, Utah. Groundwater sampling was conducted to satisfy the requirements of Utah Administrative Code R315-308-2. In addition, we have provided a summary of groundwater elevations, potentiometric surface maps, a review of the sampling activities, a summary of the data validation, and statistical analysis.

Lined Landfill Cell

Two semiannual detection groundwater monitoring events were performed at the Lined Landfill Cell monitoring network during June and November 2004.

Unlined Landfill Cell

Statistical analysis of background water quality data was performed and submitted in the Background Water Quality Report (Bingham, October 1998). Results of that analysis indicated that there had been a statistically significant increase in groundwater concentrations, as compared to background groundwater quality, for several constituents within the existing landfill cell monitoring networks. Assessment monitoring of the unlined landfill cell began with the November 1998 sampling event as required by UACR315-308-2. Statistical analysis of the groundwater quality data obtained during 2003 continued to indicate a statistically significant increase in several groundwater constituents as compared to background data. As such, the unlined landfill cell remained in assessment monitoring during 2004.

The assessment monitoring program at the unlined landfill cell consisted of four (4) groundwater sampling events (March, June, September and November) during 2004. The annual assessment monitoring event, in which the entire lists of constituents found in 40CFR, Part 258, Appendix II are analyzed, was performed during November of 2004.

FIELD ACTIVITIES

Groundwater Sampling

Wasatch personnel performed the groundwater sampling of monitor wells during the entire year of 2004. All groundwater sampling was performed in accordance with the approved Groundwater Monitoring Plan.

All monitor wells are equipped with dedicated bladder pumps and were purged and sampled using micro-purging techniques as described in the Groundwater Monitoring Plan.

The unfiltered samples were containerized in the appropriate sample bottles and immediately placed on ice in a cooler. Groundwater samples were hand delivered under chain of custody to American West Analytical Laboratories (AWAL), a State of Utah certified laboratory. Upon receipt at AWAL, each set of samples was assigned a Laboratory Sample Set ID Number. Table 1 summarizes the Lab Set ID No., monitor network, date delivered to the laboratory and the samples delivered under each chain of custody.

Table 1

CHAIN OF CUSTODY SUMMARY 2004 Groundwater Sampling Program			
Lab Set ID No.	**Monitor Network**	**Date Delivered**	**Sample ID's**
59434	Unlined Cell	3/19/03 (17:39)	DMW-2, DMW-4, MW-7, MW-8, MW-3, MW-4, MW-15, MW-16R, MW-20, field blank, trip blank
60880	Lined Cell	6/22/04 (17:15)	MW-5, MW-11, MW-12, MW-13, MW-14, MW-20, DMW-2, DMW-4, field blank, trip blank
60912	Unlined Cell	6/23/04 (17:45)	MW-7, MW-8,MW-4, MW-15, MW-16R, MW-3, MW-21, field blank, trip blank
61942	Unlined Cell	9/1/04 (07:45)	DMW-2, DMW-4, MW-7, MW-8, MW-3, MW-4, MW-15, MW-16R, MW-20, field blank, trip blank
62989	Lined Cell	11/3/04 (16:40)	MW-5, MW-11, MW-12, MW-13, MW-14, MW-20, DMW-2, DMW-4, MW-7, field blank, trip blank
63009	Unlined Cell	11/4/04 (15:25)	MW-8, MW-4, MW-15, MW-16R, MW-3, MW-21, field blank

All samples were analyzed in accordance with Utah Administrative Code R315-308-4 and/or 40CFR, Part 258, Appendix II as appropriate.

Field measurements and observations noted during sampling were both hand recorded on field data sheets and electronically recorded with Hydrolab Surveyor. Both records have been included in Attachment 1, Field Sampling Documentation.

Water Level Measurements

Groundwater level measurements were obtained during the sampling events prior to purging each monitor well. Depth to groundwater and groundwater elevations are summarized in Table 2, 2004 Groundwater Level Measurements, which have been included in Attachment 2, Potentiometric Surface Maps.

Review of the groundwater measurements indicates the direction of groundwater flow in the shallow perched aquifer is generally toward the north-northeast, which is consistent with previous measurements. The direction of groundwater flow in the deep perched aquifer is inferred to be toward the north-northeast, which is also consistent with previous measurements. Potentiometric surface maps for the upper and the intermediate aquifer, for each sampling event, have also been included in Attachment 2, Potentiometric Surface Maps.

Field QA/QC Samples

Trip Blank - Trip blanks were utilized throughout the sampling events to monitor the potential for cross contamination during the storage and shipment of samples. Trip blanks were analyzed for volatile constituents.

Field Blank - Field blanks were utilized during several sampling events to monitor the potential for contamination from the environment during sample collection and transport. Field blanks were also analyzed for volatile constituents.

Field Duplicate - Field duplicate samples were taken during the sampling events to assess data precision.

DATA VALIDATION

The analytical data generated during the 2004 groundwater sampling events at the Davis Landfill has been reviewed and evaluated for quality, accuracy, and precision according to EPA data validation general guidelines and requirements. The data passes the Quality Assurance review and can be used as reliable data with the following exceptions.

Some of the data has been flagged with qualifiers, which typically designate the value as an estimate or reject the data. The following qualifiers may have been used in this review:

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

J - The analyte was positively identified; the associated value is the approximate concentration of the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

JFD - The reported value is qualified because the associated field duplicate sample analysis control limits were exceeded.

In the event that more than one qualifier is applied to a single data point, only the more severe qualifier is shown. The 2004 laboratory analysis reports are provided in Attachment 3. Trip blank, field blank, method blank, field duplicate analyses, and Laboratory Quality Assurance/Quality Control documentation is provided in Attachment 4.

Methods and Detection Limits - All methods used in the chemical analyses of the 2004 sampling events are EPA approved methods. All laboratory reporting limits met project requirements.

Field Duplicate - Field duplicate analysis provides a means to monitor the performance of the laboratory's precision and the consistency of field sampling techniques. Precision is a measure of the reproducibility of the data. For chemical analyses, precision is calculated as relative percent difference (RPD) as follows:

$$RPD = \frac{(S - D)}{(S + D) / 2} \times 100$$

Where:

S	=	Sample Result
D	=	Duplicate Result

The acceptance criteria for sample values greater than 5 times the laboratory detection limit (LDL) is a control limit of +/- 20% for the RPD. If the sample values are less than 5 times the LDL, a control limit of +/- the LDL shall be used. If field duplicate analysis results for a particular analyte fall outside the control windows of +/- 20% or +/- LDL, whichever is appropriate, the results for that analyte in all other samples associated with that laboratory set should be flagged as estimated.

It should be noted that field QA/QC samples should not be the basis of accepting or rejecting data, but rather as additional evidence to support the conclusions arrived at by a review of the total data package. Actions taken as a result of duplicate sample analysis must be weighed carefully since it may be difficult to determine if poor precision is a result of sample non-homogeneity, method defects, or laboratory technique. In general, the results of duplicate analysis should be used to support conclusions drawn about the quality of the data rather than as a basis for these conclusions.

During 2004 a field duplicate was taken at two different wells during the four sampling events in the unlined landfill cell. MW-15 was the well used for the first and second quarter sampling events. MW 8 was the well used for the third and fourth quarter sampling events. The duplicate sample taken during the first and third sampling event was labeled MW-20. The duplicate sample taken during the second and fourth sampling event was labeled MW-21. A field duplicate sample was also taken during the June and November sampling events in the lined landfill cell at MW-13 (second Quarter) and MW-14 (fourth Quarter) and was labeled MW-20.

Table 3 summarizes those constituents that did not meet the acceptance criteria for field duplicate analysis and the action taken.

Table 3

SUMMARY OF FIELD DUPLICATE ANALYSIS		
2004 Groundwater Sampling Program		
Event	**Constituent**	**Action/Comment**
Unlined Cell - March	Iron	Data flagged [ ]JFD
	TOC	Data flagged [ ]JFD
Lined Cell – June	Iron	Data flagged [ ]JFD
	Sulfate	Data flagged [ ]JFD
	TOC	Data flagged [ ]JFD
Unlined Cell – June	Manganese	Data flagged [ ]JFD
Unlined Cell – August	Nitrate (as N)	Data flagged [ ]JFD
	TOC	Data flagged [ ]JFD
Lined Cell – November	Iron	Data flagged [ ]JFD
	Manganese	Data flagged [ ]JFD
Unlined Cell – November	Vinyl Chloride	Data flagged [ ]JFD
	COD	Data flagged [ ]JFD

Results of field duplicate laboratory analysis and summary of RPD analysis are included in Attachment 4, Quality Assurance/Quality Control Documentation.

Trip Blanks – No contaminants were detected in the Trip Blanks analyzed during 2004.

Field Blanks - No contaminants were detected in the Field Blanks analyzed during 2004.

Laboratory Blanks - The assessment of blank analysis results is used to determine the existence and magnitude of contamination problems. There was one contaminant that was detected in the Method Blanks during 2004. Di-n-butyl phthalate was detected in both the lab sets for the Fourth Quarter Sampling Event (62989 and 63009). It was detected in the Method Blank Analysis at 13.01 µg/L and 7.82 µg/L in lab sets 62989 and 63009 respectively. Di-n-butyl phthalate was detected in six of nine wells sampled, two of which are upper gradient wells. Di-n-butyl phthalate was also detected in the field duplicate, but not the duplicate sample. For these reasons Di-n-butyl phthalate detections in lab sets 62989 and 63009 are rejected and have been flagged with an [ ]R.

Table 4

SUMMARY OF METHOD BLANK ANALYSIS	
Di-n-butyl phthalate detection levels	
Lab Set and Location	**Level (µg/L)**
62989 – Method Blank	13.01
62989 – DMW 4	12
62989 – DMW 2	12
62989 – MW 7	20
63009 – Method Blank	7.82
63009 – MW 21	8.4
63009 – MW 4	11
63009 – MW 3	10
63009 – MW 15	8.9

Holding Times - To ascertain the validity of the results, the holding times (time of collection to time of analysis) was reviewed. There were no samples that were analyzed outside of applicable hold time. A summary of Hold Times Analysis is provided in Attachment 4, Table 5.

Laboratory Control Sample - Laboratory control samples (LCS) demonstrate on a daily basis the ability of the laboratory to analyze samples with good qualitative and quantitative accuracy. All laboratory control sample results were within acceptable limits.

Matrix Spike/Matrix Spike Duplicate Sample Analysis - The matrix spike/matrix spike duplicate sample analysis provides information about the effect of the sample matrix on the digestion and measurement methodology. All laboratory matrix spike recovery results were within acceptable limits, except as summarized in Table 6.

Table 6

SUMMARY OF MATRIX SPIKE ANALYSIS				
2004 Groundwater Sampling Program				
Laboratory Set	**Analyte**	**MS Recovery**	**Limit**	**Action/Comments**
60880	Chloride	84.4	90-110	no action, see note below[1]
	Nitrate	82.3	90-110	no action, see note below[1]
60912	Iron	141	75-125	data flagged [ ] J as estimated
	Tin	59.2	75-125	data flagged [ ]UJ as estimated
	Zinc	0	75-125	data flagged [ ]UJ as estimated
	Cyanide	111	85-115	data flagged [ ]UJ as estimated
	Nitrate	87.3	90-110	no action, see note below[1]
61942	Nitrate	-669	90-110	data flagged [ ] J as estimated
	Chloride	-66.4	90-110	data flagged [ ] J as estimated
63009	COD	82.0	85-115	no action, see note below[1]
	Nitrate	84.8	90-110	no action, see note below[1]

[1] – These analytes are naturally found at high concentrations in the water samples. The spikes are therefore relatively small in concentration and accurate interpretations are not easily made. Laboratory test methods do not require that the MS Recovery Percents be calculated if the spike amount is less than 10% of the sample background concentration (EPA Method 200.7).

All laboratory matrix spike duplicate RPD results were within acceptable limits with the following exceptions:

The RPD for the matrix spike duplicate of Sulfate was reported at 6.45% in lab set 59434. The RPD Limit is 10%, however the percent recovered was 75% with limits of 80-120; data was flagged [ ] UJ estimated.

In lab set 60912, the RPD for the matrix spike duplicate of Sodium was reported at 1.4%. The RPD Limit is 20%, however the percent recovered was 140% with limits of 75-125; data was flagged [ ] J estimated. The RPD for the matrix spike duplicate of Ammonia was reported at 1.05%. The RPD Limit is 20%, however the percent recovered was 82.7% with limits of 90-110; there was no action taken due to above note [1]. The RPD for the matrix spike duplicate of Calcium was reported at 1.5%. The RPD Limit is 20%, however the percent recovered was 136% with limits of 75-125; data was flagged [ ] J estimated.

The RPD for the matrix spike duplicate of 2-Chloronaphthalene was reported at 29.1% in lab set 62989. The RPD Limit is 40%, however the percent recovered was 91.9% with limits of 20-90; there was no action taken.

Matrix spike duplicate problems that were also associated with a matrix spike problem were not specifically addressed here as the appropriate action was applied as a result of matrix spike recovery.

Duplicate Sample Analysis - Duplicate analyses are indicators of laboratory precision based on each sample matrix. Some parameters use a duplicate analysis rather than a matrix spike analysis. All duplicate analysis results and associated relative percent differences (RPDs) were within acceptable limits.

RESULTS AND STATISTICAL ANALYSIS

Results of 2004 groundwater monitoring are summarized in Table 6, Summary of Water Quality Data at the end of this report. Laboratory reports of all analyses performed during 2004 are located in Attachment 3, Groundwater Quality Analyses.

Lined Landfill Cell

Two semiannual detection groundwater monitoring events were performed on the Lined Landfill Cell monitoring network during June and November 2004.

Statistical analysis of available water quality data for the lined landfill cell indicates that there has not been a significant change in groundwater quality as compared to background data. A summary of the statistical analysis is located in Attachment 5, Table 7.

Unlined Landfill Cell

During 2004, four groundwater assessment monitoring events were performed at the unlined landfill cell. The annual assessment monitoring event, in which the entire list of constituents listed 40CFR, Part 258, Appendix II are analyzed, was performed in November of 2004.

There were three constituents, of those listed in 40CFR Part 258 Appendix II, that were newly detected during the November 2004 groundwater sampling event, in addition to the detection monitoring constituents listed in UACR315-308-4. Benzo(a)pyrene was detected in MW-15 at 1.1 µg/L, Pentachlorophenol was detected in MW-16R and DMW-4 at 1.1 and 1.5 µg/L respectfully, and 2,4-D was detected in MW-3 at 1.6 µg/L. Of the Appendix II constituents which have been detected in the past (tin, bis(2-ethylhexyl)phthalate, cyanide, and sulfide), only tin and sulfide were not detected during the 2004 sampling events. These two constituents have not been detected for seventeen and nine (respectively) consecutive sampling events. Bis (2-ethylhexyl) phthalate was detected in MW-3 in the first and second quarters, and cyanide was detected in MW-3 in the fourth quarter. 2,4,5,-T and Anthracene were not sampled during the first three quarters and were not detected in the fourth quarter. However, these constituents will be analyzed quarterly in 2005.

Statistical analysis of groundwater quality data for the Unlined Landfill Cell, including the November 2004 event, indicates that there is a statistically significant change, as compared to background, for several constituents as outlined in Table 8.

