GT - ___1___

PERMITS, RENEWALS, & MODS

2008

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, August 06, 2009 12:45 PM
To: 'Jay Hamilton'
Cc: Michael Hayter; Reeves, Jacqueta, EMNRD
Subject: Lightning Dock Geothermal Project (GTHT-1) Final Signed Permit

Jay:

FYI, the OCD has not received the signed version of the OCD discharge permit (GTHT-001) issued on July 1, 2009. The OCD needs the signed discharge permit from Mr. Brown (the applicant) I believe. Also, Los Lobos has already paid the $100 filing fee and permit fee, so we just need the signed version of permit that was mailed out on July 1, 2009. Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Jay Hamilton [mailto:hamiltonenviro@yahoo.com]
Sent: Tuesday, August 04, 2009 4:37 PM
To: Chavez, Carl J, EMNRD
Subject: Re: Fw: Lightning Dock - Move Well 47-07

Carl,

thanks,

Jay

From: "Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>
To: Jay Hamilton <hamiltonenviro@yahoo.com>
Cc: Steve Brown <steve.brown@rasertech.com>; Michael Hayter <Michael.Hayter@rasertech.com>; "Reeves, Jacqueta, EMNRD" <Jacqueta.Reeves@state.nm.us>
Sent: Tuesday, August 4, 2009 4:32:50 PM
Subject: RE: Fw: Lightning Dock - Move Well 47-07

Jay:

I would complete a C-103 change of location for Well 47-07 and attach the C-101 and 102 forms to it. Thanks.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Jay Hamilton [mailto:hamiltonenviro@yahoo.com]
Sent: Tuesday, August 04, 2009 4:23 PM
To: Chavez, Carl J, EMNRD
Cc: Steve Brown; Michael Hayter
Subject: Re: Fw: Lightning Dock - Move Well 47-07

Carl,

Thanks, I will have you the C-101 and C102 as soon as they give me a new location for 47-07.

Jay

From: "Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>
To: Jay Hamilton <hamiltonenviro@yahoo.com>; carl <carlj.chavez@state.nv.us>
Cc: Steve Brown <steve.brown@rasertech.com>; Michael Hayter <Michael.Hayter@rasertech.com>; "Reeves, Jacqueta, EMNRD" <Jacqueta.Reeves@state.nm.us>; "Fesmire, Mark, EMNRD" <mark.fesmire@state.nm.us>
Sent: Tuesday, August 4, 2009 3:36:36 PM
Subject: RE: Fw: Lightning Dock - Move Well 47-07

Jay, et al.:

The OCD testified that moving a well location is possible through the OCD's administrative process.

If Raser is looking to change the location significantly from the originally proposed location, then the OCD would need to scrutinize this more closely in our review and approval process. If the location is slightly altered, the OCD must approve the new location too, but the review process may be minor in scope. I hope this addresses your question. Both reviews fall under the OCD's administrative process and may require a site visit to make a final call too. Thanks.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Jay Hamilton [mailto:hamiltonenviro@yahoo.com]
Sent: Tuesday, August 04, 2009 11:14 AM
To: Chavez, Carl J, EMNRD; carl
Cc: Steve Brown; Michael Hayter
Subject: Fw: Fw: Lightning Dock - Move Well 47-07

Carl,

My moving Well 47-07 will that have impact on Damon or the appealing process?

We are a little gun shy.

Thanks,

Jay

----- Forwarded Message ----
From: Steve Brown <Steve.Brown@rasertech.com>
To: Jay Hamilton <hamiltonenviro@yahoo.com>
Cc: Michael Hayter <Michael.Hayter@rasertech.com>
Sent: Monday, August 3, 2009 7:50:55 PM
Subject: RE: Fw: Lightning Dock - Move Well 47-07

Jay,

Will this have an impact on Damon Seawright?

Steve

From: Jay Hamilton [mailto:hamiltonenviro@yahoo.com]
Sent: Monday, August 03, 2009 12:44 PM
To: Steve Brown; Ben Barker
Subject: Fw: Fw: Lightning Dock - Move Well 47-07

Steve/Ben

Because of State regulations Well 47-07 needs to be moved.

The well needs to be 165 feet from quarter-quarter-quarter section.

Mark has given us a map with the boundaries of where the well can be moved.

Ben this probably is your call. This well will probably be moved in the future unless this it is the first well we will be drilling.

I just need to get this approved so we can moved forward.

Please call if you have questions. I need this as soon as possible.

Thanks,

Jay

-- Forwarded Message ----
From: Mark Winkelaar <winkerstick@gmail.com>
To: Jay Hamilton <hamiltonenviro@yahoo.com>
Sent: Monday, August 3, 2009 8:53:17 AM
Subject: Re: Fw: Lightning Dock - Move Well 47-07

Attached map document with description of 100 ft x 100 ft area at
least 165 ft from quarter quarter section lines.

Mark Winkelaar

On Wed, Jul 29, 2009 at 9:56 AM, Jay Hamilton<hamiltonenviro@yahoo.com> wrote:
> oops!!! Here is the attachment from the OCD. Well 47-07 needs to be at
> least 165 feet from the outer boundary of the quarter-quarter-quarter

> section.
> Thanks,
>
> Jay
> ----- Forwarded Message ----
> From: Jay Hamilton <hamiltonenviro@yahoo.com>
> To: Mark Winkelaar <winkerstick@gmail.com>
> Cc: Steve Brown <steve.brown@rasertech.com>; Michael Hayter
> <Michael.Hayter@rasertech.com>
> Sent: Wednesday, July 29, 2009 9:52:27 AM
> Subject: Lightning Dock - Move Well 47-07
>
> Mark,
>
> Please give the boundry where we can move Well 47-07 at Lightning Dock.
>
> Thanks,
>
> Jay

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Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

July 1, 2009

Mr. Steve Brown
Los Lobos Renewable Power, L.L.C.
5152 North Edgewood Drive, Suite 375
Provo, Utah 84604

RE: LOS LOBOS RENEWABLE POWER, L.L.C. - LIGHTNING DOCK GEOTHERMAL NO. 1 (HI-01) DISCHARGE PERMIT (GTHT-001) NE/4 SW/4 OF SECTION 7, TOWNSHIP 25 SOUTH, RANGE 19 WEST, NMPM, HIDALGO COUNTY, NEW MEXICO CLASS V INJECTION WELLS AND GEOTHERMAL PRODUCTION OR DEVELOPMENT WELLS, TOWNSHIP 25 SOUTH, RANGES 19 AND 20 WEST, NMPM, HIDALGO COUNTY, NEW MEXICO

Dear Mr. Brown:

Pursuant to the Water Quality Control Commission (WQCC) Regulations 20.6.2.3104 through 20.6.2.3114 NMAC (*Permitting and Ground Water Standards*) and 20.6.2.5000 through 20.6.2.5299 NMAC (*Underground Injection Control*), the Oil Conservation Division (OCD) hereby approves the discharge permit for of three (3) Class V geothermal injection wells and authorizes the operation of five (5) production or development wells for the Los Lobos Renewable Power, L.L.C. (**owner/operator**) for the above referenced site, contingent upon the conditions specified in the enclosed **Attachment 1 to the Discharge Permit**. The owner/operator of the geothermal power plant is located in the NE/4 SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The Class V geothermal injection wells and the production or development wells are located in Township 25 South, Ranges 19 and 20 West, NMPM, Hidalgo County, New Mexico.

Class V Injection Wells

Well 42-18 is located in the NE/4, NW/4 of Section 18 (1307 FNL and 2123 FWL)
Well 51-07 is located in the NW/4, NE/4 of Section 07 (169.2 FNL and 2406.9 FEL)
Well 53-12 is located in the SW/4, NE/4 of Section 12 (1574.8 FNL and 3350 FWL)

Geothermal Production or Development Wells

Well 13-07 is located in the SW/4, NW/4 of Section 7 (3781 FSL and 530 FWL)
Well 33-07 is located in the SE/4, NW/4 of Section 7 (3721 FSL and 1789 FWL)
Well 45-07 is located in the NE/4, SW/4 of Section 7 (2360 FSL and 2278 FWL)
Well 47-07 is located in the SE/4 SW/4 of Section 7 (1219 FSL and 2266 FWL)
Well 53-07 is located in the SW/4 NE/4 of Section 7 (3775 FSL and 3052 FWL)

Enclosed are two copies of the conditions of approval. **Please sign and return one copy to the Oil Conservation Division (OCD) Santa Fe Office within 30 days of receipt of this letter.**

Please be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3490) or E-mail carlj.chavez@state.nm.us. On behalf of the staff of OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Mark Fesmire
Oil Conservation Division Director

MF/cc
Attachments - 1
xc: OCD District Office

ATTACHMENT 1
LIGHTNING DOCK GEOTHERMAL NO. 1 (HI-01) (GTHT-001)
DISCHARGE PERMIT APPROVAL CONDITIONS

1. **Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of $100.00 plus a renewal flat fee (*see* WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division (OCD) has received the required $100.00 filing fee and the $1700.00 Class V Geothermal Well permit fee.

2. **Permit Expiration and Renewal:** Pursuant to WQCC Regulation Paragraph 4 of Subsection H of 20.6.2.3109 NMAC, this permit is valid for a period of five years. **This permit will expire on August 4, 2014** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation Subsection F of 20.6.2.3106 NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. ***Expired permits are a violation of the Water Quality Act {Chapter 74, Article 6 NMSA 1978} and civil penalties may be assessed accordingly.***

3. **Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by OCD pursuant to the Geothermal Resources Conservation Act (71-5-1 through 71-5-24 NMSA) and the Geothermal Power regulations (19.14.1 through 19.14.132 NMAC).

4. **Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its May 12, 2008 discharge permit application, including attachments and subsequent amendments and these conditions. Permit applications that reference previously approved plans on file with OCD shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.

5. **Modifications:** WQCC Regulations Subsection C of 20.6.2.3107 NMAC, 20.6.2.3109 NMAC and Subsection I of 20.6.2.5101 NMAC address possible future modifications of a permit. The owner/operator (discharger) shall notify OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at WQCC Regulation 20.6.2.3103 NMAC is being or will be exceeded or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use or that the Water Quality Standards for Interstate and Intrastate streams as specified in WQCC Regulation 20.6.4 NMAC (*Water Quality Standards for Interstate and Intrastate Streams*) are being or may be violated in surface water in New Mexico.

6. **Waste Disposal and Storage:** The owner/operator shall dispose of all wastes at an OCD-approved facility. Only geothermal RCRA-exempt wastes (*i.e.*, geothermal production fluids, hydrogen sulfide abaternent wastes from geothermal energy production, *etc.*) may be disposed of by injection in a Class II salt water disposal well. RCRA non-hazardous, non-exempt geothermal wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR part 261. Any waste stream that is not listed in the discharge permit application must be approved by OCD on a case-by-case basis.

A. **Disposal Of Certain Non-Domestic Waste At Solid Waste Facilities:** Pursuant to 19.15.35.8 NMAC disposal of certain non-domestic waste without notification to OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

B. **Waste Storage:** The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store geothermal waste on-site for more than 180 days unless approved by OCD.

7. **Drum Storage:** The owner/operator must store drums, including empty drums, or drums containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks or buckets on an impermeable pad with curbing.

8. **Process, Maintenance and Yard Areas:** The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

9. **Above-Ground Tanks:** The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (*e.g.* liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.

10. **Labeling:** The owner/operator shall clearly label all tanks, drums and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

11. Below-Grade Tanks/Sumps and Pits/Ponds.

A. All below-grade tanks and sumps must be approved by OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. Owner/operator must test all existing below-grade tanks and sumps without secondary containment and leak detection annually, or as specified herein. For all systems that have secondary containment with leak detection, owner/operator shall perform a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

B. All pits and ponds, including modifications and retrofits, shall be designed by a registered professional engineer and approved by OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports, location, foundation, liners and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

C. The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted or otherwise rendered non-hazardous to wildlife, including migratory birds. Where netting is not feasible, routine witnessing and/or discovery of dead wildlife and migratory birds shall be reported by the owner/operator to the appropriate wildlife agency with notification also provided to OCD in order to assess and enact measures to prevent the above from reoccurring.

D. The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps or other OCD-approved methods. The owner/operator shall notify OCD at least 72 hours prior to all testing.

12. Underground Process/Wastewater Lines:

A. The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh water or fluids that are gases at atmospheric temperature and pressure. The owner/operator shall submit a comprehensive listing of process/wastewater pipelines to OCD within three months of the date of the permit issuance. The owner/operator shall test pressure rated pipe by pressuring up to

one and one-half times the normal operating pressure, if possible or for atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by OCD.

B. The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size and approximate location. All new underground piping must be approved by OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify OCD at least 72 hours prior to all testing.

13. Class V Wells: With the exception of Class V geothermal energy injection wells associated with the recovery of geothermal energy for heating, aquaculture, and production of electrical power, the owner/operator shall close all Class V wells (*e.g.*, septic systems, leach fields, dry wells, *etc.*) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic sanitary effluent wastes, unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal systems at OCD-regulated facilities that inject sanitary effluent and non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program. Class V wells that inject domestic sanitary effluent waste only must be permitted by the New Mexico Environment Department (NMED).

14. Housekeeping: The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

15. Spill Reporting: The owner/operator shall report all unauthorized discharges, spills, leaks and releases and shall conduct corrective actions pursuant to WQCC Regulation 20.6.2.1203 NMAC and 19.15.29 NMAC. The owner/operator shall notify both OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days. The owner/operator shall notify OCD of any fire, break, leak, spill or blowout occurring at any geothermal drilling, producing, transporting, treating, and disposal or utilization facility in the State of New Mexico by the person operating or controlling the facility pursuant to 19.14.36.8 NMAC.

16. OCD Inspections: OCD may impose additional requirements on the facility and modify the permit conditions based on OCD inspections.

17. Storm Water: The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in WQCC Regulations 20.6.2.3103 NMAC or 20.6.4 NMAC including

any oil sheen, in any storm water run-off. The owner/operator shall notify OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

18. Unauthorized Discharges: The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in 20.6.2.3103 NMAC (*Standards for Ground Water of 10,000 mg/L TDS Concentration or Less)* or 20.6.4 NMAC (*Water Quality Standards for Interstate and Intrastate Streams*) unless specifically listed in the permit application and approved herein.

An unauthorized discharge is a violation of this permit.

19. Vadose Zone and Water Pollution: The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000 through 20.6.2.4116 NMAC (*Prevention and Abatement of Water Pollution*). OCD may require the owner/operator to modify its permit for investigation, remediation, abatement and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement or to submit subsequent reports will constitute a violation of the permit.

20. Additional Site Specific Conditions - Water Quality Monitoring Program: The owner/operator shall implement the following water quality monitoring programs.

A. Aquatic Toxicity Testing: Prior to the startup of geothermal operations, the owner/operator shall conduct an aquatic toxicity test (ATT) on the Tilapia fish species present at the AmeriCulture aquaculture facility located down-gradient from the owner/operators proposed Class V injection well locations with all NALCO cooling-tower chemical constituents. The chemicals used in the ATT shall consist of the high range application of all mixed Nalco chemicals proposed during the hearing on December 1, 2008, to determine the LD_{50} under a worse-case scenario. OCD will use the results of the ATT as a tool to help assess the threat to Aquaculture and wildlife near the facility.

B. Ground Water and Surface Water Sampling and Monitoring Requirements:

i. The owner/operator shall submit a ground water monitoring program work plan that includes a well installation and monitoring plan and a sampling and analysis plan for the monitor wells to the OCD Santa Fe Office for approval at least 3 months before system startup. The owner/operator shall conduct all water quality monitoring using low-flow purging and sampling methods where monitor well screens do not exceed 15 feet with 5 feet of screen placed above the water table (potential for water table draw-down addressed at subpart 20(B)(iii)). If multiple isolated fresh water aquifers are found to exist, the owner/operator shall include a provision in the work plan for the installation of additional monitor wells

to monitor for contamination in any different fresh water aquifer system(s).

ii. The owner/operator shall submit a Background and Compliance Report reflecting the first 6 months of sampling conducted to the OCD within 30 days of completion of the first 6 months of sampling that includes the results of the initial sampling conducted in accordance with Permit Conditions 20 and 21 to determine background water quality conditions at the facility and compliance with WQCC 20.6.2.3103 NMAC and Subparagraph WW of 20.6.2.7 NMAC. The report shall specify all monitoring locations, including nested wells, hydrogeology, piezometric and/or potentiometric ground water flow direction, hydraulic gradient and water quality data from all monitoring locations and down-gradient locations from potential point sources at the facility (*i.e.*, cooling tower blow-down combined with spent production water at all Class V Well injection locations). The report shall note all exceedences of the standards specified in WQCC 20.6.2.3103 NMAC or background, or if any toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, has been detected.

iii. The owner/operator shall implement the ground water monitoring program specified in the applicable Tables in Appendix 1. The owner/operator shall monitor static water levels from monitoring locations at least quarterly to assess ground water flow direction and hydraulic gradient at the facility. If draw-down of the water table below the screen level in any monitor well occurs at and/or nearby production or development well locations, the owner/operator shall deepen wells within 30 days to provide for monitoring and the OCD and Office of the State Engineer (OSE) District Supervisor shall be notified within 24 hours of having knowledge of the above. In addition, the Owner/Operator shall provide a written statement of whether the water resource in the Animas Valley is or is not adequate to sustain steady-state production of the geothermal resource within 60 days of the original notification above. The OCD and OSE may require the owner/operator to perform corrective action(s) to private water user wells that are adversely affected by geothermal operations. The OCD and/or OSE may require the owner/operator to implement corrective action(s) to private water wells depending on the situation.

iv. The owner/operator shall gauge and sample nested monitor well head elevations (accuracy to 0.01 ft.), recorded to establish the natural vertical hydrogeologic gradient(s) within the aquifer(s) or between reservoir(s) and to monitor for any potentially upwelling contamination to nearby down-gradient pumping domestic and commercial water supply wells.

v. The owner/operator shall comply with the Federal Underground Injection Control requirements for Class V Wells (40 CFR 144 subpart G) and WQCC 20.6.2 NMAC injection well construction standards to protect the Underground Source of Drinking Water (USDW). The owner/operator shall immediately shut down the system and contact the OCD for further instructions if the concentration of any water contaminants in the injection fluids exceed the greater of the standards specified in WQCC 20.6.2.3103 NMAC or background, as established for the injection formation at the injection well location pursuant to Clause (i) of Paragraph 21.D, or if any toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, is detected.

vi. The owner/operator shall construct all monitor wells with at least 15 feet of screen with 10 feet of screen positioned below the water table (~ 60 – 70 feet bgs). The screen slot size must facilitate the collection of low turbidity samples. Low-flow ground water sampling may be used with stabilization monitoring for temperature, oxygen reduction potential (ORP) and dissolved oxygen (DO) prior to and during sample collection, if wells are constructed for low-flow sampling techniques. Otherwise, the owner/operator shall purge the wells of three well volumes prior to sampling.

vii. The owner/operator shall triangulate seasonal piezometric surface flow across the facility, including surveying all well locations (TOC and ground elevations, Mean Sea Level) to the nearest 0.01 feet. The owner/operator shall measure static water levels at least quarterly for 2 years to determine ground water flow direction. The owner/operator shall submit plots of ground water flow direction with estimates of hydraulic gradients from quarterly monitoring.

viii. The owner/operator shall notify the Santa Fe OCD office immediately after having knowledge that the concentration of a monitor well sample exceeds the greater of the water quality standards specified in WQCC 20.6.2.3103 NMAC or background established at that well's location pursuant to the monitoring program described in this paragraph or if any toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, is detected. In the event of an exceedence, the owner/operator may be required to shut down the operation for such time as may be necessary to allow the owner/operator and OCD to investigate the cause of the exceedence. If the cause is associated with geothermal operations, the OCD may invoke the permit modification provision for treatment provided herein, and may require additional conditions.

