P.O. Box 670
Windsor, CO 80528
719.492.0065

April 16, 2014

Mr. Dan Hall
xDivision of Water Quality
Department of Environmental Quality
State of Utah
288 North 1460 West
P.O. Box 144870
Salt Lake City, UT 84114-4870

Re: Pond use conversion, Danish Flats Environmental Services, Cisco, UT

Gentlemen:

I recently met with you in Salt Lake City to discuss our desire to remove a number of our evaporative ponds (6) from service to the oil and gas industry under our current DOGM permit , and convert them for service to the non-hazardous groundwater/surface water markets under jurisdiction of the Water Quality Control Division of the Department of Environmental Quality.

BACKGROUND

Danish Flats Environmental Services, Inc. was formed in May of 2007 dedicated to the creation of a properly permitted, properly designed, and constructed wastewater disposal facility to service an active Oil and Gas Exploration and Production industry in the region. In July of 2007, Danish Flats applied for a permit to construct Phase 1 of an evaporative pond facility in Grand County near Cisco, Utah. The permit was granted and Danish Flats made immediate application for a conditional use permit from the Department of Planning and Zoning of Grand County, Utah.

The conditional use permit from Grand County was issued in September of 2007 and construction of Phase 1 of the evaporative pond facility commenced in December of 2007. The construction of the eight (8) 5-acre ponds and related infrastructure was completed in April, 2008. Oil and Gas E&P activity at this point in time was brisk and demand for disposal of E&P wastewater at the Danish Flats facility was immediate. In the early months of operation, upwards to 400 truckloads of non-hazardous E&P wastewater per day were delivered to Danish Flats.

As the brisk demand grew through the year, it became apparent that Phase 1 of the facility would be at capacity in early 2009. Immediate preparation of a permit to construct Phase 2 ((12) 5-acre, 20 foot deep evaporative ponds) of the facility took place. A State of Utah permit to construct and operate, and a Grand County, Utah Conditional Use permit were issued to Danish Flats in early 2009. Construction of (6) Phase 2 evaporative ponds began and one by one five (5) of those ponds were bonded and put into service in summer of 2009. Construction of a sixth pond of Phase 2 was also completed and the pond was bonded. That pond (pond #14) was not put into service, and lacking necessary Grand County permit to operate, it still remain unused. Six additional ponds were permitted but have not been constructed.

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Demand for water disposal continued to be brisk through 2009 and early 2010, and ponds 9, 10, 11, &12 were filled to capacity.

CURRENT STATUS

Later in 2010, domestic demand for natural gas declined and stimulated a downturn in new exploration, drilling, and completion of natural gas wells in the region. As demand declined the resultant pricing of natural gas continued to decline. As prices declined, E&P activity continued to decline. In 2011, 2012, 2013, disposal volumes at Danish Flats declined by 70%. The need for additional pond storage disappeared. Pond #14 was never needed and is still unused and unpermitted by Grand County.

Danish Flats Environmental Services has learned, over the last two years specifically, that natural and enhanced evaporation of its Phase 1 ponds provided more space than the industry demand requires. Costly operation of Phase 2 of the facility is not needed taking into account short term and mid-term demand projections for E&P wastewater disposal.

PROPOSED CHANGE IN USE

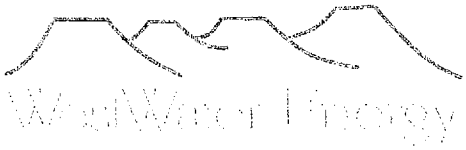
The need for Phase 2 of the Danish Flats evaporative continues to diminish. We are anxiously looking for alternative uses of the ponds in Phase 2. Recent discussions with the Bureau of Reclamation in southwest Colorado various industries in eastern Utah has identified such a possible alternative. There is a growing demand for disposal of non-hazardous, high TDS groundwater generated in southwest Colorado and along the I-70 corridor in eastern Utah. We wish to make Phase 2 of our facility available for disposal of some or all of those and similar waste streams. By converting Phase 2 to a non-hazardous, non-E&P wastewater disposal facility, Danish Flats will create opportunities for increased local employment and at the same time provide a disposal alternative for high TDS wastewater reducing possibilities

In preparation for this change, water currently stored in ponds of Phase 2 will be pumped back to ponds in Phase 1 for eventual evaporation. Once liquids are pumped, ponds in Phase 2 will become

isolated, and dedicated to storage and evaporation of non-E&P, non-hazardous wastewaters described above.

Unloading of incoming non-hazardous waste water will be done separately and apart from the unloading of water into Phase 1 (E&P wastewater). Please refer to the attached site plan identifying Phase 1 and Phase 2 of the facility and the separated unloading system for each phase. The attached site diagram identifies the proposed off-loading area and its proximity to all ponds in Phase 2.

Please give your ultimate consideration of this request as soon as possible. I am available at any time to answer questions you might have.



P.O. Box 670
Windsor, CO 80528
719.492.0065

Respectfully submitted,

James H. Bradish
Danish Flats Environmental Services, Inc.

MAIL TO:
Division of Water Quality
Utah Department of Environmental Quality
Salt Lake City, Utah 84114-4870

Application No.:_____
Date Received:_____
(leave both lines blank)

UTAH GROUND WATER DISCHARGE PERMIT APPLICATION

Part A - General Facility Information

Please read and follow carefully the instructions on this application form. Please type or print, except for signatures. This application is to be submitted by the owner or operator of a facility having one or more discharges to groundwater. The application must be signed by an official facility representative who is: the owner, sole proprietor for a sole proprietorship, a general partner, an executive officer of at least the level of vice president for a corporation, or an authorized representative of such executive officer having overall responsibility for the operation of the facility.

1. **Administrative Information.** Enter the information requested in the space provided below, including the name, title and telephone number of an agent at the facility who can answer questions regarding this application.

Facility Name: DANISH FLATS ENVIRONMENTAL SERICES, INC.

Mail Address: P.O. Box 670, WINDSOR, CO 80550
(Number & Street, Box and/or Route, City, State, Zip Code)

Facility Legal Location* County:_____
T. 20 S, R. 24 E, Sec. 8, S 1/2 of [redacted]
Lat. 39 ° 34 ' 36.1524 "N. Long. 109 ° 17 ' 39.0076 "W
*Note: A topographic map or detailed aerial photograph should be used in conjunction with a written description to depict the location of the facility, points of ground water discharge, and other relevant features/objects.

Contact's Name: JAMES H. BRADSH Phone No.: (719) 497-0065
Title: SECRETARY

2. **Owner/Operator Information.** Enter the information requested below, including the name, title, and phone number of the official representative signing the application.

Owner
Name: WESTWATER ENERGY, LLC Phone No.: (970) 775-8100

Mail Address: P.O. BOX 670, WINDSOR, CO 80550
(Number & Street, Box and/or Route, City, State, Zip Code)

Operator
Name: — Phone No.: ( ) —
(If different than Owner's above)

Mail Address: — —
(Number & Street, Box and/or Route, City, State, Zip Code)

Official Representative
Name: JAMES H. BRADSH Phone No.: (719) 497-0065

Title: SECRETARY

3. **Facility Classification** (check one)

[ ] New Facility
[ ] Existing Facility
[X] Modification of Existing Facility

4. **Type of Facility** (check one)

- [X] Industrial
- [ ] Mining
- [ ] Municipal
- [ ] Agricultural Operation
- [ ] Other, please describe:_____

5. **SIC/NAICS Codes:** 1389
Enter Principal 3 Digit Code Numbers Used in Census & Other Government Reports

6. **Projected Facility Life:** 50+ years

7. **Identify principal processes used, or services preformed by the facility. Include the principal products produced, and raw materials used by the facility:**
STORAGE & EVAPORATION OF NON-HAZARDOUS WASTEWATER

8. **List all existing or pending Federal, State, and Local government environmental permits:**

		Permit Number
[ ]	NPDES or UPDES (discharges to surface water)	
[ ]	CAFO (concentrated animal feeding operation)	
[ ]	UIC (underground injection of fluids)	
[ ]	RCRA (hazardous waste)	
[ ]	PDS (air emissions from proposed sources)	
[ ]	Construction Permit (wastewater treatment)	
[ ]	Solid Waste Permit (sanitary landfills, incinerators)	
[ ]	Septic Tank/Drainfield	
[X]	Other, specify DOGM	WD-02-2008

9. Name, location (Lat.____°____'____"N,Long.____°____'____"W) and description of: each well/spring (existing, abandoned, or proposed), water usage(past, present, or future); water bodies; drainages; well-head protection areas; drinking water source protection zones according to UAC 309-600; topography, and man-made structures within one mile radius of the point(s) of discharge site. Provide existing well logs (include total depth and variations in water depths).

Name	Location	Description	Status	Usage

The above information must be included on a plat map and attached to the application.

Part B - General Discharge Information

Complete the following information for each point of discharge to ground water. If more than one discharge point exists, photocopy and complete this Part B form for each discharge point.

1. **Location** (if different than Facility Location in Part A): County:_____
   T._____, R. NO, Sec. DISCHARGE 1/4 of _____1/4,
   Lat._____ □ _____ _____"N.Long._____ □ _____' _____"W

2. **Type of fluid to be Discharged or Potentially Discharged**
   (check as applicable)

   Discharges (fluids discharged to the ground)

   [ ] Sanitary Wastewater: wastewater from restrooms, toilets, showers and the like
   [ ] Cooling Water: non-contact cooling water, non contact of raw materials, intermediate, final, or waste products
   [ ] Process Wastewater: wastewater used in or generated by an industrial process
   [ ] Mine Water: water from dewatering operations at mines
   [X] Other, specify: NON-HAZARDOUS HIGH TDS WASTEWATER

   Potential Discharges (leachates or other fluids that may discharge to the ground)

   [ ] Solid Waste Leachates: leachates from solid waste impoundments or landfills
   [ ] Milling/Mining Leachates: tailings impoundments, mine leaching operations, etc.
   [ ] Storage Pile Leachates: leachates from storage piles of raw materials, product, or wastes
   [ ] Potential Underground Tank Leakage: tanks not regulated by UST or RCRA only
   [ ] Other, specify:_____

3. **Discharge Volumes**
   For each type of discharge checked in #2 above, list the volumes of wastewater discharged to the ground or ground water. Volumes of wastewater should be measured or calculated from water usage. If it is necessary to estimate volumes, enclose the number in parentheses. Average daily volume means the average per operating day: ex. For a discharge of 1,000,000 gallons per year from a facility operating 200 days, the average daily volume is 5,000 gallons.

Discharge Type:	Daily Discharge Volume (Average)	(Maximum)	all in units of
NO DISCHARGE			

4. **Potential Discharge Volumes**
   For each type of potential discharge checked in #2 above, list the maximum volume of fluid that could be discharged to the ground considering such factors as: liner hydraulic conductivity and operating head conditions, leak detection system sensitivity, leachate collection system efficiency, etc. Attach calculation and raw data used to determine said potential discharge.

Discharge Type:	Daily Discharge Volume (Average)	(Maximum)	all in units of
NO DISCHARGE			

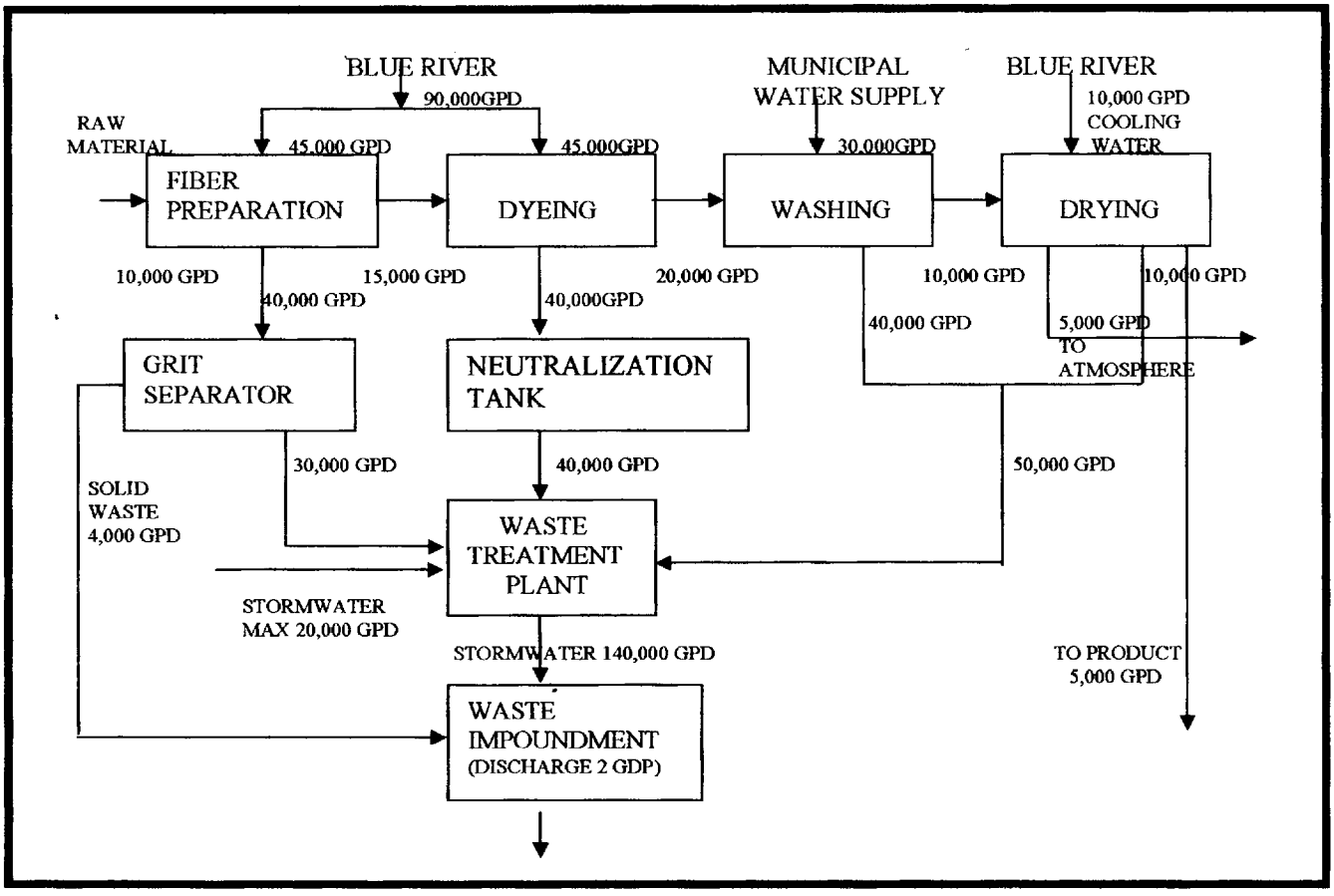
5. Means of Discharge or Potential Discharge (check one or more as applicable)

[ ] lagoon, pit, or surface impoundment (fluids)
[ ] land application or land treatment
[ ] discharge to an ephemeral drainage (dry wash, etc.)
[ ] storage pile
[ ] landfill (industrial or solid wastes)
[ ] other, specify NONE

[ ] industrial drainfield
[ ] underground storage tank
[ ] percolation/infiltration basin
[ ] mine heap or dump leach
[ ] mine tailings pond

6. Flows, Sources of Pollution, and Treatment Technologies

Flows. Attach a line drawing showing: 1) water flow through the facility to the ground water discharge point, and 2) sources of fluids, wastes, or solids which accumulate at the potential ground water discharge point. Indicate sources of intake materials or water, operations contributing wastes or wastewater to the effluent, and wastewater treatment units. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and wastewater outfalls. If a water balance cannot be determined, provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. See the following example.



7. Discharge Effluent Characteristics

Established and Proposed Ground Water Quality Standards - Identify wastewater or leachate characteristics by providing the type, source, chemical, physical, radiological, and toxic characteristics of wastewater or leachate to be discharged or potentially discharged to ground water (with lab analytical data if possible). This should include the discharge rate or combination of discharges, and the expected concentrations of any pollutant (mg/l). If more than one discharge point is used, information for each point must be provided.

Hazardous Substances - Review the present hazardous substances found in the Clean Water Act, if applicable. List those substances found or believed present in the discharge or potential discharge.

Part C - Accompanying Reports and Plans

The following reports and plans should be prepared by or under the direction of a professional engineer or other ground water professional. Since ground water permits cover a large variety of discharge activities, the appropriate details and requirements of the following reports and plans will be covered in the pre-design meeting(s). For further instruction refer to the Ground Water Permit Application Guidance Document.

8. Hydrogeologic Report

Provide a Geologic Description, with references used, that includes as appropriate:

Structural Geology – regional and local, particularly faults, fractures, joints and bedding plane joints;
Stratigraphy – geologic formations and thickness, soil types and thickness, depth to bedrock;
Topography – provide a USGS MAP (7 ½ minute series) which clearly identifies legal site location boundaries, indicated 100 year flood plain area and applicable flood control or drainage barriers and surrounding land uses.

Provide a Hydrologic Description, with references used, that includes:
Ground water – depths, flow directions and gradients. Well logs should be included if available. Include name of aquifer, saturated thickness, flow directions, porosity, hydraulic conductivity, and other flow characteristics, hydraulic connection with other aquifers or surface sources, recharge information, water in storage, usage, and the projected aerial extent of the aquifer. Should include projected ground water area of influence affected by the discharge. Provide hydraulic gradient map indicating equal potential head contours and ground water flow lines. Obtain water elevations of nearby wells at the time of the hydrologic investigation. Collect and analyze ground water samples from the uppermost aquifer which underlies the discharge point(s). Historic data can be used if the applicant can demonstrate it meets the requirements contained within this section. Collection points should be hydraulically up and downgradient and within a one-mile radius of the discharge point(s). Ground water analysis should include each element listed in Ground Water Discharge Permit Application, Part B7.
NOTE Failure to analyze for background concentrations of any contaminant of concern in the discharge or potential discharge may result in the Executive Secretary's presumptive determination that zero concentration exist in the background ground water quality.
Sample Collection and Analysis Quality assurance – sample collection and Preservation must meet the requirements of the EPA RCRA Technical Enforcement Guidance Document, OSWER-9959.1, 1986 [UAC R317-6-6.3(I,6)]. Sample analysis must be performed by State of Utah certified laboratories and be certified for each of the parameters of concern. Analytical methods should be selected from the following sources [UAC R317-6-6.3L]: (Standard Methods for the Examination of Water and Wastewater, 20th Ed.,1998; EPA, Methods for Chemical Analysis of Water and Wastes, 1983; Techniques of Water Resources Investigation of the U.S. Geological Survey, 1998, Book 9; EPA Methods published pursuant to 40 CFR Parts 141, 142, 264 (including Appendix IX), and 270. Analytical methods selected should also include minimum detection limits below both the Ground Water Quality Standards and the anticipated ground water protection levels. Data shall be presented in accordance of accepted hydrogeolgic standards and practice.

Provide Agricultural Description, with references used, that includes:
If agricultural crops are grown within legal boundaries of the site the discussion must include: types of crops produced; soil types present; irrigation system; location of livestock confinement areas (existing or abandoned).

Note on Protection Levels:

After the applicant has defined the quality of the fluid to be discharged (Ground Water Discharge Permit Application, Part B), characterized by the local hydrogeologic conditions and determined background ground water quality (Hydrogeologic Report), the Executive Secretary will determine the applicable ground water class, based on: 1) the location of the discharge point within an area of formally classified ground water, or the background value of total dissolved solids. Accordingly, the Executive Secretary will determine applicable protection levels for each pollutant of concern, based on background concentrations and in accordance with UAC R317-6-4.

9. **Ground Water Discharge Control Plan:**
Select a compliance monitoring method and demonstrate an adequate discharge control system. Listed are some of the Discharge Control Options available.

No Discharge – prevent any discharge of fluids to the ground water by lining the discharge point with multiple synthetic and clay liners. Such a system would be designed, constructed, and operated to prevent any release of fluids during both the active life and any post-closure period required.

Earthen Liner – control the volume and rate of effluent seepage by lining the discharge point with a low permeability earthen liner (e.g. clay). Then demonstrate that the receiving ground water, at a point as close as practical to the discharge point, does not or will not exceed the applicable class TDS limits and protection levels* set by the Executive Secretary. This demonstration should also be based on numerical or analytical saturated or unsaturated ground water flow and contaminant transport simulations.

Effluent Pretreatment – demonstrate that the quality of the raw or treated effluent at the point of discharge or potential discharge does not or will not exceed the applicable ground water class TDS limits and protection levels* set by the Executive Secretary.

Contaminant Transport/Attenuation – demonstrate that due to subsurface contaminant transport mechanisms at the site, raw or treated effluent does not or will not cause the receiving ground water, at a point as close as possible to the discharge point, to exceed the applicable class TDS limits and protection levels* set by the Executive Secretary.

Other Methods – demonstrate by some other method, acceptable to the Executive Secretary, that the ground water class TDS limits and protection levels* will be met by the receiving ground water at a point as close as practical to the discharge point.

*If the applicant has or will apply for an alternate concentration limit (ACL), the ACL may apply instead of the class TDS limits and protection levels.

Submit a complete set of engineering plans and specifications relating to the construction, modification, and operation of the discharge point or system. Construction Permits for the following types of facilities will satisfy these requirements. They include: municipal waste lagoons; municipal sludge storage and on-site sludge disposal; land application of wastewater effluent; heap leach facilities; other process wastewater treatment equipment or systems.