Table 8

STATISTICALLY SIGNIFICANT RESULTS AS COMPARED TO BACKGROUND Unlined Landfill Cell	
Constituent	**Monitoring Network**
Nickel	Intermediate Aquifer
Arsenic	Upper Aquifer
	Intermediate Aquifer
Barium	Upper Aquifer
	Intermediate Aquifer
Benzene	Intermediate Aquifer
Vanadium	Upper Aquifer
Chlorobenzene	Upper Aquifer
	Intermediate Aquifer
cis-1,2-Dichloroethene	Upper Aquifer
	Intermediate Aquifer
Vinyl chloride	Upper Aquifer
	Intermediate Aquifer

Statistical analysis also indicates that no constituent has shown a statistically significant change such that the established groundwater protection level has been exceeded. A summary of the statistical analysis is included in Attachment 5.

CONCLUSIONS

Field and laboratory data meet the requirements of Utah Administrative Code R315-308-4 and all results above laboratory detection limits are acceptable in determining groundwater quality of the shallow perched and deep perched aquifers with the exceptions indicated.

The direction of groundwater flow in the shallow perched aquifer is generally toward the north-northeast; consistent with previous measurements. The direction of groundwater flow in the deep perched aquifer is toward the north-northeast, which is also consistent with previous measurements.

Statistical analysis of available water quality data for the lined landfill cell indicates that there has not been a significant change in groundwater quality as compared to background.

Statistical analysis of groundwater quality data for the unlined landfill cell, including the November 2004 event, indicates that there is a statistically significant change, as compared to background, for several constituents. The monitor well network for the unlined landfill cell will continue in assessment monitoring.

Statistical analysis also indicates that no constituent has shown a statistically significant change such that the established groundwater protection level has been exceeded.

Assessment Monitoring at the Unlined Landfill Cell will include the constituents for Detection Monitoring (UACR315-308-4) and the following Part 258 Appendix II constituents: Cyanide, bis (2-ethylhexyl)phthalate, 2,4,5,-T, Anthracene, Benzo(a)pyrene, 2,4-D, and Pentachlorophenol.

With the seventeen consecutive non-detect for Tin and nine consecutive non-detect for sulfide, these two constituents will no longer be included in Assessment Monitoring.

Please do not hesitate to contact me if you have any questions regarding these submissions.

Sincerely,

Wasatch Integrated
Waste Management District

Nathan Rich, P.E.
Executive Director

Wasatch Integrated
Waste Management District

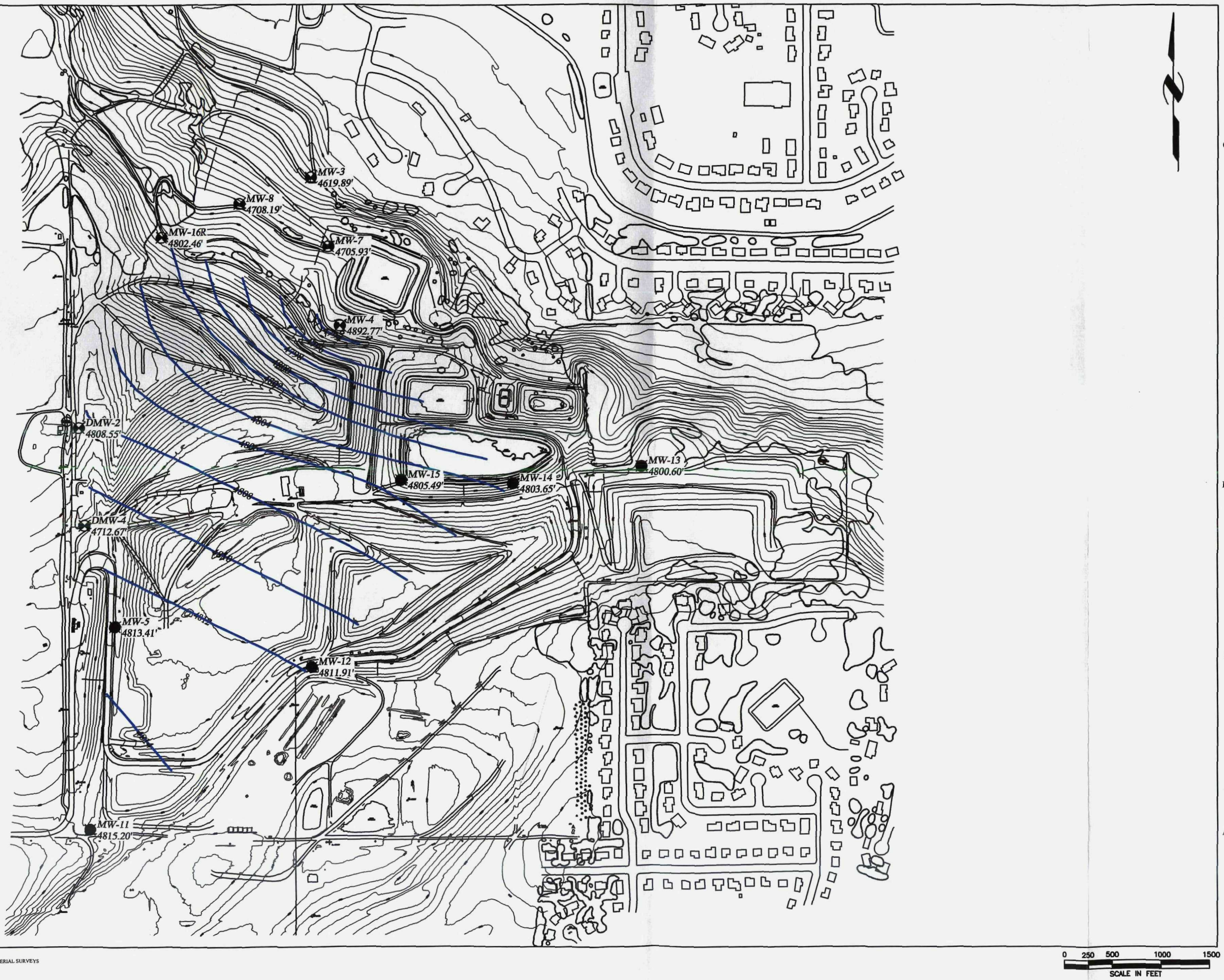
Preston Lee
Environmental Engineer

attachments

LIST OF TABLES, FIGURES AND ATTACHMENTS

LIST OF TABLES

LIST OF ATTACHMENTS



REFERENCE:
SURFACE TOPOGRAPHY BY OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

WASATCH INTEGRATED waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES ideas for a changing world

182 South 600 East, Suite 206
Salt Lake City, Utah 84102
(801)521-1800 Fax: (801)521-2800

MARK	DATE	DESCRIPTION

ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\2004 GW\MARCH 04.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

UPPER PERCHED AQUIFER (MARCH 2004)

1

REFERENCE:
SURFACE TOPOGRAPHY BY OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 250 500 1000 1500
SCALE IN FEET

WASATCH
INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

182 South 600 East, Suite 206
Salt Lake City, Utah 84102
(801)521-1800 Fax: (801)521-2800

5' CONTOURS (SURFACE TOPO.)

EXISTING ROADS

PERIMETER FENCE

GROUNDWATER MONITOR WELLS FOR UNLINED LANDFILL CELL

GROUNDWATER MONITOR WELLS FOR LINED LANDFILL CELL

2' GROUNDWATER CONTOUR (APPROXIMATE)

MARK	DATE	DESCRIPTION

ISSUE:

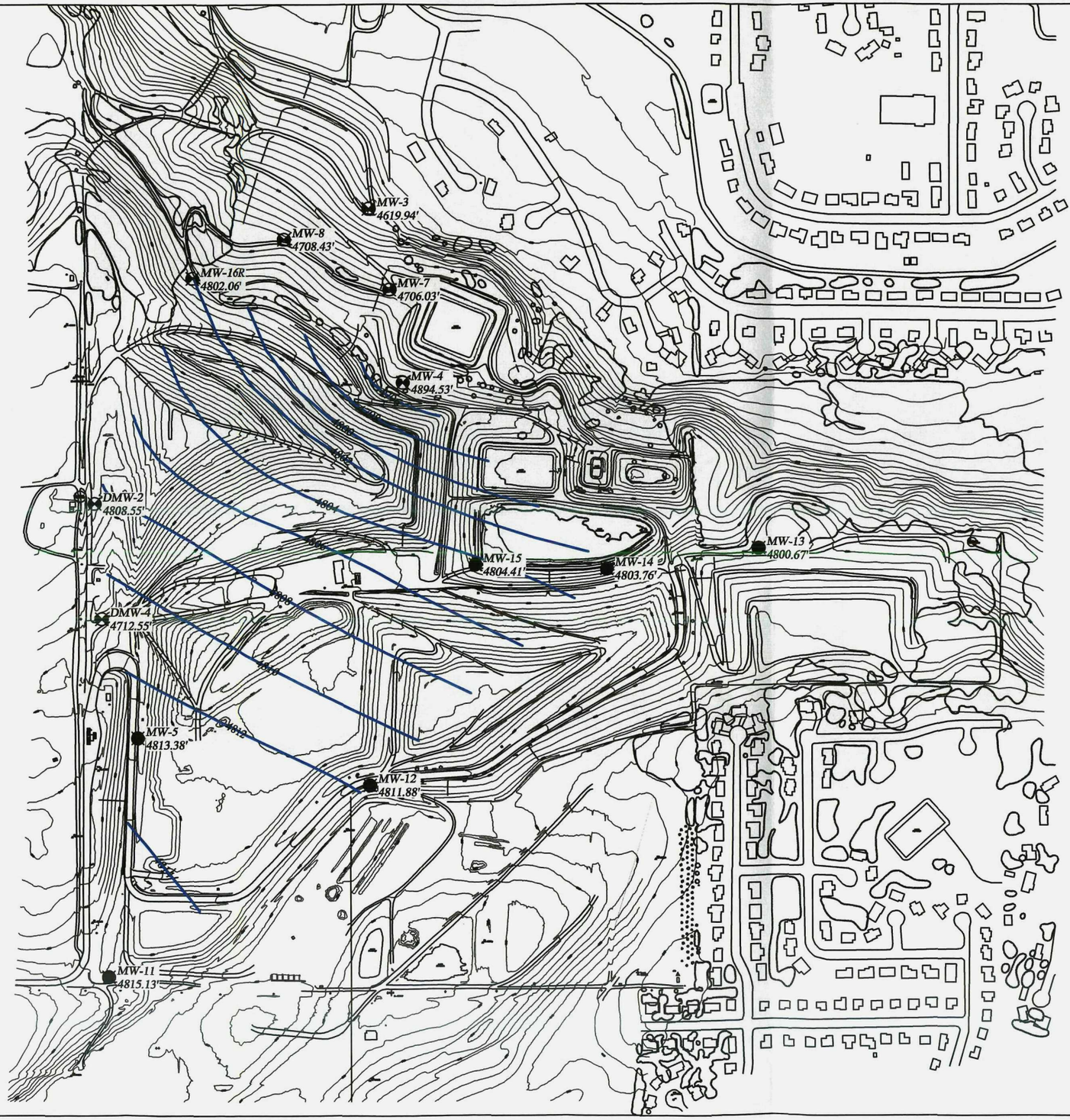
PROJECT NO.:	00169-032
CAD DWG FILE:	00169\2004 GW\MARCH 04.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

INTERMEDIATE PERCHED AQUIFER (MARCH 2004)

2



REFERENCE:
SURFACE TOPOGRAPHY BY OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 250 500 1000 1500
SCALE IN FEET

WASTATCH
INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

182 South 600 East, Suite 206
Salt Lake City, Utah 84102
(801)521-1800 Fax: (801)521-2800

5' CONTOURS (SURFACE TOPO.)

EXISTING ROADS

GROUNDWATER MONITOR WELLS FOR UNLINED LANDFILL CELL (6)

GROUNDWATER MONITOR WELLS FOR LINED LANDFILL CELL (7)

2' GROUNDWATER CONTOUR (APPROXIMATE)

MARK	DATE	DESCRIPTION

ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\2004 GW\JUNE 04.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

UPPER PERCHED AQUIFER (JUNE 2004)

3

REFERENCE:
SURFACE TOPOGRAPHY BY OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 250 500 1000 1500
SCALE IN FEET

WASATCH INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

182 South 600 East, Suite 206
Salt Lake City, Utah 84102
(801)521-1800 Fax: (801)521-2800

- 5' CONTOURS (SURFACE TOPO.)
- EXISTING ROADS
- GROUNDWATER MONITOR WELLS FOR UNLINED LANDFILL CELL
- GROUNDWATER MONITOR WELLS FOR LINED LANDFILL CELL
- 2' GROUNDWATER CONTOUR (APPROXIMATE)

MARK	DATE	DESCRIPTION

ISSUE:

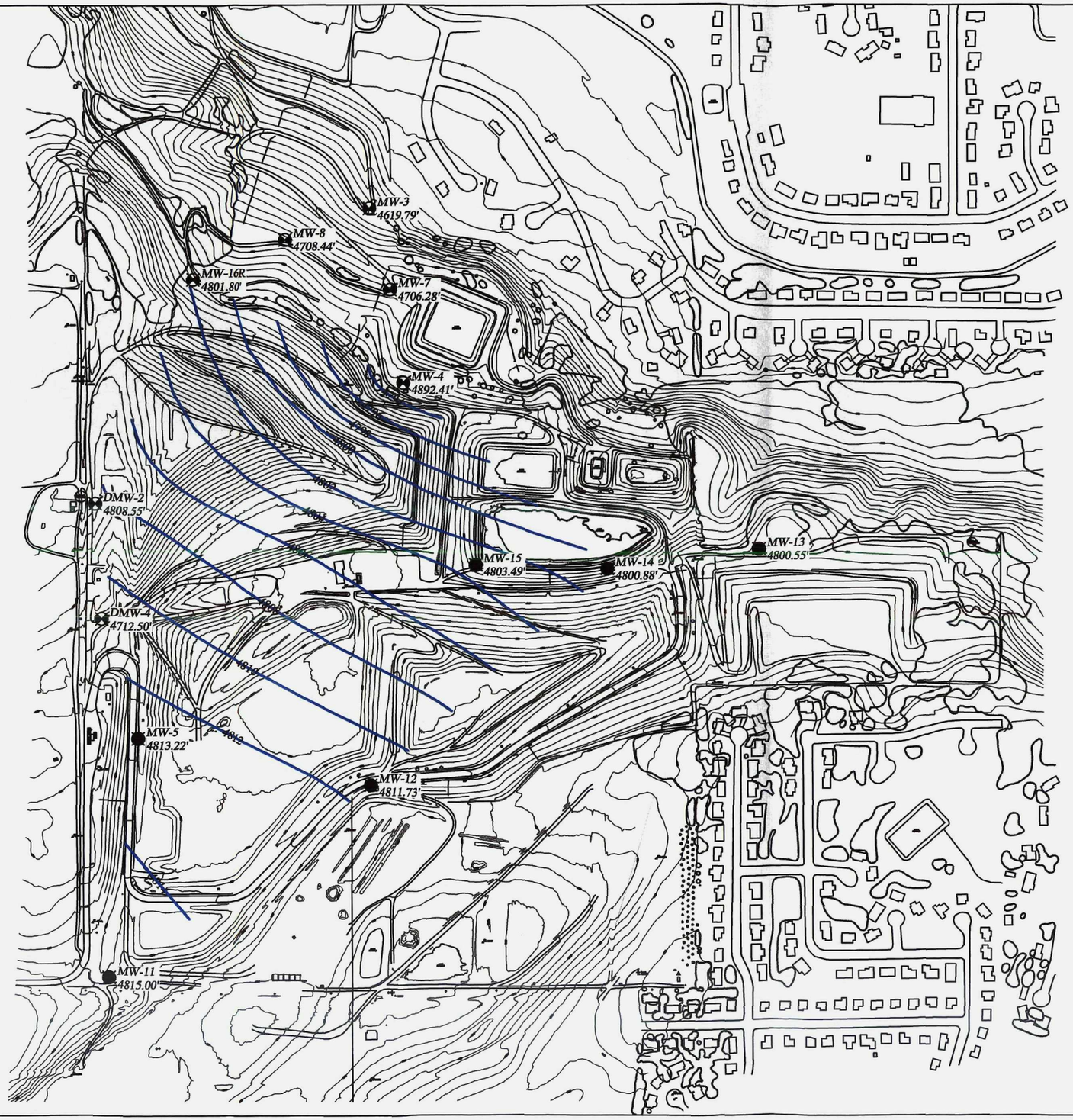
PROJECT NO.:	00169-032
CAD DWG FILE:	00169\2004 GW\JUNE 04.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

INTERMEDIATE PERCHED AQUIFER (JUNE 2004)

4



REFERENCE:
SURFACE TOPOGRPHY BY OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 250 500 1000 1500
SCALE IN FEET

WASTATCH
INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

182 South 600 East, Suite 206
Salt Lake City, Utah 84102
(801)521-1800 Fax: (801)521-2800

5' CONTOURS (SURFACE TOPO.)