C. Water Supply Wells Monitoring Program:

i. The owner/operator shall sample all water supply wells in accordance with Table 3 of Appendix 1 prior to owner/operator startup to establish background water quality conditions and thereafter at least annually to demonstrate that the water quality of the water supply wells does not exceed the greater of the standards specified in WQCC 20.6.2.3103 NMAC or background, and that no toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, is present.

ii. The owner/operator shall determine the depth to water, ground elevation, and well elevation to an accuracy of 0.01 foot.

iii. The owner/operator shall notify the OCD Santa Fe office within 72 hours of its determination that the concentration of the ground water sample exceeds the greater of the standards specified in WQCC 20.6.2.3103 NMAC or background, or if any toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, is detected.

D. Holding Ponds, Drainage Ditches, Pits and Ponds Monitoring Program: The owner/operator shall sample the holding ponds, drainage ditches, pits and ponds in accordance with Table 4 of Appendix 1. The owner/operator shall notify the OCD Santa Fe office within 72 hours of its determination that the concentration of a water sample taken at an unlined ditch or location listed above exceeds the greater of the standards specified in WQCC 20.6.2.3103 NMAC or background. *Note: Table 4 analytes consist of metals and general chemistry only. They do not monitor for "toxic pollutants" as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC.*

E. Spent Produced Water and Cooling-Tower Blow-Down Water Monitoring Program:

i. The owner/operator shall submit a flow diagram to the OCD Santa Fe Office that depicts where the comingled spent produced water and cooling-tower blow-down water will be sampled in-line before injection, as well as specification of injection well sample port locations used for the in-line sampling at least 30 days before system startup.

ii. The owner/operator shall sample and analyze the comingled spent produced water and cooling-tower blow-down water daily for 10 business days at system startup, weekly for two months; and thereafter the sampling frequency shall be based on correlation that the owner/operator established with the 3D Tresar Control Monitoring System in accordance with Table 5 of Appendix 1 to this discharge permit. Injection wells shall be sampled

monthly for 6 months in accordance with the analytical suite in Table 2 of Appendix 1.

iii. The owner/operator shall inject comingled spent produced water and cooling-tower blow-down water only if it meets either the standards for ground water specified at Subparagraph WW of 20.6.2.7 NMAC and 20.6.2.3103 NMAC or the background concentration as established from the first sampling event. In-line sample ports or devices shall be installed at each injection well to enable owner/operator to perform the in-line sampling required herein, to ensure that the specified requirements for spent produced water and cooling-tower blow-down water are met.

iv. The owner/operator shall not discharge untreated chemicals to storm water and/or "Waters of the State." Any discharge to a rip-rap area(s) is an illegal discharge. The owner/operator shall inform the OCD Santa Fe office within 72 hours of discovery of a discharge to a rip-rap basin. Discharges shall be routed to lined pits or evaporation pond areas whenever possible.

v. The owner/operator may only discharge into "Waters of the State" in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit issued by EPA Region 6. The OCD must approve the discharge concurrently with EPA. The applicant must comply with all of the Federal NPDES monitoring, treatment, and reporting requirements specified in its NPDES permit.

F. Annual Water Quality Monitoring Program Report: The owner/operator shall submit an Annual Water Quality Monitoring Program Report by January 31 of each year. The report shall include the following information:

i. Cover sheet marked as "Annual Water Quality Monitoring Program Report, name of owner/operator, Discharge Permit Number, API number(s) of well(s), date of report and the name of the person submitting report.

ii. Comprehensive summary of all water quality monitoring data.

iii. Summary charts and tables depicting the constituents that have ever exceeded the standards specified in WQCC 20.6.2.3103 NMAC or background, or if any toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, has been detected.

iv. Description and reason for any remedial or work on well(s), ponds, ditches, *etc.*

v. Copies of the chemical analyses in accordance with Permit Condition 20.

vi. A copy of any leaks and spills reports submitted in accordance with Permit Condition 15 above.

vii. A "Miscellaneous" section to include any other issues that should be brought to OCD's attention.

viii. Discharge Permit Signatory Requirements pursuant to WQCC Regulation Subsection G of 20.6.2.5101 NMAC.

21. Class V Geothermal Injection Wells and Geothermal Production or Development Wells:

A. Well Identification:

i. **Class V Geothermal Injection Wells:**

Well No. 42-18 (API No. 30-023-20018)
Well No. 51-07 (API No. 30-023-20020)
Well No. 53-12 (API No. 30-023-20019)

ii. **Geothermal Production or Development Wells:**

Well No. 13-07 (API No. 30-023-20013)
Well No. 33-07 (API No. 30-023-20014)
Well No. 45-07 (API No. 30-023-20015)
Well No. 47-07 (API No. 30-023-20016)
Well No. 53-07 (API No. 30-023-20017)

B. Well Casing and Cementing Requirements:

i. The owner/operator shall ensure that all casing and cementing meets or exceeds the requirements of 19.14.27.8 NMAC (*Casing and Cementing Requirements*). Conductor pipe shall be run to a minimum depth of 100 feet.

ii. Surface casing shall be to a depth of at least 100 feet greater than the deepest fresh water well within one-half mile from the well location.

iii. Intermediate strings shall be cemented solid to surface.

iv. Production casing shall either be cemented solid to the surface or lapped into intermediate casing, if run. If production casing is lapped into an intermediate string, the casing overlap shall be at least 50 feet. The lap shall be cemented solid and it shall be pressure tested to ensure integrity.

v. The owner/operator shall submit a logging program to OCD for review with the owner/operator depth setting recommendations for its casing program based on the logging program. The owner/operator prior to setting intermediate or production casing in each of the production and injection wells shall run open-hole logs, pursuant to the logging program, approved by the OCD. Logs must be submitted to the OCD for review with the applicant's recommendations for casing setting depths, and in case of injection wells, for precise definition of the injection interval. The type of tubing installed shall be conducive to the characteristics of the injected fluids determined after initial testing of the injected fluids. The owner/operator shall ensure that the tubing is installed with a packer set within 100 feet of the uppermost injection perforations. The casing-tubing annulus shall be filled with an inert fluid, and a gauge or approved leak-detection device shall be connected to the annulus to detect for leakage in the casing, tubing or packer.

C. **Formation Fracturing Fluids:** The owner/operator shall ensure that all fluids used in the fracturing of formations shall not harm human health, wildlife or the environment. The owner/operator shall ensure that all fluids used to fracture shall be swabbed back, collected and properly disposed.

D. **Class V Geothermal Injection Wells and Geothermal Production/ Development Wells Monitoring Program:**

i. The owner/operator shall sample the groundwater at all injection and production/development wells prior to owner/operator startup in accordance with Table 2 of Appendix 1 to establish background water quality conditions.

ii. The owner/operator shall sample cooling tower effluent (and not the groundwater) at all injection wells monthly for the first six months with dynamic water level (DWL) recordings in accordance with Table 2 of Appendix 1 to demonstrate that the injection fluid meets the standards specified in WQCC 20.6.2.3103 NMAC or background, and that no toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, has been detected.

iii. If after the first six months the owner/operator demonstrates that the in-line injection well samples meet the standards specified in WQCC 20.6.2.3103 NMAC or background, and that no toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, has been detected, then the owner/operator shall then sample ground water annually in accordance with the other annual monitoring events.

iv. The owner/operator shall determine the depth to water, ground elevation, and well elevation to an accuracy of 0.01 foot. The owner/operator shall notify the OCD Santa Fe office within 72 hours of its determination that the concentration of the ground water sample exceeds the greater of the standards specified in WQCC 20.6.2.3103 NMAC or background, or if any toxic pollutant, as defined in WQCC Subparagraph WW of 20.6.2.7 NMAC, is detected.

E. Well Workover Operations: The owner/operator shall obtain OCD's approval prior to performing remedial work, pressure test or any non-routine work. The owner/ operator shall request approval on form G-103 *"Sundry Notice"* pursuant to 19.14.52 NMAC, with copies provided to both the OCD Artesia District II Office and the Santa Fe Office.

F. Production/Injection Method: The production/injection method that the owner/operator shall follow is as follows: High temperature (>250 °F) geothermal water shall be brought to surface from the Horquilla Formation or geothermal reservoir at approximately 3,400 feet below ground level by five (5) production or development wells at approximately 3,000 gpm per well. Hot water shall be routed in parallel and in series through approximately 50 binary cycle (self-contained heat exchanger, evaporator and condenser) power generation units. Condensed produced or effluent water (approximately 225 °F) shall be routed directly to three (3) Class V geothermal wells and into the same depth within the Horquilla Formation or geothermal reservoir.

G. Well Pressure Limits: The owner/operator shall ensure that the operating surface injection and/or test pressure for each injection well measured at the wellhead shall be at a flow rate and pressure (psi) that will not exceed 0.2 psi per foot of depth from the surface to the top of injection interval, unless the owner/operator secures OCD approval for an increase based on demonstration that the increase will not involve a hazard of formation fracture and/or adversely affect public health, the environment and the correlative rights of any geothermal operators in the high temperature geothermal reservoir. The Owner/Operator shall report the intended maximum injection pressure to the Division for approval after testing the injection formation and prior to the commencement of injection in accordance with Form G-112. Re-injected fluids shall be confined to the aquifer where production is occurring and shall not adversely impact another aquifer(s). The owner/operator shall have working pressure limiting devices or controls to prevent overpressure. The owner/operator shall report any pressure that causes damage to the system to OCD within 24 hours of discovery.

H. Mechanical Integrity Testing: At least once every five years and after any well work over, the geothermal reservoir will be isolated from the casing or tubing annuals and the casing pressure tested at a minimum of 600 psig for 30 minutes.

A passing test shall be within +/- 10% of the starting test pressure. All pressure tests must be performed in accordance with the testing schedule shown below and witnessed by OCD staff unless otherwise approved.

Testing Schedule:

2009: Prior to system start-up, a 30 minute casing pressure test at a minimum of 600 psig (set packer above casing shoe to isolate formation from casing), and

2013: A 30 minute casing pressure test at a minimum of 600 psig (set packer above casing shoe to isolate formation from casing)

I. **Capacity/Reservoir Configuration and Subsidence Survey:** The owner/operator shall provide information on the size and extent of the geothermal reservoir and geologic/engineering data demonstrating that continued geothermal extraction will not cause surface subsidence, collapse or damage to property or become a threat to public health and the environment. This information shall be supplied to OCD in each annual report. OCD may require the owner/operator to perform additional well surveys, tests, etc. A subsidence monitoring section is required in the annual report and shall include well top-of-casing and ground elevation surveying (Accuracy: 0.01 ft.) before start-up and on an annual basis in order to demonstrate that there are no subsidence issues. If the owner/operator cannot demonstrate the stability of the system to the satisfaction of OCD, then OCD may require the owner/operator to shut-down, close the site and properly plug and abandoned the wells. ***The owner/operator shall report any subsidence to the OCD Santa Fe office within 24 hours of discovery.***

J. **Production/Injection Volumes:** After placing a geothermal well on production, the owner/operator shall file in duplicate a monthly production report form G-108, with the OCD Santa Fe office by the 20th day of each month and also with the annual reports. The owner/operator shall also document the production from each well and each lease during the preceding calendar month.

K. **Analysis of Injection and Geothermal Reservoir Fluids:** After placing any well on injection in a geothermal resources field or area, the owner/operator shall file in duplicate a monthly injection report, form G-110, with the OCD Santa Fe office by the 20th day of each month and also with the annual report. The owner/operator shall specify the zone or formation into which injection is being made, the volume injected, the average temperature of the injected fluid and the average injection pressure at the wellhead.

L. **Area of Review (AOR):** The owner/operator shall report within 24 hours of discovery of any new wells, conduits or any other device that penetrates or may

penetrate the injection zone within one-quarter mile from a Class V Geothermal Injection Well. *Note: AOR applies specifically to Class V Injection Wells.*

M. **Annual Geothermal Temperature and Pressure Tests:** The owner/operator shall test its production or development wells at least annually and submit the results to the OCD Santa Fe office on form G-111 within 30 days of the completion of the test. The owner/operator shall record the flowing temperatures and flowing pressure tests at the wellhead for a minimum of 72 hours of continuous flow at normal producing rates. The owner/operator shall then shut in the well for 24 hours and record the shut-in pressures at the wellhead. The owner/operator shall submit the results of these tests in duplicate to the OCD Santa Fe office.

N. **Loss of Mechanical Integrity:** The owner/operator shall report to the OCD Santa Fe Office within 24 hours of its discovery of any failure of the casing, tubing or packer or movement of fluids outside of the injection zone. The owner/operator shall cease operations until proper repairs are made and the owner/operator receives OCD approval to re-start injection operations.

O. **Bonding or Financial Assurance:**

i. Class V Geothermal Injection Wells: The owner/operator shall maintain at a minimum a cash bond (*i.e.*, Assignment of Cash Collateral Deposit or Multi-Well Cash Financial Assurance Bond Geothermal Injection) in the amount of $50,000.00 to restore the site and/or plug and abandon wells, pursuant to OCD rules and regulations.

ii. Geothermal Production or Development Wells: The owner/operator shall maintain at a minimum a cash bond (*i.e.*, $10,000.00 Multi-Well (4 wells) and/or $5,000.00 (1 well) Geothermal Plugging Bonds). If warranted, OCD may require additional financial assurance for closure of the power plant or facility (see Permit Condition 34 below).

P. **Annual Geothermal Well Report:** The owner/operator shall submit an Annual Geothermal Well Report by January 31 of each year. The report shall include the following information:

i. Cover sheet marked as "Annual Geothermal Well Report, name of owner/operator, Discharge Permit Number, API number(s) of well(s), date of report and the name of the person submitting report.

ii. Comprehensive summary of all geothermal well operations, including description and reason for any remedial or work on the well(s). The

owner/operator shall include copies of the form G-103s that it submitted to the OCD Santa Fe office.

iii. Production and injection volumes in accordance with Permit Condition 21.J, including a running total to be carried over each year. The owner/operator shall report the total mass produced, dry steam produced, flow rates, temperatures and pressures, average injection pressures, temperatures, *etc.*

iv. A copy of the chemical analyses in accordance with Permit Condition 21.K.

v. A copy of any mechanical integrity test chart, including the type of test, (*i.e.*, EPA 5-Year casing test), date, time, *etc.*, in accordance with Permit Conditions 21.H.

vi. A copy of the annual subsidence survey data results in accordance with Permit Condition 21.I.

vii. Brief explanation describing deviations from normal production methods.

viii. A copy of any leaks and spills reports submitted in accordance with Permit Condition 15 above.

ix. A copy of analytical data results from annual groundwater monitoring including the QA/QC Laboratory Summary.

x. An updated Area of Review (AOR) summary (WQCC Regulation 20.6.2 NMAC) when any new wells are drilled within 1/4 mile of any UIC Class V Geothermal Injection Well.

xi. A "Miscellaneous" section to include any other issues that should be brought to the OCD's attention.

xii. Discharge Permit Signatory Requirements pursuant to WQCC Regulation Subsection G of 20.6.2.5101 NMAC.

22. Transfer of Discharge Permit: Pursuant to WQCC Regulation Subsection H of 20.6.2.5101 NMAC, the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer brine well operations until proper

bonding or financial assurance is in place and approved by the OCD. OCD reserves the right to require a modification of the permit during transfer.

23. Closure: The owner/operator shall notify OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the owner/operator shall submit for OCD approval, a closure plan including a completed C-103 form for plugging and abandonment of the well(s). Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure. OCD may require additional financial assurance if surface water and/or ground water is impacted pursuant to WQCC Regulation Paragraph (11) of Subsection A of 20.6.2.3107 NMAC.

24. Certification: Los Lobos Renewable Power, L.L.C. (Owner/Operator), by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained here. **Owner/Operator** further acknowledges that OCD may, for good cause shown, as necessary to protect fresh water, public health, safety and the environment, change the conditions and requirements of this permit administratively.