Facilities such as storage piles, surface impoundments and landfills must submit engineering plans and specifications for the initial construction or any modification of the facility. This will include the design data and description of the leachate detection, collection and removal system design and construction. Provide provisions for run on and run-off control.

10. **Compliance Monitoring Plan:**
The applicant should demonstrate that the method of compliance monitoring selected meets the following requirements:

Ground Water Monitoring – that the monitoring wells, springs, drains, etc., meet all of the following criteria: is completed exclusively in the same uppermost aquifer that underlies the discharge point(s) and is intercepted by the upgradient background monitoring well; is located hydrologically downgradient of the discharge point(s); designed, constructed, and operated for optimal detection (this will require a hydrogeologic characterization of the area circumscribed by the background sampling point, discharge point and compliance monitoring points); is not located within the radius of influence of any beneficial use public or private water supply; sampling parameters, collection, preservation, and analysis should be the same as background sampling point; ground water flow direction and gradient, background quality at the site, and the quality of the ground water at the compliance monitoring point.

Source Monitoring – must provide early warning of a potential violation of ground water protection levels, and/or class TDS limits and be as or more reliable, effective, and determinate than a viable ground water monitoring network.

Vadose Zone Monitoring Requirements – Should be: used in conjunction with source monitoring; include sampling for all the parameters required for background ground water quality monitoring; the application, design, construction, operation, and maintainence of the monitoring system should conform with the guidelines found in: Vadose Zone Monitoring for Hazardous Waste Sites; June 1983, KT-82-018(R).

Leak Detection Monitoring Requirements – Should not allow any leakage to escape undetected that may cause the receiving ground water the exceed applicable ground water protection levels during the active life and any required post-closure care period of the discharge point. This demonstration may be accomplished through the use of numeric or analytic, saturated or unsaturated, ground water flow or contaminant transport simulations, using actual filed data or conservative assumptions. Provide plans for daily observation or continuous monitoring of the observation sump or other monitoring point and for the reporting of any fluid detected and chemical analysis thereof.

Specific Requirements for Other Methods – Demonstrate that: the method is as or more reliable, effective, and determinate than a vable ground water monitoring well network at detecting any violation of ground water protection levels or class TDS limits, that may be caused by the discharge or potential discharge; the method will provide early warning of a potential violation of ground water protection levels or class TDS limits and meets or exceeds the requirements for vadose zone or leak detection monitoring.

Monitoring well construction and ground water sampling should conform to A Guide to the Selection of Materials for Monitoring Well Construction. Sample collection and preservation, should conform to the EPA RCRA Technical Enforcement Guidance Document, OSWER-9950.1, September, 1986. Sample analysis must be performed by State-certified laboratories by methods outlined in UAC R317-6-6.3L. Analytical methods used should have minimum detection levels which meet or are less than both the ground water quality standards and the anticipated protection levels.

11. **Closure and Post Closure Plan:** The purpose of this plan is to prevent ground water contamination after cessation of the discharge or potential discharge and to monitor the discharge or potential discharge point after closure, as necessary. This plan has to include discussion on: liquids or products, soils and sludges; remediation process; the monitoring of the discharge or potential discharge point(s) after closure of the activity.

12. **Contingency and Corrective Action Plans:** The purpose of this Contingency plan is to outline definitive actions to bring a discharge or potential discharge facility into compliance with the regulations or the permit, should a violation occur. This applies to both new and existing facilities. For existing facilities that may have caused any violations of the Ground Water Quality Standards or class TDS limits as a result of discharges prior to the issuance of the permit, a plan to correct or remedy any contaminated ground water must be included.

    Contingency Plan – This plan should address: cessation of discharge until the cause of the violation can be repaired or corrected; facility remediation to correct the discharge or violation.

    Corrective Action Plan – for existing facilities that have already violated Ground Water Quality Standards, this plan should include: a characterization of contaminated ground water; facility remediation proposed or ongoing including timetable for work completion; ground water remediation.

Certification

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

JAMES H. BRADISH
SECRETARY
DANISH FLATS ENV. SVS.

NAME & OFFICIAL TITLE (type or print)

719-492-0065

PHONE NO. (area code & no.)

James H Bradish

SIGNATURE

DATE SIGNED

PARAGON
CONSULTING GROUP

1103 OAK PARK DRIVE, SUITE 110
FORT COLLINS, COLORADO 80525
T 970-225-0688/F 970-377-1880

MEMO

DATE: April 25, 2014

TO: Jim Bradish/Danish Flats

FROM: David M. Rau, P. E., BCEE

A stamped version of this memorandum dated April 25, 2014 is stored at Paragon's office and is available upon request.

RE: Danish Flats Environmental Services, Inc.
Ground Water Permit Application Accompanying Reports and Plans
Near Cisco, Utah
Project Number 1011007.1

1. INTRODUCTION

The purpose of this memorandum is to provide information to support the Ground Water Permit Application (the Application) for this facility. This information is related to both Phases I and II as originally permitted by the Division of Oil, Gas and Mining (DOGM) and the Division of Water Quality (DWQ). The DWQ prepared a letter dated January 26, 2009 approving the use of saline water to condition the clay underlined and to control dust during construction of the Phase II ponds. The information provided to support this Application is assembled from documents used during the previous permitting efforts related to disposal of exploration and production wastes.

2. PERMIT INFORMATION

Part C – Accompanying Reports and Plans of the Ground Water Application Guidance Document is divided into Items 8 through 12. This memorandum and the exhibits are intended to provide the information described in these items. The requested information is presented by listing the item number followed by a brief narrative and reference to specific exhibits. Please note that I have also made several site visits to the facility.

8. Hydrogeologic Report

The geologic description was provided in responses to comments from Grand County as well as the previously described DWQ letter dated January 26, 2009 approving the use of saline water during construction of the Phase II ponds. That letter is attached as Exhibit 4 and includes a description of the site location and topography as well as site geology and hydrogeology. Exhibit 1 is a report that was prepared to document the subsurface

exploration activities, subsurface observations and geotechnical testing performed at the facility. Exhibit 3 includes some regional geologic information in Appendix B. As seen from this information, this location is well suited for this type of facility.

Agricultural crops are not grown within the legal boundaries of the site.

9. Ground Water Discharge Control Plan

We understand that Danish Flats Environmental Services, Inc. (Danish Flats) intends to operate this facility as a "No Discharge" facility. In addition, the ponds are constructed with a primary 60 mil, high-density polyethylene (HDPE) liner and a 12-inch, compacted clay secondary liner with a maximum hydraulic conductivity of 1 x 10^{-5} cm/sec. This lining system exceeds DOGM and DWQ requirements. Significant construction quality-control and quality-assurance testing was performed during construction and documented in Construction Documentation Reports prepared for each pond.

The berm and leak-detection systems are described in items d and e on page 5 of Exhibit 2. The liner is described in the Liner System section that begins on page 8 of Exhibit 2. Drawings of the liner and leak-detection systems are included between pages 6 and 7 of Exhibit 2.

10. Compliance Monitoring Plan

We understand that the selected compliance method is "Leak Detection Monitoring." A leak detection system was installed during construction of the Phase II ponds. This system consists of leak-detection trenches between the primary and secondary liners. These trenches drain to sumps that are to be monitored for liquids. A description of the system is found in item e on page 5 of Exhibit 2.

These sumps will be monthly monitored for accumulations of liquids. The DWQ will be promptly notified of liquid observations in any of the sumps and a response plan will be submitted to the DWQ that describes the corrective actions to be taken. Please see the attached contingency plan for more detail.

11. Closure and Post Closure Plan

A closure plan was included in the approved DOGM permit application. The closure plan section begins on page 11 of Exhibit 2.

12. Contingency and Corrective Action Plans

The contingency plan for this facility is attached to this memorandum.

3. GENERAL COMMENTS

Paragon does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the assimilation of this memorandum. The analyses and opinions expressed in this memorandum are based upon data obtained at the site and from other information discussed in this memorandum. This memorandum does not reflect any variations in subsurface stratigraphy, geohydrology, or contaminant concentrations which may occur between sample locations or across the site. Actual subsurface conditions may vary and may not become evident without further exploration. This memorandum has been prepared for the exclusive use of Danish Flats for specific application to this project. No warranties, either express or implied, are intended or made.

Attachments:

Exhibit 1 Subsurface Exploration Report and Geotechnical Evaluation January 24, 2008
Exhibit 2 Phase 2 Application May 22, 2008
Exhibit 3 Excerpts from Addendum No. 1 - Responses to Comments from Grand County December 12, 2008
Exhibit 4 Construction Permit January 26, 2009
Contingency Plan
Vicinity Map

(DMR)C:\DATA\2011\1011007\WATER QUALITY PERMIT 2014\1011007.1 GROUND WATER PERMIT ACCOMPANYING DOCUMENTS 140425.MEM.DOCX

Subsurface Exploration Program
and Geotechnical Evaluation
Danish Flats Produced Water Ponds
Phase I
Grand County, Utah

Prepared for:

Kelley Trucking
6201 McIntyre Street
Golden, Colorado 80403

Attn: Mr. Mike Easley

Job Number 08-6001 **January 24, 2008**

GROUND
ENGINEERING CONSULTANTS, INC.
41 Inverness Drive East, Englewood, CO 80112-5412 Phone (303) 289-1989 Fax (303) 289-1686 www.groundeng.com
Office Locations: Englewood • Commerce City • Loveland • Granby • Gypsum

TABLE OF CONTENTS

SUBSURFACE EXPLORATION

The subsurface exploration for the project was conducted on December 27, 2007. A total of thirty five (35) test holes were excavated with a track mounted excavator supplied by the contractor. Disturbed samples were retrieved from each test hole for laboratory testing and analysis. A GROUND engineer directed subsurface exploration, logged the test holes in the field and prepared the samples for transport to our laboratory.

The approximate locations of the test holes are shown in Figure 1. Logs of the test holes are presented in Figures 2 through 8. Explanatory notes and a legend are provided in Figure 9.

LABORATORY TESTING

Samples retrieved from our test holes were examined and visually classified in the laboratory by the project engineer. Laboratory testing of soil samples obtained from the subject site included standard property tests, such as natural moisture contents, grain size analyses, Proctor analysis and Atterberg limits. Hydraulic conductivity or permeability tests were performed on selected samples, as well. The permeability testing was performed on samples that had been remolded in the laboratory to approximately 95 percent of the maximum dry density near the optimum moisture content as determined by the standard Proctor (D-698) for each soil type Laboratory tests were performed in general accordance with applicable ASTM protocols.

Data from the laboratory-testing program are summarized on Table 1 with Proctor results summarized in Appendix A.

SUBSURFACE CONDITIONS

The subsurface conditions encountered in the test holes generally consisted of a thin veneer of topsoil overlaying sandy lean clays which were typically encountered to the test hole termination depth between approximately 5 and 10 feet. Occasional weathered claystone bedrock was encountered in the excavations.

Groundwater was not encountered in the test holes below existing grades to depths explored. Groundwater levels can be expected to fluctuate, however, in response to

PURPOSE AND SCOPE OF STUDY

This report presents the results of a subsurface exploration program performed by GROUND Engineering Consultants, Inc. (GROUND) to provide a geotechnical evaluation of the native materials on site at the proposed Danish Flats Produced Water Ponds Site.

A subsurface exploration program was conducted in order to obtain information regarding the subsurface conditions. Material samples obtained during the subsurface exploration were tested in the laboratory to provide data on the classification and engineering characteristics of the on-site soils. The results of the subsurface exploration program and laboratory tests are presented herein.

This report has been prepared to summarize the data obtained and to present our conclusions and the results of our testing program based on the subsurface conditions encountered.

PROPOSED CONSTRUCTION

We understand the proposed construction will consist of 8 produced water ponds and one sludge pond. The site layout is depicted on Figure 1, following the text.

Information concerning the finished grade elevations was not available at the time this report was prepared. Given the proposed scope of work, it appears that significant cuts and fills will be required to construct the proposed ponds. Our Scope does not include slope stability evaluations.

If the proposed construction differs significantly from that described above, GROUND should be notified to re-evaluate the conclusions contained herein.

SITE CONDITIONS

At the time of our exploration, the site was consisted of a vacant undeveloped land in Grand County, Utah. The site vegetation consists of native grasses and weeds. Local cobbles and occasional trash were observed at the surface as well.

annual and longer-term cycles of precipitation, irrigation, surface drainage, land use, nearby drainages, and the development of transient, perched water conditions.

Sandy Lean Clays were fine to medium grained and were slightly sandy to sandy. They were slightly moist to moist, low to medium plastic, and pale brown to grey in color.

Weathered Claystone Bedrock was fine to medium grained and was slightly sandy to sandy. They were slightly moist, low to medium plastic, and pale brown to grey in color.

CONCLUSIONS

As requested, GROUND has performed the laboratory testing on selected samples and provided logs of the excavations completed. Based on the results of our laboratory testing program, in general, the materials encountered meet the reported requirement for permeability of less than $1.0x10^{-5}$ cm/sec when the sample was remolded to approximately 95 percent of the maximum dry density near the optimum moisture content as determined by the standard Proctor (ASTM D-698). Three samples tested did not meet permeability requirements noted in Bold on Table 1.

The materials tested classified as lean clay that was generally slightly sandy to sandy with relatively consistent results for plasticity and percentage of particles finer than the #200 sieve. Based on the test results and relative consistency of the materials encountered it appears that the materials tested would meet the requirements outlined in the project specifications dated October 12, 2007 when placed in accordance with the parameters outlined in section 02514-2 of the project specifications. GROUND recommends that additional permeability testing be performed on several samples during construction of the embankment.

CLOSURE

Limitations This report has been prepared for the Kelley Trucking Incorporated, as it pertains to the materials encountered during the subsurface exploration associated with the Danish Flats Water Ponds – Phase I in Grand County, Utah as described herein. It may not contain sufficient information for other parties or other purposes. In addition, GROUND has assumed that project construction will commence by Spring, 2008. Changes in project plans or schedule should be brought to the attention of the Geotechnical Engineer, in order that the geotechnical recommendations may be re-evaluated and, as necessary, modified.

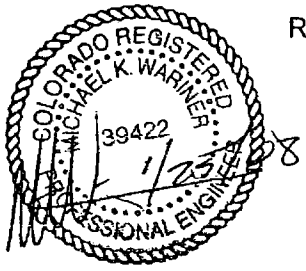
The geotechnical conclusions in this report relied upon subsurface exploration at the locations shown on Figure 1. Subsurface conditions were interpolated between and extrapolated beyond these locations. Findings were dependent on the limited amount of direct evidence obtained at the time of this geotechnical evaluation. Our recommendations were developed for site conditions as described above. Actual conditions exposed during construction may be anticipated to differ, somewhat, from those encountered during site exploration. If during construction, surface, soil, bedrock, or groundwater conditions appear to be at variance with those described herein, the Geotechnical Engineer should be advised at once, so that re-evaluation of the recommendations may be made in a timely manner.

This report was prepared in accordance with generally accepted geotechnical engineering practice at the date of preparation. GROUND makes no other warranties, either express or implied, as to the professional data, opinions or recommendations contained herein.

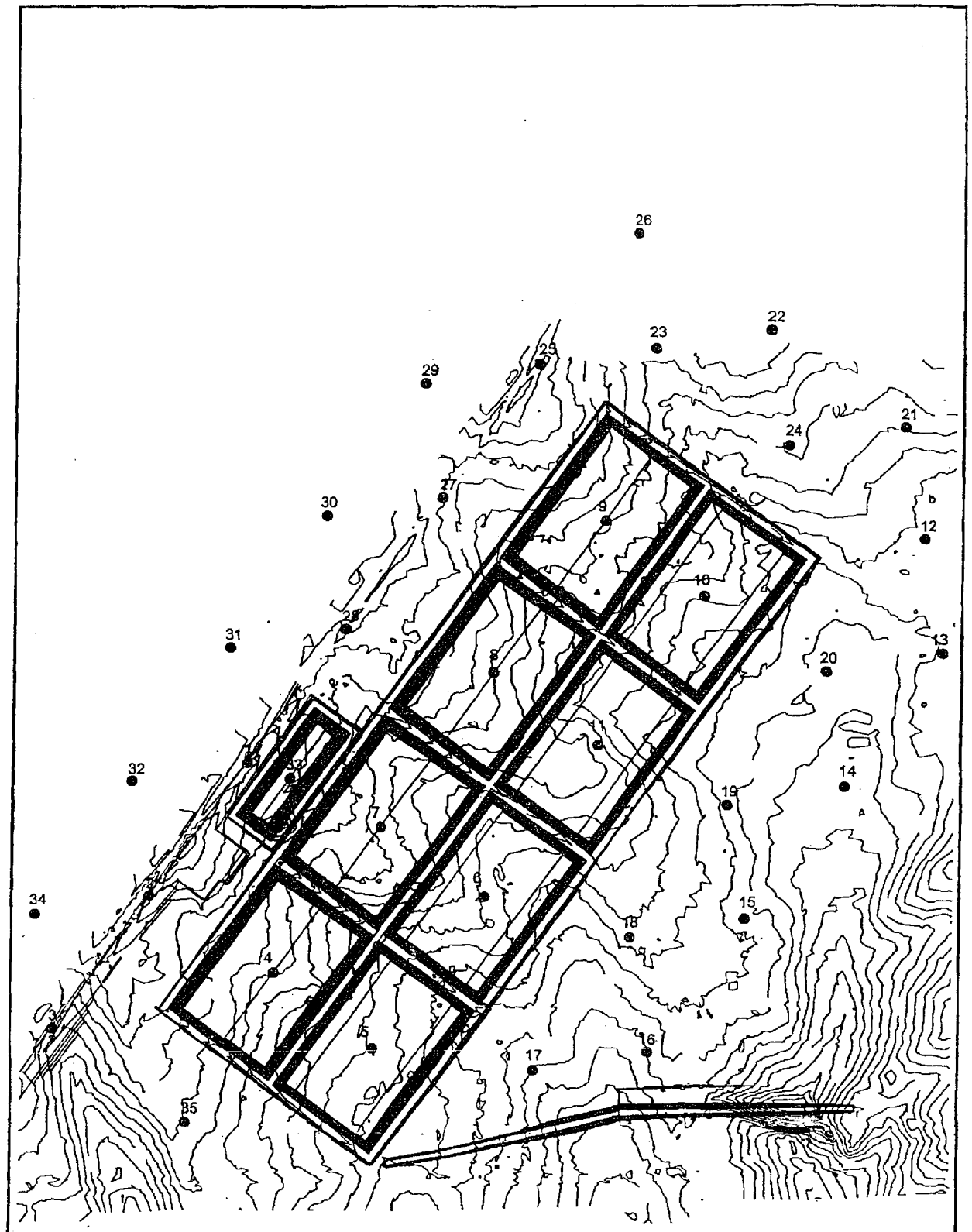
Sincerely,

GROUND Engineering Consultants, Inc.

Michael K. Wariner, P.E.



Reviewed by James B. Kowalsky, P.E.



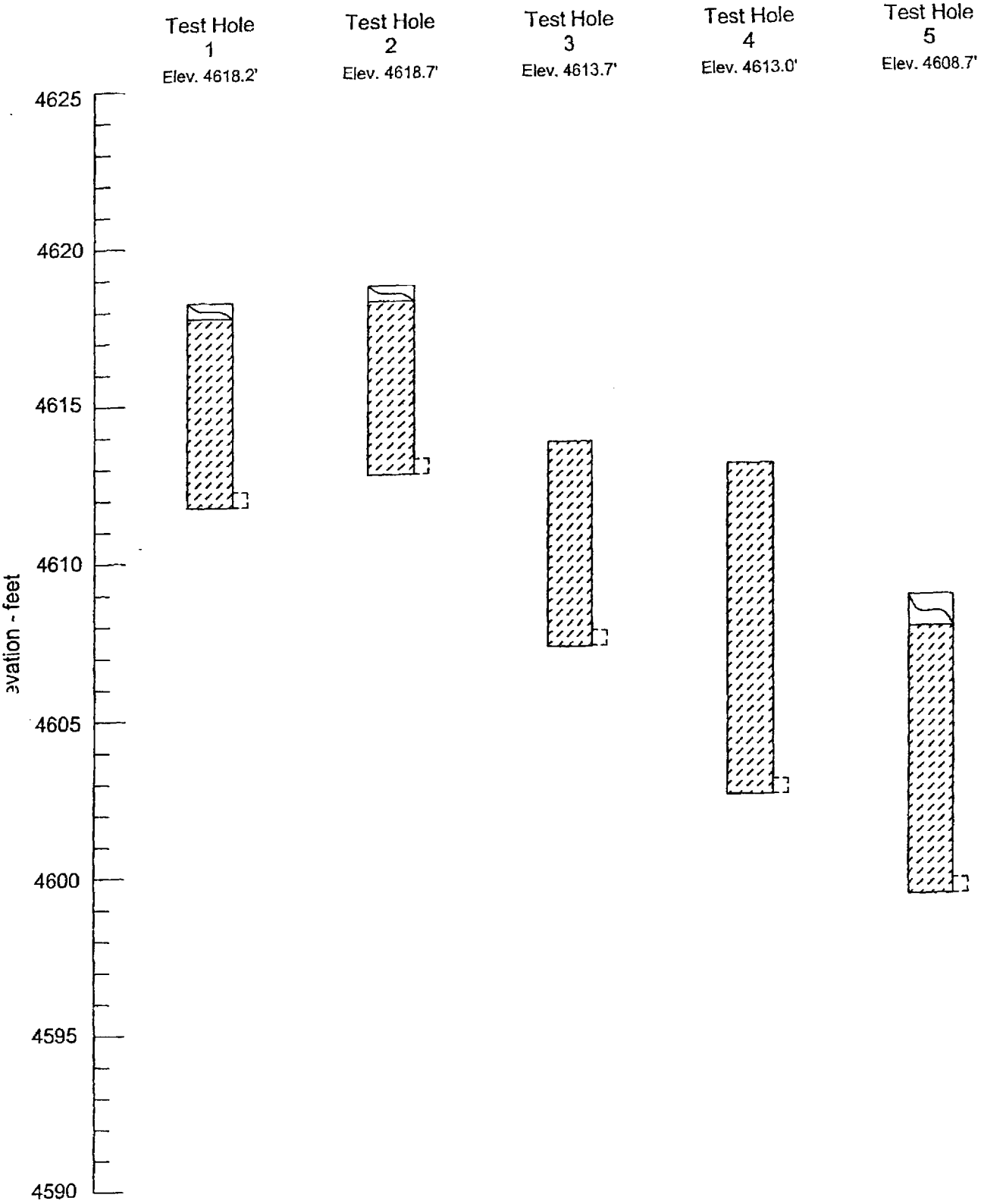
1
● Indicates test hole number and approximate location.