EXISTING ROADS

GROUNDWATER MONITOR WELLS FOR UNLINED LANDFILL CELL (6)

GROUNDWATER MONITOR WELLS FOR LINED LANDFILL CELL (7)

2' GROUNDWATER CONTOUR (APPROXIMATE)

MARK	DATE	DESCRIPTION

ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\2004 GW\SEPT 04.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

UPPER PERCHED AQUIFER (SEPT. 2004)

5

REFERENCE:
SURFACE TOPOGRPHY BY OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 250 500 1000 1500
SCALE IN FEET

WASATCH INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

182 South 600 East, Suite 206
Salt Lake City, Utah 84102
(801)521-1800 Fax: (801)521-2800

- 5' CONTOURS (SURFACE TOPO.)
- EXISTING ROADS
- GROUNDWATER MONITOR WELLS FOR UNLINED LANDFILL CELL
- GROUNDWATER MONITOR WELLS FOR LINED LANDFILL CELL
- 2' GROUNDWATER CONTOUR (APPROXIMATE)

MARK	DATE	DESCRIPTION

ISSUE:

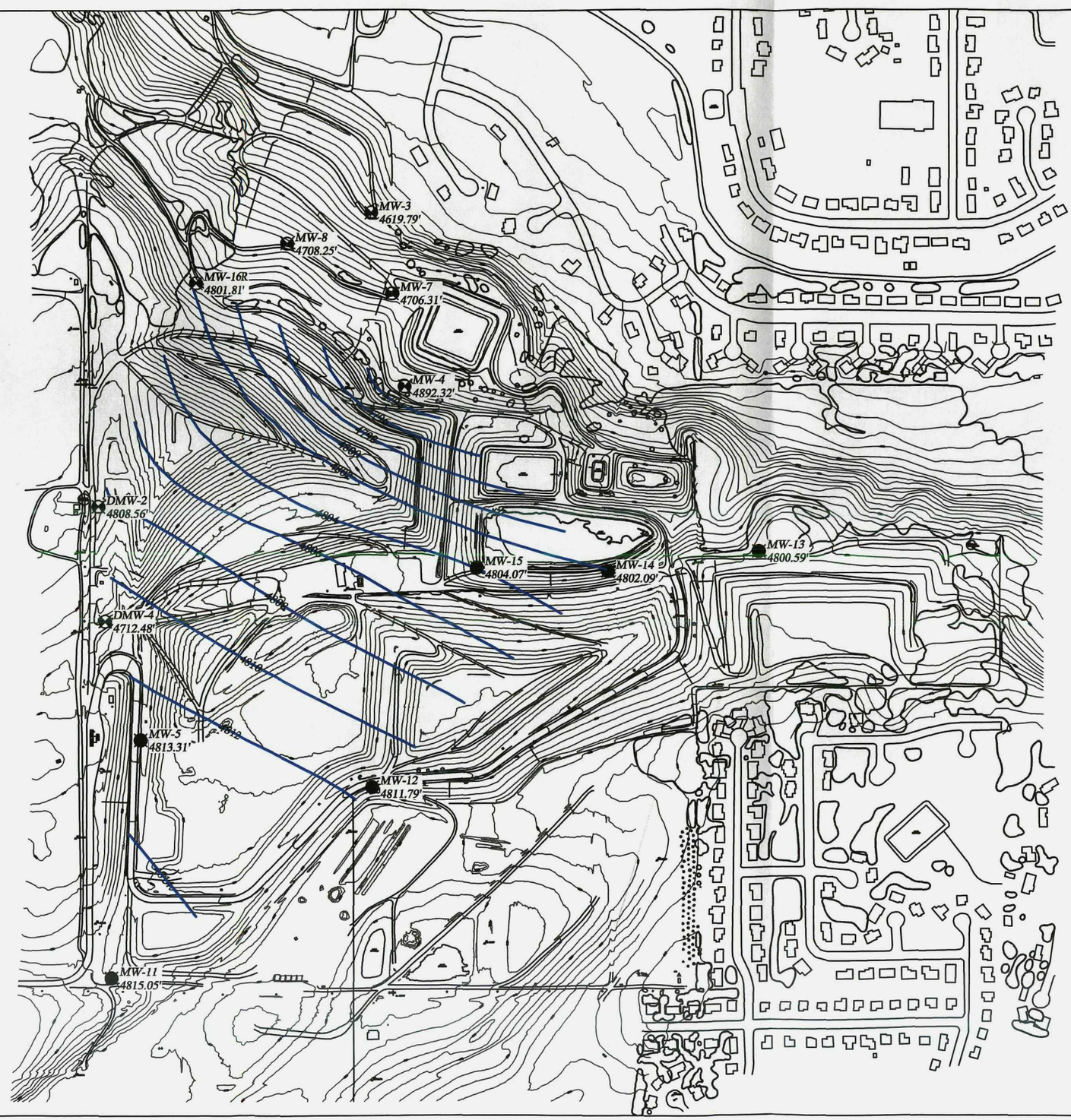
PROJECT NO.:	00169-032
CAD DWG FILE:	00169\2004 GW\SEPT 04.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

INTERMEDIATE PERCHED AQUIFER (SEPT. 2004)

6



REFERENCE:
SURFACE TOPOGRAPHY BY OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 250 500 1000 1500
SCALE IN FEET

WASATCH
INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

182 South 600 East, Suite 206
Salt Lake City, Utah 84102
(801)521-1800 Fax: (801)521-2800

5' CONTOURS (SURFACE TOPO.)

EXISTING ROADS

GROUNDWATER MONITOR WELLS FOR UNLINED LANDFILL CELL (6)

GROUNDWATER MONITOR WELLS FOR LINED LANDFILL CELL (7)

2' GROUNDWATER CONTOUR (APPROXIMATE)

MARK	DATE	DESCRIPTION

ISSUE:

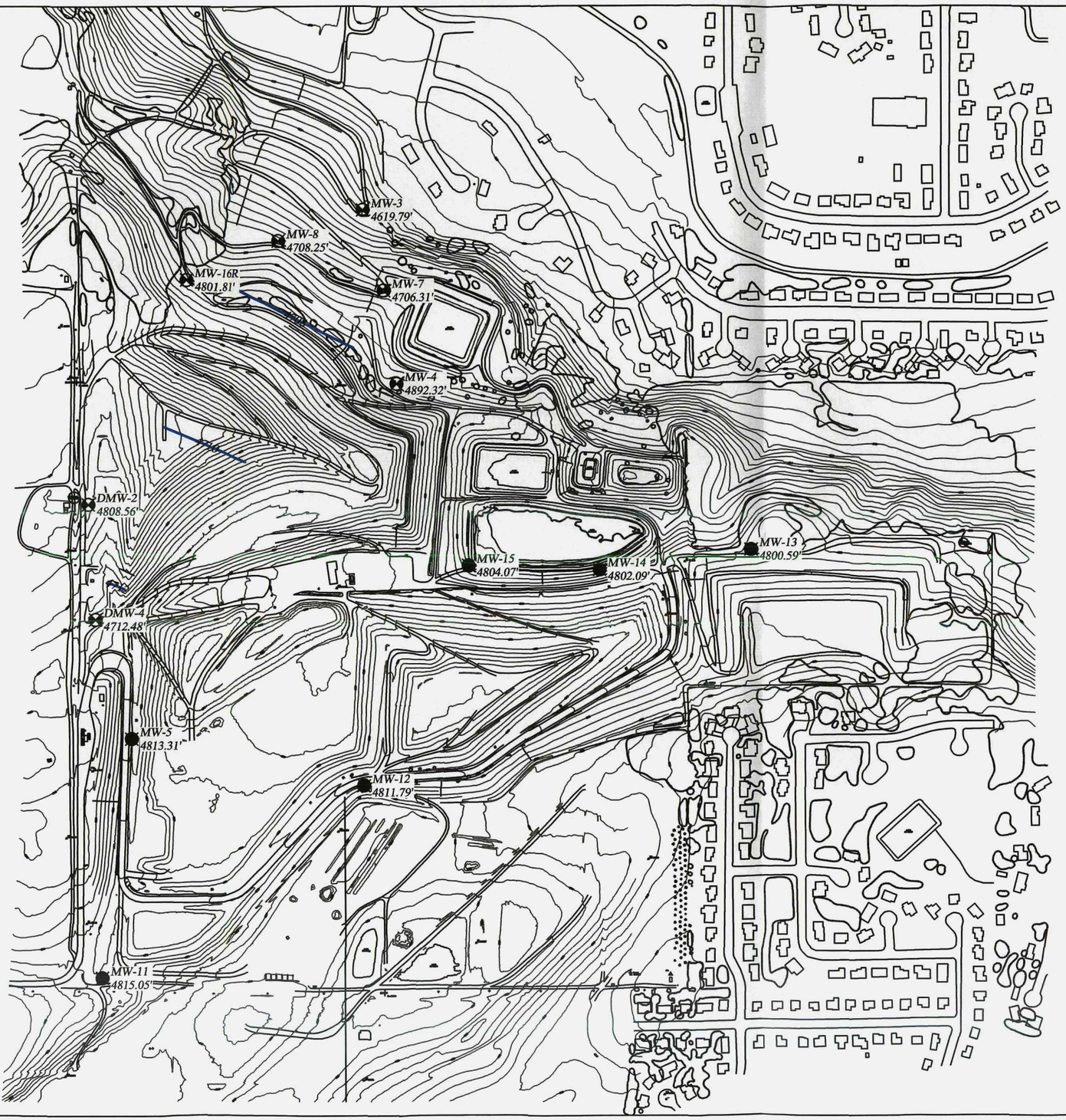
PROJECT NO.:	00169-032
CAD DWG FILE:	00169\2004 GW\DEC 04.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

UPPER PERCHED AQUIFER (DEC. 2004)

7



REFERENCE:
SURFACE TOPOGRAPHY BY OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 250 500 1000 1500
SCALE IN FEET

WASATCH INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

182 South 600 East, Suite 206
Salt Lake City, Utah 84102
(801)521-1800 Fax: (801)521-2800

5' CONTOURS (SURFACE TOPO.)

EXISTING ROADS

GROUNDWATER MONITOR WELLS FOR UNLINED LANDFILL CELL

GROUNDWATER MONITOR WELLS FOR LINED LANDFILL CELL

2' GROUNDWATER CONTOUR (APPROXIMATE)

MARK	DATE	DESCRIPTION

ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\2004 GW\DEC 04.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

INTERMEDIATE PERCHED AQUIFER (DEC. 2004)

8

APPENDIX I

Slope Stability

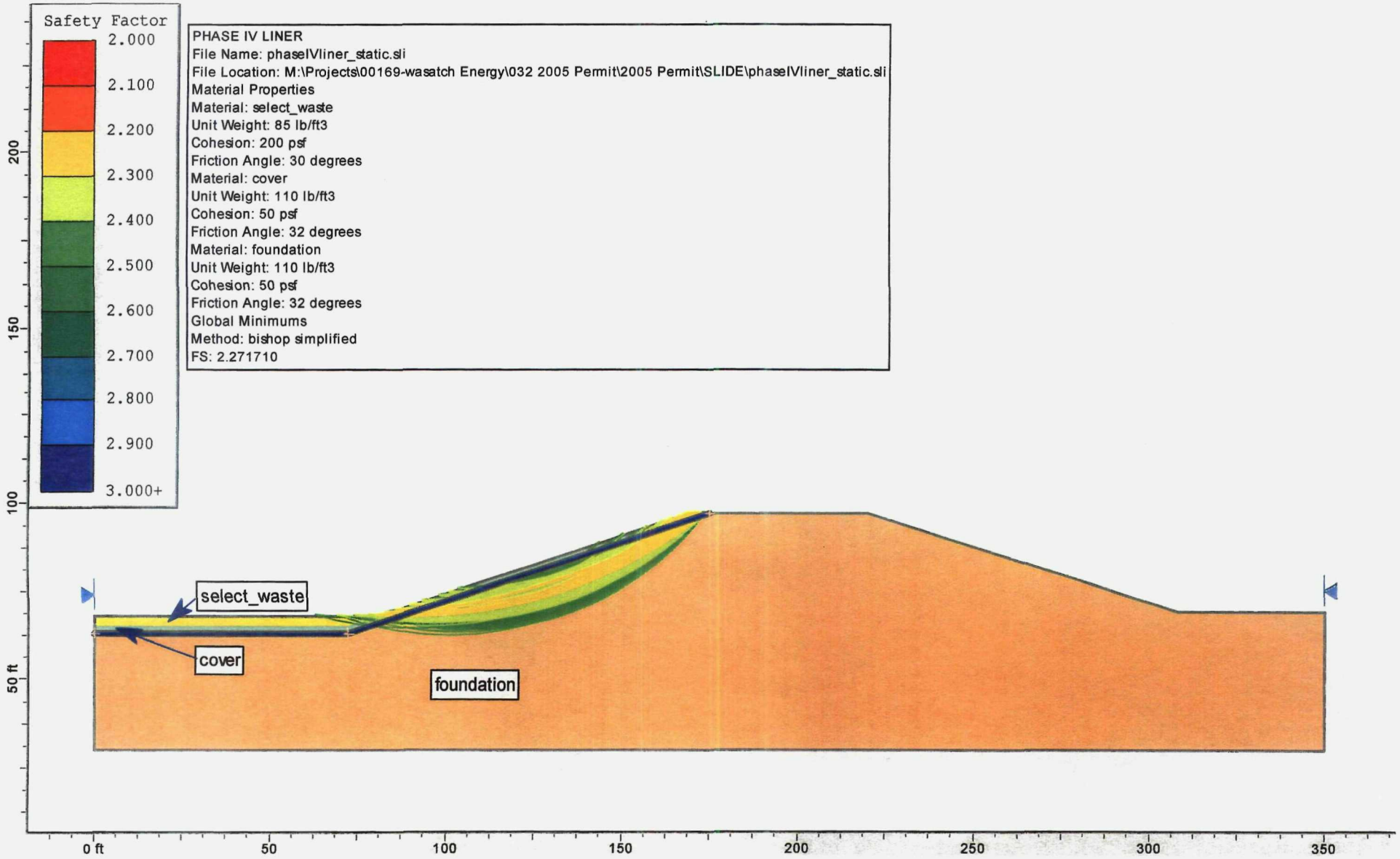

Safety Factor
2.000
2.100
2.200
2.300
2.400
2.500
2.600
2.700
2.800
2.900
3.000+
PHASE IV LINER
File Name: phaseIVliner_static.sli
File Location: M:\Projects\00169-wasatch Energy\032 2005 Permit\2005 Permit\SLIDE\phaseIVliner_static.sli
Material Properties
Material: select_waste
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Material: cover
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Material: foundation
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Global Minimums
Method: bishop simplified
FS: 2.271710
select_waste
cover
foundation
200
150
100
50 ft
0 ft
50
100
150
200
250
300
350