Conditions accepted by: *"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."*

_____
Company Name - print name above

_____
Company Representative - print name

_____
Company Representative - signature

Title_____

APPENDIX 1

WATER QUALITY MONITORING PROGRAM

Table 1
Ground Water Monitoring Program

ID*	Frequency	Media	Analytical Suite/Method	Approximate Well location
MW-1 [1]	Annual	GW	Analyze for dissolved fraction of all 20.6.2.3103 NMAC Constituents VOCs (8260B) SVOCs (8270C) PAHs (8310) TPH (418.1) Metals - dissolved (6010B/6020) including Bromide, Lithium, Rubidium, and Tungsten (by approved EPA methods) Mercury (7470A/7471A) General Chemistry (Methods specified at 40 CFR 136.3) Uranium (6010B/6020), Radioactivity (E903/E904) Radon (by EPA Method or method approved by OCD)	Shallow MW (water table) located ~100' downgradient (North) of Class V IW 42-18 and associated pits (OCD)
MW-3 [1]	Annual	GW		Shallow MW (water table) located ~100' downgradient (North) of Class V IW 51-07 and associated pits (OCD)
MW-2 [1]	Annual	GW		Shallow MW (water table) located ~100' downgradient (North) of Class V IW 53-12 and associated pits (OCD)
MW-4 [1]	Annual	GW		Shallow MW located ~1500' (Northwest) of DW 45-07 directly downgradient from facility (OCD)
MW-5 [1]	Annual	GW		Shallow MW (water table) located ~1000' upgradient (South) of the nursery greenhouses 3 & 4 to monitor background (OCD)
MW-6 [1]	Annual	GW		Shallow MW (water table) located ~100' downgradient (North) of DW 53-07 and associated pits (OCD)
MW-7 [1]	Annual	GW		Shallow MW (water table) located ~100' downgradient (North) of DW 13-07 and associated pits (OCD)

ID*	Frequency	Media	Analytical Suite/Method	Approximate Well location
MW-8 [1]	Annual	GW		Shallow MW (water table) located ~100' downgradient (North) of DW 33-07 and associated pits (OCD)
NW-1 [1]	Annual	GW		Similar to monitoring & sampling plan from Los Lobos.
NW-2 [1]	Annual	GW		Similar to monitoring & sampling plan from Los Lobos.
NW-3 [1]	Annual	GW		Similar to monitoring & sampling plan from Los Lobos.

Table 2
Geothermal Injection Wells and
Production/Development Wells Monitoring Program

ID*	Frequency	Media	Analytical Suite/Method	Approximate Well Location
DW 13-07[1,3]	Annual	GW	Analyze for dissolved fraction of all 20.6.2.3103 NMAC Constituents	As Proposed in Application
DW 33-07[1,3]	Annual	GW		
DW 45-07[1,3]	Annual	GW	VOCs (8260B)	
DW 47-07[1,3]	Annual	GW	SVOCs (8270C)	
DW 53-07[1,3]	Annual	GW	PAHs (8310)	
IW 42-18[1,3]	Annual	GW	TPH (418.1)	
IW 51-07[1,3]	Annual	GW		
IW 53-12[1,3]	Annual	GW	Metals - dissolved (6010B/6020) including Bromide, Lithium, Rubidium, and Tungsten (by approved EPA methods) Mercury (7470A/7471A)	
			General Chemistry (Methods specified at 40 CFR 136.3)	
			Uranium (6010B/6020), Radioactivity (E903/E904)	
			Radon (by EPA Method or method approved by OCD)	

Table 3
Water Supply Wells Monitoring Program

ID*	Frequency	Media	Analytical Suite/Method	Approximate Location
TG 52-07	Annual	GW	Analyze for dissolved fraction of all 20.6.2.3103 NMAC Constituents VOCs (8260B) SVOCs (8270C) PAHs (8310) TPH (418.1) Metals - dissolved (6010B/6020) including Bromide, Lithium, Rubidium, and Tungsten (by approved EPA methods) Mercury (7470A/7471A) General Chemistry (Methods specified at 40 CFR 136.3) Uranium (6010B/6020), Radioactivity (E903/E904) Radon (by EPA Method or method approved by OCD)	Similar to monitoring & sampling plan from Los Lobos.
AmeriCulture No. 1 Federal	Annual	GW		
AmeriCulture State Well No. 2	Annual	GW		
McCants No. 1 State	Annual	GW		
Burgett No. 1 State	Annual	GW		
Burgett Greenhouse No. 2	Annual	GW		

Table 4
Holding Ponds, Drainage Ditches, Pits and Ponds Monitoring Program

ID*	Frequency	Media	Analytical Suite/Method	Approximate Location
GH Holding Pond No. 1	Quarterly[4]	SW	Metals- dissolved (6010B/6020) including Bromide, Lithium, Rubidium, and Tungsten (by approved EPA methods) General Chemistry (Methods specified at 40 CFR 136.3	Similar to monitoring & sampling plan from Los Lobos.
GW Holding Pond No. 2	Quarterly[4]	SW		
Drainage Ditch No. 1 (East)	Quarterly[4]	SW		
Retention Pond No. 1	Quarterly[4]	SW		
Bermed Canal No. 1	Quarterly[4]	SW		
Pit Associated with Well 13-07	Within 30 days of use	SW		
Pit Associated with DW 33-07	Within 30 days of use	SW		
Pit Associated with DW 45-07	Within 30 days of use	SW		
Pit Associated with DW 47-07	Within 30 days of use	SW		
Pit Associated with DW 53-07	Within 30 days of use	SW		
Pit Associated with IW 42-18	Within 30 days of use	SW		
Pit Associated with IW 51-07	Within 30 days of use	SW		

ID*	Frequency	Media	Analytical Suite/Method	Approximate Location
Pit Associated with IW 53-12	Within 30 days of use	SW		

Table 5
Cooling Tower Effluent Monitoring Program

ID*	Frequency	Media	Analytical Suite/Method	Approximate Location
Cooling Tower Effluent	Daily [5]	Effluent	Metals - dissolved (6010B/6020) including Bromide, Lithium, Rubidium, and Tungsten (by approved EPA methods) BOD_5 (405.1/5210B) COD (410.2) General Chemistry (Methods specified at 40 CFR 136.3	Similar to monitoring & sampling plan from Los Lobos.

BOD_5: Biochemical Oxygen Demand
COD: Chemical Oxygen Demand
DW: Development/Production Well
DWL: Dynamic Water Level
GH: Greenhouse
GW: Ground Water
IW: Injection Well
MSL: Mean Sea-Level
MW: Monitor Well
NW: Nested Well
SW: Surface Water
SWL: Static Water Level
* Quarterly Static Water Level (SWL): MSL to nearest 0.01 feet prior to sampling event

1. Wells must be installed in advance of system startup and sampled.
2. Semi-Annual groundwater monitoring event must be completed no more than 30 days prior to the start of the irrigation season but no later than April 30 of each year. Monitoring must be conducted no later than 30 days after the conclusion of the irrigation season but no later than November 15 of each year.
3. One time sampling event with static water level (SWL) mean sea-level (0.01 ft. accuracy) measurements in advance of system start-up. Thereafter, monthly sampling for the first six months with dynamic water level (DWL) recording is required. After six months of monthly monitoring, the sampling shall be conducted at least annually.
4. Sample quarterly while in use. If organics are evident, sampling with analytical methods similar to MWs shall be implemented during the sampling event.
5. Daily for 10 business days at system startup; thereafter weekly for two months; thereafter based on establishing correlation with the 3D Tresar Control Monitoring System.

Note: All wells with phase-separated hydrocarbons (PSHs) must be checked at a minimum of once per month and recorded on a spreadsheet. The data must be presented in table form listing all of the impacted wells, date inspected, product thickness measured to 0.01 of a foot, and amount of product/water recovered. If PSHs are observed in a monitoring well, then appropriate steps must be taken to recover the PSHs using the best available technology.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 14246
ORDER NO. R-13127

APPLICATION OF RASER POWER SYSTEMS, LLC, FOR APPROVAL OF A DISCHARGE PLAN PURSUANT TO THE WATER QUALITY ACT, HIDALGO COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This case came on for hearing at 9:00 a.m. on December 1, 2008, and April 7, 2009 at Lordsburg, New Mexico, before Hearing Officer David K. Brooks.

NOW, on this 29th day of May, 2009, the Division Director, having considered the testimony, the record and the recommendations of the Hearing Officer,

FINDS THAT:

Background and Procedure

(1) Due public notice has been given, and the Division has jurisdiction of the subject matter of this case.

(2) Los Lobos Renewable Power, LLC ("Applicant" or "Los Lobos"), a subsidiary of Raser Power Systems, LLC, filed an administrative application with the Environmental Bureau of the Division for approval of a discharge plan pursuant to the New Mexico Water Quality Act [NMSA 1978, Sections 74-6-1 through 74-6-17] and applicable rules of the Water Quality Control Commission ("WQCC"), for a geothermal power generating facility ("the facility") to be located in the NE/4 SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, in Hidalgo County, New Mexico.

(3) After initial public notices were given, Americulture, Inc. ("Americulture" or "Protestant") protested the application. The Director of the Division ("the Director")

determined, pursuant to 20.6.2.3108.K NMAC, that there was substantial public interest in this application, and designated a hearing officer to conduct a public hearing in accordance with 20.6.2.3110 NMAC. The hearing was convened only to consider approval, disapproval or conditional approval of the proposed discharge plan. No issue under the Geothermal Resources Conservation Act [NMSA 71-5-1 through 71-5-24] was addressed in this proceeding.

(4) At the initial hearing on December 1, 2008, Applicant and the Division each appeared through counsel and presented evidence in support of the proposed discharge plan. Protestant appeared through a non-attorney corporate representative and presented evidence in opposition.

(5) The evidence at the initial hearing showed that:

(a) applicant intends to locate one of three proposed Class V injection wells included in the discharge plan at a location different from that indicated in the application and in the original public notice; and

(b) the Division staff had not yet obtained all of the technical information it needed from Applicant and had not finalized its recommendations for conditions to be included in a final draft permit.

(6) In order to provide public notice of the changed location of one of the injection wells and to allow the Division to complete a recommended draft permit, the Hearing Officer recessed the hearing. The hearing re-convened pursuant to a new hearing notice on April 7, 2009, at which time Applicant, the Division and Protestant appeared and presented additional evidence, and the Division offered in evidence a revised draft permit. After the hearing, the Division staff filed a further, non-substantive revision of its draft permit. Because the Division did not file its final draft permit 30 days prior to the hearing, the Hearing Officer re-opened the record to allow Protestant to file comments on the final draft permit. The Protestant filed comments, and the administrative record was finally closed on May 4, 2009.

The Evidence

(7) Applicant's witnesses, Michael Hayter and Roger Perry, testified that Applicant proposes to construct a binary-cycle geothermal power generating facility, including five geothermal production wells ("the production wells") that will lift geothermal water from approximately 3,400 feet below the surface, presumably from the Horquilla Limestone formation, and three water injection wells ("the injection wells") that will re-inject the spent geothermal waters, together with waste water from the plant's cooling tower, into the source formation. Applicant anticipates that the subterranean heat source will re-heat the injected water and allow it to be re-produced for further geothermal use.

(8) The cooling tower water will be produced from a water supply well located in proximity to the facility. It will be treated with biocides and anti-corrosion agents.

(9) Applicant presented a witness, Jennifer Wright, from NALCO, the company which designed the chemical treatment program for the cooling tower water. Ms. Wright testified that the chemical agents that would be introduced into the cooling tower water, in the quantities that would be used, would not cause the water to exceed WQCC water quality standards, nor introduce any toxic pollutants. Ms. Wright also described the 3D-TRASER system that would monitor and control the levels of chemical agents used in the water treatment process to prevent introducing excessive amounts of these agents.

(10) The Division's witness, Carl Chavez, an environmental engineer, described the Division's application review process and the provisions of the proposed draft permit, including the groundwater monitoring requirements included in the draft permit and the tables attached thereto.

(11) Protestant presented the testimony of James Witcher, a hydro-geologist with substantial experience studying the area where the facility will be located. Mr. Witcher offered a detailed interpretation of the region's geology. He specifically testified that the geothermal water so far discovered and produced in the area could not have originated in or moved through the Horquilla Limestone, the formation which Applicant's witness posited as their geothermal source formation, because the chemical qualities of waters produced from Protestant's wells and other geothermal wells in the vicinity indicate that those waters have never moved though a carbonate reservoir.

(12) Though he did not give any specific opinions about hydrologic connections between formations, Mr. Witcher expressed concerns about the injected water's potential to migrate into aquifers from which Protestant and others are producing fresh water. He recommended that the proposed discharge plan be rejected until the Applicant can present further evidence of geologic conditions that could only be obtained by drilling one or more test wells.

(13) Mr. Witcher also expressed a concern that the monitor wells required in the proposed draft permit would be ineffective to monitor water in the aquifers as they were intended to do because of the draw-down of the water table that would result from the proposed operation.

(14) Both Applicant's and Protestant's witnesses testified that no testing had been done on the water in the Horquilla Limestone formation. There was discussion of water tests indicating concentrations of total dissolved solids (TDS) in the range of 1,000 to 1,500 milligrams per liter (mg/l), but it was uncontested that these results were from tests of shallower formations, and not of Horquilla.

(15) No party presented any specific evidence regarding hydrologic connection or lack thereof between the Horquilla and any of the shallower aquifers in the vicinity.

(16) Protestant is in the business of commercial production of Tilapia fish for human consumption. Protestant has a fish farm close to the facility. During the hearing, Protestant's corporate representative, Damon Seawright, made various non-specific observations about water quality considerations that might affect the particular species of fish that Protestant produces, but Mr. Seawright was not sworn, did not testify as a witness and offered no expert or factual testimony, or other evidence, about these matters.

(17) In addition to the parties who entered appearances, several residents of Hidalgo County made comments at the hearing. All supported Los Lobos' application.

Division Director's Findings and Conclusions

(18) Each of the following findings shall constitute findings of fact to the extent that they address factual issues, and conclusions of law to the extent that they address legal issues.

(19) The proposed permit authorizes construction and operation of lined reserve pits at the wells, evaporation ponds, and other elements, in addition to the three Class V injection wells. However, there was no controversy at the hearing concerning these pits, ponds or other elements, and the Director accordingly accepts the conclusion of the Division staff, as evidenced by the staff's endorsement of the draft permit, that these elements present no hazard to any underground source of drinking water.

(20) The controversy at the hearing focused exclusively on the proposed injection wells. The governing standard for determining whether these wells should be permitted is set forth in 20.6.2.3109.C NMAC. That subsection reads, in pertinent part, as follows:

> [t]he secretary shall approve the proposed discharge plan, modification or renewal if the following requirements are met:
>
> ***
>
> (2) the person proposing to discharge demonstrates that approval of the proposed discharge plan, modification or renewal will not result in either concentrations in excess of the standards of 20.6.2.3103 NMAC or the presence of any toxic pollutant at any place of withdrawal of water for present or reasonably foreseeable future use, except for contaminants in the water diverted as provided in Subsection D . . . .

(21) The referenced Subsection D provides, in pertinent part, as follows:

> The secretary shall allow the following unless he determines that a hazard to public health may result:
>
> > (1) the weight of water contaminants in water diverted from any source may be discharged provided that the discharge is to the aquifer from which the water was diverted or to an aquifer containing a greater concentration of the contaminants than contained in the water diverted; and provided further that contaminants added as a result of the means of diversion shall not be considered to be part of the weight of water contaminants in the water diverted . . .

(22) Since the injection wells in this case will discharge the same water that was diverted into the same aquifer from which it was diverted, Subsection D of 20.6.2.3109 NMAC applies in this case and counsels approval of the application *unless* the addition of cooling tower water introduces toxic pollutants or other water contaminants that could introduce or cause the water in the injection zone to exceed standards.

(23) There was some discussion during the second hearing about the possibility of injection into an "intermediate zone" between the shallow aquifers from which ground water is now being produced and the geothermal source formation. This possibility, however, need not be considered since the draft permit would not authorize such injection. Paragraph 21.F of the draft permit specifically provides that the injected fluids will be injected into "the geothermal reservoir." From a reading of the entirety of Paragraph 21.F, it is plain that it authorizes injection only into the reservoir from which the geothermal water was produced, be it the Horquilla or some other formation. Injection into an "intermediate formation" would require a permit modification.

(24) The testimony of the NALCO witness, Ms. Wright, established, *prima facie*, that the proposed chemical treatment of the cooling tower water will not cause an exceedance of standards or introduce any toxic pollutant. Protestant offered no contrary evidence. Speculation by a party representative speaking in the role of counsel is not evidence.

(25) The Division proposes further conditions in the draft permit to insure that addition of the treated cooling tower water to the injected fluids will not cause an exceedance of water quality standards or introduce toxic pollutants. Clause (ii) of Paragraph 20.E of the draft permit requires frequent testing and analysis of the fluids to be injected, prior to injection. Clause (v) of Paragraph 20.B expressly requires immediate shut-down "if the concentration of the injection fluids exceed the greater of the standards specified in WQCC 20.6.2.3103 NMAC or background, or if any toxic pollutant . . . is detected." Applicant has indicated that it will accept these permit conditions.

(26) There is an ambiguity inherent in the use of the term "background" in Paragraph 20.B since the draft permit requires numerous different background tests at

different locations. To resolve this ambiguity, the relevant provision of Clause (v) of Paragraph 20.B of the draft permit should be changed to read:

> if the concentration of any water contaminants in the injection fluids exceeds the greater of the standards specified in WQCC 20.6.2.3103 NMAC or background [as established for the injection formation at the injection well location pursuant to Clause (i) of Paragraph 21.D], or if any toxic pollutant . . . is detected.

(27) Protestant's corporate representative, Mr. Seawright, suggested that use of a water tower for cooling, with the attendant necessity to dispose of waste water, might not be the best available technology for the facility, since air cooling could be used. Applicant's witnesses, however, testified that air cooling would not be practical for this facility. Protestant offered no evidence to the contrary. Indeed, Protestant's sole witness, Mr. Witcher, expressly disclaimed any expertise in power plant cooling technology.