(Not to Scale)

GROUND
ENGINEERING CONSULTANTS

LOCATION OF TEST HOLES

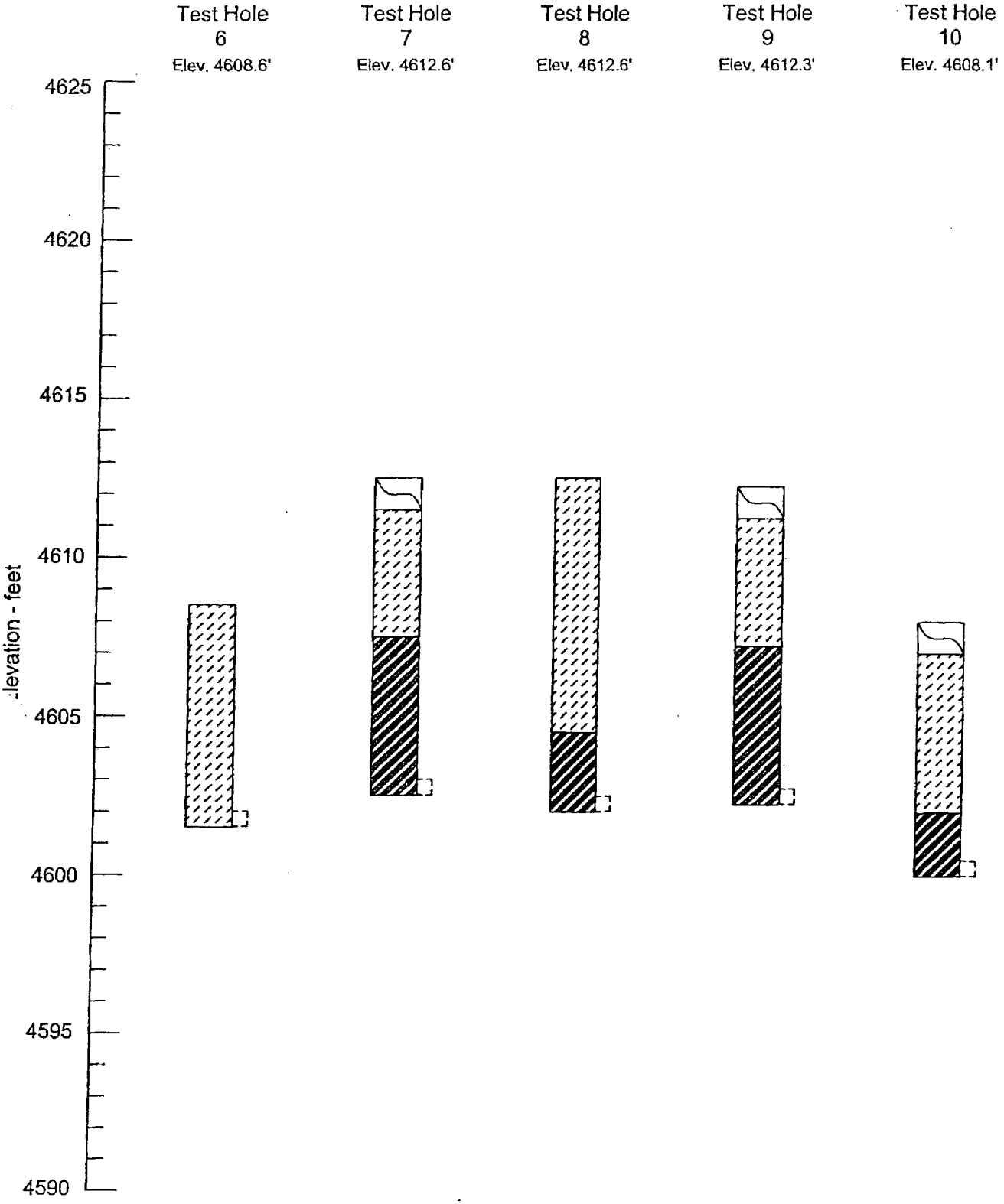
JOB NO. 06-6001	DRAWN BY: HS
FIGURE: 1	APPROVED BY: MW
CADFILE NAME: 6001SITE.DWG	



GROUND
ENGINEERING CONSULTANTS

LOGS OF TEST HOLES

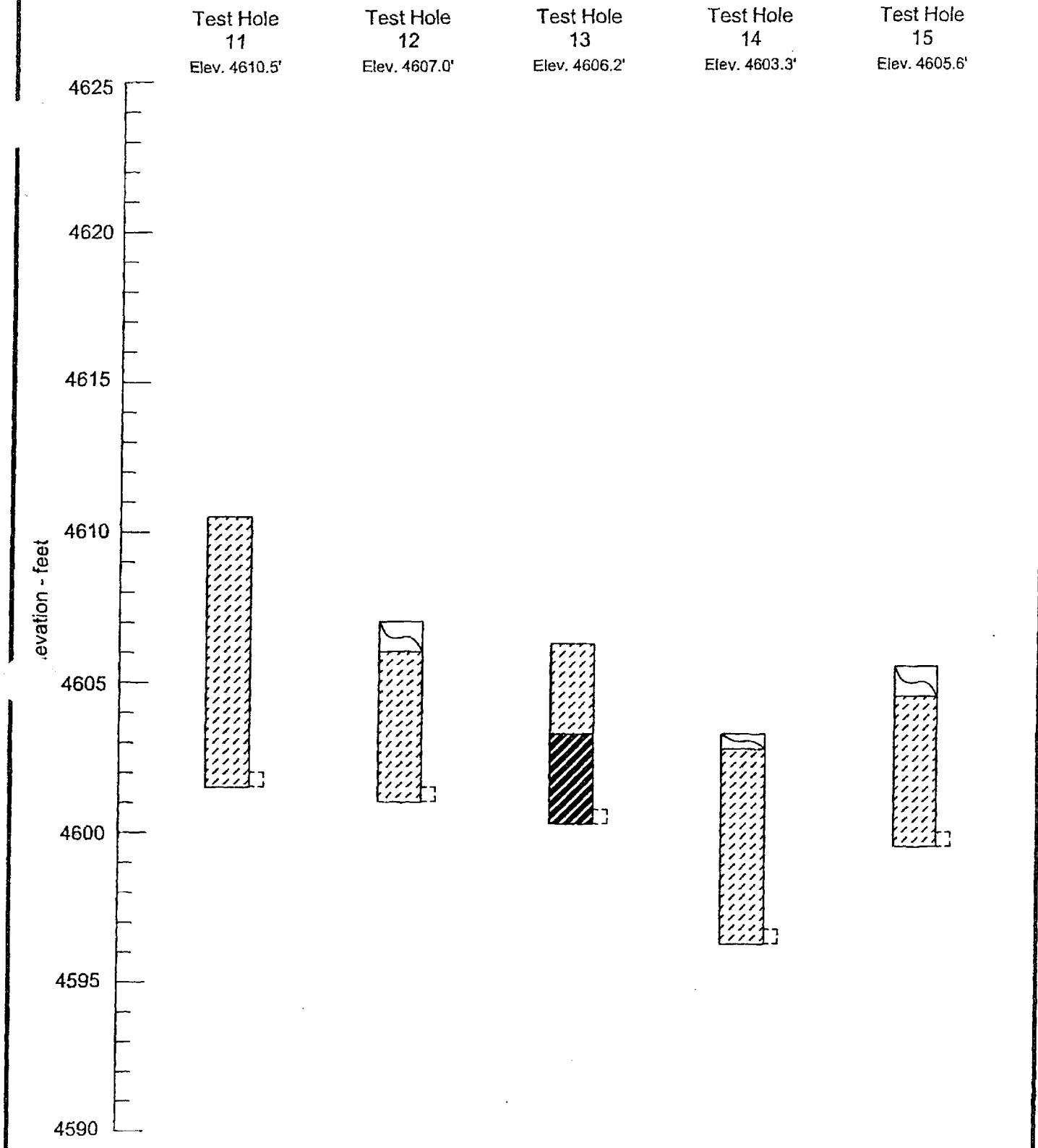
JOB NO. 08-6001	DRAWN BY: HS
FIGURE: 2	APPROVED BY: MW
CADFILE NAME: 6001LOG01.DWG	



GROUND
ENGINEERING CONSULTANTS

LOGS OF TEST HOLES

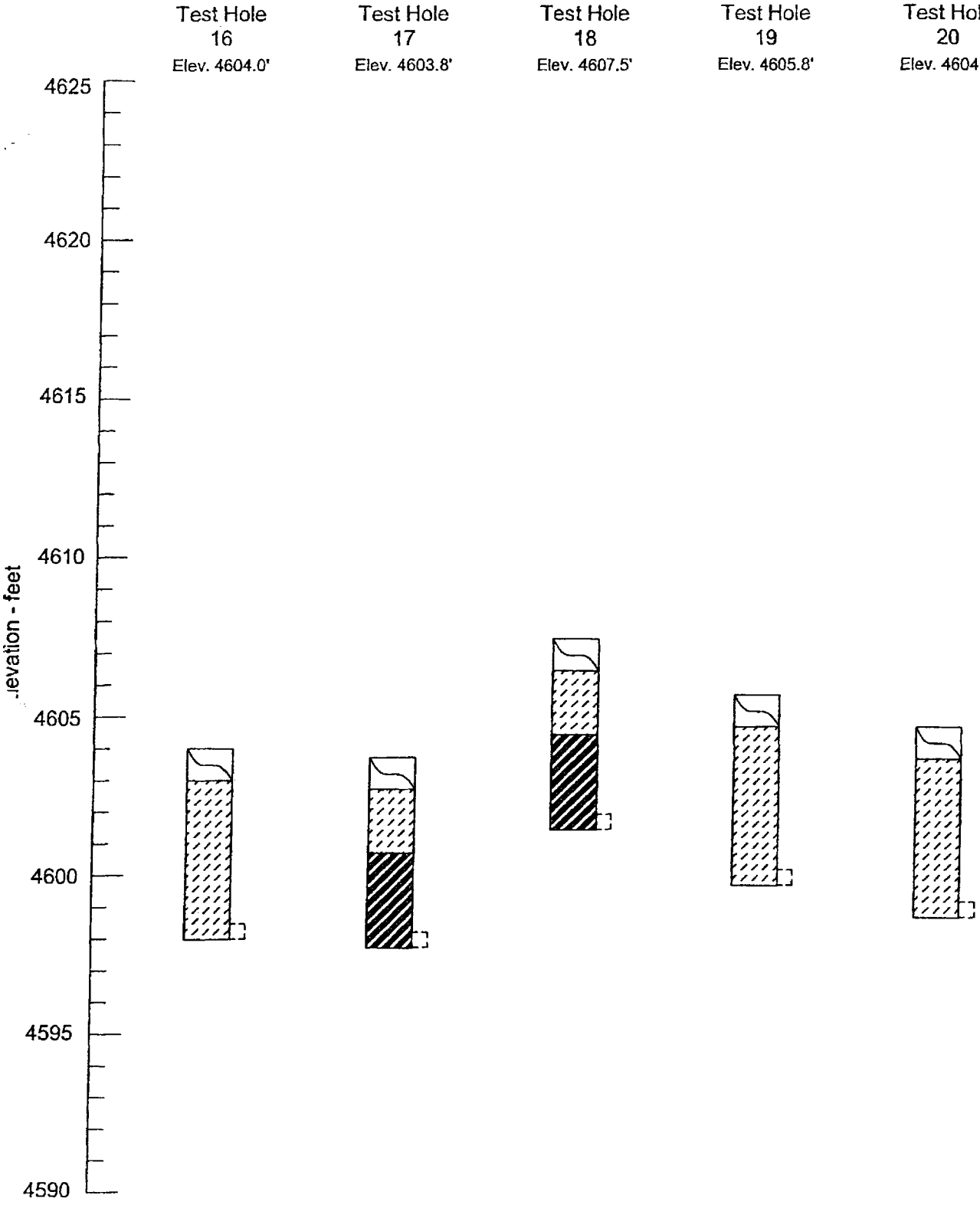
JOB NO. 08-6001	DRAWN BY: HS
FIGURE: 3	APPROVED BY: MW
CADFILE NAME: 6001LOG02.DWG	



GROUND
ENGINEERING CONSULTANTS

LOGS OF TEST HOLES

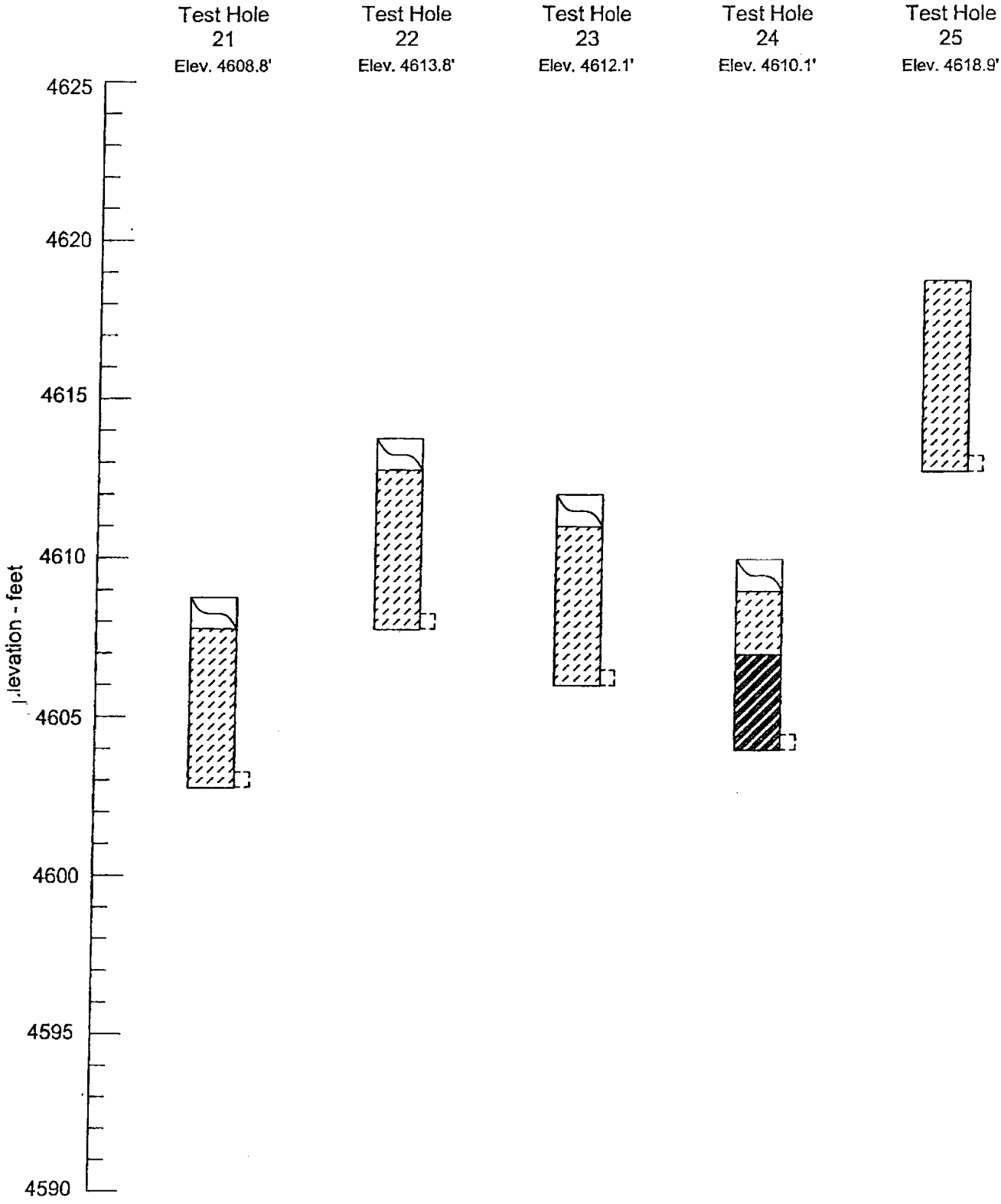
JOB NO. 08-6001	DRAWN BY: HS
FIGURE: 4	APPROVED BY: MW
CADFILE NAME: 6001LOG03.DWG	



GROUND
ENGINEERING CONSULTANTS

LOGS OF TEST HOLES

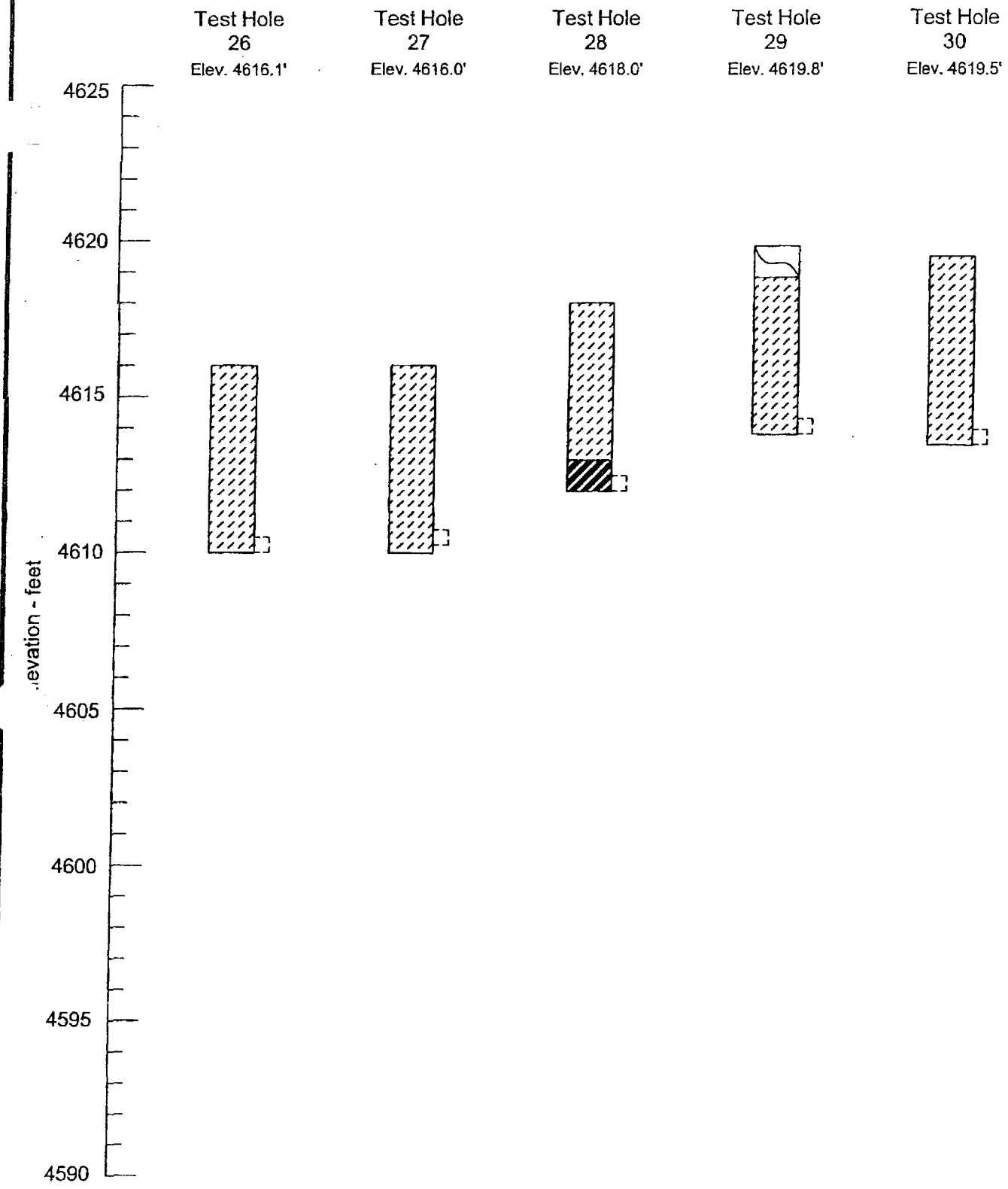
JOB NO. 08-6001	DRAWN BY: HS
FIGURE: 5	APPROVED BY: MW
CADFILE NAME: 6001LOG04.DWG	