PLATE I-1

Slide Analysis Information

Document Name

File Name: phaseIVliner_static.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Composite Surfaces: Disabled
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Material: select_waste
Strength Type: Mohr-Coulomb
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: None

Material: cover
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Material: foundation
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Support Properties

Support: Bentonite_interface <1.2ksf
Bentonite_interface <1.2ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 25 lb/ft2
Pullout Strength Friction Angle: 29.5 degrees

Global Minimums

Method: bishop simplified
FS: 2.271710
Center: 89.744, 196.089
Radius: 128.362
Left Slip Surface Endpoint: 81.148, 68.015
Right Slip Surface Endpoint: 171.342, 97.000
Resisting Moment=5.82996e+006 lb-ft
Driving Moment=2.56633e+006 lb-ft

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 3041
Number of Invalid Surfaces: 0

Slide Analysis Information

Document Name

File Name: phaseIVliner_pseudo.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Composite Surfaces: Disabled
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.35

Material Properties

Material: select_waste
Strength Type: Mohr-Coulomb

Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: None

Material: cover
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Material: foundation
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Support Properties

Support: Bentonite_interface <1.2ksf
Bentonite_interface <1.2ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 25 lb/ft2
Pullout Strength Friction Angle: 29.5 degrees

Global Minimums

Method: bishop simplified
FS: 0.999991
Center: 90.802, 197.880
Radius: 130.243
Left Slip Surface Endpoint: 81.088, 68.000
Right Slip Surface Endpoint: 173.181, 97.000
Resisting Moment=5.80807e+006 lb-ft
Driving Moment=5.80812e+006 lb-ft

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 3710
Number of Invalid Surfaces: 0

Probabilistic Analysis Input

Project Settings
Sensitivity Analysis: On
Probabilistic Analysis: Off

Horizontal Seismic Coefficient
Distribution: Normal
Minimum: 0.25 (relative minimum: 0.1)
Mean: 0.35
Maximum: 0.45 (relative maximum: 0.1)

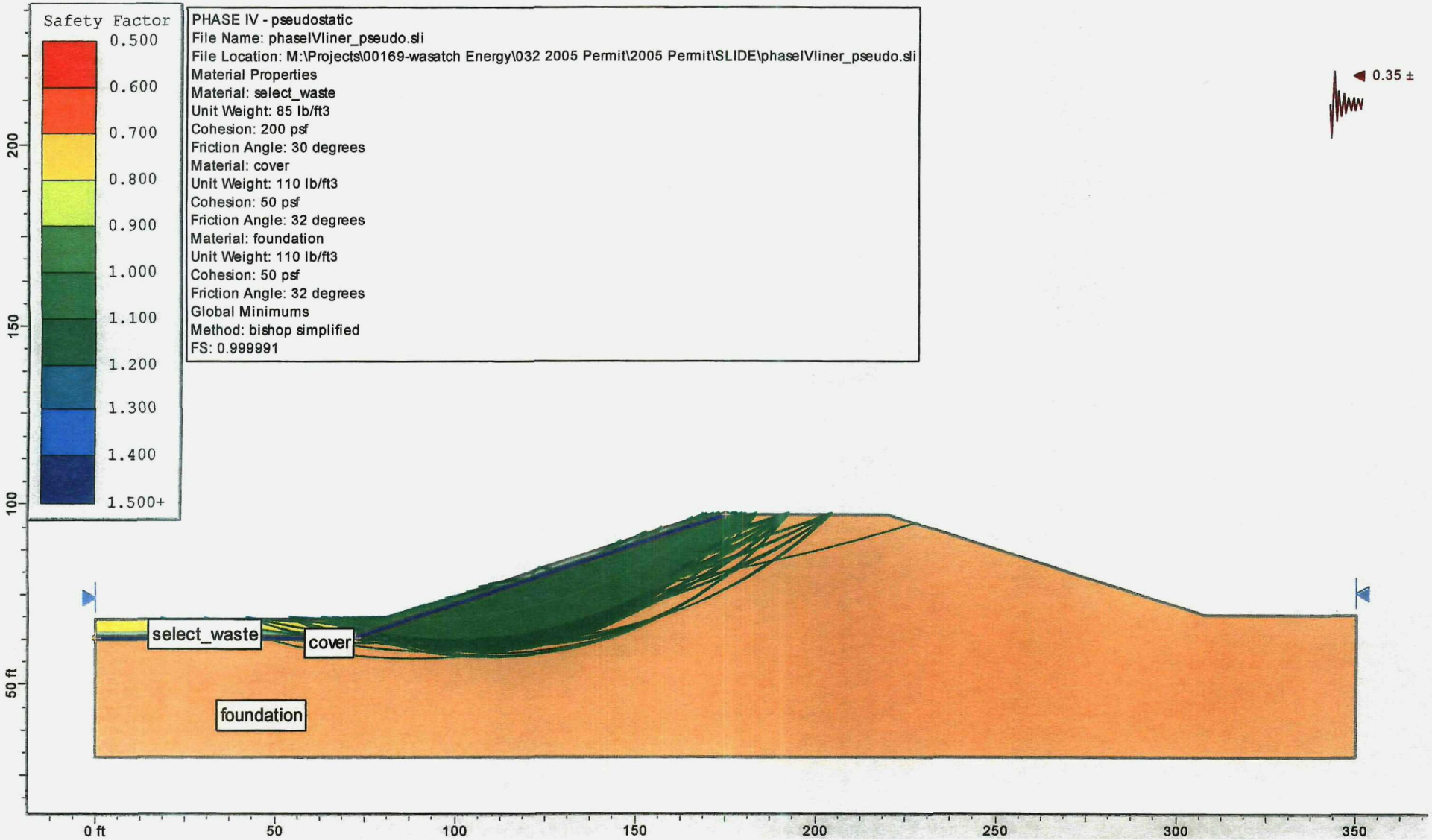
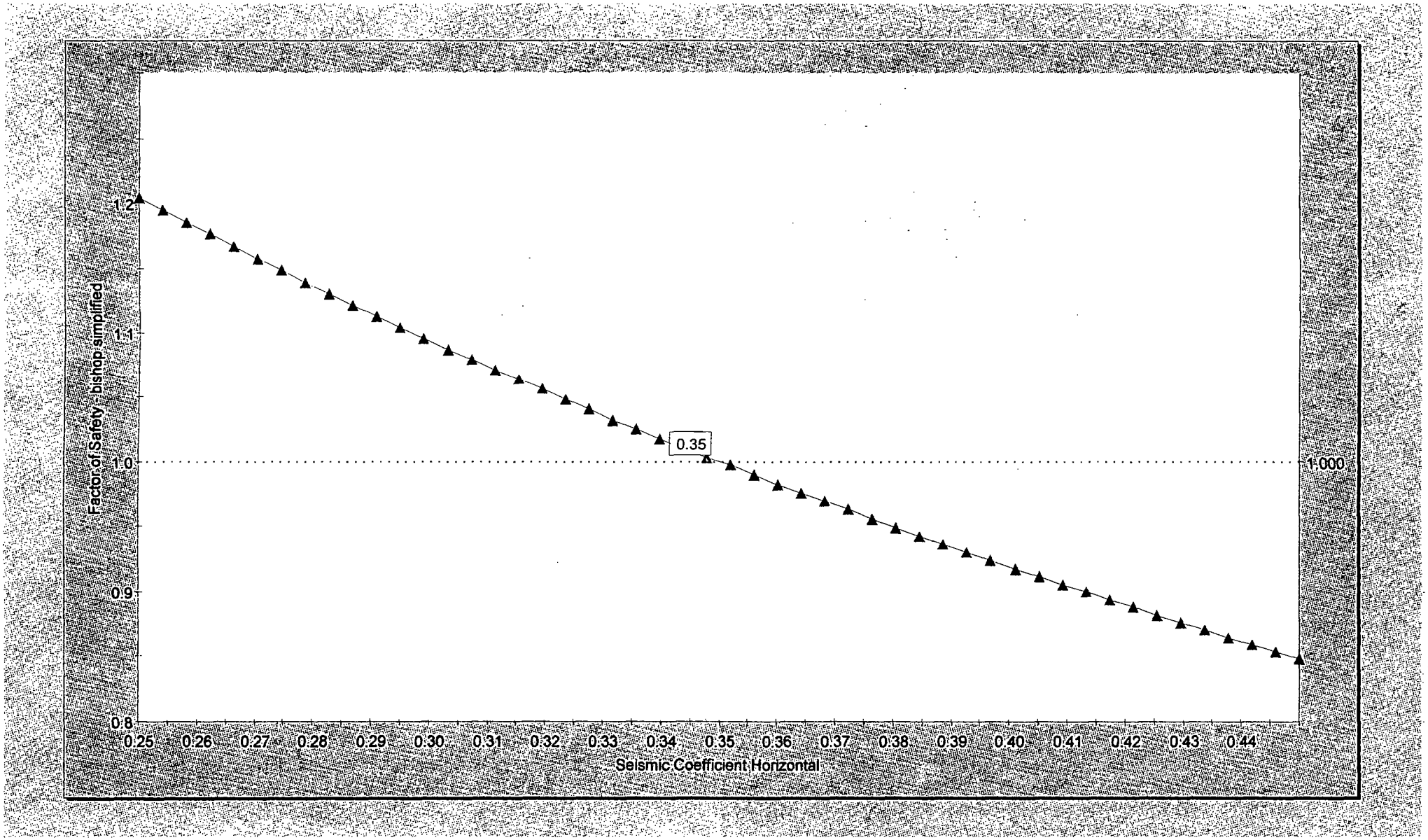

Safety Factor
0.500
0.600
0.700
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500+
PHASE IV - pseudostatic
File Name: phaseIVliner_pseudo.sli
File Location: M:\Projects\00169-wasatch Energy\032 2005 Permit\2005 Permit\SLIDE\phaseIVliner_pseudo.sli
Material Properties
Material: select_waste
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Material: cover
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Material: foundation
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Global Minimums
Method: bishop simplified
FS: 0.999991
0.35 ±
200
150
100
50 ft
select_waste
cover
foundation
0 ft
50
100
150
200
250
300
350

PLATE I-2


Factor of Safety - bishop simplified
1.2
1.1
1.0
0.9
0.8
0.35
1.000
0.25 0.26 0.27 0.28 0.29 0.30 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44
Seismic Coefficient Horizontal

Slide Analysis Information

Document Name

File Name: phaseIVliner_pseudo.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Composite Surfaces: Disabled
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.35

Material Properties

Material: select_waste
Strength Type: Mohr-Coulomb

Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: None

Material: cover
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Material: foundation
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Support Properties

Support: Bentonite_interface <1.2ksf
Bentonite_interface <1.2ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 25 lb/ft2
Pullout Strength Friction Angle: 29.5 degrees

Global Minimums

Method: bishop simplified
FS: 0.999991
Center: 90.802, 197.880
Radius: 130.243
Left Slip Surface Endpoint: 81.088, 68.000
Right Slip Surface Endpoint: 173.181, 97.000
Resisting Moment=5.80807e+006 lb-ft
Driving Moment=5.80812e+006 lb-ft

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 3710
Number of Invalid Surfaces: 0

Probabilistic Analysis Input

Project Settings
Sensitivity Analysis: On
Probabilistic Analysis: Off

Horizontal Seismic Coefficient
Distribution: Normal
Minimum: 0.25 (relative minimum: 0.1)
Mean: 0.35
Maximum: 0.45 (relative maximum: 0.1)

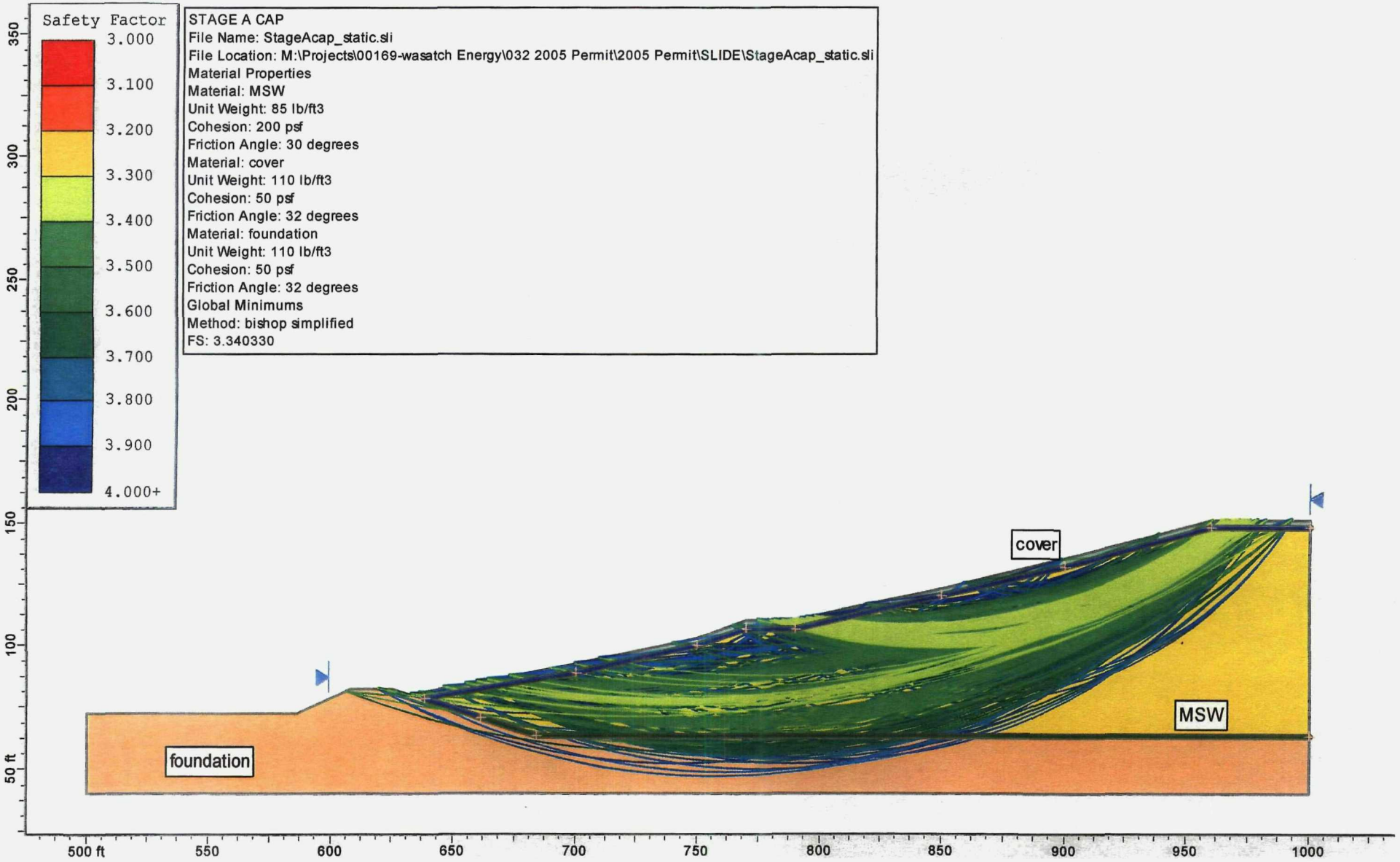

Safety Factor
3.000
3.100
3.200
3.300
3.400
3.500
3.600
3.700
3.800
3.900
4.000+
STAGE A CAP
File Name: StageAcap_static.sli
File Location: M:\Projects\00169-wasatch Energy\032 2005 Permit\2005 Permit\SLIDE\StageAcap_static.sli
Material Properties
Material: MSW
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Material: cover
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Material: foundation
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Global Minimums
Method: bishop simplified
FS: 3.340330
350
300
250
200
150
100
50 ft
cover
MSW
foundation
500 ft
550
600
650
700
750
800
850
900
950
1000