(28) Based on Findings (22) through (27), the Director concludes that operation of the proposed Class V injection wells in accordance with the proposed draft permit, as modified in Finding (26), will comply with the applicable standards of Subsections C and D of 20.6.2.3109 NMAC *unless* the injection process causes excursion of the injected fluids, or migration of other waters, into another aquifer (distinct from the source formation) so as to cause an exceedance of standards or background in that aquifer.

(29) Subsection D of 20.6.2.3109 should not be construed to permit re-injection into a source aquifer if the injected fluids cannot be effectively confined to that aquifer or if the injection process itself causes an exceedence of standards in another aquifer.

(30) The evidence in this case is not sufficient to demonstrate the characteristics of, or even the identity of, the injection formation, nor does it demonstrate whether or not hydrologic communication exists between the injection formation and other aquifers in the vicinity that are or may be underground sources of drinking water. The low injection pressure (75 psi) proposed according to the testimony of Applicant's witnesses may suggest that induced migration from the injection zone is unlikely, but does not, in this unknown environment, necessarily demonstrate that it will not occur.

(31) These considerations would tend to support the approach recommended by Protestant's witness, Mr. Witcher, of requiring Applicant to drill exploratory wells and furnish additional data prior to approval of permits for the proposed Class V injection wells.

(32) However, Applicant presented testimony that it would be difficult to secure financing for the necessary exploratory work absent issuance of a permit.

(33) The Division's approach, as evidenced by the draft permit, and the testimony of the Division's witness as to the reasoning supporting certain permit

conditions, has been to impose permit conditions which will allow early detection and response if any excursion of injected fluids or induced migration is discovered.

(34) In view of the unknown geologic environment and the difficulty of obtaining more definitive information, the Director concludes that the Division's approach is a viable one. Accordingly, if the permit conditions are sufficient to allow timely detection and intervention of any process that may cause an exceedence of standards or applicable background in another aquifer, or at another location, the Division can properly conclude that the standard for permit approval established by Subsection C of 20.6.2.3109 NMAC is satisfied.

(35) In any injection well, the first line of defense for preventing excursion of the injected fluids into a formation other than the approved injection formation is the well's casing program. The casing program provided in the draft permit (Paragraph 21.B) is extremely general, doubtless because, as pointed out by Protestant's witness, Mr. Witcher, one does not know where to set casing until one has some knowledge of the stratigraphy. However, the casing program should not be left to chance, or to Applicant's unsupervised discretion. Accordingly, Paragraph 21.B of the draft permit should be amended to require Applicant, prior to setting intermediate or production casing in each of the production and injection wells, to run open hole logs, pursuant to a logging program approved by the Division, and submit the logs to the Division for review together with Applicant's recommendations for casing setting depths, and, in the case of injection wells, for precise definition of the injection interval. Furthermore, Paragraph 21.B should be further amended to require injection to be accomplished through tubing suitable for the character of the injected fluids, to be determined after initial testing of the fluids to be injected. The tubing should be installed in a packer set within 100 feet of the uppermost injection perforations. The casing-tubing annulus should be filled with an inert fluid, and a gauge or approved leak-detection device should be attached to the annulus in order to detect leakage in the casing, tubing or packer.

(36) Although the evidence in this case indicates that injection pressures will be sufficiently low that formation fracture problems are unlikely, Paragraph 21.G of the draft permit, relating to well pressure limits, should be amended to specifically require the Applicant, after testing the injection formation, to report the intended maximum injection pressure to the Division for approval prior to commencement of injection. The injection pressure shall not exceed 0.2 psi per foot of depth from the surface to the top of the injection interval, unless the Applicant secures Division approval for an increase based on demonstration that the increase will not involve a hazard of formation fracture.

(37) Paragraphs 20 and 21 of the draft permit, and the tables attached to the permit, require an extensive ground water monitoring program, and require notification to the Division within 72 hours if any test reveals an exceedence of the higher of WQCC standards or background at any monitoring location, or if any toxic pollutant is encountered. The Division's witness, Mr. Chavez, testified that this monitoring program would be sufficient to provide prompt detection of any introduction of pollutants into existing, identified aquifers resulting from operation of the injection wells. With certain

qualifications indicated below, the Director concludes that the monitoring, testing and reporting requirements of the draft permit are adequate to meet the standards of the applicable WQCC regulations.

(38) In order to address concerns that were articulated at the hearing or in the responses filed, or that arise from the terms of the draft permit, the groundwater monitoring provisions of the draft permit should be modified as follows:

(a) Protestant has requested that its Americulture State Well No. 2 be added to the list of water supply wells to be monitored and tested, as set forth in Table 3 attached to the draft permit. Although no evidence was presented to indicate that monitoring this additional well would produce better or different data, Mr. Chavez testified that the Division staff did not object to adding this well to the list of wells to be tested, and this requested change to the draft permit should be made.

(b) Protestant's witness, Mr. Witcher, articulated concerns that the drawdown of the water table resulting from operation of the facility would render the monitoring wells ineffective (Transcript of 4-7-09 hearing at 143-45). Neither Applicant nor the Division presented any responsive evidence concerning this issue. Accordingly, Clause (i) of Paragraph 20.B of the draft permit, which requires Applicant to prepare a monitoring plan for approval of the Division, should be amended to direct Applicant to specifically address Mr. Witcher's concerns in its monitoring plan, and to describe measures to be promptly taken to remedy the problem if the monitoring wells cease to function.

(c) To avoid any ambiguity, since the draft permit requires extensive background sampling at various locations, the 72-hour notification provision in Clause (viii) of Paragraph 20.B of the draft permit should be amended to require that the notification requirement is triggered if:

> "the concentration of a monitor well sample exceeds the greater of the water quality standards specified in WQCC 20.6.2.3103 NMAC or the background established at that well's location pursuant to the monitoring program described in this paragraph, or if any toxic pollutant is detected, . . ."

(d) Protestant objected to the notification provision as inadequate to remedy any exceedence that might be detected at a location other than an injection well, and pointed out that while Clause (v) of Paragraph 20.B of the draft permit requires shut-down of the facility if an exceedence is detected at an injection site, no comparable requirement exists if an exceedence is detected elsewhere. A distinction between the response required to an exceedence at the injection site and an exceedence at another location is appropriate, since an exceedence at another location would not necessarily be attributable to the operation of facility. However, in this case, where the geologic evidence the

Division would normally require to demonstrate that the injected fluids will be confined to the injection zone is absent, the Division must rely on the adequacy of the permit's requirements for early detection and remedial action to justify a finding that an exceedence in another formation will not result. Accordingly, Clause (viii) of Paragraph 20.B should be amended to expressly require that, in the event of an exceedence as described in that clause occurs, the Applicant, if so ordered by the Division, shall shut down the operation for such time as may be necessary to allow the Division to investigate the cause of the exceedence. If the Division determines that the operation of the facility contributed to the exceedence, it can then invoke the permit modification provisions of Paragraph 5 of the draft permit, as explained by the Division's witness, Mr. Chavez, in his testimony at the hearing.

(39) The Director determines that the draft permit, if modified in accordance with Finding Paragraphs (35) through (38), meets the standard for permit approval provided in 20.6.2.3109.C(2) NMAC .

(40) Paragraph 20.A of the draft permit requires that Applicant conduct an aquatic toxicity test on the Tilapia fish species present at Protestant's facility. Applicant indicated that it will accept this condition. Accordingly, there is no issue about this requirement except that Protestant has argued that Applicant should be required to make a more extensive demonstration that the injected fluids cannot harm Protestant's fish or those who consume Protestant's fish. Such a showing would be required only by applicable WQCC rules only if there were evidence that the injected fluids might contain one or a combination of the potential "toxic pollutant" substances specifically listed in 20.6.2.7.WW NMAC, which is not the case here.

(41) There are some additional provisions of the draft permit that were not explained at the hearing, and that seem to have questionable relevance, and should be modified or deleted:

(a) Paragraph 6 contains an apparently erroneous reference to Class II (oil and gas-related) wells, which are not contemplated in connection with this facility. This provision should be corrected or deleted.

(b) Paragraph 13 requires closure of all Class V wells, without excluding the Class V injection wells that are the subject of the permit. This provision should be deleted unless there are other Class V wells to which it applies, in which event it should be corrected to make clear to what it applies, and to expressly exclude the Class V injection wells contemplated by the permit.

(42) The Division staff should be instructed to revise/correct the draft permit as set forth in this Order. The Applicant's discharge plan should be approved subject to the conditions set forth in the draft permit and the additional conditions described herein.

IT IS THEREFORE ORDERED THAT:

(1) Pursuant to 20.6.2.3109 NMAC, the application of Los Lobos Renewable Power Systems, LLC, a subsidiary of Raser Power Systems, LLC, for a discharge permit for construction and operation of a binary-cycle, geothermal power generating facility to be located in the NE/4 SW/4 of Section 7, Township 25 South, Range 19 West, in Hidalgo County, New Mexico, is hereby granted.

(2) Applicant shall be authorized, subject to approval of Applications for Permits to Drill (APDs) by the Division's Artesia District Office, to construct three Class V injection wells at the following locations in Hidalgo County, New Mexico:

Well No. 42-18, to be located 1307 feet FNL and 2123 feet FWL (Unit C) in Section 18, in Township 25 South, Range 19 West, NMPM

Well No. 51-07, to be located 169 feet FNL and 2407 feet FEL (Unit B) in Section 7, in Township 25 South, Range 20 West, NMPM

Well No. 53-12, to be located 1575 feet FNL and 3350 feet FWL (Unit K) of Section 12, in Township 25 South, Range 19 West, NMPM

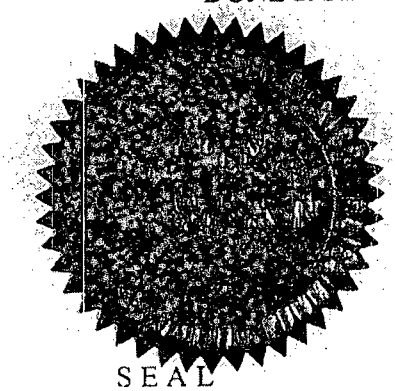
(3) Subject to approval of construction and authorization for start-up, Applicant is authorized to employ the above described wells for injection of produced geothermal waters and power plant cooling tower effluent into the source formation from which the injected geothermal waters were produced.

(4) Approval of this application is subject to the conditions of the final permit, which shall include the conditions provided in the draft permit presented in evidence at the hearing of this case, as amended pursuant to this Order, and the additional conditions described in this Order.

(5) The staff of the Division's Environmental Bureau is directed to revise the draft permit to incorporate the changes and additions described in the finding paragraphs of this Order, and to present the revised draft permit to the Director for signature and transmission to the Applicant for acceptance.

(6) Jurisdiction of this case is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.



SEAL

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MARK E. FESMIRE, P.E.
Director

NOTICE OF PUBLIC HEARING

State of New Mexico
Energy, Minerals and Natural Resources Department,
Oil Conservation Division

Discharge permit for the Lightning Dock Geothermal No. 1 (GTHT-001)

The State of New Mexico, through its Oil Conservation Division (OCD), hereby gives notice that the division will conduct the final public hearing on **Tuesday, April 7, 2009** beginning at 9:00 a.m. at the Sheriff Administration Building (Training Room), 720 E. 2nd Street, in Lordsburg, New Mexico to consider the application for a discharge permit for the Lightning Dock Geothermal No. 1 geothermal power plant. The application was filed by Raser Power System, LLC or Los Lobos Renewable Power, L.L.C., 5152 North Edgewood Drive, Suite 375, Provo, Utah 84604.

The Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe geothermal power plant (5 production/development wells & 3 Class V geothermal injection wells) will be located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant will be within the Animas River Valley approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). Development wells are located within the SW/4; NW/4; and NE/4 of Section 7. Class V injection wells will be located within the NE/4 and NW/4 of Section 18. The operator may deviate from certain well locations and/or a development well may become injection well, and vice-versa with OCD approval and in advance of any well drilling. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/l based on a water sample collected at about 1,200 ft. Sampling at depth will be required before system startup to confirm TDS concentrations at depth at development and production wells. High temperature geothermal water from development wells will be routed in parallel and series into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary-cycle power generation units. Approximately 325 gpm of shallow low temperature geothermal reservoir or makeup water with a TDS concentration of approximately 300 mg/l will be mixed with cooling tower chemical additives and cycled through the cooling tower unit. Approximately 390 gpm of cooling tower blow-down effluent (180~225-°F) will be comingled with a high volume of spent effluent to be injected into the Class V injection wells with the exception of effluent that is routed back into a lined evaporation pond during operation or cessation of operations and in the case of emergencies. Each Class V well will have a maximum injection rate of between 4,000 to 5,000 gpm at an average pressure of about 75 psig. The flow rate of each development or Class V well may be subject to the correlative rights of any future geothermal operators in the high temperature geothermal reservoir. Lined evaporation ponds at the surface will

temporarily store any excess development or well test water for injection back into the high temperature geothermal reservoir. Ground water most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 60 feet with a TDS of approximately 300 mg/l. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The division will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in requesting further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact Mr. Glenn von Gonten, Team Leader of the Oil Conservation Division, at 1220 S. St. Francis Drive, Santa Fe, NM 87505, (505) 476-3488. The discharge permit application and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday. The discharge permit application and draft permit are also posted on the division's web site: http://www.emnrd.state.nm.us/ocd/ENV-DraftPublicEtc.htm.

The rule governing public participation at the hearing is 20.6.2.3110 NMAC. Any person who wishes to present technical evidence at the hearing must, at least 10 days before the hearing, file with the division and serve on the applicant a statement of intent to present evidence. The filing may be mailed to the division at the above address, or faxed to the division at (505) 476-3462, attention Glenn von Gonten. The statement must include the name of the person filing the statement; indicate whether the person supports or opposes the proposed discharge plan proposal; give the name of each witness; estimate of the length of the direct testimony of each witness; provide a list of exhibits, if any, to be offered into evidence at the hearing; and provide a summary or outline of the anticipated direct testimony of each witness. A person who does not file a statement of intent to present evidence may present a general non-technical statement in support of or in opposition to the proposed discharge plan. At the hearing, all persons shall be given a reasonable chance to submit data, views or arguments orally or in writing and to examine witnesses testifying at the hearing.

Unless otherwise allowed by the hearing officer, testimony shall be presented in the following order: testimony by and examination of the applicant supporting the facts relied upon to justify the proposed discharge plan and demonstrate that it meets the requirements of the regulations; testimony by and examination of technical witnesses supporting or opposing approval, or supporting or opposing conditional approval, in any reasonable order; testimony by the general public; and rebuttal testimony, if appropriate.

The hearing officer shall issue a report within thirty days after the close of the hearing record. The report shall be served on the applicant, the division, and all persons who

request copies in advance in writing. The report will also be available for public inspection at the division's office in Santa Fe and at the Artesia district office, 1301 West Grand Ave., Artesia, NM 88210. The director shall issue a decision in the matter no later than thirty days after receipt of the hearing report. The decision shall be served on the applicant, the division, and all persons who request copies in writing. The decision will also be available for public inspection at the division's office in Santa Fe and at the Artesia district office and on the division's website.

If you are a person with a disability who is in need of a reader, amplifier, qualified sign language interpreter, or any other form of auxiliary aid or service to attend or participate in the hearing, please contact Mr. Glenn von Gonten at (505) 476-3488 or through the New Mexico Relay Network (1-800-659-1779) at least ten days prior to the hearing, so the division can make reasonable accommodations.

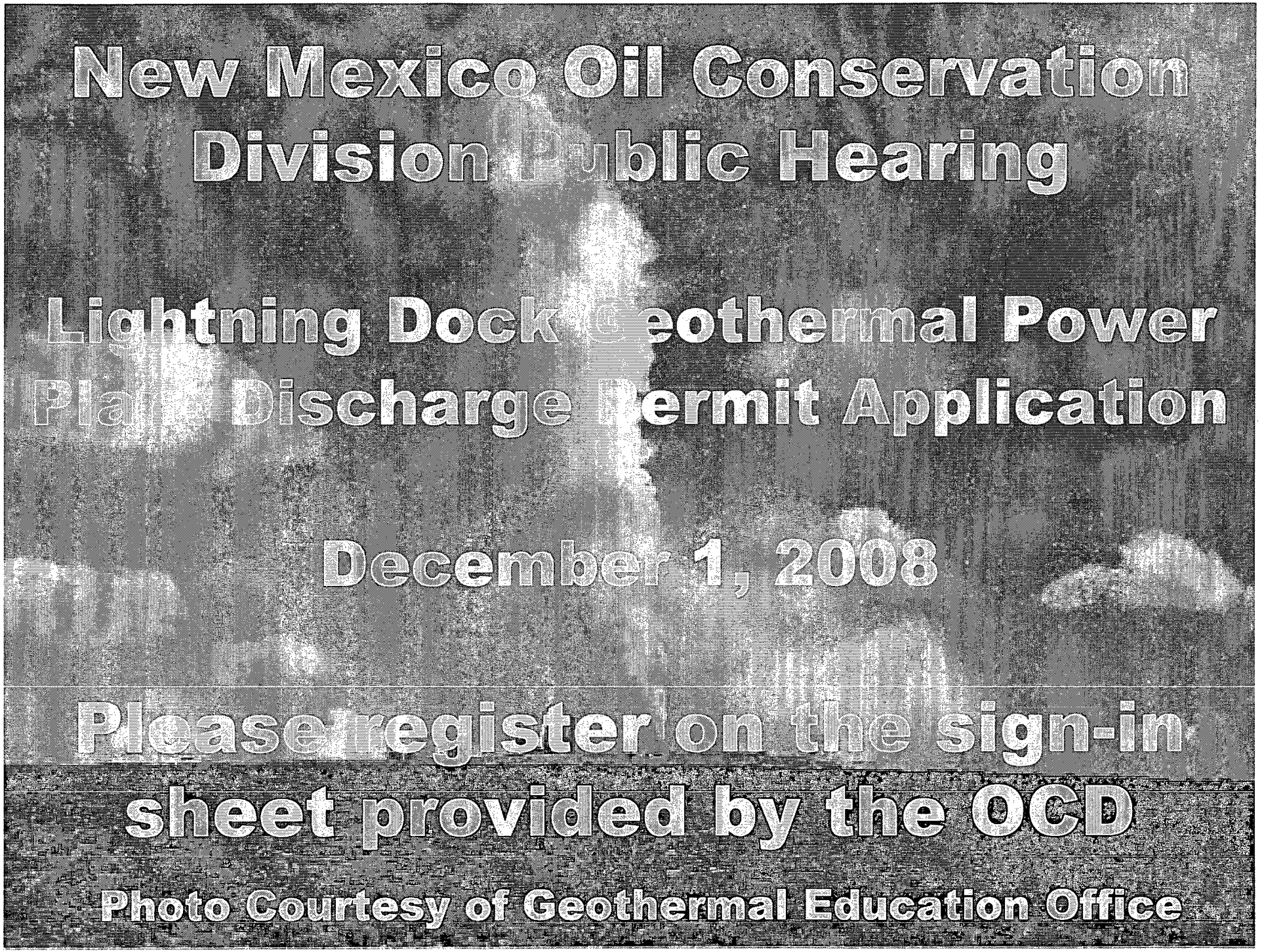
Para obtener más información sobre esta solicitud en español, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México 87505 (Contacto: Dorothy Phillips, 505-476-3461).