GROUND
ENGINEERING CONSULTANTS

LOGS OF TEST HOLES

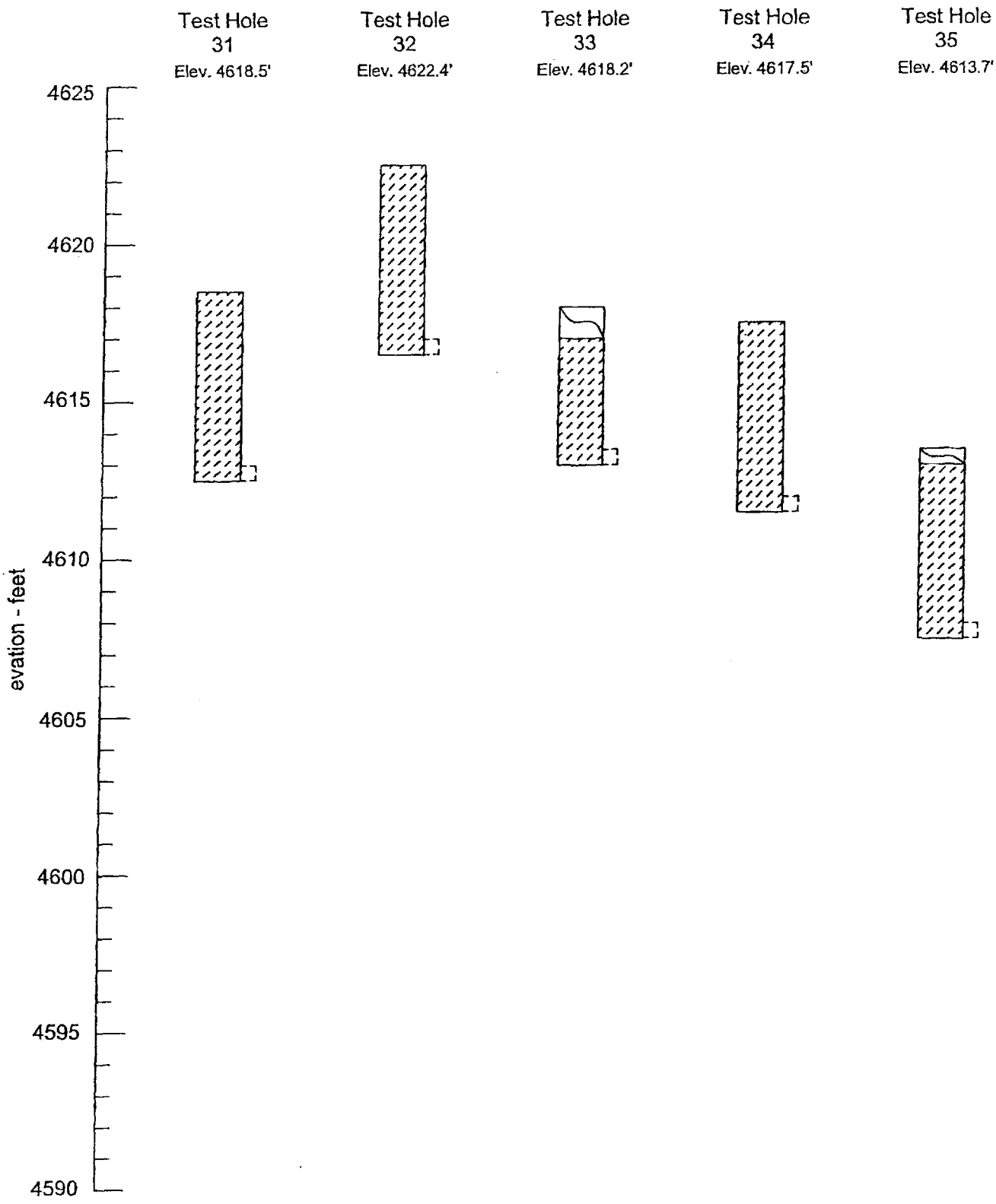
JOB NO. 08-6001	DRAWN BY: HS
FIGURE: 6	APPROVED BY: MW
CADFILE NAME: 6001LOG05.DWG	



GROUND
ENGINEERING CONSULTANTS

LOGS OF TEST HOLES

JOB NO. 08-6001	DRAWN BY: HS
FIGURE: 7	APPROVED BY: MW
CADFILE NAME: 6001LOG06.DWG	



GROUND
ENGINEERING CONSULTANTS

LOGS OF TEST HOLES

JOB NO. 08-6001	DRAWN BY: HS
FIGURE: 8	APPROVED BY: MW
CADFILE NAME: 6001LOG07.DWG	

LEGEND:

Topsoil

Sandy Lean Clay: Fine to medium grained, slightly sandy to sandy, slightly moist to moist, low to medium plastic, and pale brown to grey in color.

Weathered Claystone Bedrock: Fine to medium grained, slightly sandy to sandy, slightly moist, low to medium plastic, and pale brown to grey in color.

Small disturbed sample

NOTES:

1) Test pits were excavated on 12/27/07 with excavator.

2) Locations of the test pits were measured approximately by pacing from features shown on the site plan provided.

3) Elevations of the test pits were not measured and the logs of the test pits are drawn to depth.

4) The test pit locations and elevations should be considered accurate only to the degree implied by the method used.

5) The lines between materials shown on the test pit logs represent the approximate boundaries between material types and the transitions may be gradual.

6) Groundwater was not encountered during drilling. Groundwater levels can fluctuate seasonally and in response to landscape irrigation.

The material descriptions on this legend are for general classification purposes only. See the full text of this report for descriptions of the site materials and related recommendations.

GROUND
ENGINEERING CONSULTANTS

LEGEND AND NOTES

JOB NO. 08-6001	DRAWN BY: HS
FIGURE: 9	APPROVED BY: MW
CADFILE NAME: 6001LEG.DWG	

GROUND
ENGINEERING CONSULTANTS

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

Sample Location			Natural	Percent	Atterberg Limits		Maximum	Optimum		AASHTO	Soil Type
GROUND Test Hole No.	Kelley Hole No.	Depth *(feet)*	Moisture Content *(%)*	Passing No. 200 Sieve	Liquid Limit *(%)*	Plasticity Index *(%)*	Dry Density *(pcf)*	Moisture Content *(%)*	Perme-ability * *(cm/sec)*	Classifi-cation *(GI)*	Type (USCS Classification)
TH #1	1193	6.5	7.1	75	25	11	-	-	-	A-6 (6)	Sandy Lean Clay (CL)
TH #2	1191	6	7.6	84	25	11	-	-	-	A-6 (7)	Sandy Lean Clay (CL)
TH #3	1189	6.5	8.2	83	30	15	106.8	18.7	1.41E-06	A-6 (11)	Sandy Lean Clay (CL)
TH #4	Pond 1	10.5	8.2	83	22	9	117.2	13.4	2.59E-07	A-4 (5)	Sandy Lean Clay (CL)
TH #5	Pond 2	9.5	6.2	86	26	14	-	-	**1.23E-05**	A-6 (9)	Sandy Lean Clay (CL)
TH #6	Pond 4	7	4.5	88	21	11	-	-	4.41E-07	A-6 (6)	Slightly Sandy Lean Clay (CL)
TH #7	Pond 3	10	13.0	95	27	13	107.9	19.2	2.59E-08	A-6 (11)	Slightly Sandy Lean Clay (CL)
TH #8	Pond 5	10.5	6.8	96	22	10	-	-	1.53E-06	A-4 (7)	Lean Clay (CL)
TH #9	Pond 7	10	6.3	90	24	11	-	-	1.22E-07	A-6 (7)	Slightly Sandy Lean Clay (CL)
TH #10	Pond 8	8	7.2	91	26	13	-	-	2.16E-08	A-6 (10)	Slightly Sandy Lean Clay (CL)
TH #11	Pond 6	9	7.1	89	24	12	-	-	2.15E-08	A-6 (8)	Slightly Sandy Lean Clay (CL)
TH #12	1205	6	7.8	88	24	12	-	-	-	A-6 (8)	Slightly Sandy Lean Clay (CL)
TH #13	1178	6	8.6	93	26	12	115.7	13.3	**8.76E-05**	A-6 (9)	Slightly Sandy Lean Clay (CL)
TH #14	1180	7	9.3	92	24	12	113.7	13.9	5.51E-06	A-6 (8)	Slightly Sandy Lean Clay (CL)
TH #15	1182	6	7.3	93	28	25	-	-	-	A-6 (20)	Slightly Sandy Lean Clay (CL)
TH #16	1184	6	7.7	85	27	16	-	-	-	A-6 (11)	Sandy Lean Clay (CL)
TH #17	1213	6	6.9	91	24	10	116.5	13.6	9.20E-09	A-4 (7)	Slightly Sandy Lean Clay (CL)
TH #18	1211	6	9.4	87	33	13	-	-	1.32E-07	A-6 (11)	Sandy Lean Clay (CL)
TH #19	1209	6	7.2	80	22	11	117.5	12.7	9.10E-08	A-6 (6)	Sandy Lean Clay (CL)
TH #20	1207	6	7.7	94	23	10	-	-	-	A-4 (7)	Slightly Sandy Lean Clay (CL)
TH #21	1174	6	7.0	87	22	11	-	-	-	A-6 (6)	Sandy Lean Clay (CL)

*** Sample remolded at approximately 95% of the maximum dry density near optimum moisture content (ASTM D-698)**

GROUND
ENGINEERING CONSULTANTS

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

Sample Location			Natural	Percent	Atterberg Limits		Maximum	Optimum		AASHTO	Soil Type
GROUND Test Hole No.	Kelley Hole No.	Depth (feet)	Moisture Content (%)	Passing No. 200 Sieve	Liquid Limit (%)	Plasticity Index (%)	Dry Density (pcf)	Moisture Content (%)	Perme-ability * (cm/sec)	Classifi-cation (GI)	Type (USCS Classification)
TH #22	1172	6	9.1	92	32	14	-	-	-	A-6 (12)	Slightly Sandy Lean Clay (CL)
TH #23	1201	6	10.4	93	21	8	116.3	13.0	2.64E-07	A-4 (5)	Slightly Sandy Lean Clay (CL)
TH #24	1203	6	9.5	98	29	12	-	-	-	A-6 (11)	Lean Clay (CL)
TH #25	1199	6	7.2	88	24	9	-	-	-	A-4 (6)	Slightly Sandy Lean Clay (CL)
TH #26	1170	6	8.8	90	25	11	116.0	13.3	2.22E-05	A-6 (8)	Slightly Sandy Lean Clay (CL)
TH #27	1197	6	5.4	95	21	10	-	-	-	A-4 (6)	Slightly Sandy Lean Clay (CL)
TH #28	1195	6	5.8	93	23	10	108.5	17.7	-	A-4 (7)	Slightly Sandy Lean Clay (CL)
TH #29	1166	6	7.8	92	25	10	-	-	-	A-4 (7)	Slightly Sandy Lean Clay (CL)
TH #30	1164	6	8.8	90	22	10	110.6	15.8	-	A-4 (6)	Slightly Sandy Lean Clay (CL)
TH #31	1162	6	6.4	89	30	10	-	-	-	A-4 (8)	Slightly Sandy Lean Clay (CL)
TH #32	1160	6	5.4	83	23	10	-	-	-	A-4 (6)	Sandy Lean Clay (CL)
TH #33	Sludge Pond	5	4.9	84	22	9	-	-	6.99E-06	A-4 (5)	Sandy Lean Clay (CL)
TH #34	1158	6	7.2	88	24	9	-	-	-	A-4 (6)	Slightly Sandy Lean Clay (CL)
TH #35	1187	6	9.5	98	29	12	-	-	-	A-6 (11)	Lean Clay (CL)

* Sample remolded at approximately 95% of the maximum dry density near optimum moisture content (ASTM D-698)

APPENDIX A

Proctor Evaluation Summary

COMPACTION TEST REPORT

Curve No.: Pond 1

Project No.: 08-6001 **Date:** 1/3/08

Project: Danish Flats

Location: Bulk Sample from Pond 1

Elev./Depth: 10.5' Below Grade **Sample No.** Pond 1

Remarks:

MATERIAL DESCRIPTION

Description: Sandy Lean Clay

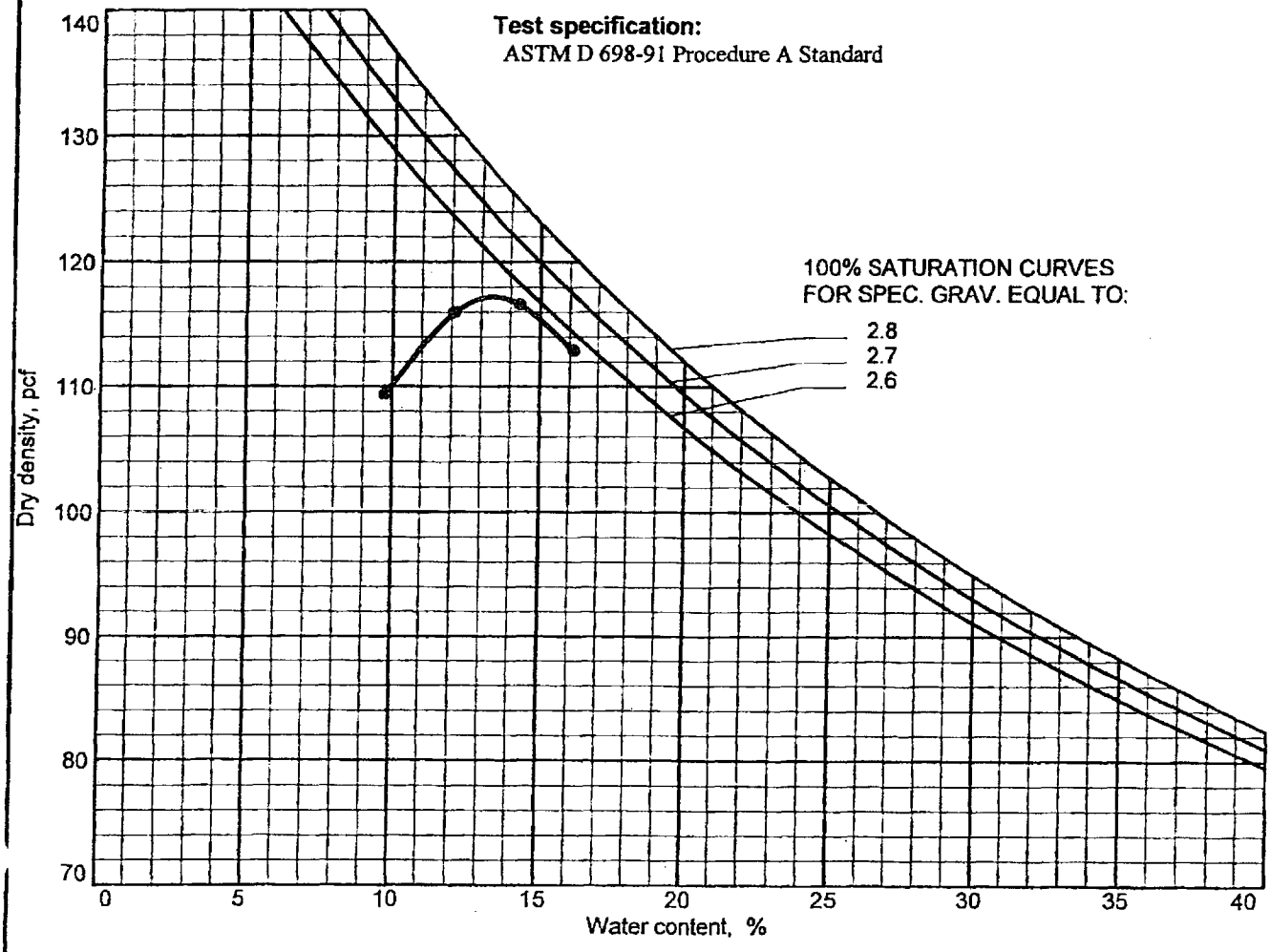
Classifications - **USCS:** (CL)s **AASHTO:** A-4(5)

Nat. Moist. = **Sp.G. =**

Liquid Limit = 22 **Plasticity Index =** 9

% > No.4 = 0.0 % **% < No.200 =** 82.8 %

TEST RESULTS
Maximum dry density = 117.2 pcf
Optimum moisture = 13.4 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: Pond 3

Project No.: 08-6001 **Date:** 1/2/08

Project: Danish Flats

Location: Bulk Sample from Pond 3

Elev./Depth: 10' Below Grade **Sample No.** Pond 3

Remarks:

MATERIAL DESCRIPTION

Description: Slightly Sandy Lean Clay

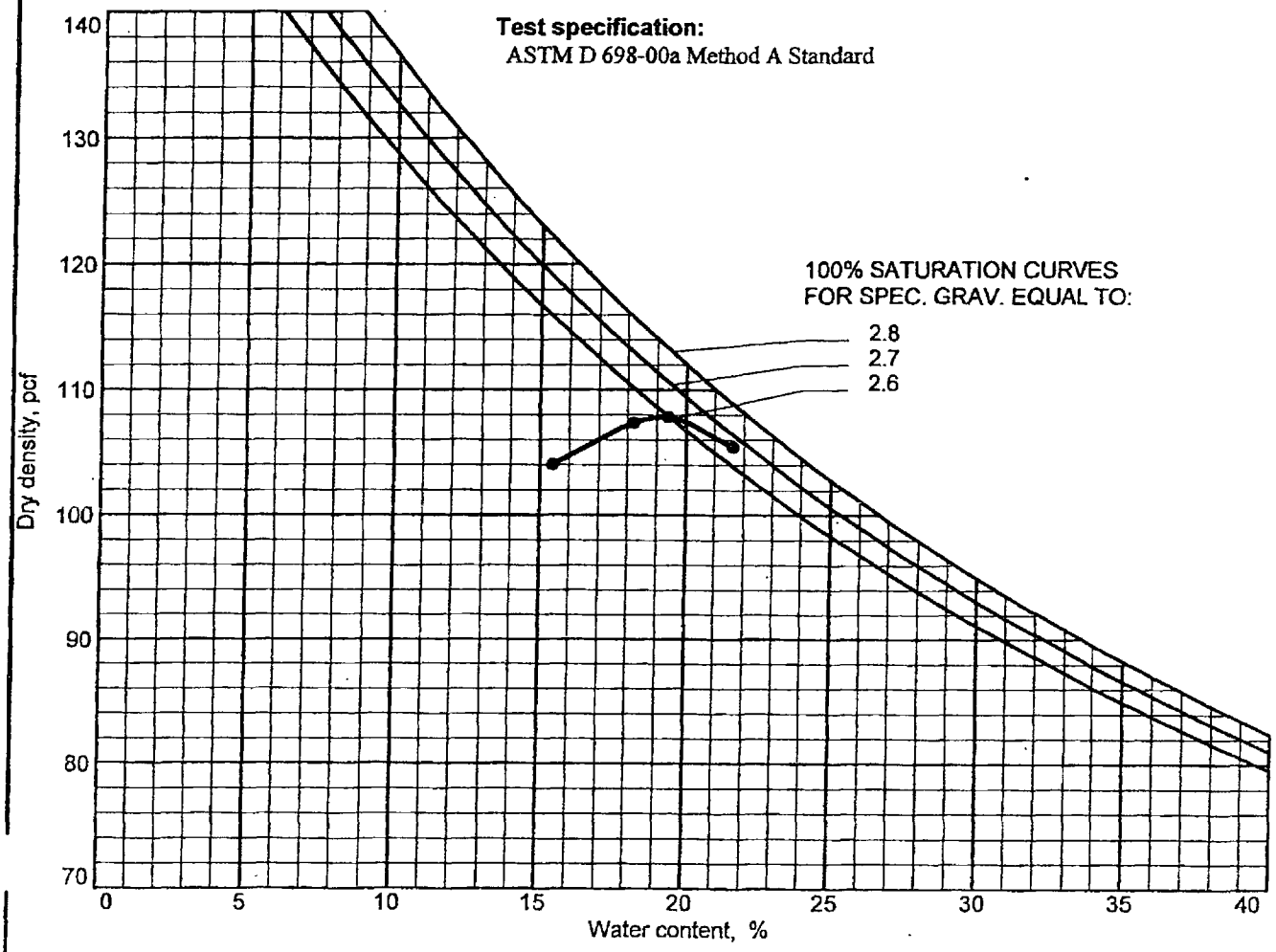
Classifications - **USCS:** CL **AASHTO:** A-6(11)

Nat. Moist. = **Sp.G. =**

Liquid Limit = 27 **Plasticity Index =** 13

% > No.4 = 0.0 % **% < No.200 =** 94.9 %

TEST RESULTS
Maximum dry density = 107.9 pcf
Optimum moisture = 19.2 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH #3

Project No.: 08-6001 **Date:** 1/2/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #3

Elev./Depth: 6.5' Below Grade **Sample No.** Test Hole #3 / 1189

Remarks:

MATERIAL DESCRIPTION

Description: Sandy Lean Clay

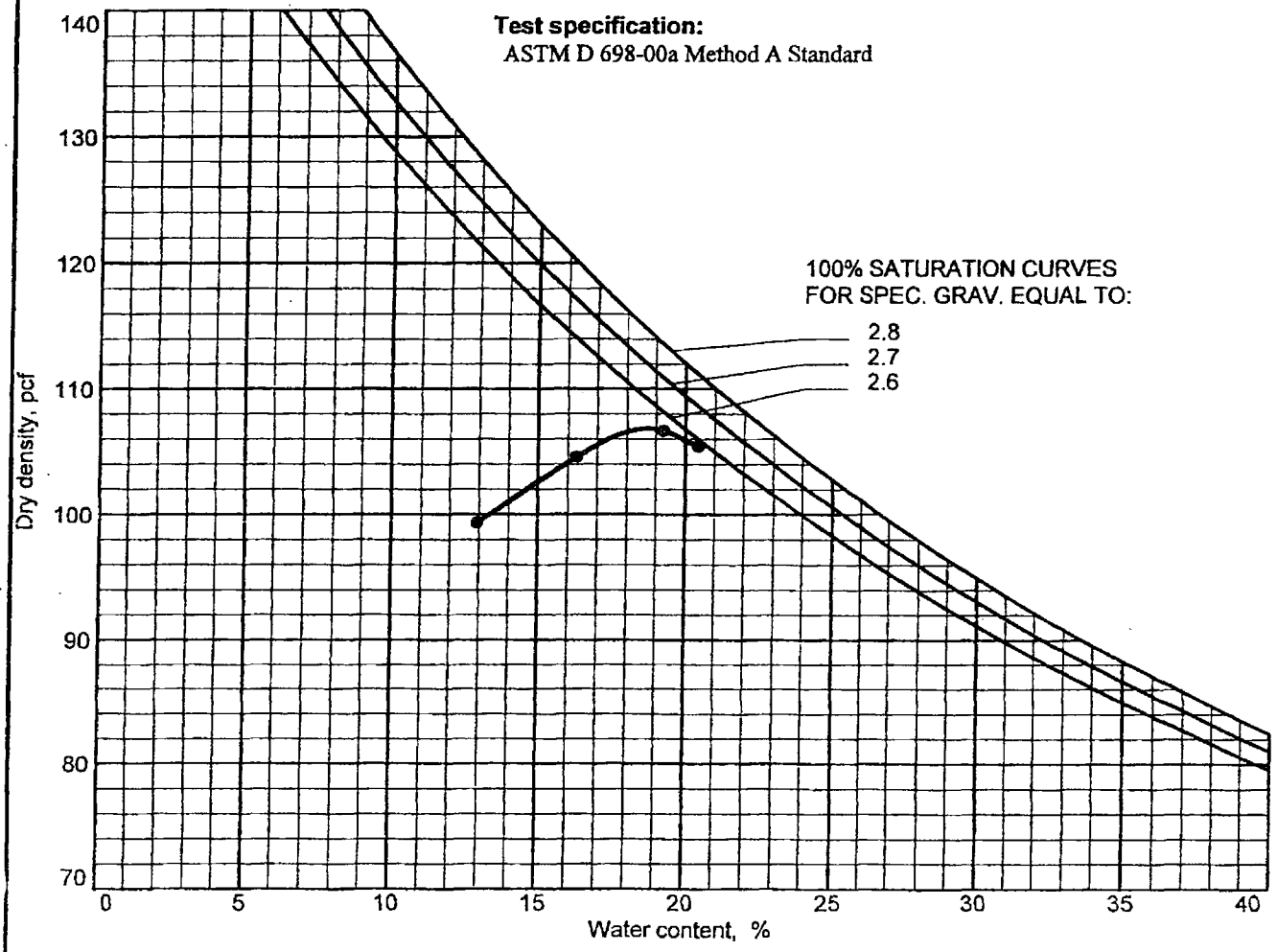
Classifications - **USCS:** (CL)s **AASHTO:** A-6(11)

Nat. Moist. = **Sp.G. =**

Liquid Limit = 30 **Plasticity Index =** 15

% > No.4 = 0.0 % **% < No.200 =** 83.0 %

TEST RESULTS
Maximum dry density = 106.8 pcf
Optimum moisture = 18.7 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH #13

Project No.: 08-6001 **Date:** 1/3/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #13

Elev./Depth: 6' Below Grade **Sample No.** Test Hole 13 / 1178

Remarks:

MATERIAL DESCRIPTION

Description: Slightly Sandy Lean Clay

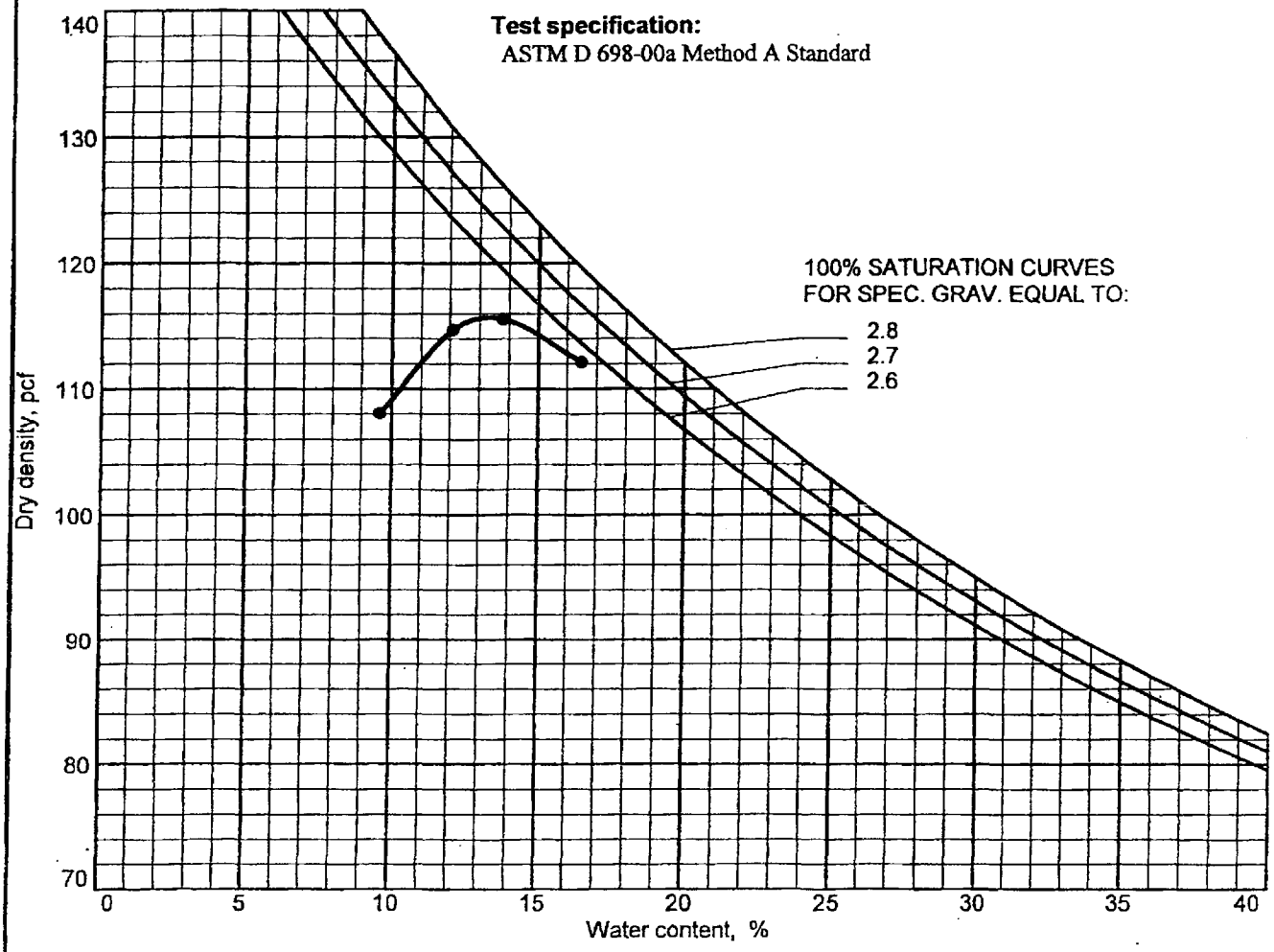
Classifications - **USCS:** (CL)s **AASHTO:** A-6(9)

Nat. Moist. = **Sp.G. =**

Liquid Limit = 26 **Plasticity Index =** 12

% > No.4 = 0.0 % **% < No.200 =** 92.6 %

TEST RESULTS
Maximum dry density = 115.7 pcf
Optimum moisture = 13.3 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH #14

Project No.: 08-6001 **Date:** 1/3/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #14

Elev./Depth: 7' Below Grade **Sample No.** Test Hole #14 / 1180

Remarks:

MATERIAL DESCRIPTION

Description: Slightly Sandy Lean Clay

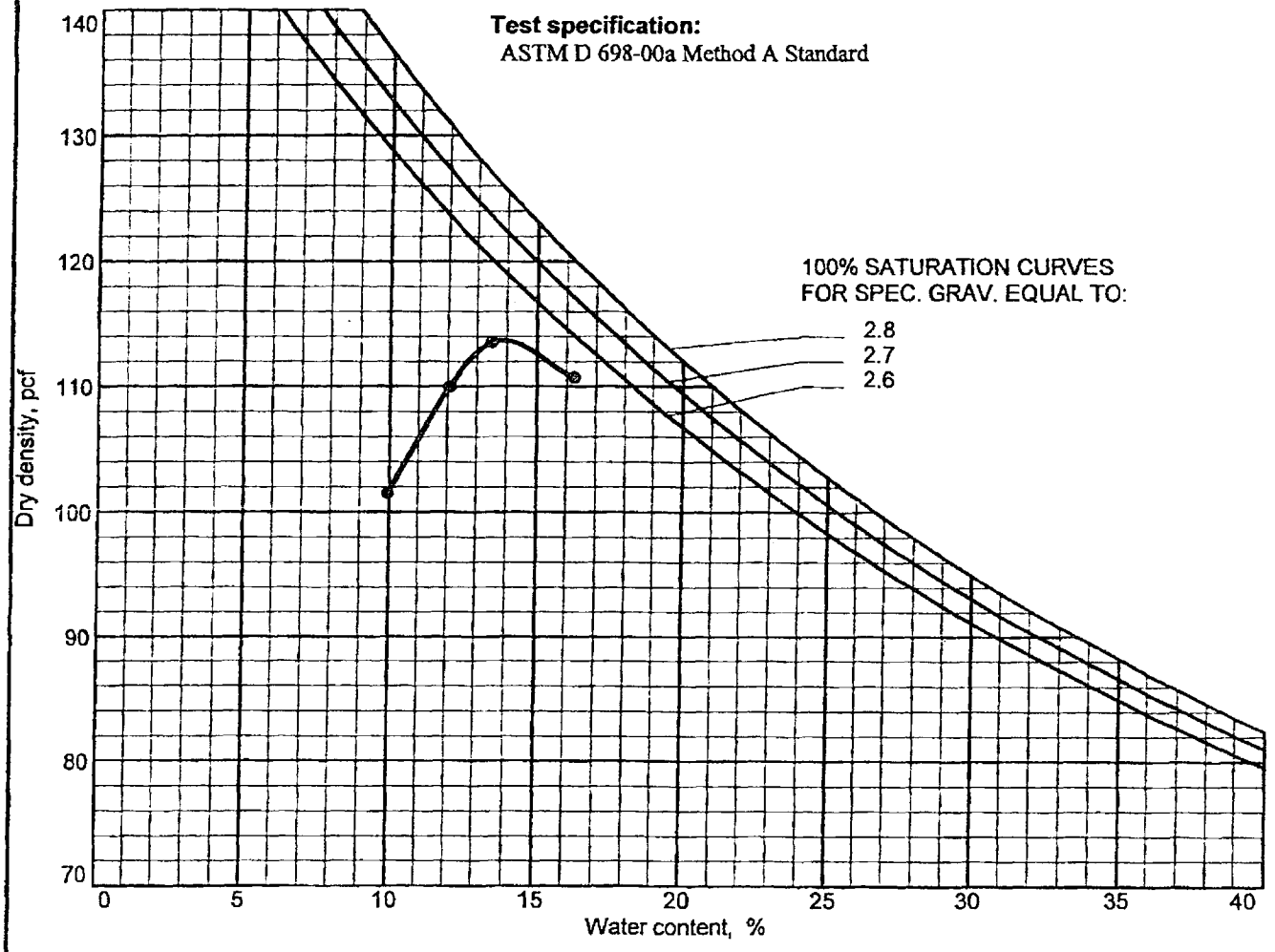
Classifications - **USCS:** CL **AASHTO:** A-6(8)

Nat. Moist. = **Sp.G.** =

Liquid Limit = 24 **Plasticity Index** = 12

% > No.4 = 0.0 % **% < No.200** = 91.5 %

TEST RESULTS
Maximum dry density = 113.7 pcf
Optimum moisture = 13.9 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH #17

Project No.: 08-6001 **Date:** 1/2/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #17

Elev./Depth: 6' Below Grade **Sample No.** Test Hole #17 / 1213

Remarks:

MATERIAL DESCRIPTION

Description: Slightly Sandy Lean Clay

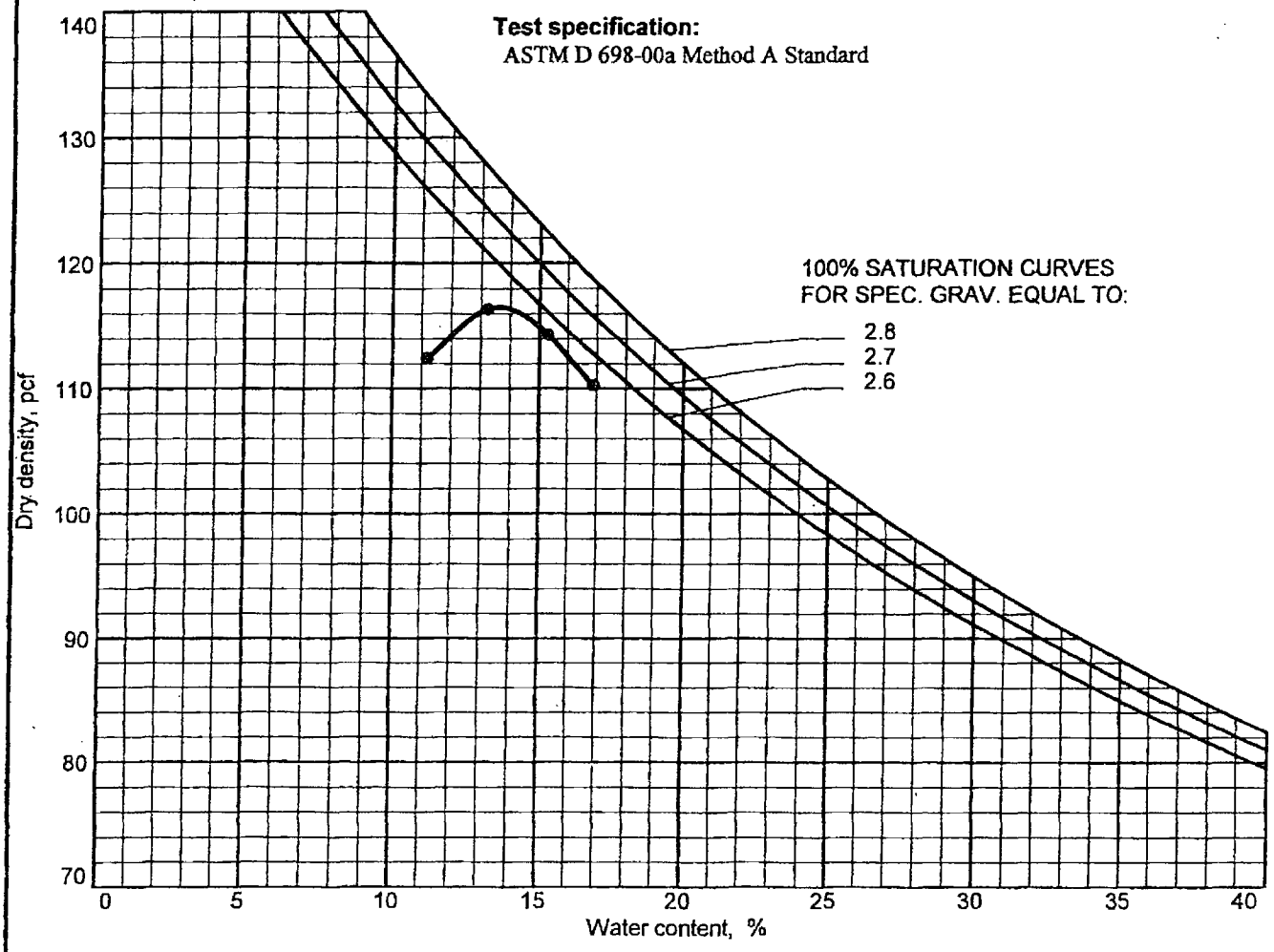
Classifications - **USCS:** CL **AASHTO:** A-4(7)

Nat. Moist. = **Sp.G.** =

Liquid Limit = 24 **Plasticity Index** = 10

% > No.4 = 0.0 % **% < No.200** = 91.4 %

TEST RESULTS
Maximum dry density = 116.5 pcf
Optimum moisture = 13.6 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH #19

Project No.: 08-6001 **Date:** 1/3/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #19

Elev./Depth: 6' Below Grade **Sample No.** Test Hole #19 / 1209

Remarks:

MATERIAL DESCRIPTION

Description: Sandy Lean Clay

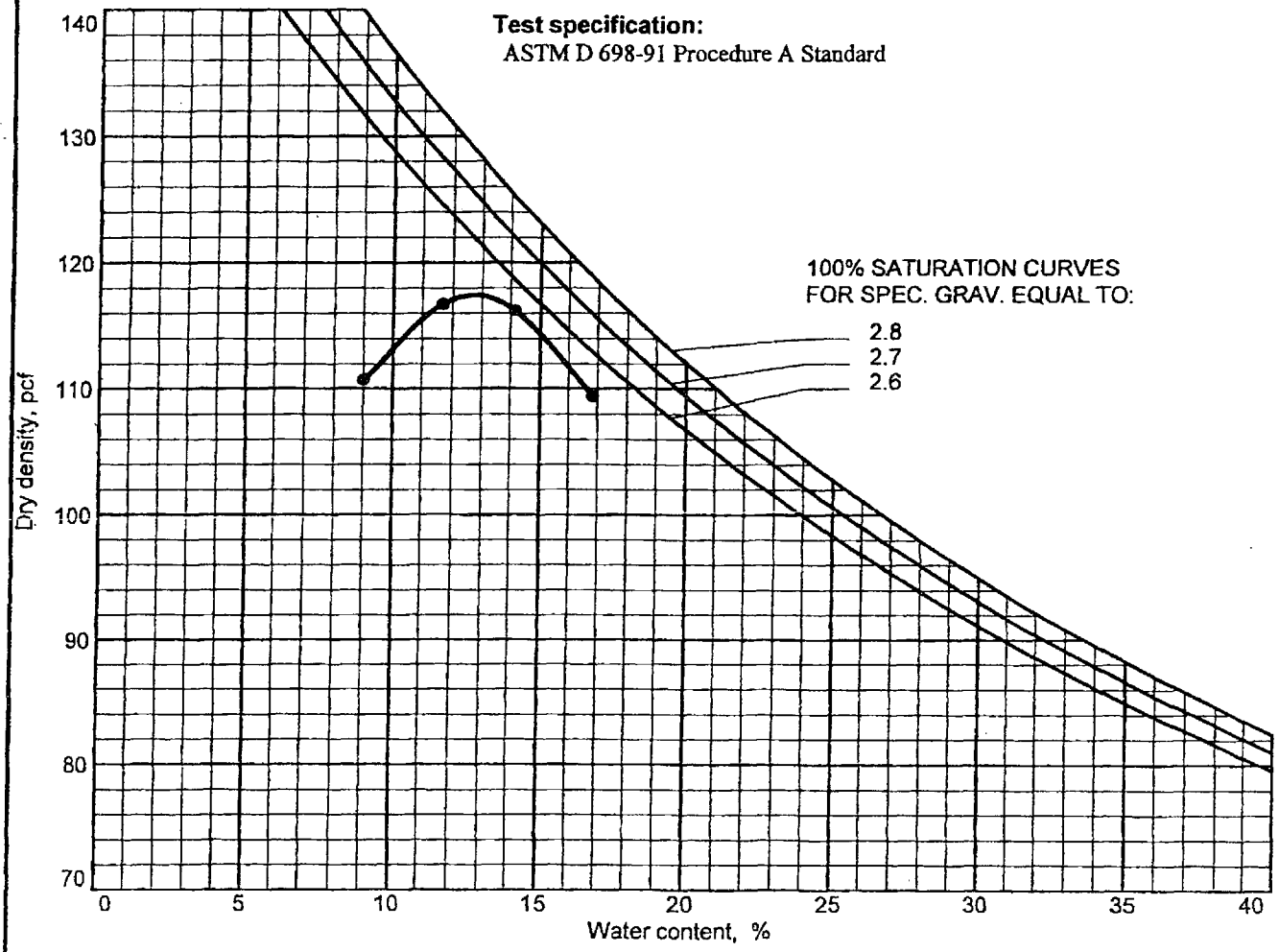
Classifications - **USCS:** CL **AASHTO:** A-6(6)

Nat. Moist. = **Sp.G. =**

Liquid Limit = 22 **Plasticity Index =** 11

% > No.4 = 0.0 % **% < No.200 =** 80.1 %

TEST RESULTS
Maximum dry density = 117.5 pcf
Optimum moisture = 12.7 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH 23