PLATE I-3

Slide Analysis Information

Document Name

File Name: StageAcap_static.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Composite Surfaces: Disabled
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Material: MSW
Strength Type: Mohr-Coulomb
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: None

Material: cover
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Material: foundation
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Support Properties

Support: Bentonite_interface <1.2ksf
Bentonite_interface <1.2ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 25 lb/ft2
Pullout Strength Friction Angle: 29.5 degrees

Support: Bentonite_interface>1.2 ksf
Bentonite_interface>1.2 ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 200 lb/ft2
Pullout Strength Friction Angle: 17.6 degrees

Global Minimums

Method: bishop simplified
FS: 3.340330
Center: 834.261, 344.945
Radius: 239.086
Left Slip Surface Endpoint: 789.951, 110.000
Right Slip Surface Endpoint: 974.074, 151.000
Resisting Moment=4.07225e+007 lb-ft
Driving Moment=1.21912e+007 lb-ft

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2944
Number of Invalid Surfaces: 0

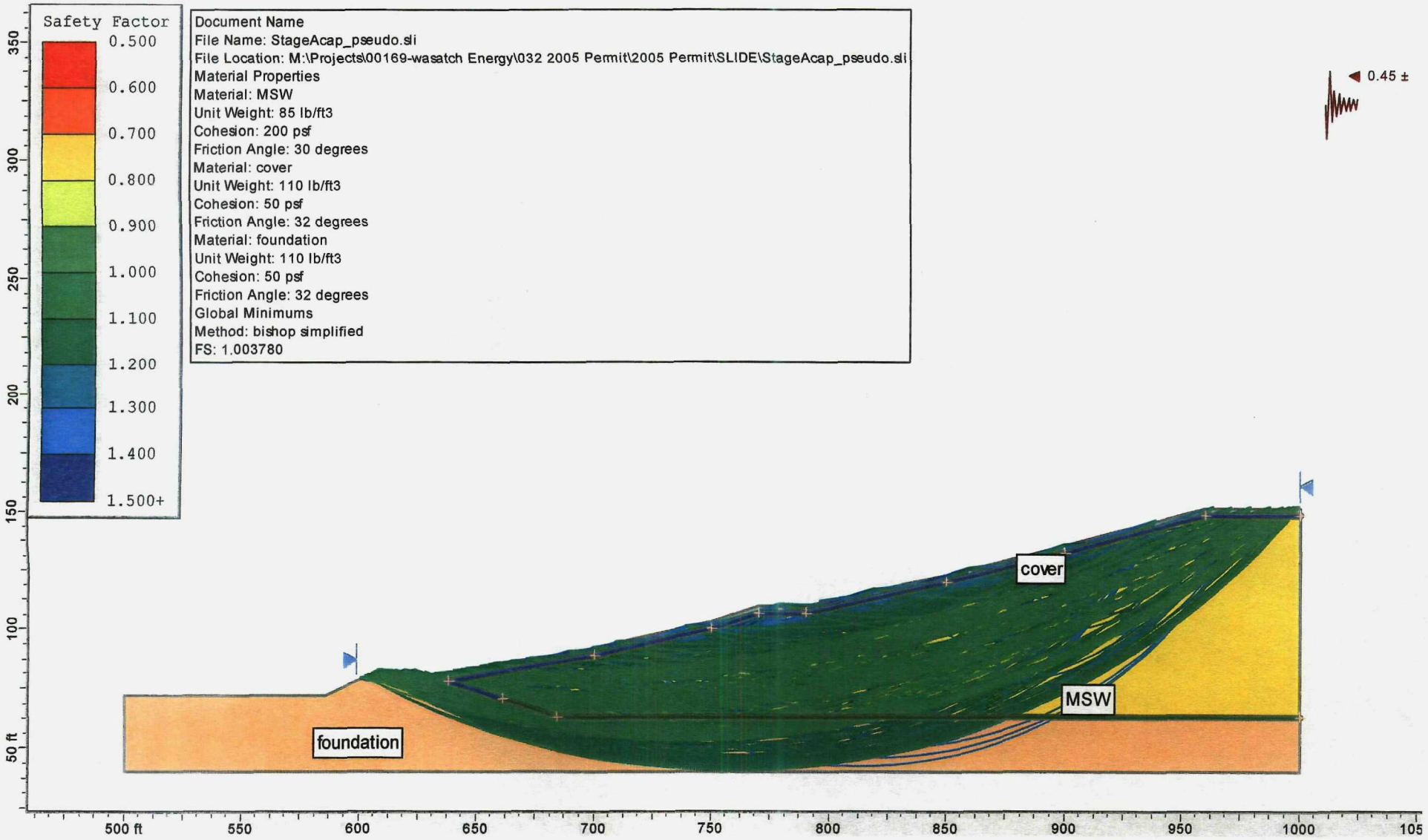
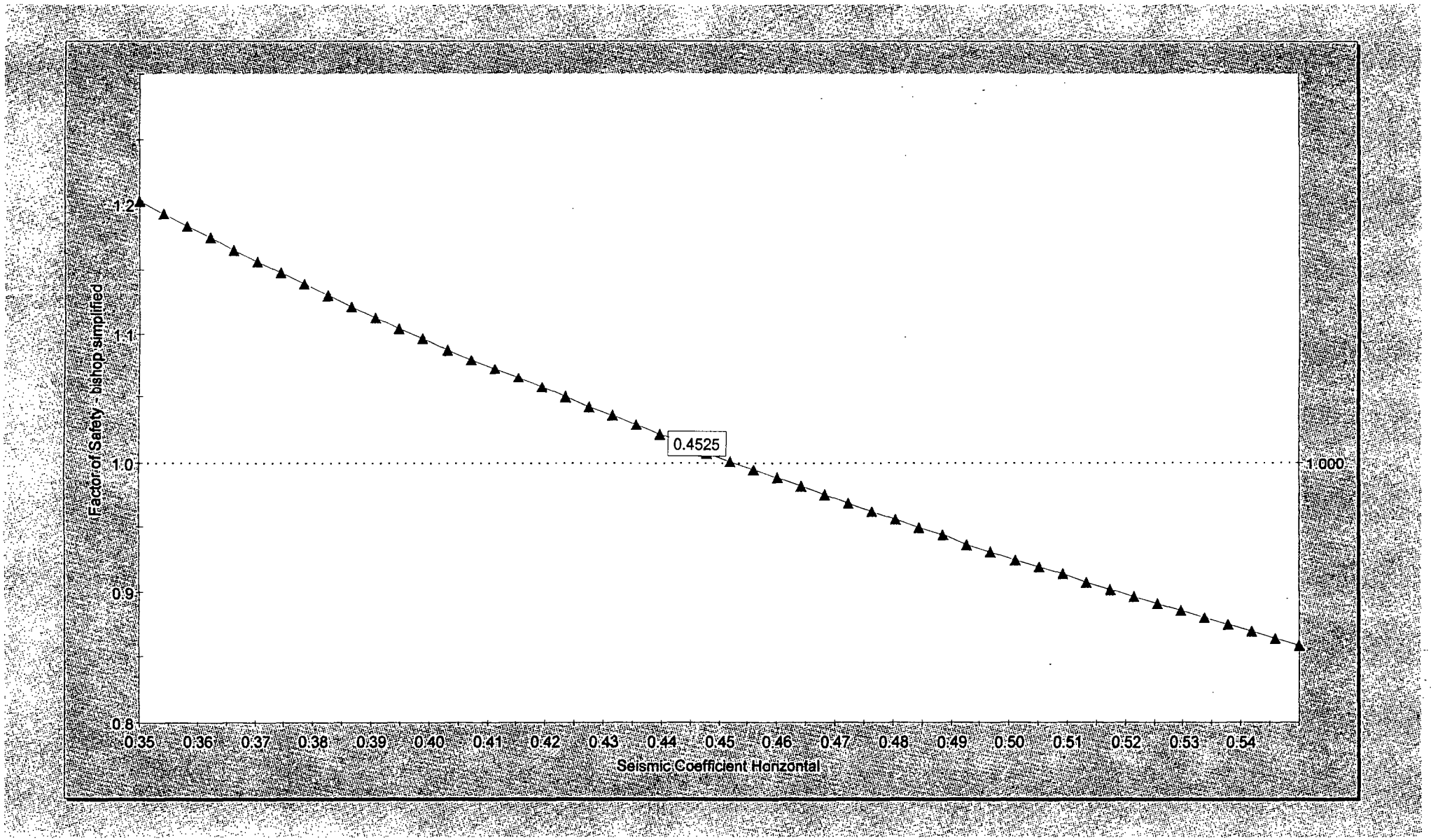

Safety Factor
0.500
0.600
0.700
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500+
Document Name
File Name: StageAcap_pseudo.sli
File Location: M:\Projects\00169-wasatch Energy\032 2005 Permit\2005 Permit\SLIDE\StageAcap_pseudo.sli
Material Properties
Material: MSW
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Material: cover
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Material: foundation
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Global Minimums
Method: bishop simplified
FS: 1.003780
0.45 ±
cover
MSW
foundation
350
300
250
200
150
100
50 ft
500 ft
550
600
650
700
750
800
850
900
950
1000
105

PLATE I-4


Factor of Safety - bishop simplified
1.2
1.1
1.0
0.9
0.8
0.4525
1.000
0.35
0.36
0.37
0.38
0.39
0.40
0.41
0.42
0.43
0.44
0.45
0.46
0.47
0.48
0.49
0.50
0.51
0.52
0.53
0.54
Seismic Coefficient Horizontal

Slide Analysis Information

Document Name

File Name: StageAcap_pseudo.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Composite Surfaces: Disabled
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.45

Material Properties

Material: MSW
Strength Type: Mohr-Coulomb

Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: None

Material: cover
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Material: foundation
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Support Properties

Support: Bentonite_interface <1.2ksf
Bentonite_interface <1.2ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 25 lb/ft2
Pullout Strength Friction Angle: 29.5 degrees

Support: Bentonite_interface>1.2 ksf
Bentonite_interface>1.2 ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 200 lb/ft2
Pullout Strength Friction Angle: 17.6 degrees

Global Minimums

Method: bishop simplified
FS: 1.003780
Center: 727.893, 553.723
Radius: 486.005

Left Slip Surface Endpoint: 610.939, 82.000
Right Slip Surface Endpoint: 999.949, 151.000
Resisting Moment=2.779e+008 lb-ft
Driving Moment=2.76853e+008 lb-ft

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 2603
Number of Invalid Surfaces: 0

Probabilistic Analysis Input

Project Settings
Sensitivity Analysis: On
Probabilistic Analysis: Off

Horizontal Seismic Coefficient
Distribution: Normal
Minimum: 0.35 (relative minimum: 0.1)
Mean: 0.45
Maximum: 0.55 (relative maximum: 0.1)

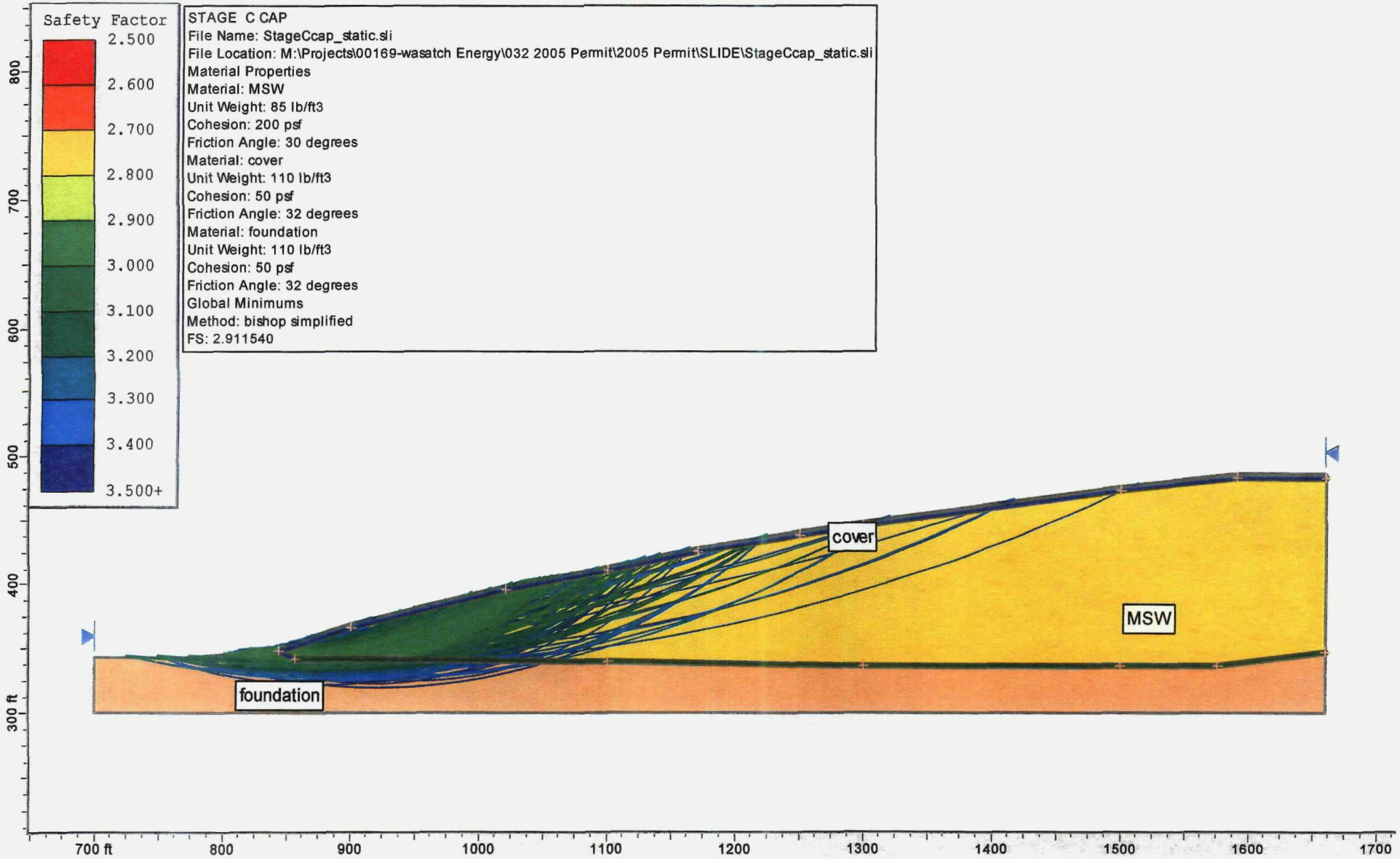

Safety Factor
2.500
2.600
2.700
2.800
2.900
3.000
3.100
3.200
3.300
3.400
3.500+
STAGE C CAP
File Name: StageCcap_static.sli
File Location: M:\Projects\00169-wasatch Energy\032 2005 Permit\2005 Permit\SLIDE\StageCcap_static.sli
Material Properties
Material: MSW
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Material: cover
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Material: foundation
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Global Minimums
Method: bishop simplified
FS: 2.911540
cover
MSW
foundation
800
700
600
500
400
300 ft
700 ft
800
900
1000
1100
1200
1300
1400
1500
1600
1700