GIVEN under the Seal of New Mexico Oil Conservation Division at Santa Fe, New Mexico, on this 3rd Day of March 2009.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

Mark Fesmire, Director


New Mexico Oil Conservation Division Public Hearing
Lightning Dock Geothermal Power Plant Discharge Permit Application
December 1, 2008
Please register on the sign-in sheet provided by the OCD
Photo Courtesy of Geothermal Education Office

Lightning Dock Geothermal No. 1 (GTHT-1) "Binary-Cycle" Power Generation Plant WQCC Discharge Permit Application

New Mexico

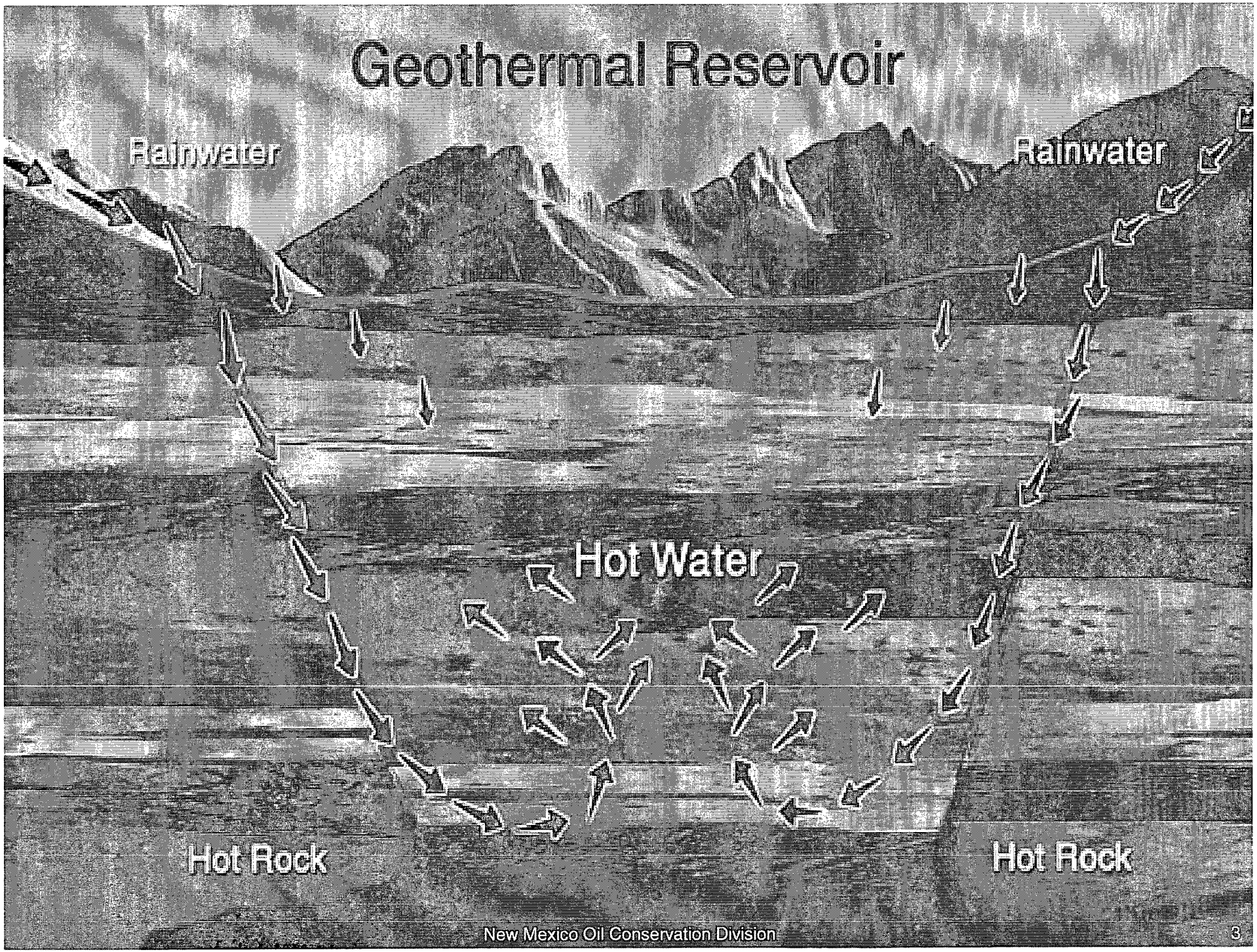
Energy, Minerals, and Natural Resources Department

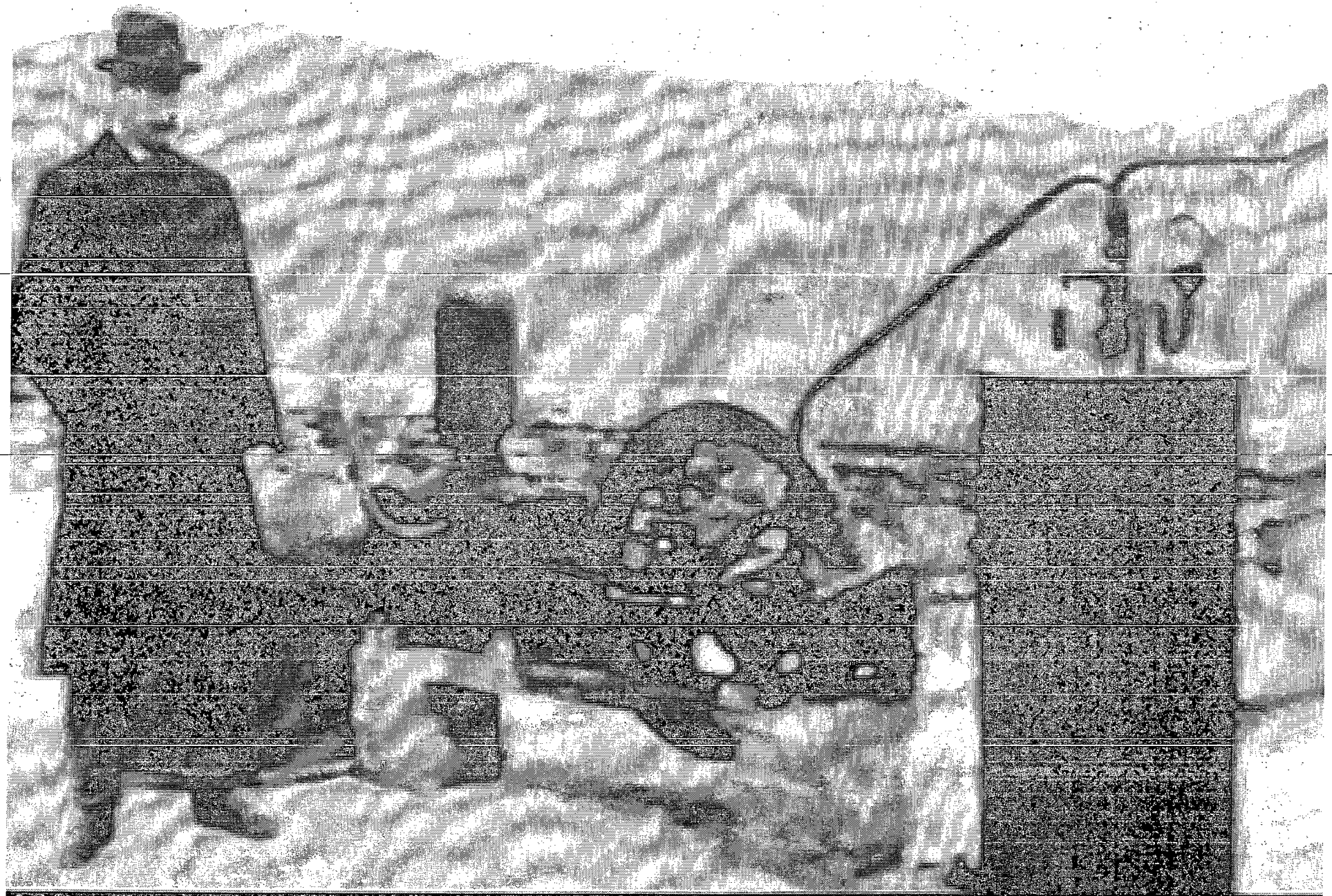
Oil Conservation Division

Carl Chavez (Environmental Engineer) & Wayne Price (Environmental Bureau Chief)

December 1, 2008

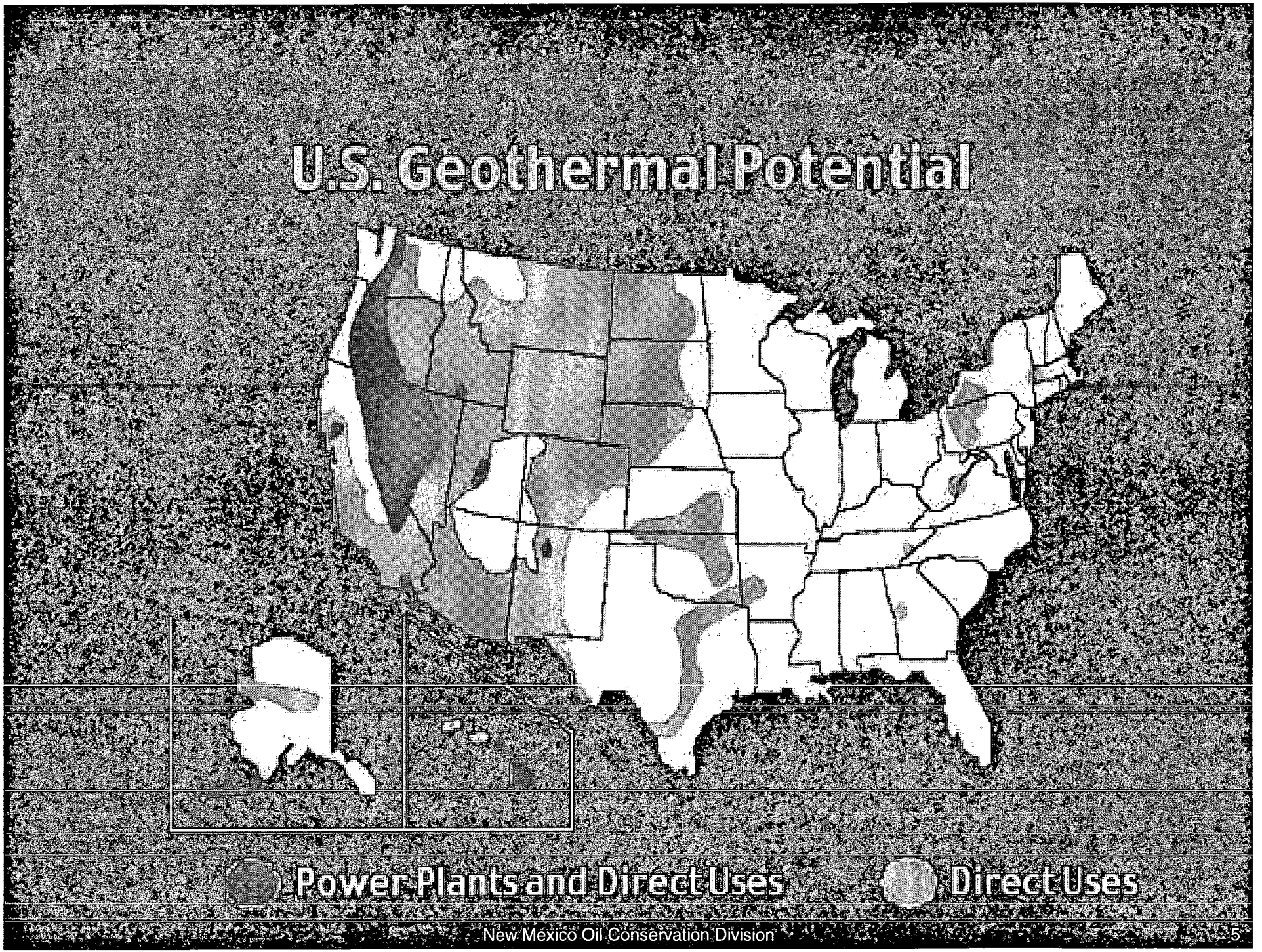
Lordsburg, New Mexico

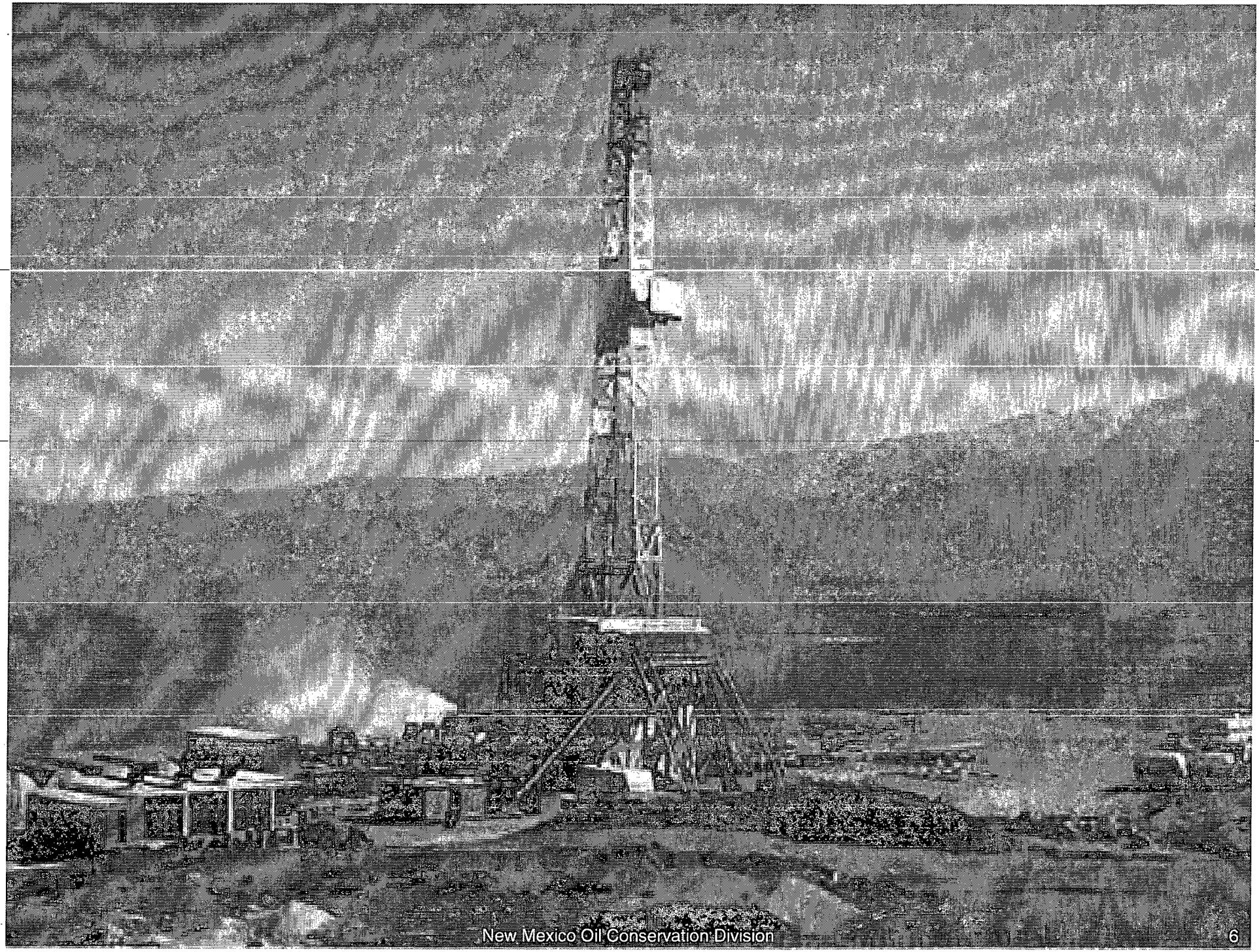

Geothermal Reservoir
Rainwater
Rainwater
Hot Water
Hot Rock
Hot Rock



First Geothermal Power Plant, 1904, Larderello, Italy

U.S. Geothermal Potential





Benefits of Geothermal Power

- Provides clean and safe energy using little land
- Is renewable and sustainable
- Generates continuous, reliable "baseload" power
- Conserves fossil fuels and contributes to diversity in energy sources
- Avoids importing and benefits local economies
- Offers modular, incremental development and village power to remote sites