Project No.: 08-6001 **Date:** 1/3/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #23

Elev./Depth: 6' Below Grade **Sample No.** Test Hole #23 / 1201

Remarks:

MATERIAL DESCRIPTION

Description: Slightly Sandy Lean Clay

Classifications - **USCS:** CL **AASHTO:** A-4(5)

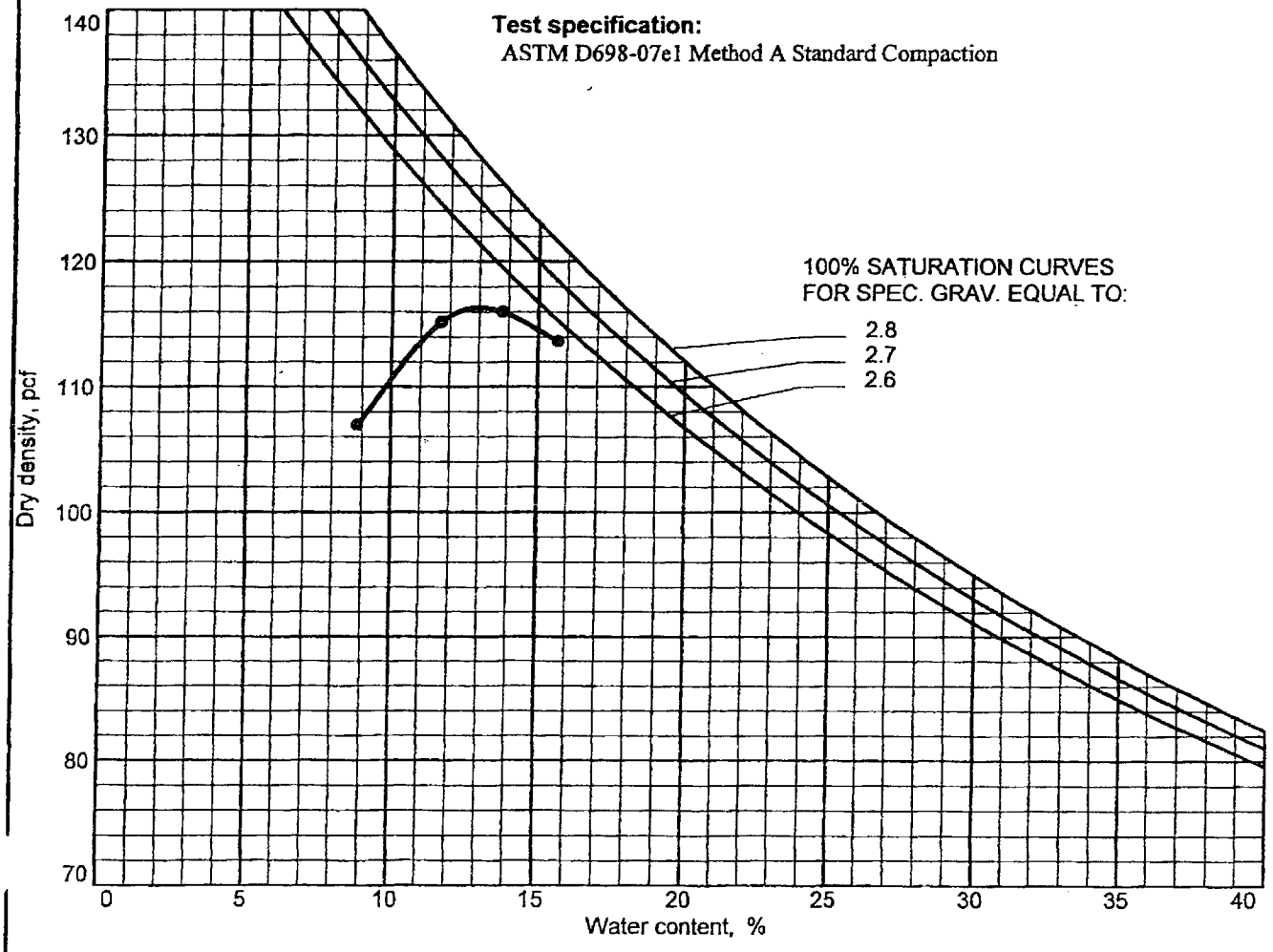
Nat. Moist. = **Sp.G. =**

Liquid Limit = 21 **Plasticity Index =** 8

% > No.4 = % **% < No.200 =** 93.1 %

TEST RESULTS
Maximum dry density = 116.3 pcf
Optimum moisture = 13.0 %

Test specification:
ASTM D698-07e1 Method A Standard Compaction



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH #26

Project No.: 08-6001 **Date:** 1/2/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #26

Elev./Depth: 6' BG **Sample No.** Test Hole #26 / 1170

Remarks:

MATERIAL DESCRIPTION

Description: Slightly Sandy Lean Clay

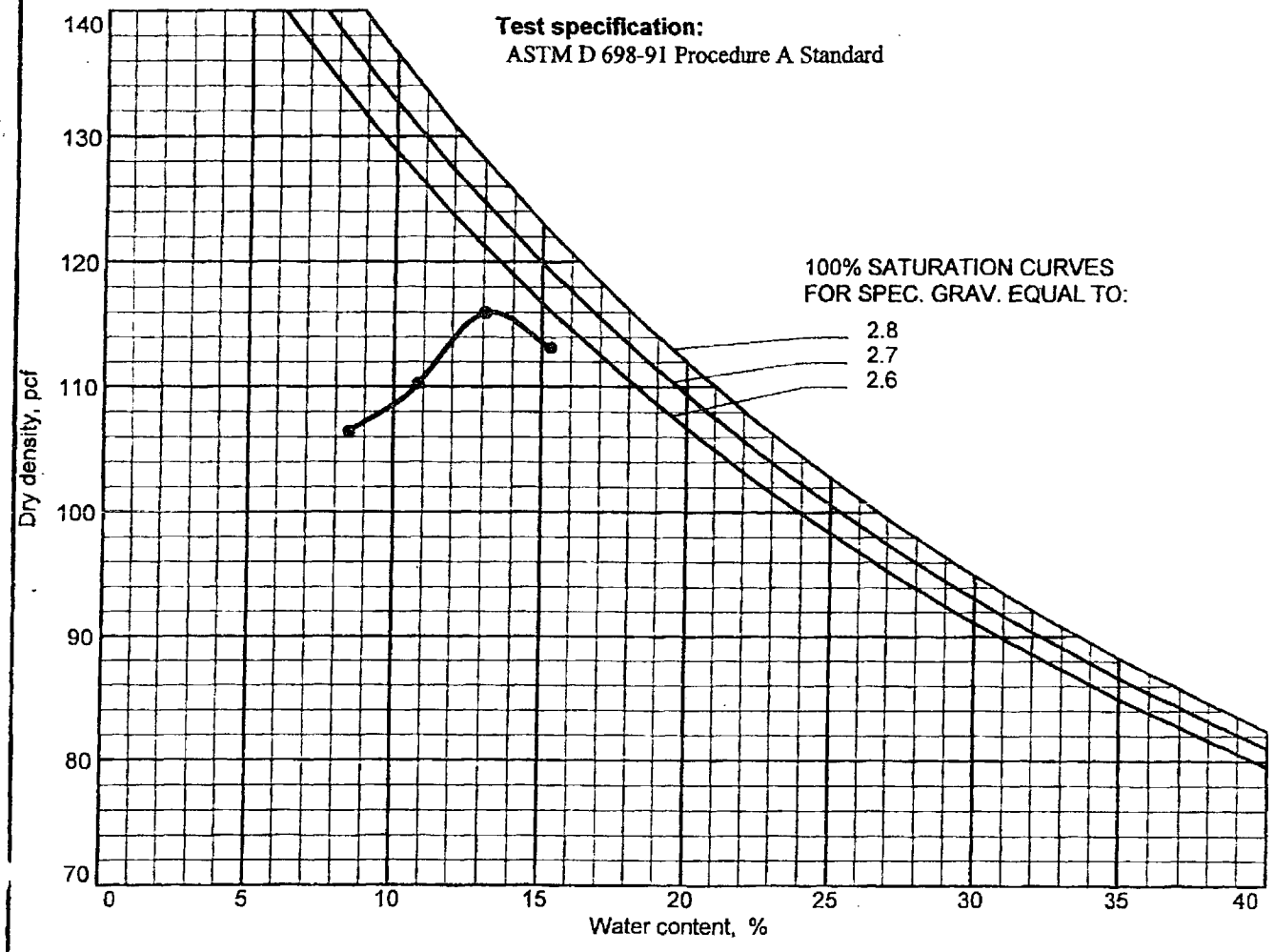
Classifications - **USCS:** (CL)s **AASHTO:** A-6(8)

Nat. Moist. = **Sp.G. =**

Liquid Limit = 25 **Plasticity Index =** 11

% > No.4 = 0.0 % **% < No.200 =** 89.8 %

TEST RESULTS
Maximum dry density = 116.0 pcf
Optimum moisture = 13.3 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH #28

Project No.: 08-6001 **Date:** 1/2/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #28

Elev./Depth: 6' Below Grade **Sample No.** Test Hole #28 / 1195

Remarks:

MATERIAL DESCRIPTION

Description: Slightly Sandy Lean Clay

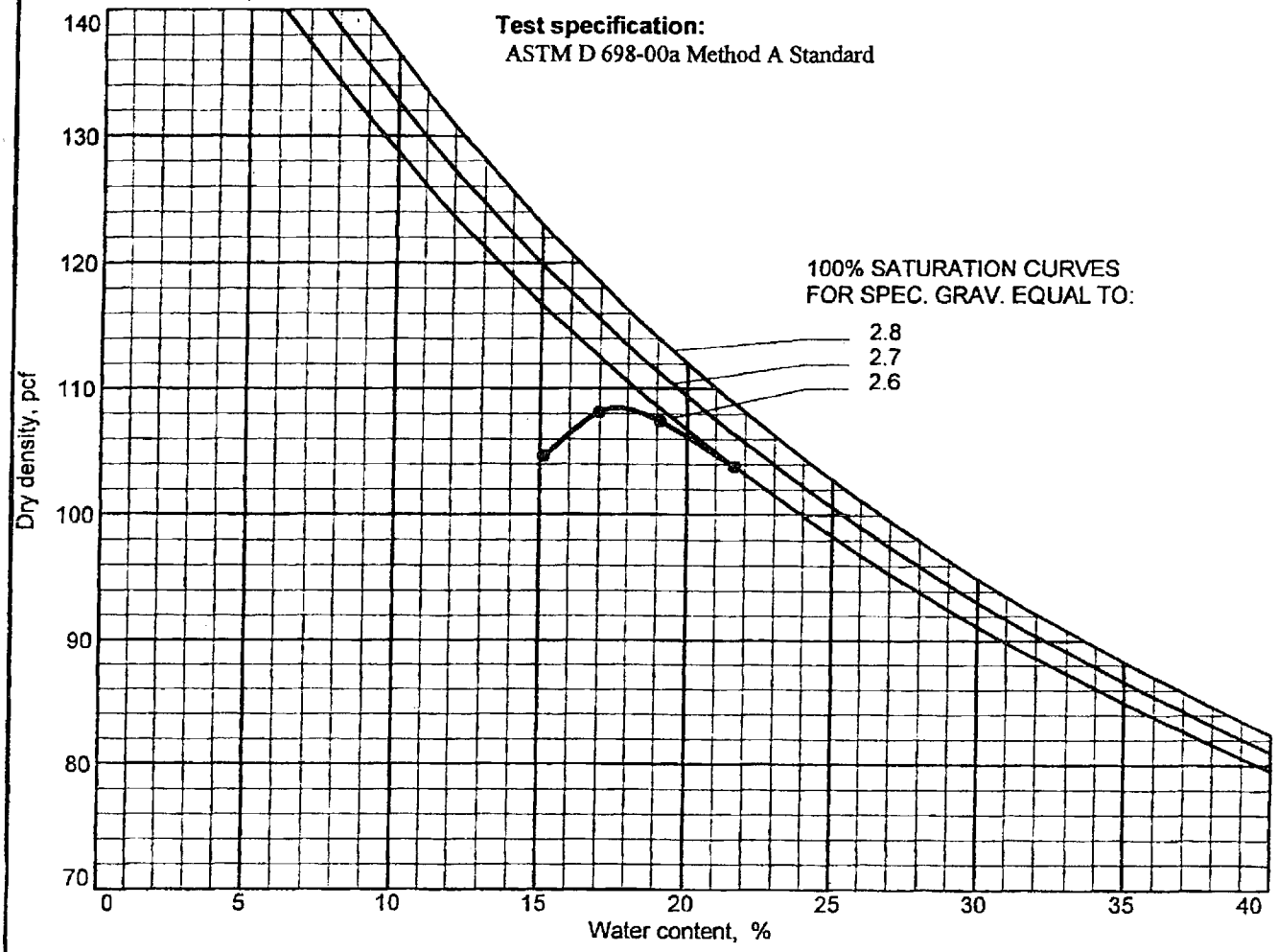
Classifications - **USCS:** CL **AASHTO:** A-4(7)

Nat. Moist. = **Sp.G. =**

Liquid Limit = 23 **Plasticity Index =** 10

% > No.4 = 0.0 % **% < No.200 =** 93.2 %

TEST RESULTS
Maximum dry density = 108.5 pcf
Optimum moisture = 17.7 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

COMPACTION TEST REPORT

Curve No.: TH #30

Project No.: 08-6001 **Date:** 1/2/08

Project: Danish Flats

Location: Bulk Sample from Test Hole #30

Elev./Depth: 6' Below Grade **Sample No.** Test Hole #30 / 1164

Remarks:

MATERIAL DESCRIPTION

Description: Slightly Sandy Lean Clay

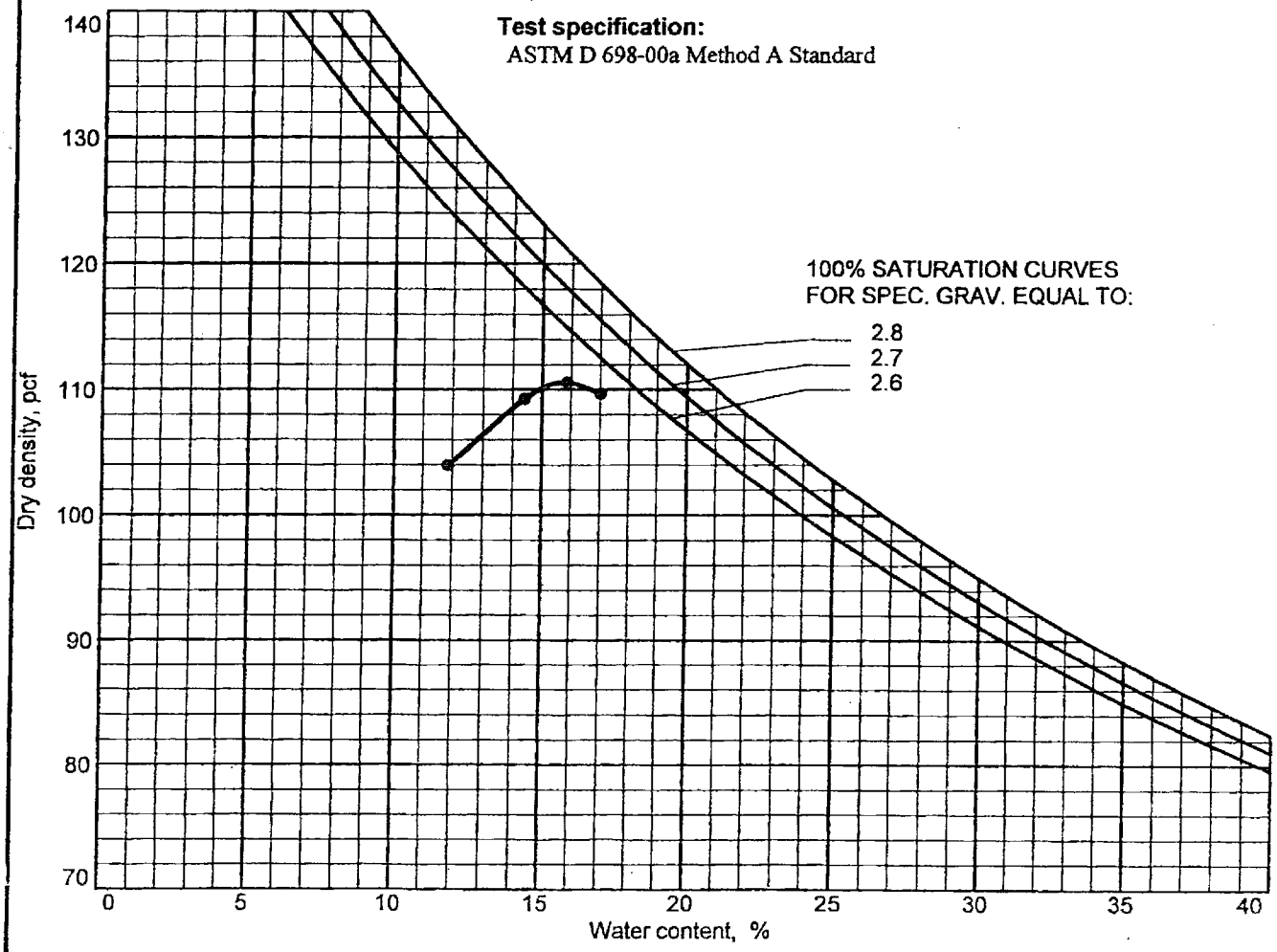
Classifications - **USCS:** (CL)s **AASHTO:** A-4(6)

Nat. Moist. = **Sp.G. =**

Liquid Limit = 22 **Plasticity Index =** 10

% > No.4 = 0.0 % **% < No.200 =** 90 %

TEST RESULTS
Maximum dry density = 110.6 pcf
Optimum moisture = 15.8 %



Plate

GROUND ENGINEERING CONSULTANTS, INC.

WEAVER
BOOS
CONSULTANTS
LLC

5675 DTC Boulevard, Suite 210
Greenwood Village, Colorado 80111
Phone: 720-529-0132
Fax: 720-529-0137
www.weaverboos.com

Chicago, IL
Naperville, IL
Griffith, IN
South Bend, IN
Springfield, IL
St. Louis, MO
Columbus, OH
Fort Worth, TX
Denver, CO
Grand Rapids, MI
Orlando, FL

May 22, 2008

Mr. Clinton Dworshak
State of Utah - Department of Natural Resources (UDNR)
Division of Oil, Gas and Mining
1594 West North Temple - Suite 1210
PO Box 145801
Salt Lake City, UT 84114-5801

Re: Danish Flats Environmental Services - Produced Water Ponds – Phase 2
Grand County, UT

Dear Mr. Dworshak,

As discussed, on behalf of Danish Flats Environmental Services, LLC (DFES), Weaver Boos Consultants, LLC (WBC) is submitting to you and requesting approval of Phase 2 of a produced water evaporation pond facility in Grand County, Utah. As you know, the initial project, "Danish Flats Produced Water Ponds – Phase 1" was approved, is currently being constructed, and is partially operational per UDNR approval.

Please find enclosed one copy of the "Design and Operations Plan, Danish Flats Environmental Services, LLC, Produced Water Evaporation Ponds, Phase 2 – Grand County, Utah" and the associated drawings. The design of the Phase 2 facility is essentially the same as the Phase 1 facility, and is described as follows:

- Truck off-loading pad for simultaneous unloading trucks.
- Two sets of three-stage concrete receiving tanks to allow oil-water separation
- A sludge pond with bird netting over the open water
- Twelve (12) - five-acre evaporation ponds.
- All of the structures will be connected via a piping system that will flow by gravity from the truck to the ponds.
- The existing Phase 1 facility includes eight evaporation ponds, and the proposed expansion for Phase 2 is to be located to the northwest of Phase 1 (see the site drawings)

The attached "Design and Operations Plan, Danish Flats Environmental Services, LLC, Produced Water Evaporation Ponds, Phase 2 – Grand County, Utah", and drawings were prepared by WBC and AgriTech Consulting in accordance with Rule R649-9 and standard

industry practices Upon approval of this permit application, construction level drawings and bid documents will be prepared for advertisement to construct the Phase 2 ponds

The physical location of the Phase 2 area is approximately 200 feet to the northwest of Phase 1 and, therefore, the geology and soils can be considered nearly identical The Phase 2 HPDE-lined ponds are located over 1,200 feet of Mancos Shale The Dakota Sandstone is located below the shale formation and is considered to be the first aquifer in the area A leak detection system consisting of sumps and wet/dry monitoring wells has been included in the plans for each pond (sludge and 12 evaporation ponds) to insure that the local environment will not be adversely impacted

Proven methods for protection of birds and other wildlife, including fence and bird netting over the sludge pond will be used, which is the same as used in Phase 1 Although the current proposed treatment method is evaporation, we will continue to aggressively investigate methods to convert the liquid to a beneficial use.