PLATE I-5

Slide Analysis Information

Document Name

File Name: StageCcap_static.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Composite Surfaces: Disabled
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Material: MSW
Strength Type: Mohr-Coulomb
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: None

Material: cover
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Material: foundation
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Support Properties

Support: Bentonite_interface <1.2ksf
Bentonite_interface <1.2ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 25 lb/ft2
Pullout Strength Friction Angle: 29.5 degrees

Support: Bentonite_interface>1.2 ksf
Bentonite_interface>1.2 ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 200 lb/ft2
Pullout Strength Friction Angle: 17.6 degrees

Global Minimums

Method: bishop simplified
FS: 2.911540
Center: 884.592, 553.651
Radius: 212.990
Left Slip Surface Endpoint: 824.759, 349.238
Right Slip Surface Endpoint: 1033.710, 401.571
Resisting Moment=5.48953e+007 lb-ft
Driving Moment=1.88544e+007 lb-ft

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 3287
Number of Invalid Surfaces: 0

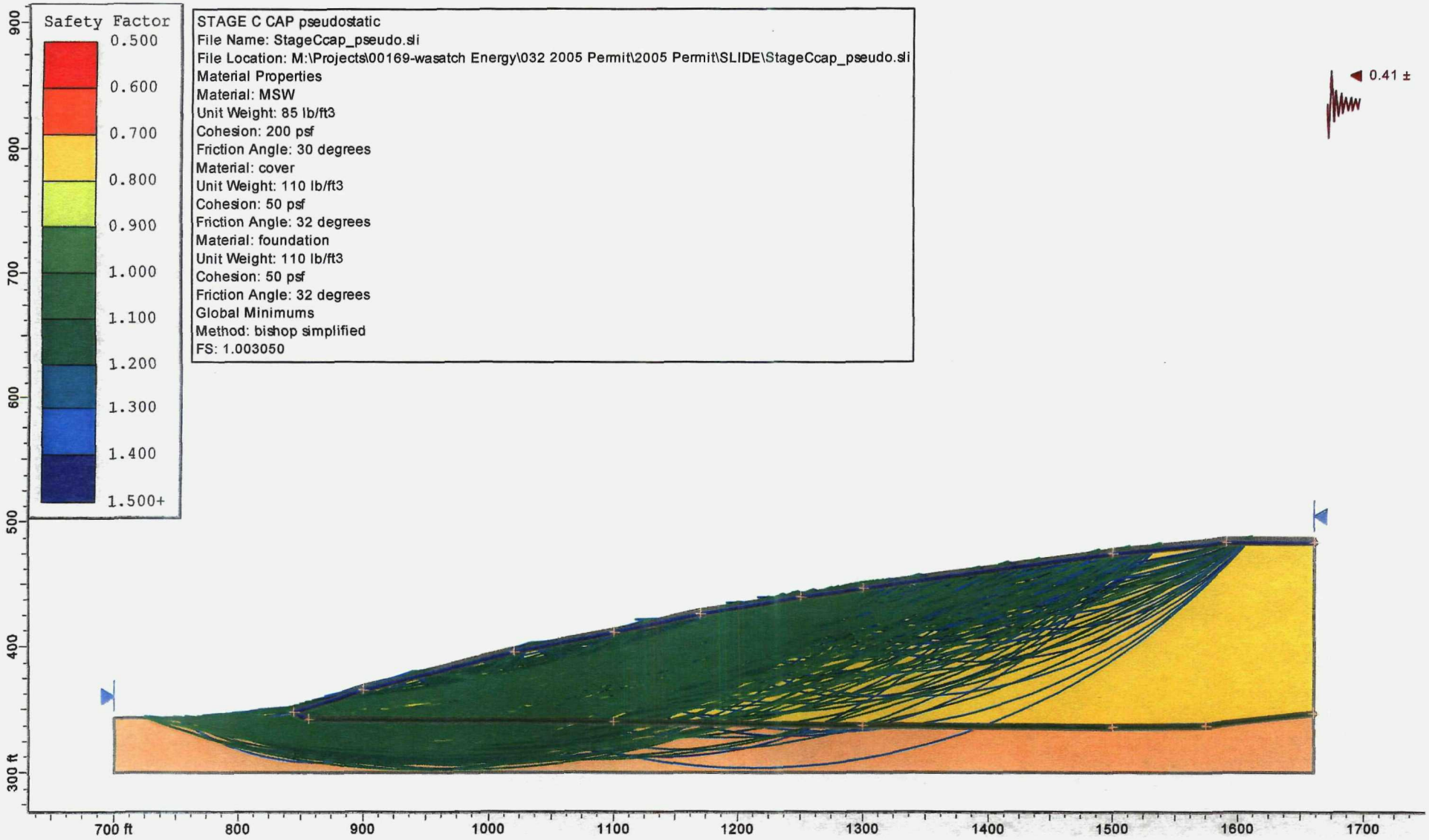
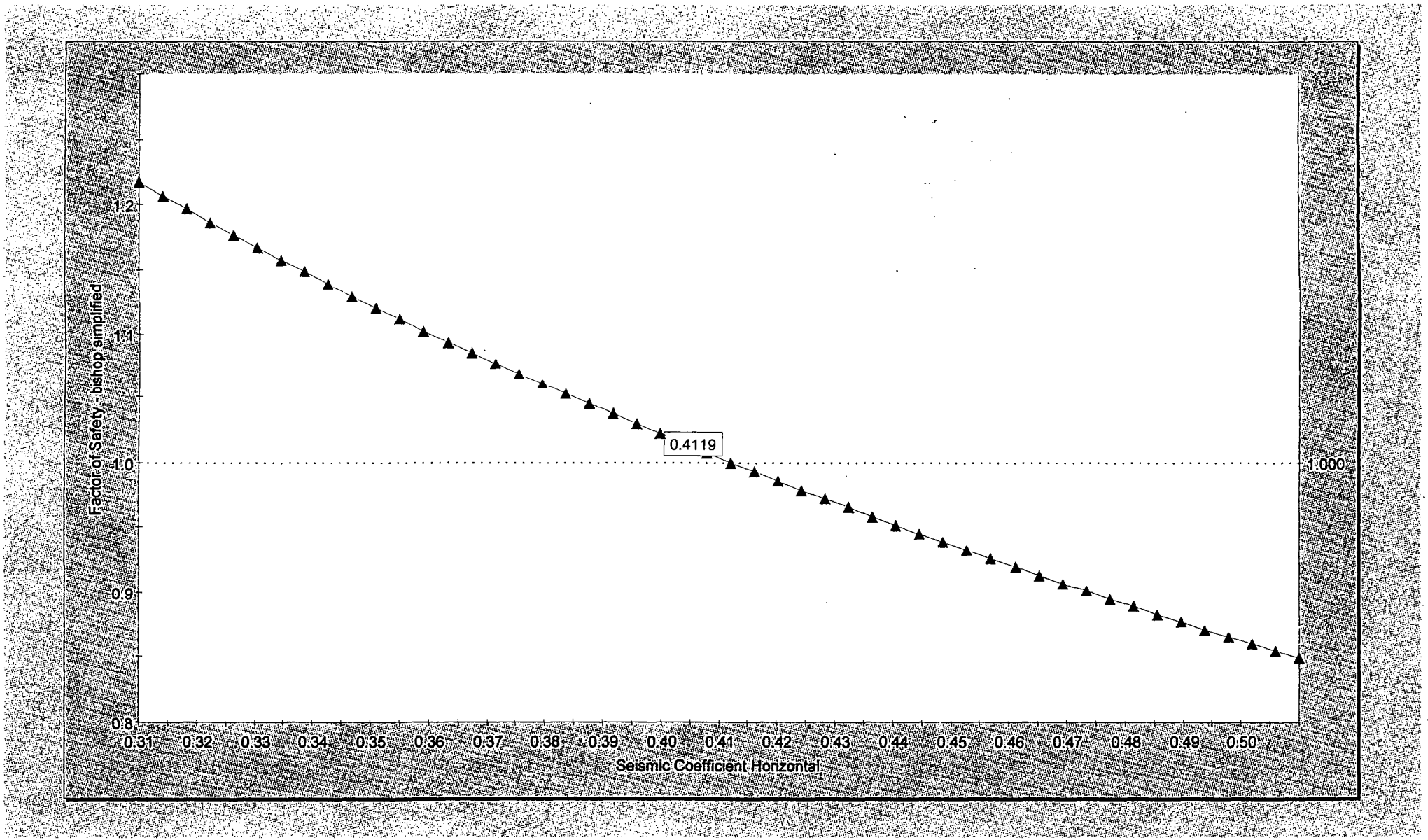

Safety Factor
0.500
0.600
0.700
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500+
STAGE C CAP pseudostatic
File Name: StageCcap_pseudo.sli
File Location: M:\Projects\00169-wasatch Energy\032 2005 Permit\2005 Permit\SLIDE\StageCcap_pseudo.sli
Material Properties
Material: MSW
Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Material: cover
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Material: foundation
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Global Minimums
Method: bishop simplified
FS: 1.003050
0.41 ±
900
800
700
600
500
400
300 ft
700 ft
800
900
1000
1100
1200
1300
1400
1500
1600
1700

PLATE I-6


Factor of Safety - bishop simplified
1.2
1.1
1.0
0.9
0.8
1.000
0.4119
0.31
0.32
0.33
0.34
0.35
0.36
0.37
0.38
0.39
0.40
0.41
0.42
0.43
0.44
0.45
0.46
0.47
0.48
0.49
0.50
Seismic Coefficient Horizontal

Slide Analysis Information

Document Name

File Name: StageCcap_pseudo.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Composite Surfaces: Disabled
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.41

Material Properties

Material: MSW
Strength Type: Mohr-Coulomb

Unit Weight: 85 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: None

Material: cover
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Material: foundation
Strength Type: Mohr-Coulomb
Unit Weight: 110 lb/ft3
Cohesion: 50 psf
Friction Angle: 32 degrees
Water Surface: None

Support Properties

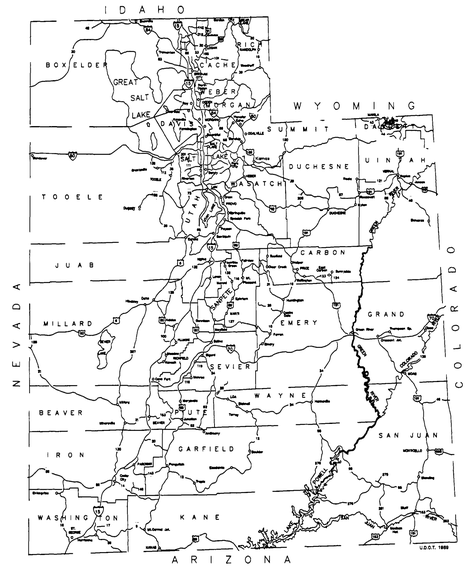
Support: Bentonite_interface <1.2ksf
Bentonite_interface <1.2ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 25 lb/ft2
Pullout Strength Friction Angle: 29.5 degrees

Support: Bentonite_interface>1.2 ksf
Bentonite_interface>1.2 ksf
Support Type: GeoTextile
Force Application: Passive
Force Orientation: Bisector of Parallel and Tangent
Anchorage: None
Shear Strength Model: Linear
Strip Coverage: 100 percent
Tensile Strength: 5 lb/ft
Pullout Strength Adhesion: 200 lb/ft2
Pullout Strength Friction Angle: 17.6 degrees

Global Minimums

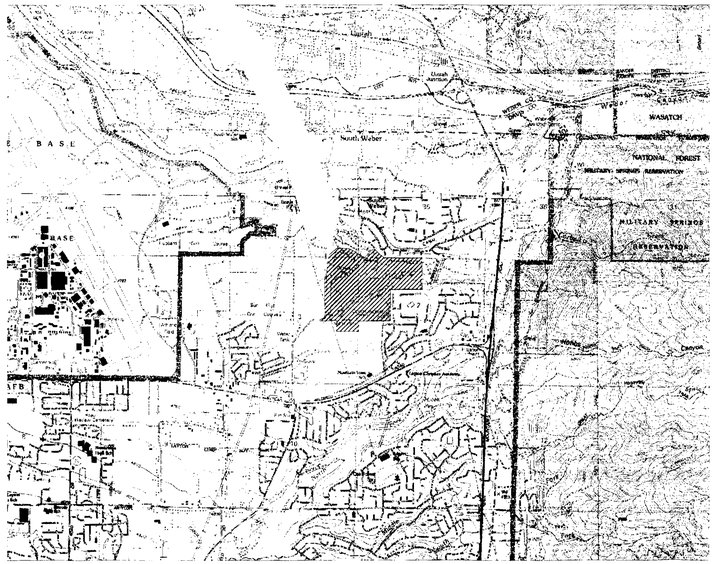
Method: bishop simplified
FS: 1.003050
Center: 847.738, 1331.935
Radius: 991.712

DAVIS LANDFILL
2005 PERMIT APPLICATION



LOCATION MAP

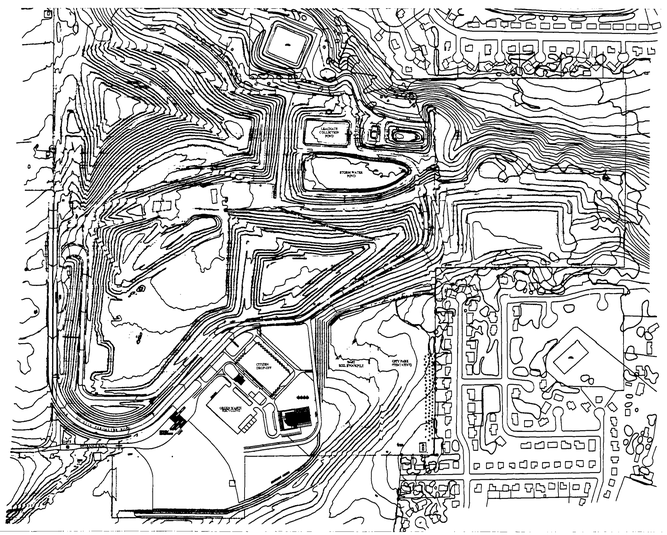
VICINITY MAP



DRAWING INDEX

SHEET	NAME
1	TITLE SHEET
2	GENERAL ARRANGEMENT
3	PHASE III & IV DEVELOPMENT (PLAN)
4	PHASE III & IV DEVELOPMENT (ELEVATION)
5	CLOSURE STAGES A & B
6	CLOSURE STAGE C (FINAL)
7	CLOSURE STAGES A-C (ELEVATION)
8	STORM WATER CONTROLS
9	DETAILS/LANDFILL LIFE

SITE MAP



REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

WASATCH
INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84107
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

TITLE SHEET

1

REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

WASATCH
INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84102
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