Courtesy of Geothermal Education Office

GW-32
Northwest NM Regional Landfill
Rio Rancho Landfill
Albuquerque
Arizona
New Mexico
Mesa
Tucson
Lightening Dock Geothermal No. HI-01
10
25
19
Ciudad Juárez
El Paso
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© 2008 Tele Atlas
© 2008 LeadDog Consulting
Image © 2008 DigitalGlobe
© 2008 Europa Technologies
Google
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Pointer 31°52'23.43" N 108°25'19.02" W
Streaming 100%
Eye alt 215.46 mi

Lightening Dock Geothermal No. HI-01
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2.71 mi
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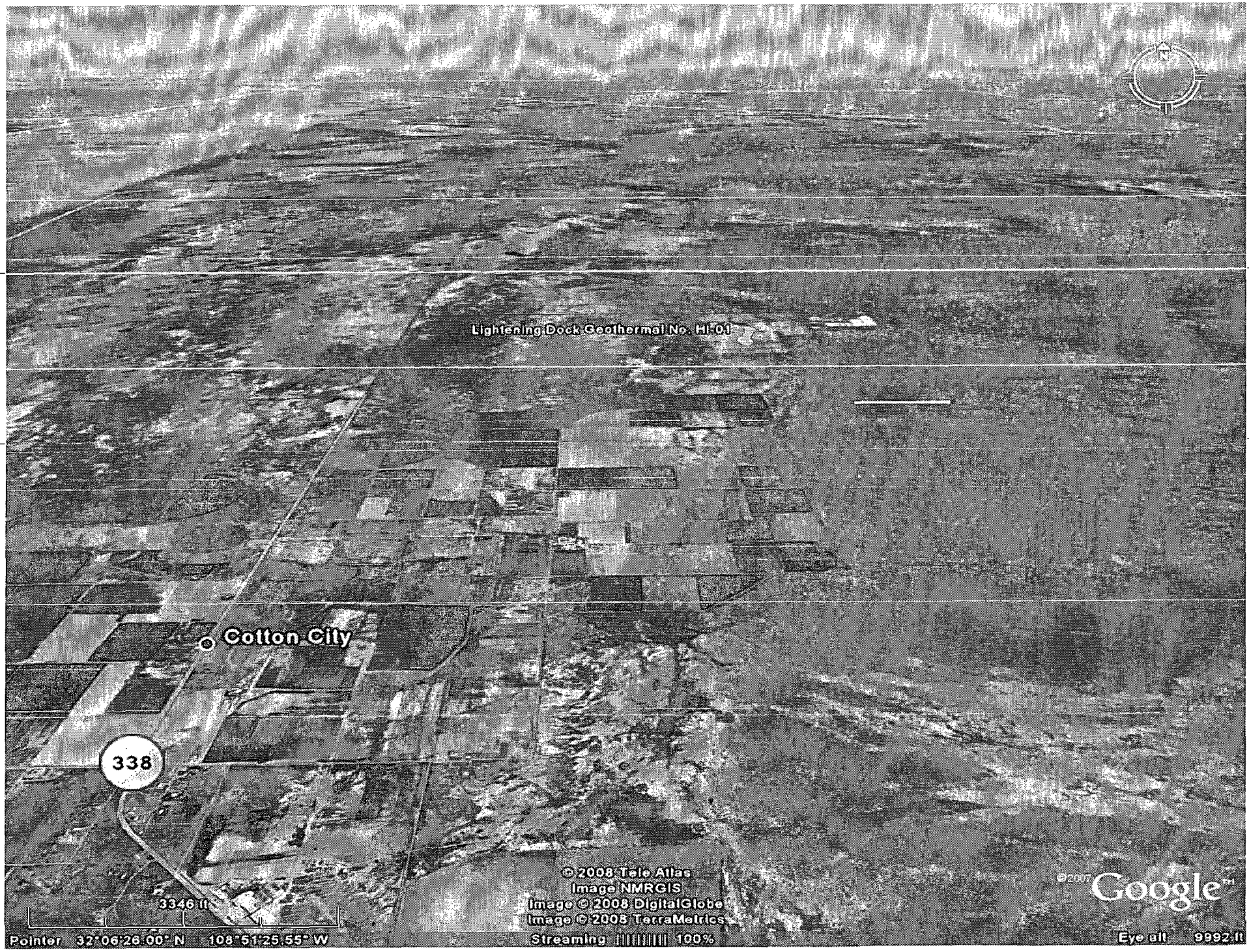
Lightning Dock Geothermal No. HI-01
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338
3346 ft
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Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics
Streaming 100%
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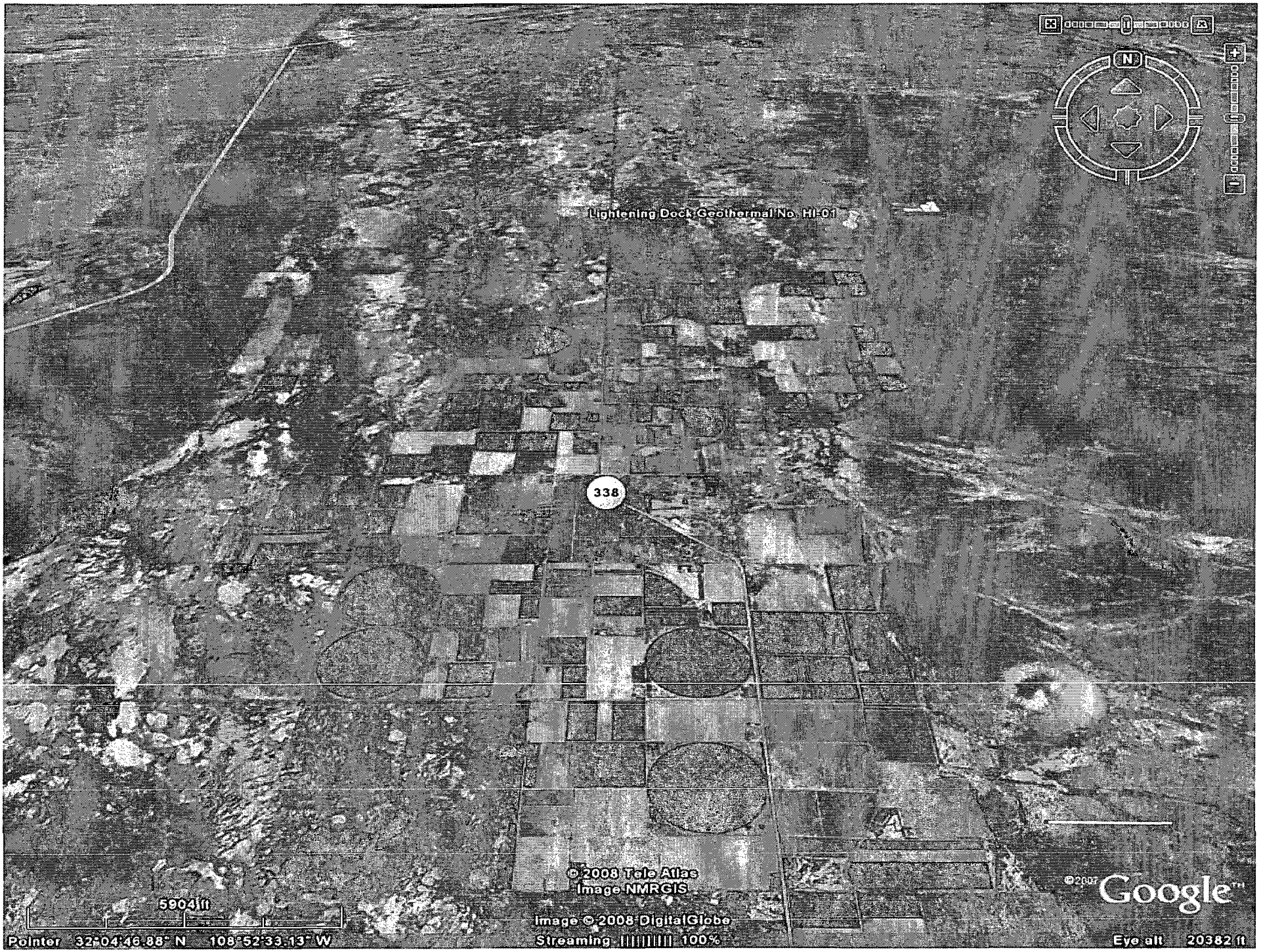
Lightening Dock Geothermal No. HI-01
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Lightening Dock Geothermal No. HI-01
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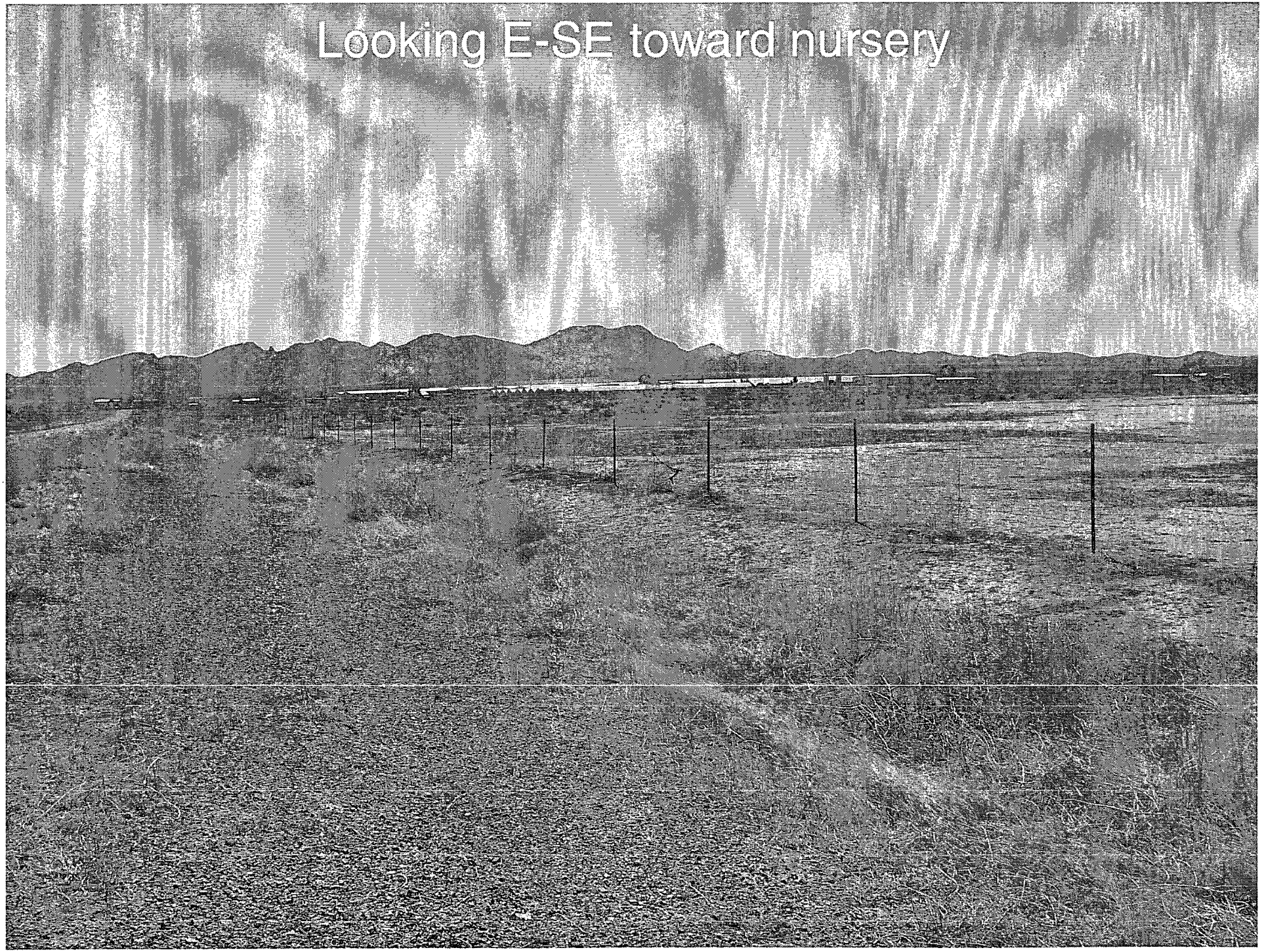
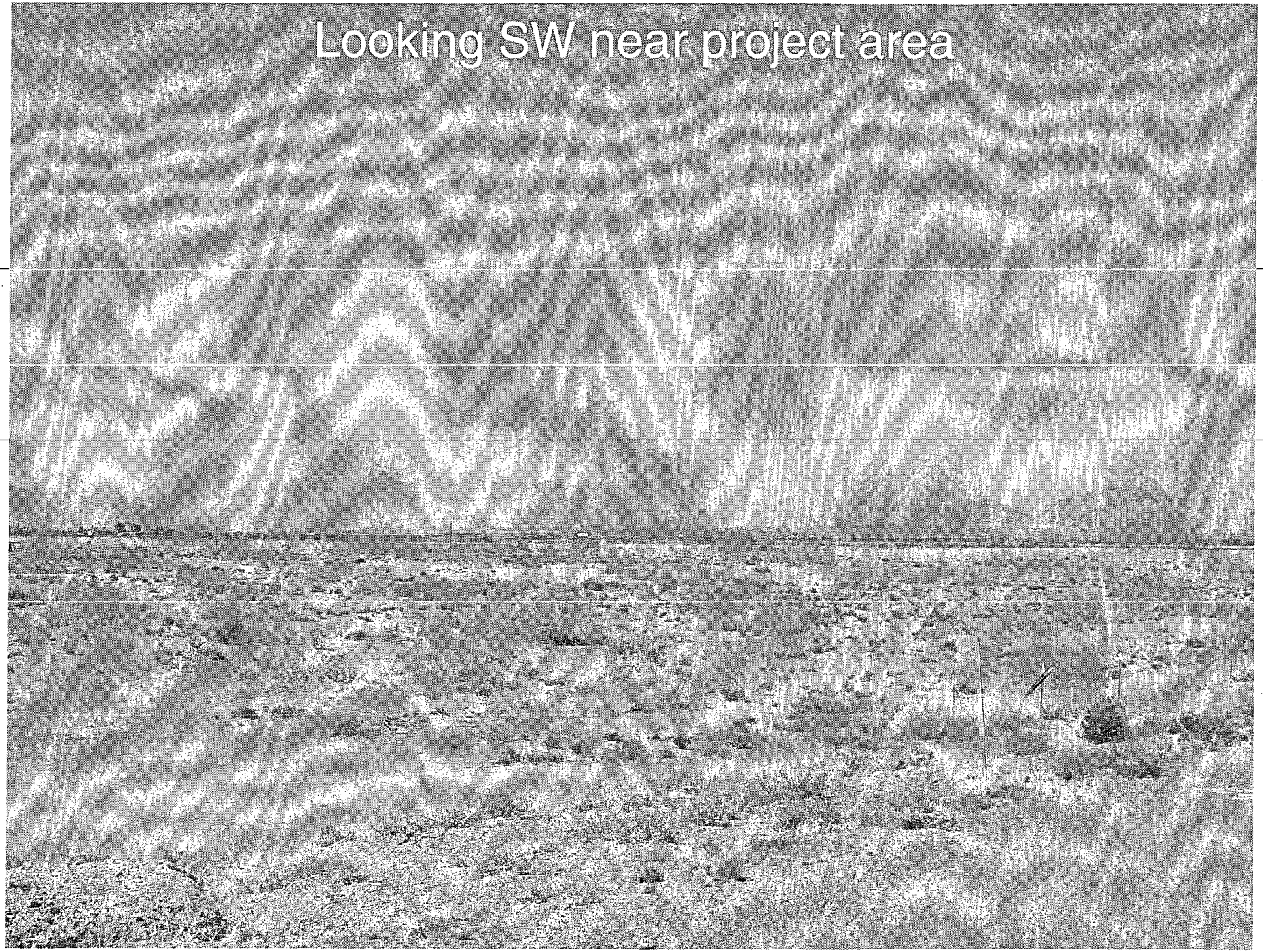
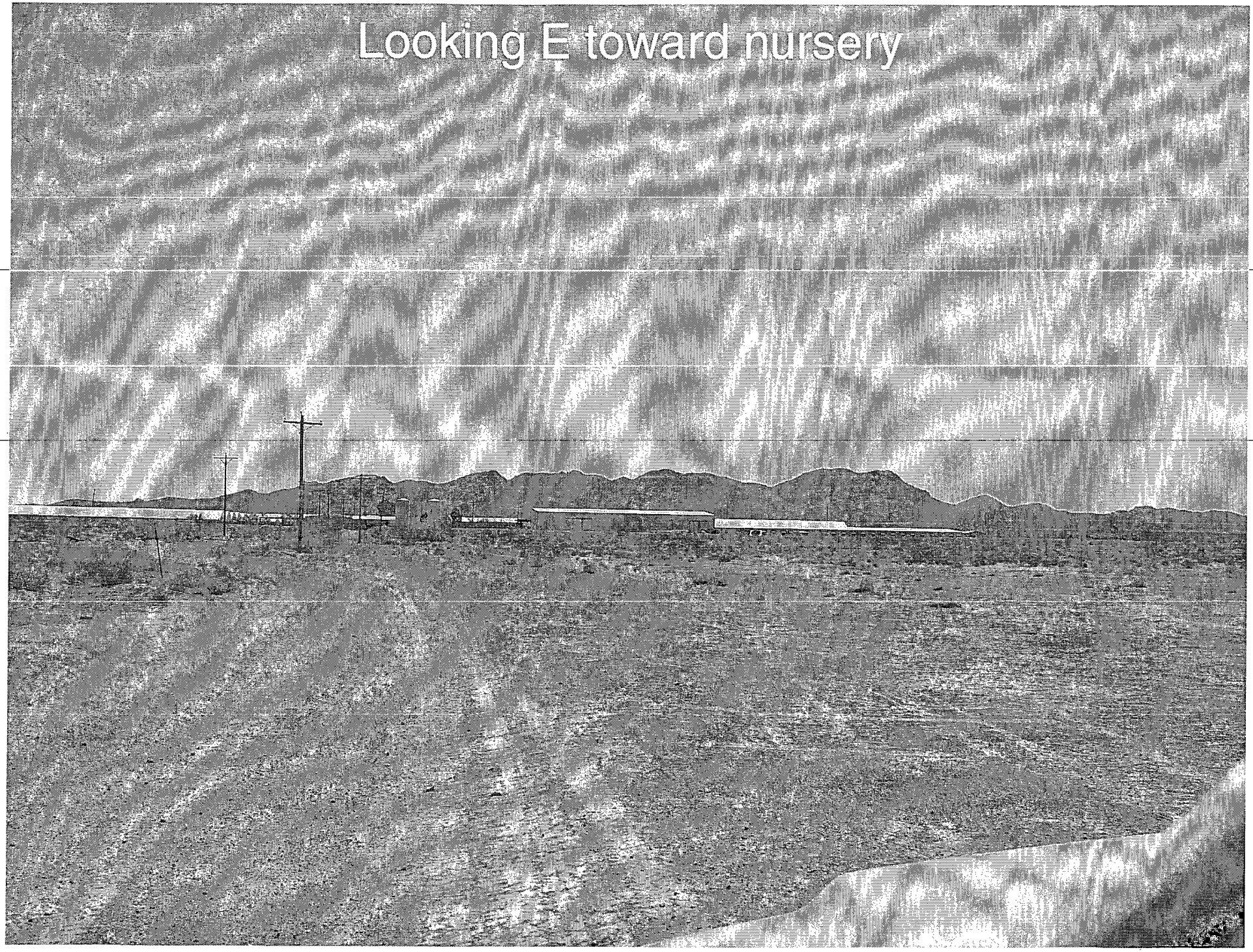
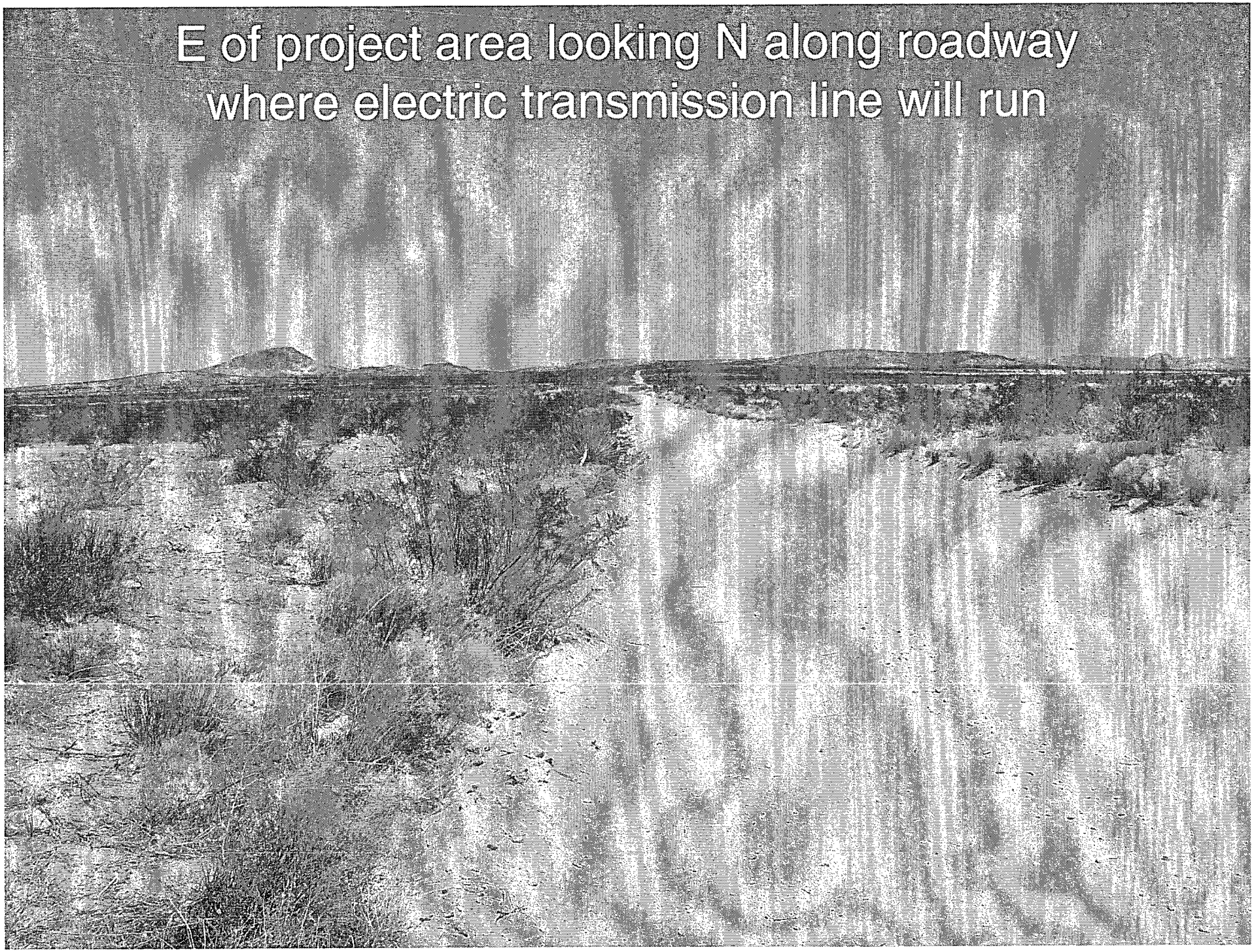
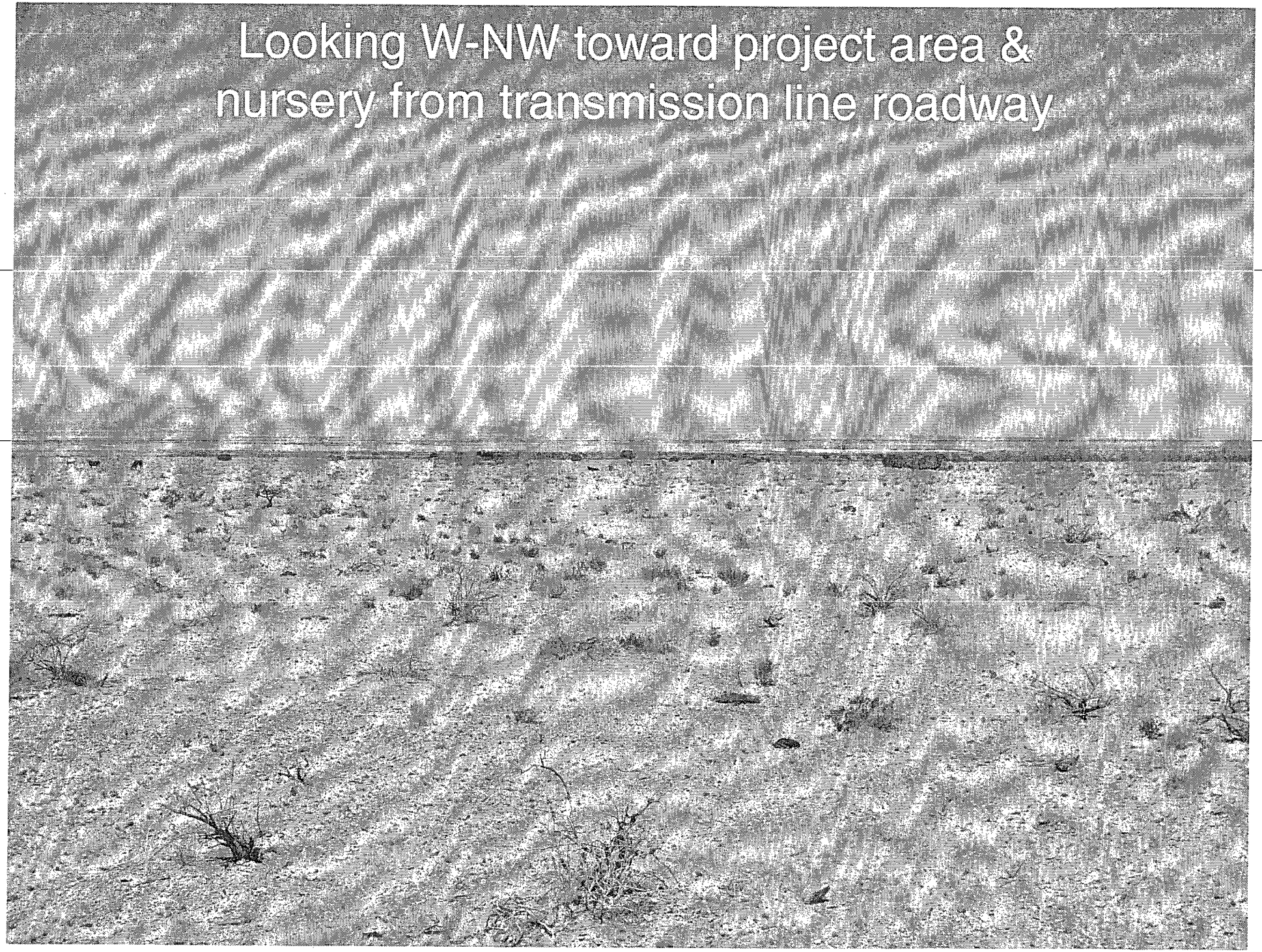