We are confident that the proposed expansion of the existing facility, including Phase 1 and Phase 2, will be an asset to the oil and gas industry and will be operated in accordance with the standards and practices of the State of Utah If you have any questions or comments, please contact me

Sincerely,

Weaver Boos Consultants, LLC

REGISTERED PROFESSIONAL ENGINEER
No 6680346
NEIL C NOWAK
05-22-08
STATE OF UTAH

Neil C Nowak, P.E
Senior Project Manager
nnowak@weaverboos.com

Attachments

cc: J Bradish – Danish Flats Env Services
J. Knudsen – AgriTech

DESIGN AND OPERATIONS PLAN

DANISH FLATS PRODUCED WATER EVAPORATION PONDS - PHASE 2 GRAND COUNTY, UTAH

MAY 2008

Prepared For:

Danish Flats Environmental Services, Inc.
225 North 5th Street
Grand Junction, CO 81501

Prepared By:

AgriTech Consulting
20156 Flint Lane
Morrison, CO 80465

and

WEAVER
BOOS
CONSULTANTS
LLC
GEO-ENVIRONMENTAL ENGINEERS
AND SCIENTISTS

Weaver Boos Consultants, LLC
5675 DTC Boulevard, Suite 102
Englewood, CO 80111
720 529 0132

TABLE OF CONTENTS

LIST OF APPENDICES

BONDING OF THE PROPOSED FACILITIES:

a. Regulatory Requirements: Utah Administrative Code R649-9-9 requires bonding for commercial Exploration and Production (E and P) waste management facilities.

b. Amount of Bond: The amount of the bond will be based on the pond areas, storage capacity, and volume of waste stored.

c. Bonding Mechanism: As described in section R649-3-1, surety or collateral bonds, or a combination of the two will be provided by the owners prior to acceptance of waste.

LOCATION OF THE FACILITY:

a. Physical Locations: The Danish Flats Produced Water Ponds – Phase 2 (herein known as Phase 2) will be located approximately 200 feet to the northwest of the existing location of Phase 1 in Section 8, Township 20 South, range 24 East in Grand County, Utah. See site location map on plan sheets. The site is 3.5 miles north of I-70 interchange exit number 212, and approximately 43 miles west of the Utah-Colorado state line.

b. Surface Ownership: The land is privately owned.

c. Topography: The topography at the site for Phase 2 slopes gradually to the southeast. There are no major watercourses on the site. The drainage areas will be shaped to prevent offsite runoff from entering the pond area.

d. Geology and Hydrology: The Phase 2 site is located in the Mancos Shale lowland area including the Greater Cisco area.

The Mancos Shale Formation is the predominant outcrop in this area. Due to the preponderance of fine-grained sediments and water soluble minerals found in this formation, it does not usually contain any fresh water. Groundwater that comes in contact with the Mancos Shale Formation almost always contains high levels of dissolved solids. Groundwater is usually limited to alluvial deposits along streams and drainages or to sandstone units, some of which are very localized with low recharge rates. Wells in the area are usually drilled with air with little or no water encountered until the Dakota Formation is penetrated [1]

The site specific geology encountered during the site investigation for Phase 1 (please refer to Appendix A for soil boring logs) consisted of alluvial material with a thickness ranging from 15 to 40 feet underlain by Upper Cretaceous Mancos shale. No ground water was encountered in, or above, the Mancos shale.

[1] ENVIRONMENTAL HANDBOOK, *Environmental Regulations for the Oil & Gas Exploration and Production Industry, Prepared by G.L. Hunt, Environmental manager, UTAH DIVISION OF OIL, GAS & MINING, January 1996*

The alluvial material consists of a mixture of sand, silt, and clay and, in the southwest, pediment deposits consisting of sand and gravel veneering surfaces formed during recent erosion cycles. The underlying Mancos shale is a dark grey to black soft shale with sandstone beds at various horizons. The maximum thickness of the Mancos shale is approximately 1,200 feet. The Mancos shale is considered a confining unit and is a thick barrier to vertical and lateral groundwater flow.

Below the Mancos shale is the lower to upper Cretaceous Dakota Sandstone, which are a yellow-brown and gray friable to quartzitic sandstone and conglomerate sandstone and interbedded gray to black carbonaceous shale with occasional lenticular coal beds. The Dakota Sandstone is considered to be the first aquifer in the area.

e. Soil stabilization: The ponds at Phase 2 will generally be excavated to a depth of approximately eight feet below the ground surface. A two-foot berm will be constructed to provide freeboard capacity. The soil in the excavated area will be scarified and recompacted to provide a solid base for the protective liner and to seal any cracks that may occur in the shale.

The berm will be compacted in six inch lifts. Moisture and density will be determined based on the results of the geotechnical laboratory analysis. Please see Appendix A for site geotechnical soils lab test data. Dust will be controlled using magnesium chloride or produced water, if approved by the appropriate regulatory agency.

f Climatological Data: According to the attached U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) map, the average annual precipitation is six inches. The National Weather Service developed an isopleths map of the Free Water Surface Evaporation (shallow lake evaporation) based on 24 years of data. The free water surface evaporation rate is the amount expected to evaporate from the disposal ponds. That rate is 50 inches per year. Approximately 35 inches of that rate occurs from May to October. The remaining 15 inches would evaporate from November to April.

[2] Geologic and Structure Map of the Grand Junction Quadrangle, Colorado and Utah, William B. Cashion, USGS Miscellaneous Geologic Investigations, Map I-736

The climate survey for Cisco, UT (closest weather station to site) from 1952 to 1967 according to the Western Regional Climate Center is offered in the following table (re-created from WRCC information):

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg Max Temp (F)	37 2	45.7	56 6	68 7	80 3	91 8	98 7	94 3	85 5	72 5	53 4	40 2	68 7
Avg Min Temp (F)	8.8	17 7	24 0	33 5	43.7	52 1	60.7	58 4	47 3	35 2	22 5	12 5	34 7
Avg Total Precip	0 48	0 50	0 52	0 61	0 61	0 26	0 37	1 03	0 80	0 86	0 63	0.43	7 11
Avg Total Snowfall	4 3	2 1	1 1	0 3	0 0	0 0	0 0	0 0	0 0	0 2	0 9	2 1	11 0

DESIGN AND CONSTRUCTION CRITERIA FOR THE PROPOSED PONDS:

a. General: The facility plan view is shown on the attached drawings in Appendix D. The operation units include two sets of 14,000 – gallon, three-stage concrete receiving tanks, a sludge pond and a series of twelve five-acre evaporation ponds. All of the structures will be connected via a gravity fed underground piping system.

b Pond Inlet: All of the water will flow through one of the three-stage concrete settling tank systems and the sludge pond before entering the evaporation ponds. The pre-treatment facilities and the evaporation ponds have been designed to follow the topography, allowing for gravity flow throughout the system. Shut-off valves will be installed on the crossover piping to allow for proper flow management. If necessary, portable gasoline powered pumps will be used to transfer liquid to ponds that are not in the gravity flow line or to empty a pond for maintenance or liner repair.

c. Slope Design: The sludge pond and evaporation ponds will have an interior slope of 3 to 1, and a maximum exterior slope of 2 to 1.

d Berm Design: Surface water will not be allowed to enter the ponds because of the constructed berms and the ditches. Detailed drainage features will be shown on the final grading plan. The interior berm walls will be covered with a protective layer of 60-mil high density polyethylene (HDPE). The HDPE will provide erosion control. The area between the evaporation ponds will also be covered with HDPE to prevent erosion, control dust and enhance evaporation. The exterior sides of the berm as needed. Refer to Appendix C for HDPE samples.

e. Leak Detection System: As described in the geology/hydrology section of this report, the site is underlain by approximately 1,200 feet of impermeable shale. The first aquifer is below the shale formation. The geological investigation did not detect perched groundwater. In addition to the ideal natural conditions, a 60-mil HDPE liner will be installed in all of the ponds. The pond floors will slope toward a sump that will be fitted with a monitoring pipe. The leak detection system will be inspected and data recorded on a weekly basis. A summary of the weekly inspections will be reported to the State of

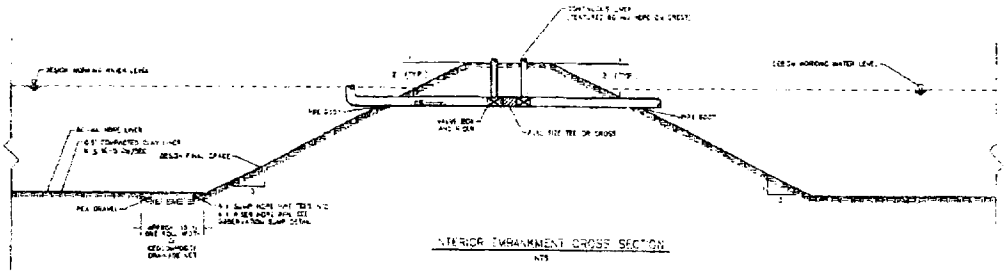
Utah on a quarterly basis. Liquid from the sump can be pumped back into the pond if excessive amounts accumulate.

f Livestock/Wildlife Protection Measures: The entire operations area around Phase 2 will be fenced and gated to prevent cattle from entering. Since the sludge pond could have oily material on the surface, netting or four-inch polyethylene balls will be used to deter the entry of birds or other wildlife.

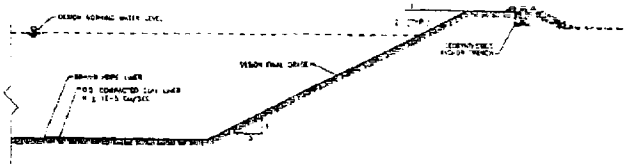
g. Identification: The Phase 2 facility, same as the Phase 1 facility, will be clearly identified and "no trespassing" signs will be installed. Emergency contact numbers will also be displayed on the sign.

DESIGN AND OPERATIONS PLAN TEXT

1011007.3



INTERIOR EMBANKMENT CROSS SECTION
N.T.S.



SLUDGE POND CROSS SECTION
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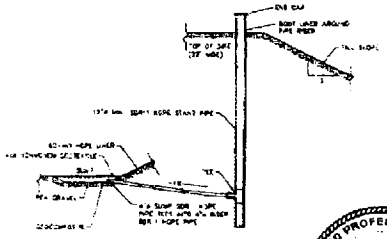
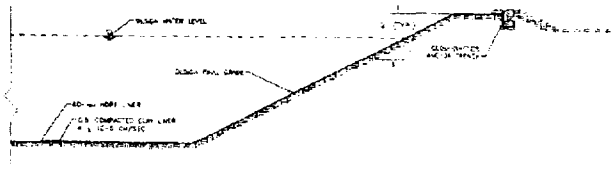


OBSERVATION SUMP
N.T.S.



EXTERIOR EMBANKMENT CROSS SECTION
N.T.S.

REGISTERED PROFESSIONAL ENGINEER
No 0680346
NEIL C NOWAK
STATE OF UTAH

PREPARED FOR
DANISH FLATS ENVIRONMENTAL SERVICES

DANISH FLATS PRODUCED WATER PONDS
PHASE I DESIGN AND OPERATIONS PLAN
DETAILS

GRAND COUNTY, UTAH

Weaver Boos Consultants

DRAWING 3

OPERATION OF THE FACILITY:

a. Storage Capacity: The approximately 400 by 600-foot, 5 5-acre evaporations ponds will have a freeboard of at least two feet and a maximum liquid depth of 8 feet. Each pond will have a liquid volume capacity of 37.74 acre-feet. The capacity of each pond at 2 feet below the top of the berms at freeboard level will be approximately 293,000 barrels (BBLs). The dimensions of the ponds are indicated on the drawings attached in Appendix D.

b. Receiving Headworks: Trucks will dump their loads into the first of three concrete oil/water separation tanks. The liquid will be transferred through positive flexible hoses which will clamp onto the truck discharge pipe. The tanks will be connected in series to provide maximum detention time. Each tank will have dimensions of 12 ft by 12 ft at a liquid depth of 13 feet and contain 14,000 gallons of liquid. The liquid from the third tank will flow to a 400 foot by 100 foot sludge pond. The sludge pond will have protective devices to prevent birds and wildlife from entering.

c. Typical Production Water: The water to be received in the ponds includes production water from the oil and gas industry that is "briny" in content. Please see the attached Appendix B for recent analytical data.

d. Anticipated Quantity of Water: The approximate maximum daily quantity of produced water to be disposed of at the facility will be 10,000 barrels initially and is proposed for this application. The facility will record the quantities of production water received and provide a report to the State of Utah on a quarterly basis.

LINER SYSTEM:

a Regulatory Requirements: Section 3.2 of Rule R649-9 states that "Commercial disposal pits shall be lined with a minimum liner thickness of 40 mils or as approved by the Division". Section 3.3 states that "Lined pits constructed in relatively impermeable soils shall have an underlying gravel filled sump and lateral system or suitable leak detection system

b. Liner: All ponds will have a primary 60-mil HDPE liner, which exceeds the minimum requirements.

c. Leak Detection Sump: The soils at the site are of low permeability and are not expected to transmit liquids even if a leak occurs in the HDPE liner. The soils in the bottom of the ponds will be scarified to a minimum thickness of six inches and be re-compacted to meet the minimum density standards determined in laboratory testing with a maximum permeability of 1 x 10-5 cm/sec. (Please note: If the soil proves unable to achieve proper density and permeability, it may become necessary to use a secondary liner composed of geosynthetic materials, which may include geosynthetic clay liner (GCL) or HDPE (See Appendix C for samples of the geosynthetics)). The bottom of the pond will be sloped at a 0.4 percent grade to a gravel or geocomposite geonet sump with inspection ports.

d. Physical Properties, HDPE Liner: The 60-mil liner will meet ASTM and other industry standards. HDPE is well suited for this purpose because it is UV resistant and chemical resistant

e. Physical Properties Sub-soil: The sub-soil characteristics are described in the geology/hydrology section of this report and as described in Appendix A.

f Liner Details: Liner details are shown on the plan sheets (Appendix D)

g. Liner Installation: The HDPE liner will have an anticipated lifespan of 20 to 30 years. The installation will be conducted by an experienced contractor. The field installation

supervisor shall have installed a minimum of 2,000,000 square feet of geomembrane. Stringent quality assurance measures will be monitored by the owner's consultants. All seams will be tested using air pressure or vacuum box methods. Destructive samples will be collected and tested for every 500 feet of seam.

h. Liner repair: An experienced liner installation contractor will make necessary repairs. The pond liquid levels will be lowered below the repair area. If required, the liquid in the pond will be transferred to another pond and the liner inspected and repaired.

i. Geosynthetic Samples: Attached to this document as Appendix C is included physical samples of the geosynthetic materials proposed (or that may possibly be used, such as GCL) for the project.

WASTE MANAGEMENT:

a. Solid Waste: A large accumulation of solids is not anticipated. Solids that do occur will be stored in water tight compartment or dried and disposed in an appropriate manner and in accordance with the laws and regulations of the State of Utah. The solids will be tested to determine which disposal option is appropriate.

b. Hydrocarbon Waste: The receiving head-works and sludge pond are expected to remove hydrocarbons from the waste stream. If hydrocarbons accumulate in the evaporation pond, the material will be skimmed as soon as practical and disposed of in an appropriate manner. Absorbent pads or booms may be used to remove the hydrocarbon product.

CLOSURE PLAN:

a. Surface Equipment/Materials: All equipment will be removed from the site. All liquid inside the liner and pits will be removed and then the liner material, concrete pits, and underground piping may be buried on site. Other debris will be removed from the site and disposed of at an approved facility prior to contouring of the pond areas.

b. Vegetation: The local NRCS office and the Bureau of Land Management Soil scientists will be contacted to provide vegetation recommendations. All recommendations by the NRCS will be adhered to Since the site is located in a dessert area with low productivity soils, interim soil erosion measures may be required.

Note: Appendix A, B and C available upon request
Appendix C drawings are included in Site Plan section of application

WEAVER
BOOS
CONSULTANTS
LLC

5675 DTC Boulevard, Suite 210
Greenwood Village, Colorado 80111
Phone: 720-529-0132
Fax: 720-529-0137
www.weaverboos.com

Chicago, IL
Naperville, IL
Griffith, IN
South Bend, IN
Springfield, IL
St. Louis, MO
Columbus, OH
Fort Worth, TX
Denver, CO
Grand Rapids, MI
Orlando, FL

December 12, 2008

SUBMITTED VIA OVERNIGHT DELIVERY ON 12-12-2008

Mark Wright, PE
Community Development Director/County Engineer
Grand County Planning and Engineering Department
125 East Center Street
Moab, UT 84532

Subject: **Danish Flats Environmental Services, Inc.**
Produced Water Evaporation Ponds - Phase 2
Conditional Use Application – Supplemental Information
Addendum No. 1 – Responses to Comments

Dear Mr. Wright,

On December 9, 2008, a meeting was held with you at the Grand County Planning and Engineering Department to discuss the above referenced project. At the meeting were representatives from Danish Flats Environmental Services, Inc. (DFES), and their engineering consultants, Weaver Boos Consultants, LLC (WBC) and AgriTech Consulting (ATC).

Previously, the Conditional Use Permit application and various support documents/information were submitted to your office, including the following:

- Letter of Intent and Supplemental Information from AgriTech, dated September 23, 2008.
- Conditional Use Permit Application (new County form) submitted October 10, 2008 from AgriTech, including the application fee increase at $225 to total the fee submitted = $550.
- Additional information in support of the CUP application hand delivered by AgriTech to Grand County on November 18, 2008, including figures.

Based on your review of the information submitted, there were a few outstanding items that needed to be addressed, which are submitted to you via this letter and attachments by WBC, on behalf of DFES.

As you know, the proposed Danish Flats Environmental Services, LLC Phase 2 produced water evaporation and recycling facility will be located in northeast Grand County adjacent to the existing system. The site is 2.5 miles north of I-70 interchange number 214, approximately 43 miles southwest of the Utah-Colorado state line. The

APPENDIX B

Danish Flats Evaporation Ponds – Phase 2
Determination of Groundwater Flow Direction

The only recognized aquifer system beneath the site is the Dakota-Glen Aquifer. The rocks that make up this aquifer are late Cretaceous to Triassic in age. There are four areas of permeable rock that are then referred to as the Dakota aquifer, the Morrison aquifer, the Entrada aquifer, and the Glen Canyon aquifer (see figure below). These four aquifers are considered one unit, however, because they are confined from all other principal aquifers in the region. Discharge flows towards the major rivers of the region. The water in this aquifer is highly mineralized. There is a substantial amount of dissolved halite (salt) most likely from an unplugged or poorly plugged oil test hole.[1]

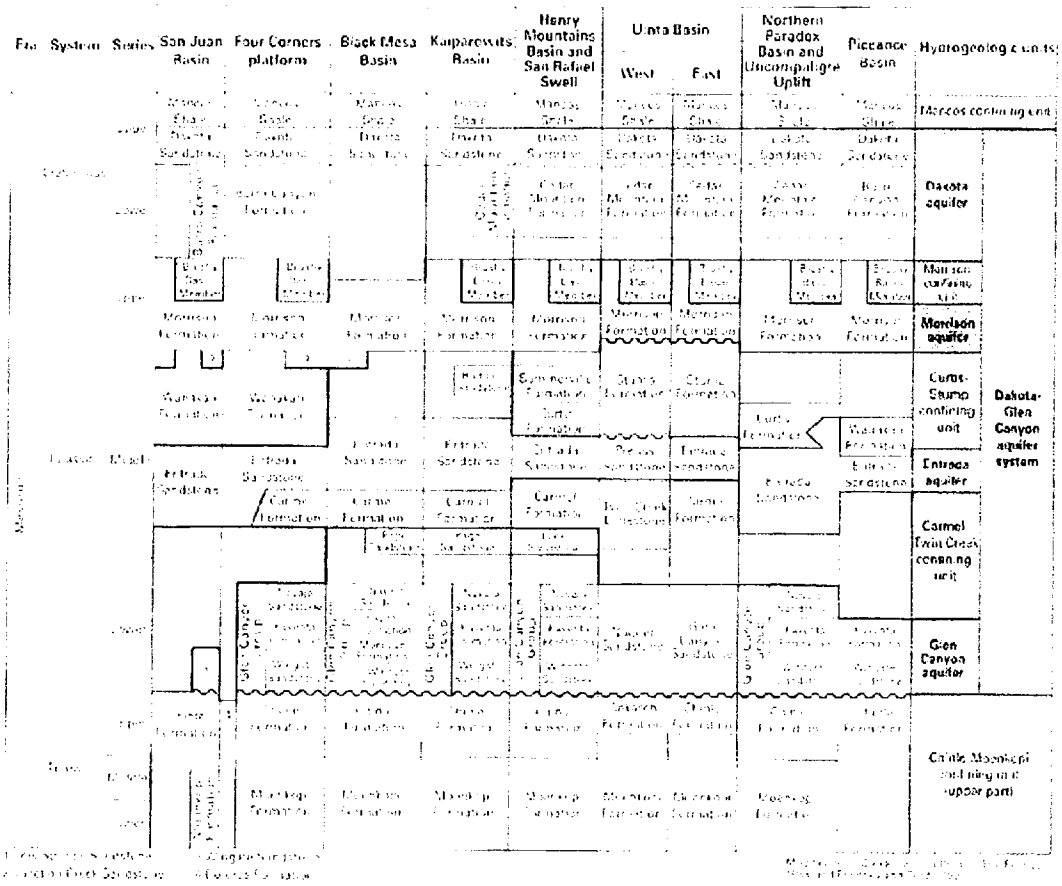


Figure 121.

The next figure, also obtained from the *Hydrologic Investigations Atlas*, shows that the potentiometric surface in the vicinity of the site (see the open area just to the right of the word "Utah") is to the southeast.