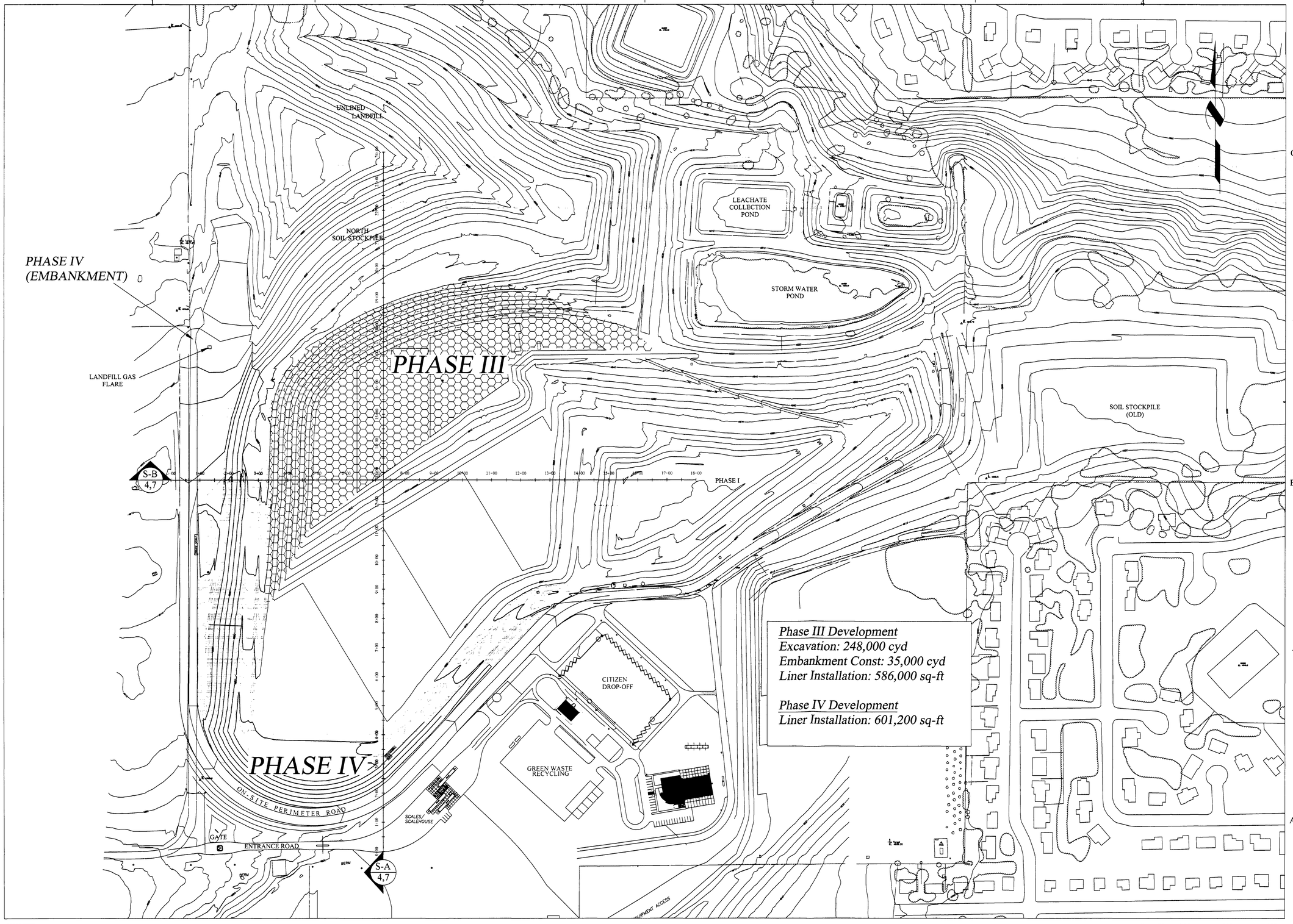
ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL
GENERAL ARRANGEMENT

2



REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

WASATCH INTEGRATED waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84102
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

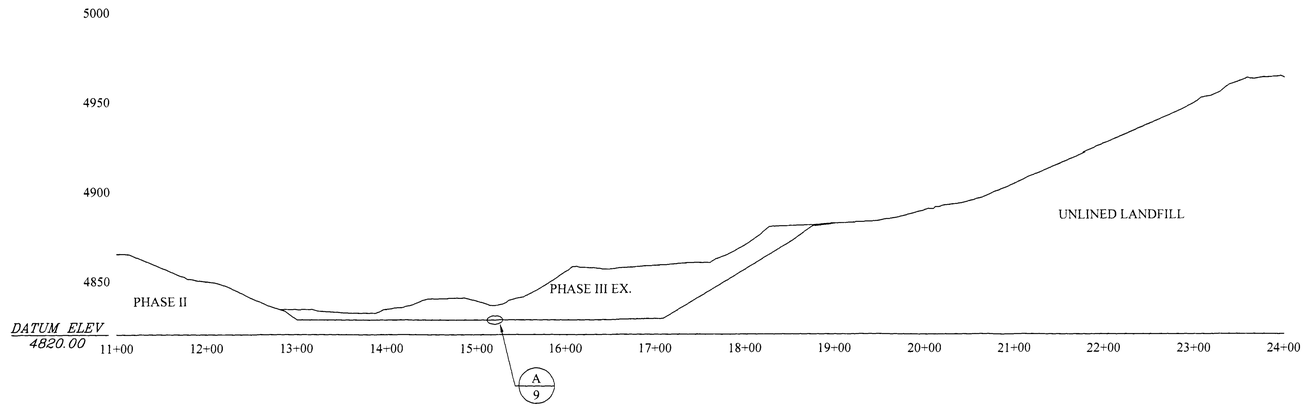
ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

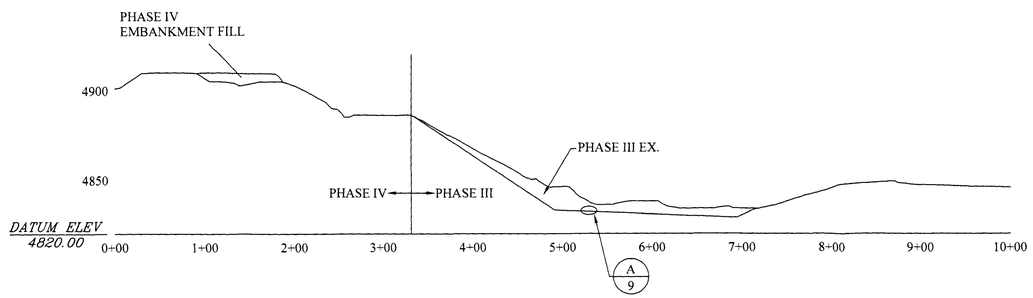
DAVIS LANDFILL
PHASE III & IV DEVELOPMENT (PLAN)

3



S-A
3,5,6

SECTION A (STA: 11+00-24+00)
1"=80' (2X VERTICAL EXAGGERATION)



S-B
3,5,6

SECTION B (STA: 0+00-10+00)
1"=80' (2X VERTICAL EXAGGERATION)

REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 40 80 160 240
SCALE IN FEET
(2X VERTICAL EXAGGERATION)

WASATCH INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84102
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

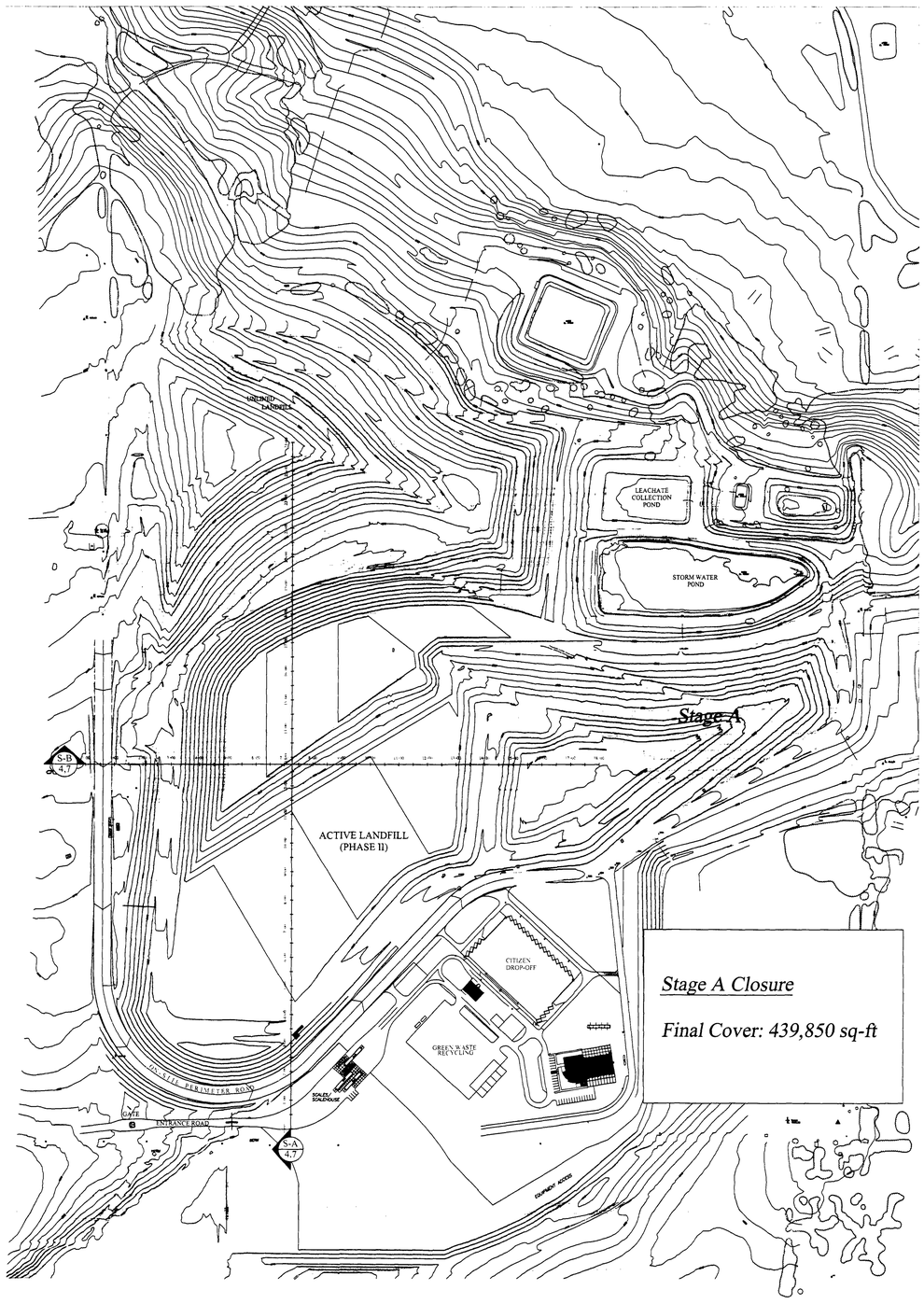
ISSUE:

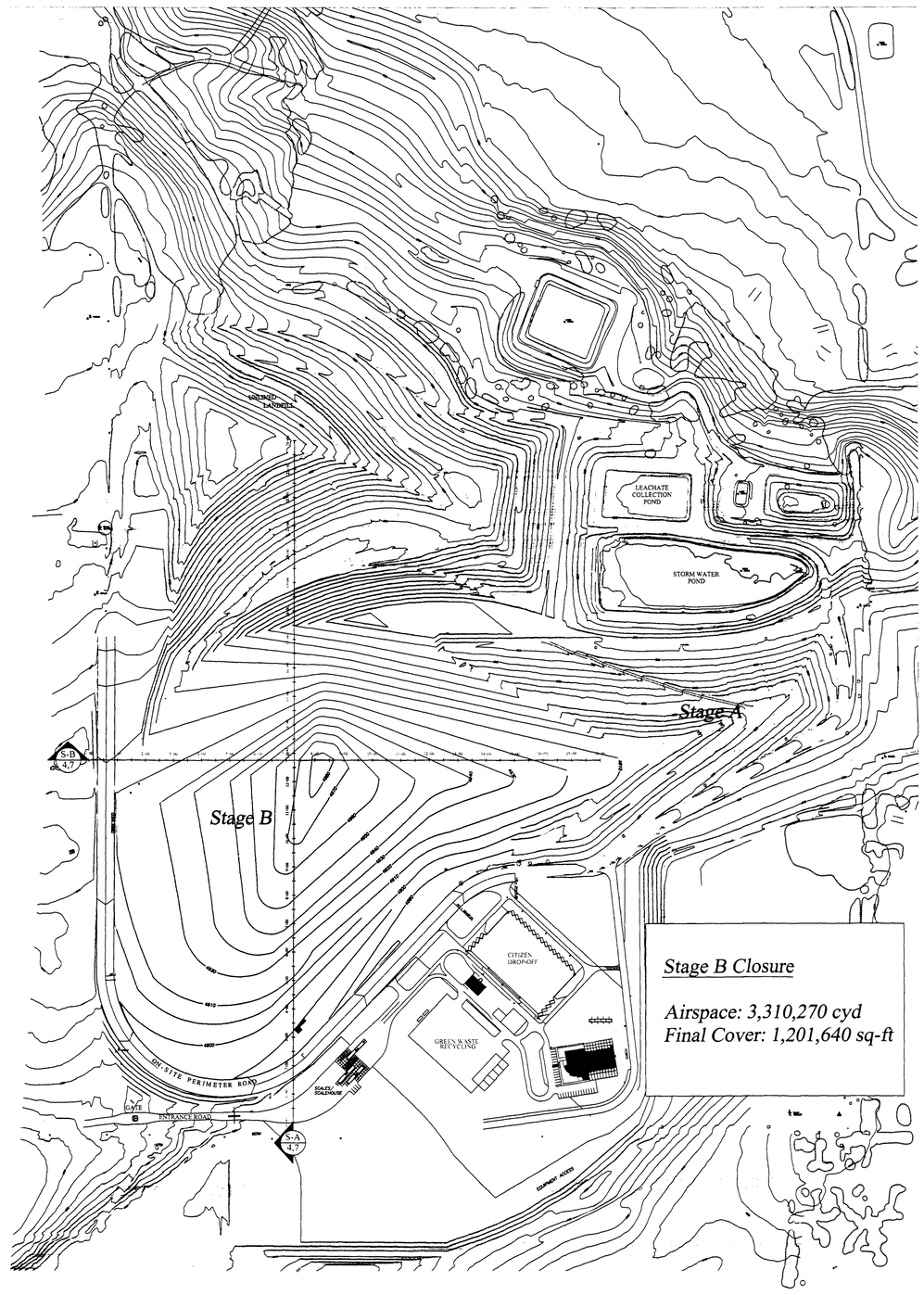
PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL
PHASE III & IV DEVELOPMENT (ELEVATION VIEW)

4





REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 120 240 480 720
SCALE IN FEET

WASATCH INTEGRATED waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84107
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

ISSUE:

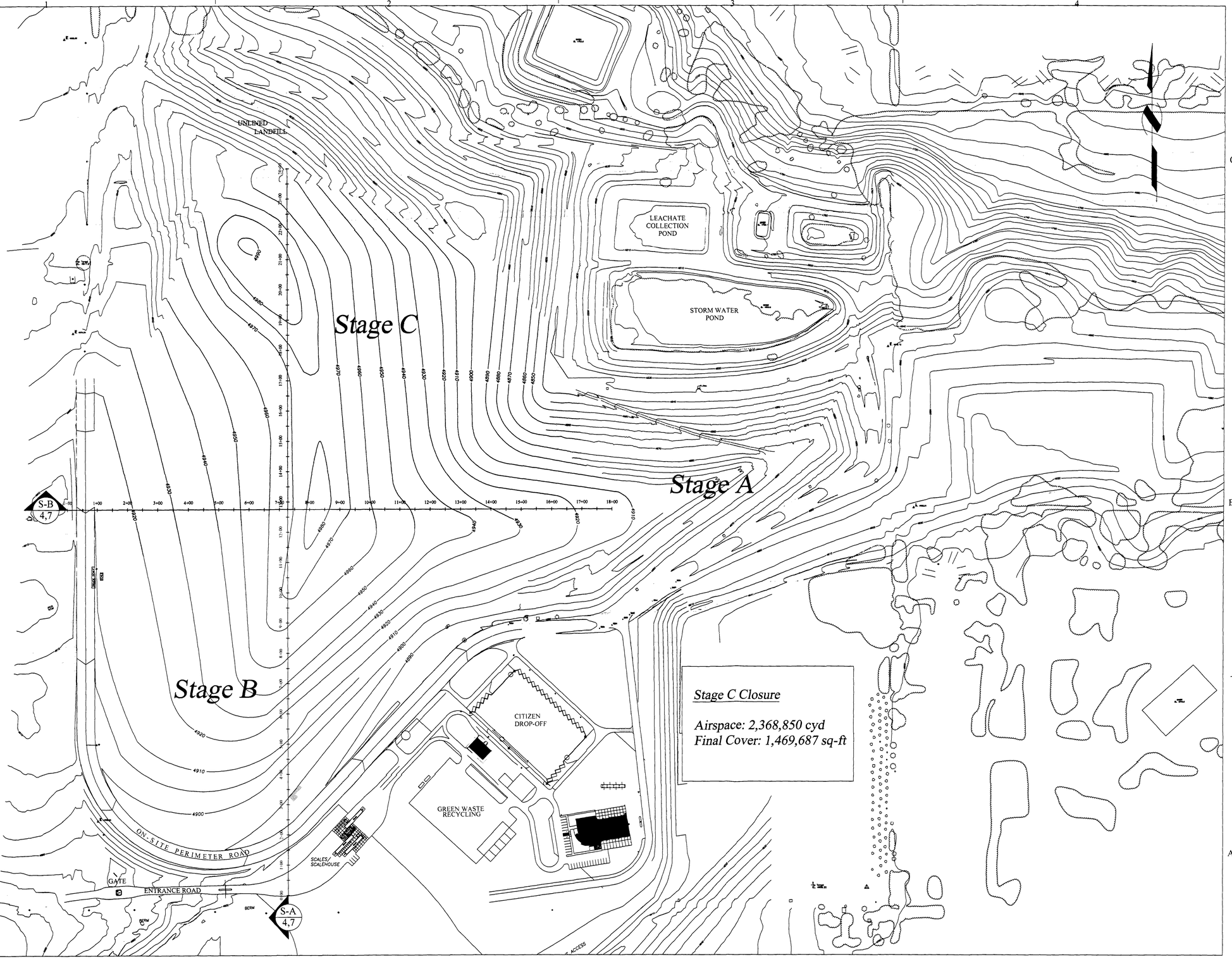
PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL

CLOSURE STAGES A & B

5



REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

WASATCH INTEGRATED waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84107
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

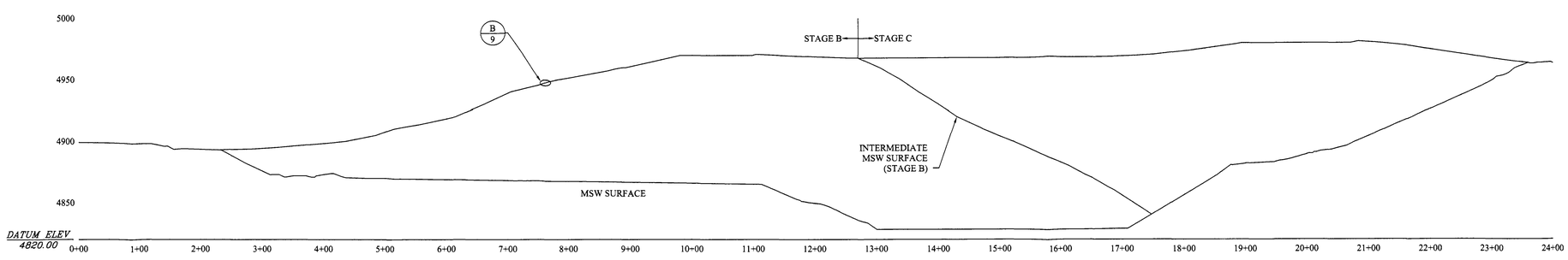
ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

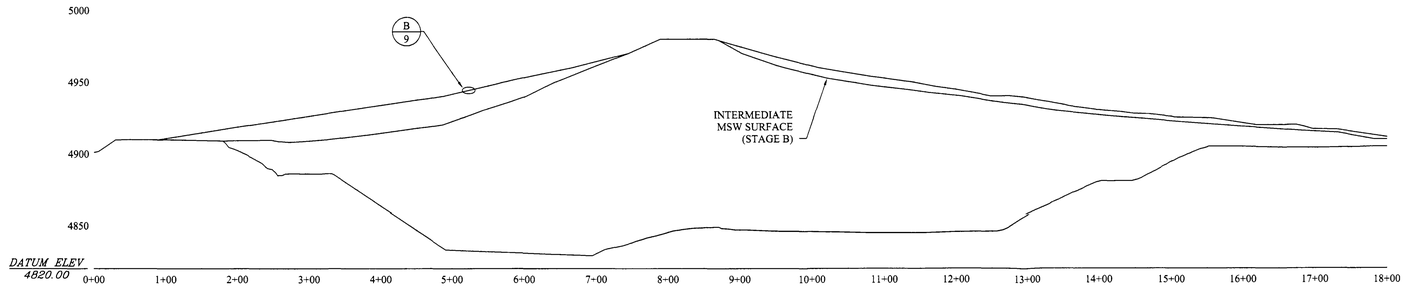
DAVIS LANDFILL

CLOSURE STAGE C (FINAL)



S-A
3,5,6

SECTION A
1"=100' (2X VERTICAL EXAGGERATION)



S-B
3,5,6

SECTION B
1"=100' (2X VERTICAL EXAGGERATION)

REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 50 100 200 300
SCALE IN FEET
(2X VERTICAL EXAGGERATION)

WASATCH INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84102
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

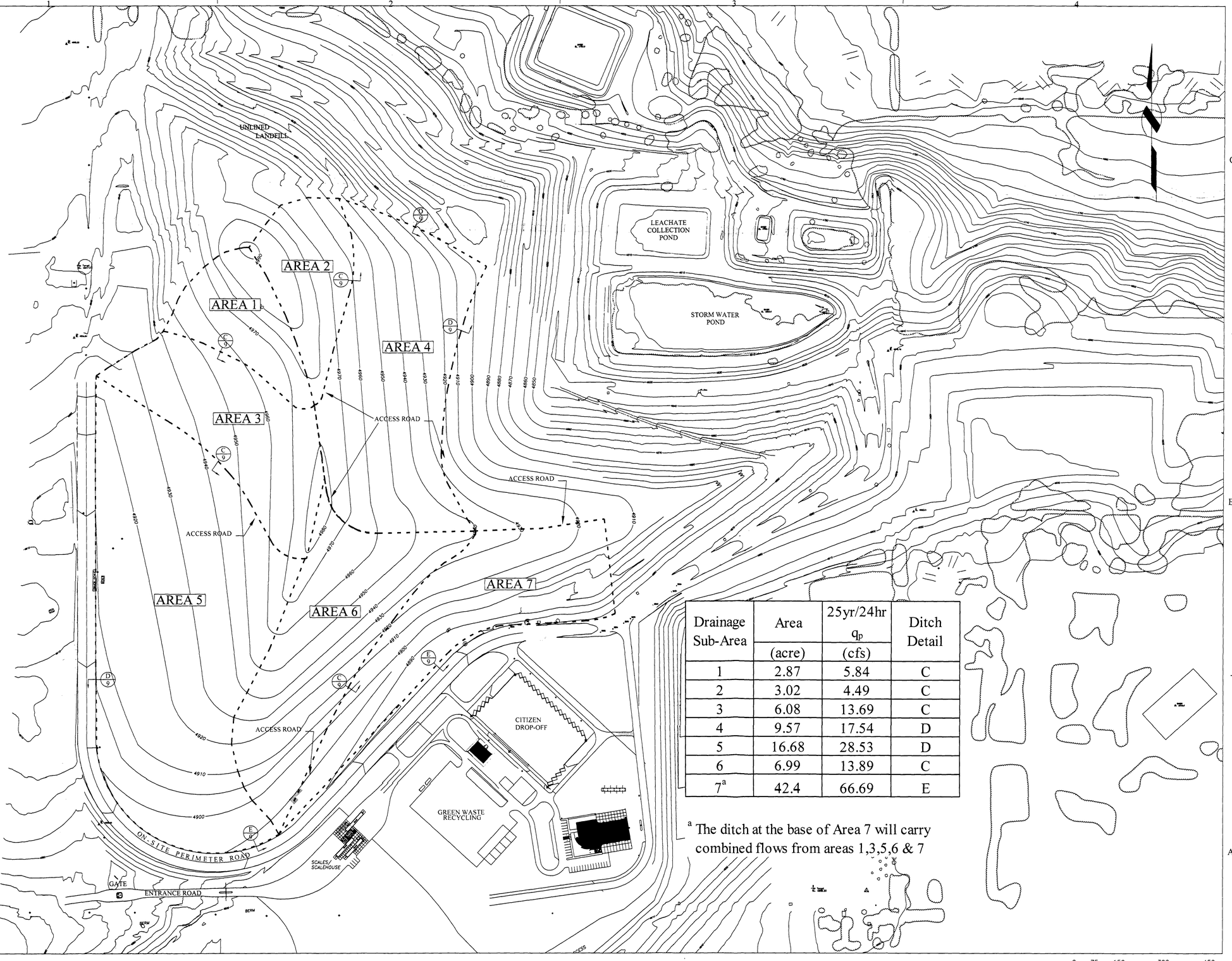
ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL
CLOSURE
STAGES A - C
(ELEVATION VIEW)

7



Drainage Sub-Area	Area (acre)	25yr/24hr q_p (cfs)	Ditch Detail
1	2.87	5.84	C
2	3.02	4.49	C
3	6.08	13.69	C
4	9.57	17.54	D
5	16.68	28.53	D
6	6.99	13.89	C
7[a]	42.4	66.69	E

[a] The ditch at the base of Area 7 will carry combined flows from areas 1,3,5,6 & 7

REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 75 150 300 450
SCALE IN FEET

WASATCH INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84107
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

ISSUE:

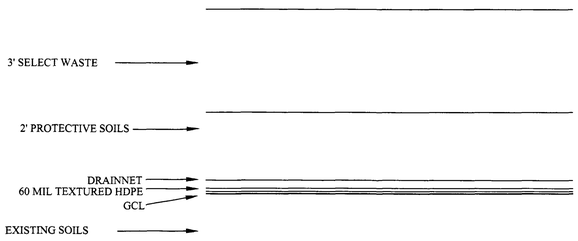
PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

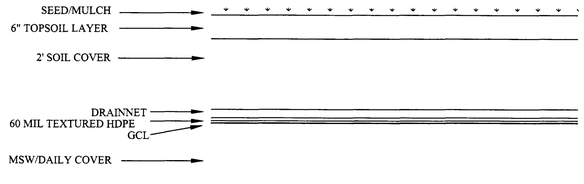
DAVIS LANDFILL

STORM WATER CONTROLS

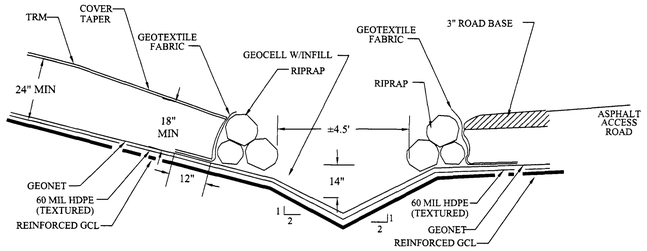
8



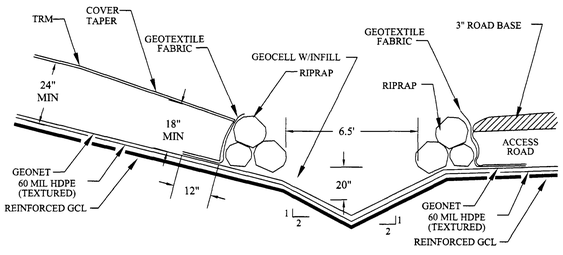
A/4 DETAIL (N.T.S.)
LINER



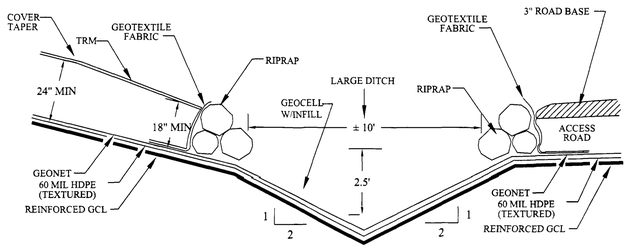
B/7 DETAIL (N.T.S.)
FINAL COVER



C/8 SECTION (N.T.S.)
SMALL DITCH



D/8 SECTION (N.T.S.)
MEDIUM DITCH



E/8 SECTION (N.T.S.)
LARGE DITCH

WASTE PARAMETERS*

ASH	Appr. Daily Weight (Tons)	117.2
	Yearly Weight (Tons)	36,337
	Density	1.5 Tons/Yd.^{3} (0.67 Yd.^{3}/Ton)
	Appr. Daily Volume (Yd3)	78.5
	Yearly Voulme (Yd3)	24,346
MSW	Appr. Daily Weight (Tons)	404.0
	Yearly Weight (Tons)	125,255
	Density	0.7 Tons/Yd^3 (1.43 Yd^3/Ton)
	Appr. Daily Volume (Yd3)	577.8
	Yearly Voulme (Yd3)	179,115
ASH & MSW	Appr. Daily Weight (Tons)	521.3
	Yearly Weight (Tons)	161,592
	Appr. Daily Volume (Yd3)	656.3
	Yearly Voulme (Yd3)	203,460
SOIL CONSUMPTION		
	Soil Ratio is 5 Parts MSW to 1 Part Soil	
	Appr. Daily Volume (Yd3)	115.6
	Yearly Voulme (Yd3)	35,823
AIRSPACE CONSUMPTION		
	Appr. Daily Volume (Yd3)	771.9
	Yearly Voulme (Yd3)	239,283
AVAILABLE AIRSPACE	Baseline Date of Airspace Consumption	10/1/2005
STAGE A		
	Total Volume (Yd3)	0
STAGE B	Total Volume (Yd3)	3,310,270
	Remaining Operational Days (At 771.9 Yd^3 / day)	4289
	Convert Operational Days to Calander Days	1.18
	Remaining Calander Days (At 365cal/310Op)	5049
	Approximate Date of Completion	August of 2019
STAGE C	Total Volume (Yd3)	2,368,850
	Remaining Operational Days (At 771.9 Yd^3 / day)	3069
	Convert Operational Days to Calander Days	1.18
	Remaining Calander Days (At 365cal/310Op)	3613
	End of Landfill Life	June of 2028

* Landfill Operations are assumed to be as follows:
365 days / year minus 52 sundays and 3 holidays = 310 days/year
Avg. 26 days / month.

REFERENCE:
OLYMPUS AERIAL SURVEYS
NOVEMBER 2, 2004

0 75 150 300 450
SCALE IN FEET

WASATCH INTEGRATED
waste management district

650 East Hwy. 193
Layton, Utah 84041
(801) 771-5661

CONSULTANTS

IGES
ideas for a changing world

4153 South Commerce Drive
Salt Lake City, Utah 84107
(801) 270-9400 Fax: (801)270-9401

NOTE:
CONCEPTUAL ENGINEERING FOR LANDFILL PERMIT APPLICATION - NOT FOR CONSTRUCTION.

MARK	DATE	DESCRIPTION
	12/5/05	PERMIT SUBMITTAL

ISSUE:

PROJECT NO.:	00169-032
CAD DWG FILE:	00169\032\05permit.dwg
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	NBR
COPYRIGHT:	IGES 2005

SHEET TITLE

DAVIS LANDFILL
DETAILS/ LANDFILL LIFE

9