Looking E-SE toward nursery

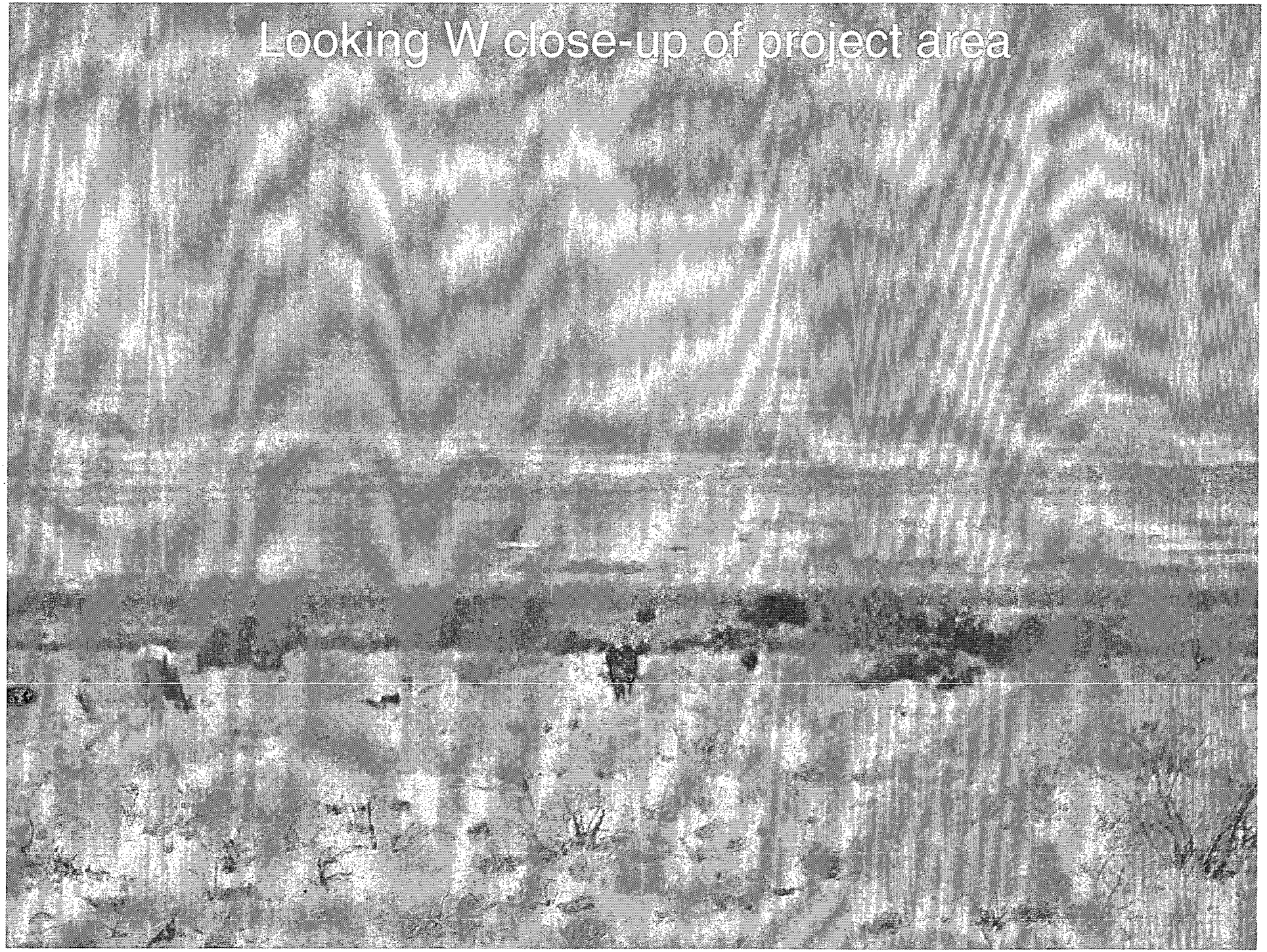

Looking SW near project area

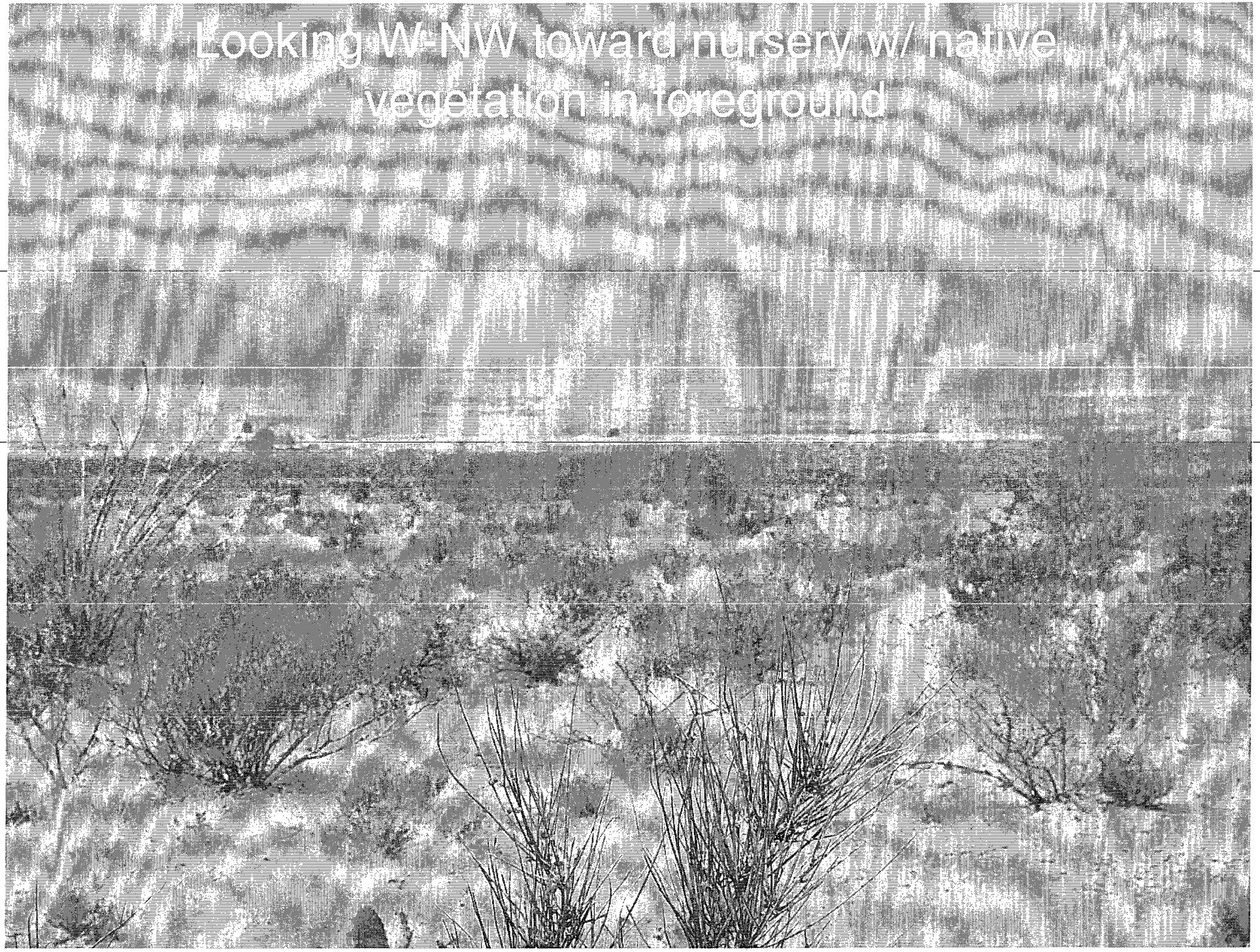
Looking S-SW across project area in foreground
Approx. 2,592 acres of private land lease located on Sections 7, 11-14, 18 & 23 of T 25 S R 19 W (NMPM). BLM administers the geothermal rights of ~ 2,500 acres under lease No. NM-108801 & NM-034790 (Los Lobos Renewable Power, LLC)


Looking E toward nursery


E of project area looking N along roadway
where electric transmission line will run


Looking W-NW toward project area &
nursery from transmission line roadway


Looking W close-up of project area


Looking W-NW toward nursery w/ native vegetation in foreground

New Mexico Oil Conservation Division
Geothermal Regulations

Chapter 71: Energy & Minerals
Article 5: Geothermal Resources Conservation Act
"Chapter 71, Article 5 NMSA 1978"

71-5-2.1. Exclusion; incidental loss or extraction of heat. When the application of potable water to a beneficial use involves the incidental loss or extraction of heat, and the water is 250 degrees Fahrenheit or less, then that heat is not a geothermal resource for which a royalty is due. In such a case, the use is not governed by laws related to geothermal resources but is simply governed by Chapter 72 NMSA 1978.