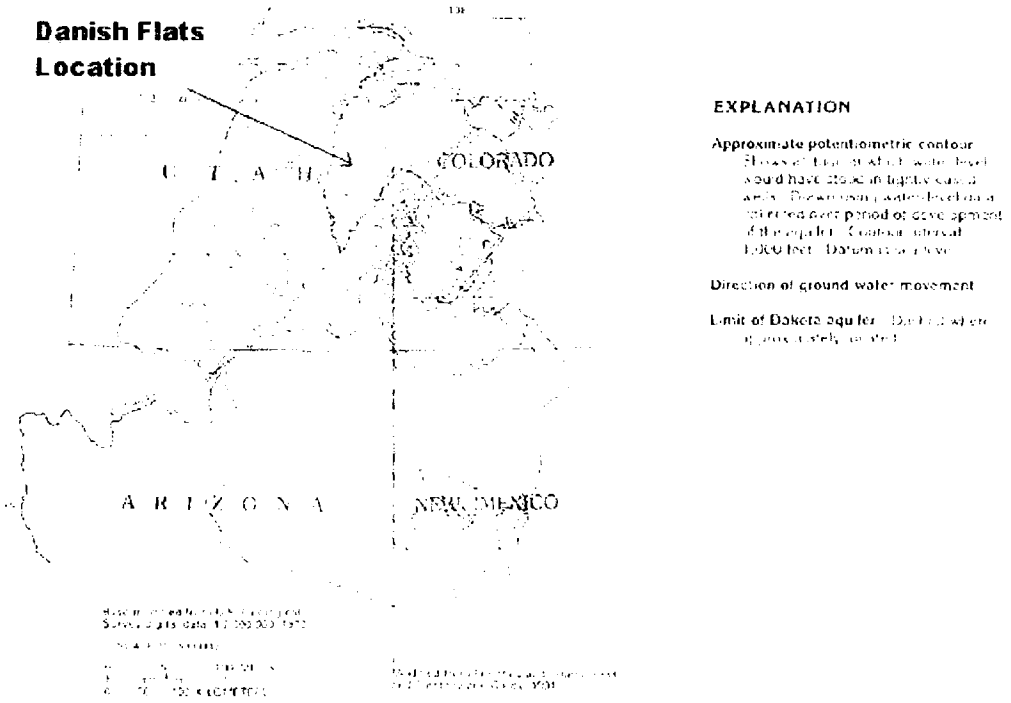


Figure 126.

Additional Information

- The topography at the site slopes gradually to the southeast. Groundwater flow direction does not always mimic topography; however, very often it does which makes topography a good indicator of the groundwater flow direction.
- Another good indication of groundwater flow is the presence of rivers. Often, groundwater will flow toward a nearby river. Although there are no nearby rivers to the site, the Colorado River is located approximately nine miles to the southeast.
- Geotechnical drilling conducted at the site indicates that: alluvial groundwater is not present; the Mancos Shale underlies the unconsolidated soil; and, drilling auger refusal is met very quickly once the Mancos is encountered.

Conclusions

- Phase 2 will be located approximately 200 feet northwest of Phase 1, putting it even farther from the downgradient boundary than the Phase 1 ponds.
- Given a groundwater flow direction to the southeast, the closest portion of the Phase 2 project to a downgradient property boundary would be the southern tip of proposed Pond #2, which is approximately 2,300 feet from the boundary in a downgradient direction.

[1] *Source*: U. S. Geological Survey. Hydrologic Investigations Atlas 730-C. Segment 2. Reston, Virginia. 1995.

State of Utah
JON M. HUNTSMAN, JR.
Governor

GARY HERBERT
Lieutenant Governor

Department of
Environmental Quality

William J. Sinclair
Acting Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

Mailed 1/29/09 FB

FILE COPY

January 26, 2009

Mr. James H. Bradish
Danish Flats Environmental Services, Inc.
616 West Monument Street
Colorado Springs, CO 80905

Subject: Construction Permit for Phase II Danish Flats Produced Water Pond Complex

Dear Mr. Bradish:

The Division of Oil Gas and Mining (DOGM) is the lead agency that regulates the management and disposal of oil-field exploration and production wastes, which includes produced water. However, just as they did for the construction of the Phase I Danish Flats Produced Water Pond Complex, DOGM has deferred the construction oversight of the Phase II construction project to the Division of Water Quality (DWQ) based on a request by Danish Flats Environmental Services, Inc. to allow moderately saline produced water to condition the clay underliner and to control dust during construction of the ponds. Because DOGM does not have the authority to allow the use of produced water as part of the construction activities, they have deferred the construction oversight for the Phase II construction project to DWQ.

DWQ issued a Construction Permit to Danish Flats Environmental Services, Inc. on October 2, 2007 for the construction of the Phase I Danish Flats Produced Water Pond Complex, which consists of eight evaporation ponds, a sludge pond, and six concrete acceptance pits. All ponds were constructed with a composite liner system consisting of a 6-inch clay underliner with a permeability of 1×10^{-5} cm/sec overlain with a synthetic primary liner consisting of 60-mil high density polyethylene (HDPE) flexible membrane liner (FML). The ponds are slightly sloped at a minimum of 0.4% with a gravel/pipe trench leak detection system at the low end of each pond and a riser access pipe for leak detection inspection. A perimeter berm was also constructed to prevent any surface water from entering or leaving the complex.

The Phase II Danish Flats Produced Water Pond Complex will be nearly identical to the Phase I complex and will include the construction of six concrete acceptance pits, one sludge pond, and 12 evaporation ponds. The only difference is that Phase II will have 12 evaporation ponds compared to eight for Phase I. The Phase II complex will have the same construction specifications as the completed Phase I complex. The set of stamped and approved engineering design plans and specifications that was returned to Danish Flats Environmental Services, Inc. for the Phase I construction project will also apply to the Phase II construction project. The drawing showing the site plan for the Phase I and Phase II complexes is returned herewith bearing an imprint of our construction permit stamp. Both stamped sets must be kept available for examination and inspections to be conducted by DWQ, or for resolution of any conflicts or discrepancies that may arise during construction or installation.

The plans and specifications, as provided in the submittals described above, comply with *the Utah Water Quality Rules (R317, Utah Administrative Code).* A **Construction Permit** is hereby issued as constituted by this letter, subject to the following conditions:

1. *Any revisions or modifications to the approved plans and specifications must be submitted to the Division of Water Quality (DWQ) for review and approval, before construction or implementation thereof.*

   Please submit any changes for review and approval directly to Mr. Woodrow Campbell of my staff.

2. *A written Operations and Maintenance (O&M) document, containing a description of the functioning of the facilities, an outline of routine maintenance procedures, and all checklists and maintenance logs needed for proper operation of the system, will have to be submitted and approved before the final inspection and operation of the system.*

3. *The approved facilities must not be placed in service unless DWQ has approved the O&M document, made a final inspection, approved the Construction Certification Report, and authorized in writing to place the constructed facilities in service.*

The plans and specifications for this project must be stamped and signed by a Registered Professional Engineer licensed to practice in the state of Utah. The construction design and inspection supervision as well as written construction certification of all work associated with the wash pad and evaporation pond must be performed by a Registered Professional Engineer licensed to practice in the state of Utah.

This Construction Permit will expire one year from the date of its issuance, as indicated by the date of this letter, unless substantial progress is made in constructing the approved facilities or the plans and specifications have been resubmitted and the construction permit is reissued. This permit does not relieve you in any way of your obligations to comply with other applicable local requirements. Please contact Mr. Claron Bjork of the Southeastern Utah District Health Department at 435-637-3671, or David Ariotti, Southeastern District Engineer at 435-637-3671 for further assistance regarding local matters.

Please notify us of the beginning of construction to enable us to schedule periodic inspections. An As-Built Construction Certification Report shall be submitted to DWQ that includes but is not be limited to the following elements:

Soils

- Proctor Curves
- Soil Classification
- Field Compaction Testing
- Sub Grade Acceptance Certification

Concrete

- Concrete Slump Testing
- Compression Testing
- Concrete Mix Verification

FML

- Manufacturer Certification including QA/QC Testing of the Rolls
- Panel Placement Log
- Trial Seam Test Log
- Seaming Record
- Seam Test Record
- Repair Log

General

- As-Built Drawings
- Professional Engineer Certification

Please contact Mr. Woodrow Campbell to schedule the final inspection. After the final inspection has been conducted, and the As-Built Construction Certification Report has been approved, written approval to operate the facilities will be issued.

Site Location and Topography

The facility is located in the Danish Flats area 2.5 miles north of I-70 interchange Exit 212, approximately 43 miles west of the Utah-Colorado border, in Section 8, Township 20 South, Range 24 East, in Grand County. The property is privately owned. The Danish Flats area is a desert landscape that gradually slopes to the southeast. There are no major watercourses on or near the site.

Site Geology and Hydrogeology

The Danish Flats area is part of the Greater Cisco area and is located in the Mancos Shale lowlands where weathered Mancos Shale is exposed at the surface over most of the area. Based on site boring logs from a geotechnical investigation, the site-specific geology consists of 15 to 40 feet of silty clay derived from and underlain by the Mancos Shale formation. The Mancos Shale formation is a marine deposit consisting of gray, thin-bedded, fissile shale ranging from 3,500 feet in western Grand County to 4,000 feet thick near the Utah-Colorado border (BLM, 2005). Soils associated with the Mancos Shale are alkaline and may have high concentrations of selenium. As a result, surface water in ephemeral washes is likely to have high salinity, high turbidity, considerable hardness, and elevated levels of sulfate and selenium. Based on geologic information obtained from DOGM, the Mancos Shale is between 900 and 1,000 feet thick in the Danish Flats area.

Shallow ground water in the Greater Cisco area is limited to alluvial deposits along ephemeral washes and drainages. As indicated above, there are no major watercourses on or near the project site. Ground water was not encountered in any of the Danish Flats site soil borings. Therefore, the first ground water that would be encountered would be in discontinuous sandstone channel lenses within the Mancos Shale. The Mancos Shale overall does not yield ground water and forms an effective aquitard that inhibits ground water migration. Ground water that comes in contact with the Mancos Shale typically contains very high total dissolved solids concentrations due the high content of sulfate. Potential aquifers below the Mancos Shale are discontinuous stream channel sandstones of the Dakota, Cedar Mountain, and Morrison formations. However, these sandstones are the hydrocarbon reservoirs for oil and gas production in the Greater Cisco area and any ground water contained in them would most likely be saline. This is supported by the hydrostatic gradient in Dakota and Morrison hydrocarbon reservoirs in and the presence of saline water in the Morrison Formation near Cisco. A search of the Utah Division of Water Rights data base indicates no water wells have been drilled within a 5-mile radius of the project site.

Based on the geology and hydrogeology, the use of produced water for clay moisture conditioning and dust suppression will have a *deminimis* impact on any surface or groundwater in the area. However, the use of produced water for construction water and dust suppression is subject to the following requirements:

- Water will be sampled at a rate of one test per batch and must be less than 10,000 mg/l TDS;
- All water must be bound up into the soil and no ponds or puddles are allowed;
- Before being used, the produced water will be placed in a series of 20,000 gallon storage tanks (minimum of two storage tanks) and any petroleum product must be separated off and will not be allowed for dust control or clay moisture conditioning;
- The storage tanks will be outfitted with 200 mesh filtration screens to remove any suspended solids or other debris from the water; and
- A berm will be constructed to control runoff of any construction water.

Ground Water Discharge Permit-By-Rule

As indicated by the site geology and hydrogeology above, the presence of at least 900 feet of Mancos Shale coupled with the absence or poor quality of shallow ground water beneath the site indicate a very low risk and low vulnerability to ground water quality. As a result, DWQ has determined that this project will have a *de minimis* effect on ground water quality and qualifies for ground water discharge permit-by-rule in accordance with R317-6-6.2.A.11 and R317-6-6.2.A.25 of the Utah Administrative Rules for Ground Water Quality Protection.

Other Requirements

Based on the large size and volume of the produced water ponds, DOGM has required that Danish Flats obtain a permit for a small, low hazard from the Division of Water Rights. Danish Flats will also be required to meet DOGM bonding requirements to reclaim the site at the time of closure.

If we can be of further assistance, please contact Mr. Woodrow Campbell of my staff.

Sincerely,

UTAH WATER QUALITY BOARD

Walter L. Baker, P.E.
Executive Secretary

WLB:RFH/wwc

cc: Mr. Claron Bjork, Southeastern Utah District Health Department
Mr. David Ariotti, Southeastern Utah District Engineer
Gil Hunt, DOGM

Wcampbell/wp/Danish Flat/Production Water Ponds Construction Permit Phase II.doc

CONTINGENCY PLAN
DANISH FLATS ENVIRONMENTAL SERVICES, INC.
GROUND WATER PERMIT APPLICATION

Project Number 1011007.1
April 25, 2014

1. INTRODUCTION

Contingency plans are designed to minimize hazards to human health or the environment from fires, explosions or any unplanned sudden or non-sudden release of waste or waste constituents to soil, surface or groundwater. The provisions of the plan must be immediately carried out whenever there is a fire, explosion, or release of waste or waste constituents which could threaten human health or the environment. The contingency plan describes the action facility personnel must take to comply with emergency response to fires, explosions, or any unplanned sudden or non-sudden release of waste or waste constituents to the soil, surface or groundwater at the facility.

The shift supervisors are the first responders and emergency coordinators with the responsibility of coordinating all emergency response measures. The emergency coordinators are to be thoroughly familiar with all aspects of the facility's contingency plan, all operations and activities at the facility, the locations of all records within the facility and the facility layout. In addition, the emergency coordinators will have the authority to commit the resources needed to carry out the contingency plan.

If there is an imminent or actual emergency situation, the emergency coordinator must immediately:

1. Activate internal facility alarms or communication systems, where applicable, to notify all facility personnel; and

2. Notify appropriate State or local agencies with designated response roles described in this plan.

If there is a release, fire or explosion, the emergency coordinator must immediately identify the character, source, amount and extent of any released materials. He/she may do this by observation or a review of facility records and, if necessary, by chemical analysis.

Concurrently, the emergency coordinator must assess possible hazards to human health and the environment that may result from the release, fire or explosion. This assessment must consider both direct and indirect effects of the release, fire or explosion (e.g., the effects of

any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-offs from water or chemical agents used to control fire and heat-induced explosions).

During an emergency, the emergency coordinator must take all reasonable measures necessary to ensure that fires, explosions and releases do not occur, recur or spread to other areas of the facility. These measures must include, where applicable, stopping processes and operations, collecting and containing released waste.

If the facility stops operations in response to fire, explosion or release, the emergency coordinator must monitor for leaks, pressure buildup, gas generation or ruptures in valves, pipes or other equipment, wherever this is appropriate.

Immediately after an emergency, the emergency coordinator must provide for treating, storing or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire or explosion at the facility. The emergency coordinator must ensure that all emergency equipment listed in the contingency plan is cleaned and fit for its intended use before operations are resumed. The Division of Water Quality (DWQ) will be promptly notified in the event of any release involving more than ten 500 gallons of wastewater. A complete report will be submitted to the DWQ within seven (10) business days of identification of the release.

Whenever the emergency contingency plan requires implementation, the emergency coordinator must note in the operating record the time, date and details of any incident that requires implementation.

1.1 Spills in the Acceptance Area

Wastewaters transported to the Danish Flats facility are staged in the acceptance area. This pad is an approximately 90-foot by 130-foot compacted road base area. The area is sloped to contain any materials released during the off-loading process. Any materials released will be pumped into a pond or absorbents will be applied to absorb small spills. Any clean-up materials or personal protective equipment (PPE) will be containerized and shipped off-site to an approved disposal facility. Soil cleanup kits will be replenished and tools will be cleaned and returned to the spill clean-up kit. It is not anticipated that significant waste materials would be released to soil, surface or groundwater in this area.

1.2 Pond Failure

In the unlikely event of evaporation pond failure, the Grand County Sheriff's Office and DWQ will be notified immediately. All valves leading to a failed pond will be closed immediately upon notice of failure to prevent any waters from flowing into a failed pond. Any ponded released material will be pumped into a transporter and returned to the acceptance area or to storage tanks for reprocessing. An environmental investigation will be conducted on any soil, surface or groundwater potentially impacted by the release.

1.3 Fires

In the event of a fire, fire extinguishers are located at each acceptance pit and throughout the administration/maintenance building. All employees receive initial fire extinguisher training and an annual refresher.

1.4 Explosions

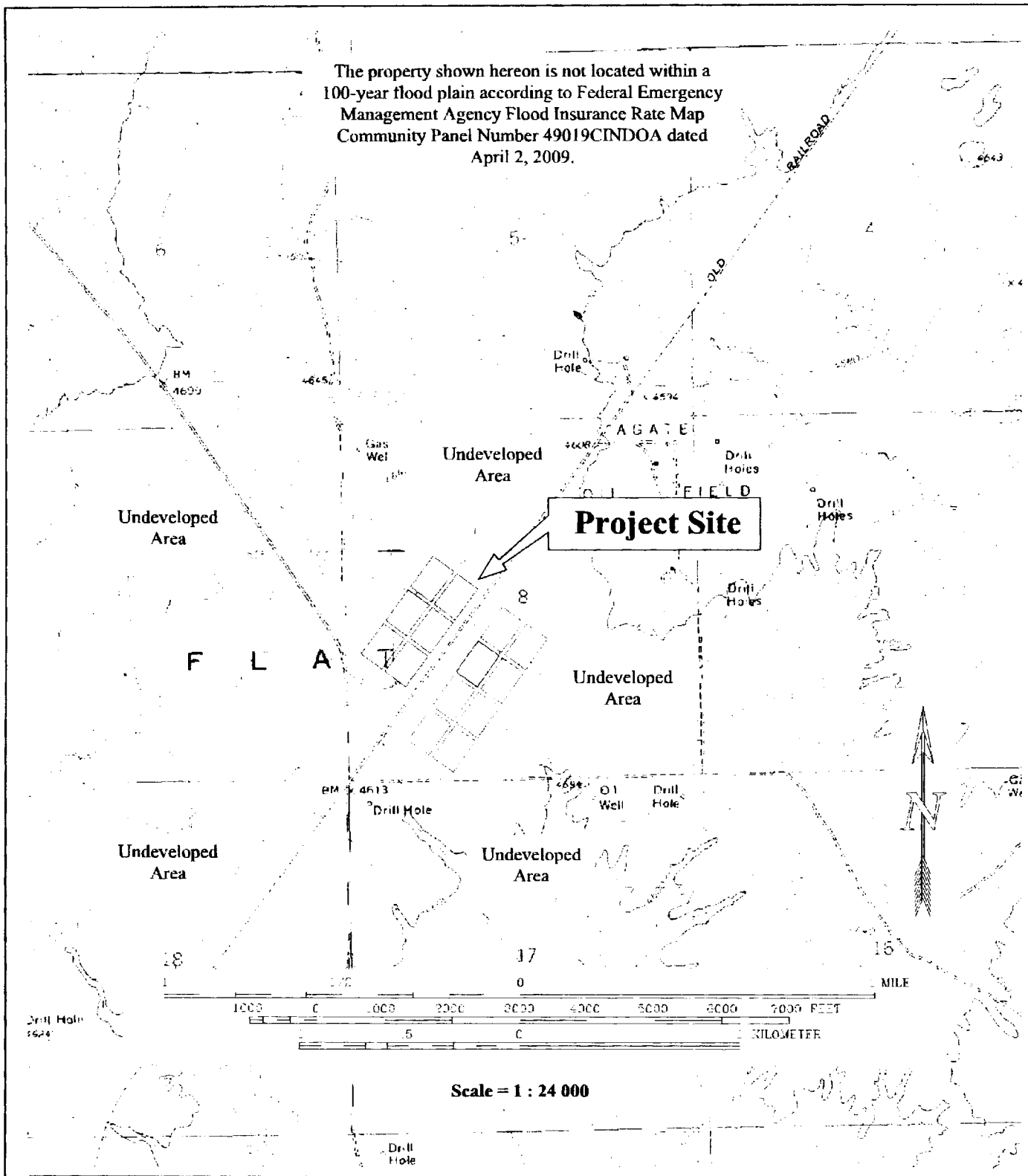
In the unlikely event of an explosion, employees will evacuate the facility and dial 911 on a cellular phone to summons fire response crews.

1.5 Leak Detection and Response – Ponds

If fluid is found in the leak detection system, and a leak is verified by observation or sampling and testing, the fluid recirculation system shall be activated to minimize the fluid level under the pond liner and the chance for migration of the fluid to groundwater, until repairs and/or corrective action can be taken.

If a leak in the primary liner of a pond is confirmed, the following monitoring, reporting and repair actions are required.

- The leak-detection system sumps shall be continuously monitored.
- The totalizing hour meters for the re-circulation pumps shall be read and recorded at least weekly.
- If the recovery rate exceeds 400 gallons per day per acre (gpd/acre) (i.e. the calculated action leakage rate) for any sub-cells as delineated by the recovery system, the DWQ shall be notified within seven (7) days. Repair of the primary liner must be scheduled within twelve (12) months.
- If the recovery rate exceeds 800 gpd/acre for any sub-cell as delineated by the recovery system, the DWQ shall be notified within 48 hours. Repair of the primary liner must be scheduled within 90 days, subject to acceptable weather for such work.



Vicinity Map
Danish Flats Produced Water Ponds
Grand County, Utah

Project No. 1011007 April 2014 Drawn by PJH(07fig2)

PARAGON