Title 19: Natural Resources & Wildlife
Chapter 14: Geothermal Power
"Title19, Chapter 14 NMAC 1983"
Recompiled 12/31/01

New Mexico Water Quality Control Commission (WQCC) Regulations

Title 20 Environmental Protection

Chapter 6 Water Quality

Part 2 Ground & Surface Water Protection

§ 20.6.2 NMAC, et seq.

Effective: 7/16/06

Title 20 Environmental Protection

Chapter 6 Water Quality

Part 4 Standards for Interstate & Intrastate Surface Waters

§ 20.6.4 NMAC, et seq.

Effective: 7/17/05

EPA delegated OCD primacy over UIC Program for Class I, III, IV and V (Geoseq. & Geotherm.) UIC Wells July 11, 1983 §1422 48FR31640

OCD delegated authority by Water Quality Control Commission (WQCC) over State UIC Program July 21, 1989 § 20.6.2.5000-5299 NMAC

Geothermal Well Locations

Sections 7, 12 & 18, T 25 S, R 19 W
(Hidalgo County) 10 mi. S of I-10 on CR-338
(East of CR-338 ~ 1000' W Greenhouse #3)

Class V Geothermal Injection Wells

51-07 NW/4, NE/4 of Section 7, 169.2 FNL 2406.9 FEL
53-12 SW/4, NE/4 of Section 12, 1574.8 FNL 3350 FWL
42-18 NE/4, NW/4 of Section 18, 1307 FNL 2123 FWL

Production or Development Wells

13-07 SW/4, NW/4 of Section 7, 3781 FSL 530 FWL
33-07 SE/4, NW/4 of Section 7, 3721.2 FSL 1789.4 FWL
45-07 NE/4, SW/4 of Section 7, 2360 FSL 2278.2 FWL
47-07 SE/4 SW/4 of Section 7, 1219.1 FSL 2266.3 FWL
53-07 SW/4 NE/4 of Section 7, 3775.3 FSL 3052.1 FWL

BRIEF HISTORY OF PROJECT

- Geothermal application received 5/13/2008
- Application deemed "Administratively Complete" on 5/28/2008
- Public comments received from AmeriCulture on 7/11/2008
- OCD issues notice of public hearing on 10/1/2008 for 12/1/2008 hearing at Lordsburg Special Events Center
- Pre-hearing statements requested from applicant, public commenter & OCD on 11/13/2008

SCOPE OF PROJECT

- Portable "Binary-Cycle" power generation units (~ 50 @ 225 kW ea.) deployed at 15 MWe Geothermal Power Plant (5 Production/ Development Wells & 3 Class V Geothermal Injection Wells @ target depth of 3,400 ft. bgl)
- Plant will produce 11 MWe for Phoenix Mkt. over 20-yr. purchased power agreement w/ Salt River Project (AZ Utility) to power 5,500 homes, but the geothermal resource may allow production of about 2x much energy *(Albuquerque Journal- 7/3/2008)*.
- Production wells produce ~ 15k gpm of 250–300 °F water w/ TDS ~ 1,300 mg/L from the Horquilla Fm. (geothermal carbonate reservoir) @ TD 3400 ft. bgl. Water routed in parallel into portable binary-cycle units.

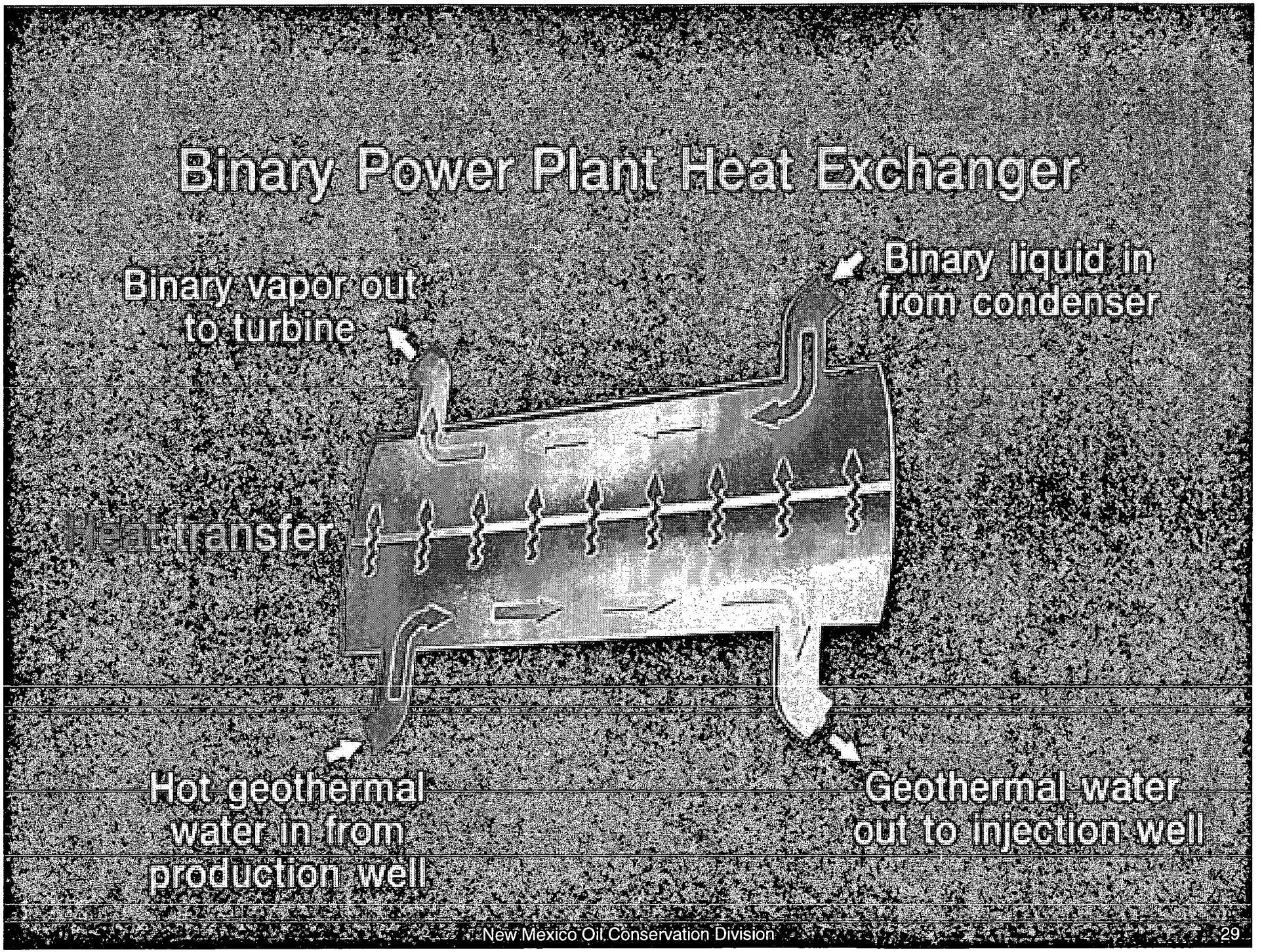
SCOPE OF PROJECT

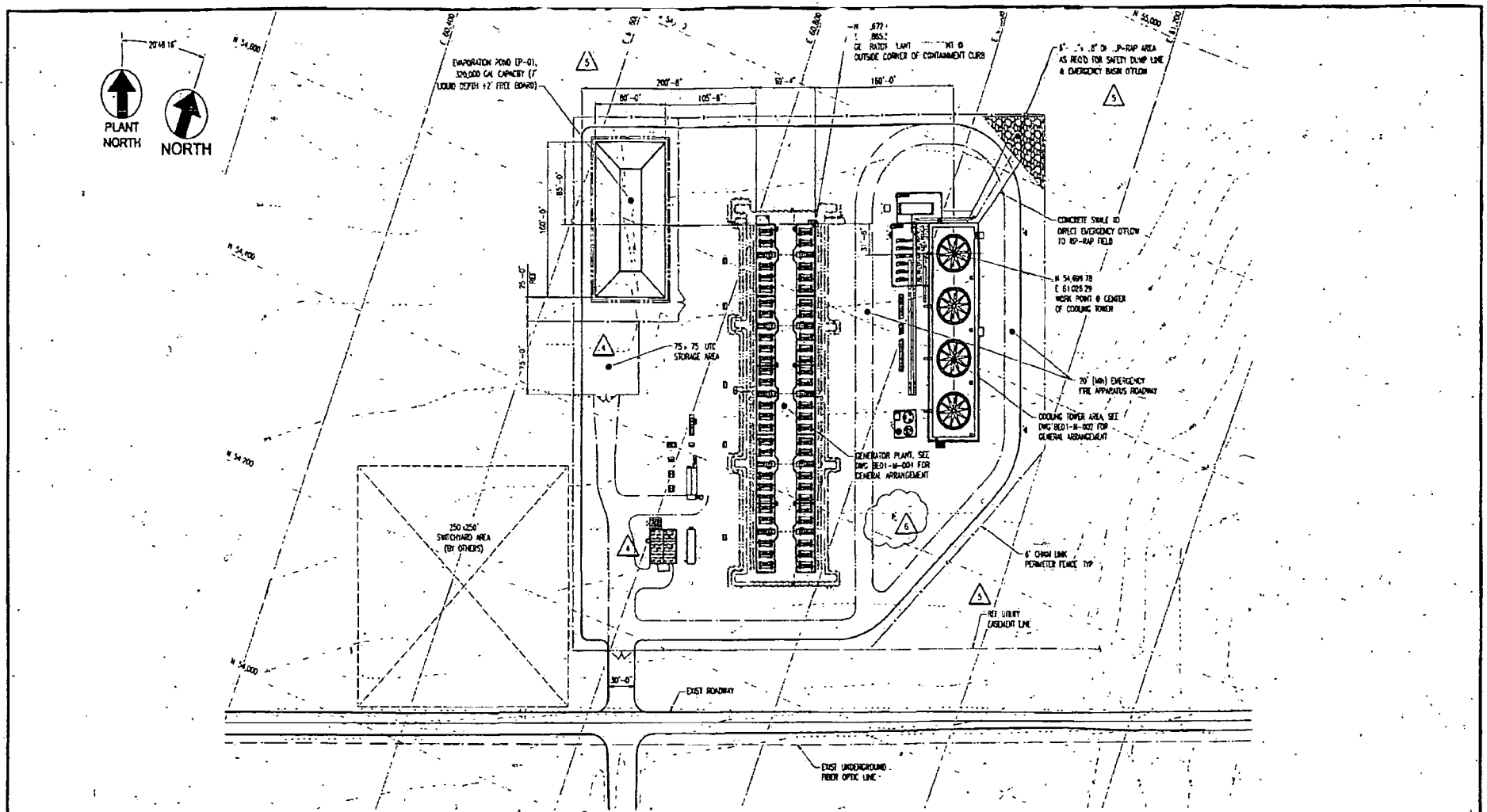
- ~ 1500 gpm shallow GW (makeup water) w/ TDS ~ 300 mg/L cycled into cooling tower unit (removes heat from hot condensate).
- ~ 425 gpm blow-down effluent w/ remainder of produced water (180–225 °F) injected into geothermal reservoir (~3400 ft bgl) via each Class V Injection Well @ 4–5k gpm @ avg. surface injection pressure of 75 psi
- Lined evaporation pond temporarily stores excess cooling tower blow-down fluid during emergencies
- Cooling tower blow-down fluid diluted w/ spent produced water must meet WQSs before injection
- Discharge permit addresses well construction, operation, monitoring, testing of the wells, assoc. surface facilities, and provides a contingency plan in the event of accidental spills, leaks, & other accidental discharges to protect fresh water.

SCOPE OF PROJECT

- Spent produced geothermal water is routed into Class V injection wells to replenish the reservoir & possibly be reused
- All drilling & well construction must conform to OCD Geothermal Regulations
- Nearest landfill to facility is at the Butterfield Trail Regional Landfill 15 mi. W of Deming, NM, scheduled to be completed Spring of 2009. OCD may approve other waste facilities

Binary Power Plant Heat Exchanger





GENERATING AREA SITE PLAN

0 25 50 100

SCALE: 1" = 50'-0"

NOTES

1. FOR EQUIPMENT, SEE EQUIPMENT LIST
2. PROJECT DATUM EL 100'-0" = 5071'-0"
3. THIS IS AN UNMANNED SITE WITHOUT PERMANENT WATER OR RESTROOM FACILITIES

NO.	DATE	BY	APP	REVISION	REFERENCE DRAWING	
5	7-7-08	TH	BH	EXPANDED PERIMETER, ENLARGED POND GENERAL UPDATE		
4	6-19-08	TH	BH	REV'D DATUM PER AS BUILT UFC STORAGE AREA, MOVED MAINTENANCE BLDG		
3	5-1-08	TH	BH	REV'D WEST PONDS - RESIZED & RELOCATED EVAP POND		
2	3-15-08	TH	BH	GENERAL UPDATE	SITE GRADING PLAN	BE01-CV-100
1	5-1-08	TH	BH	GENERAL UPDATE	COOLING TOWER AREA PLAN GA	BE01-M-002
6	7-10-08	TH	BH	RELOCATED MTORMWT	GENERATOR AREA PLAN GA	BE01-M-001

CONFIDENTIAL

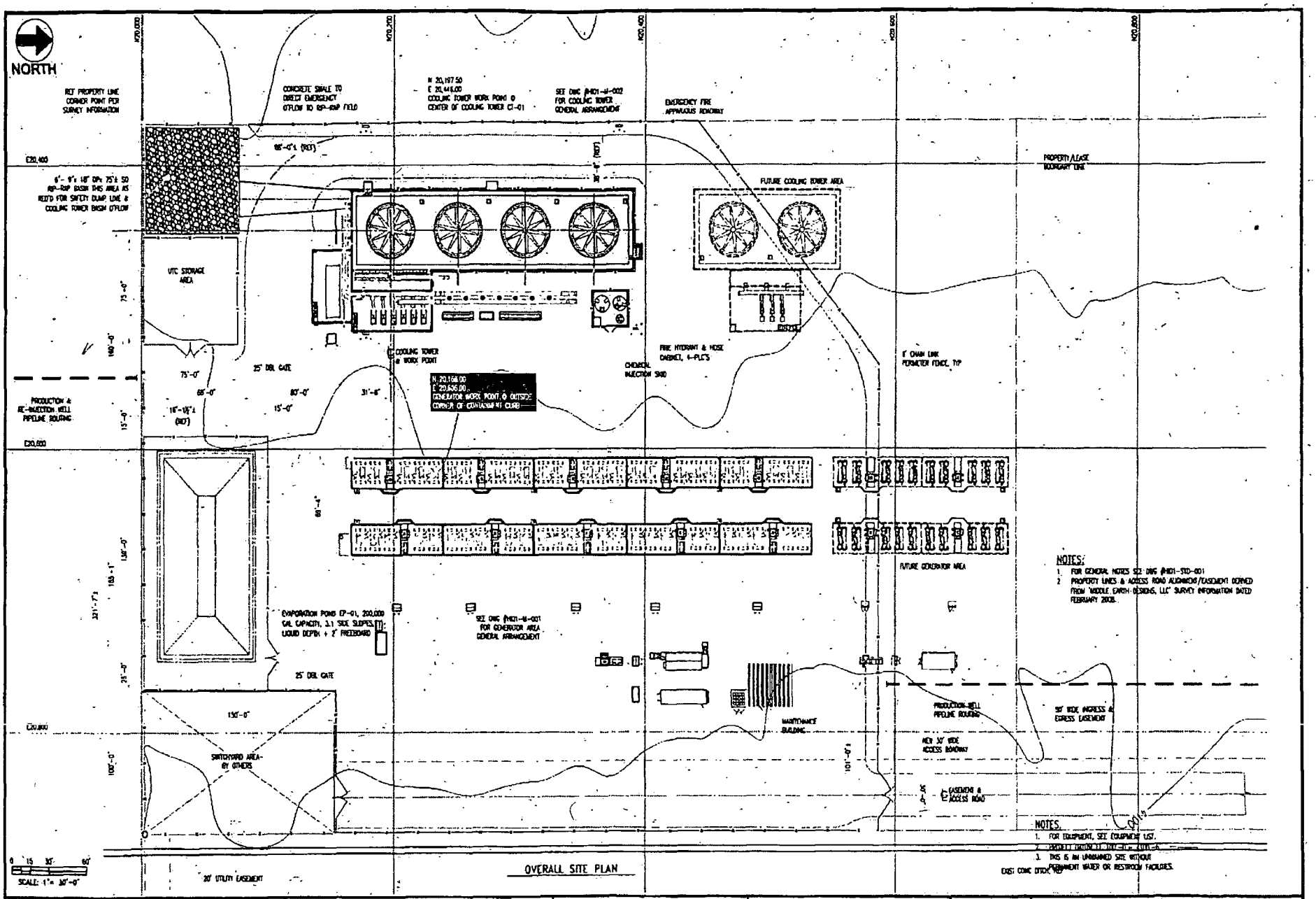
Intermountain Consumer Professional Engineers, Inc.
CONSULTING ENGINEERS
1146 S. MOUNTAIN VIEW DR.
MIDWAY, UTAH 84049
(435) (888) 555-1111 FAX (801) 555-0000

Des. by	TH	4-21-08
Drawn by	TH	4-21-08
Chk'd by	NH	4-21-08
Engr.	NH	4-21-08
Appr.		Date
Mgr.		Date

THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
GENERAL ARRANGEMENT
GENERATING AREA SITE PLAN

SCALE	DRAWING NO.	REVISION
1"=50'-0"	BE01-SP-100	6

PROJECT NO. 443-005



OVERALL SITE PLAN

NO.	DATE	BY	APP	REVISION
2	7-17-08	IH	EH	ISSUED FOR PERMIT
1	6-25-08	IH	EH	GENERAL UPDATE
0	05/26/08	DCP	EH	ISSUED FOR CONSTRUCTION

REFERENCE DRAWING

NUMBER

CONFIDENTIAL

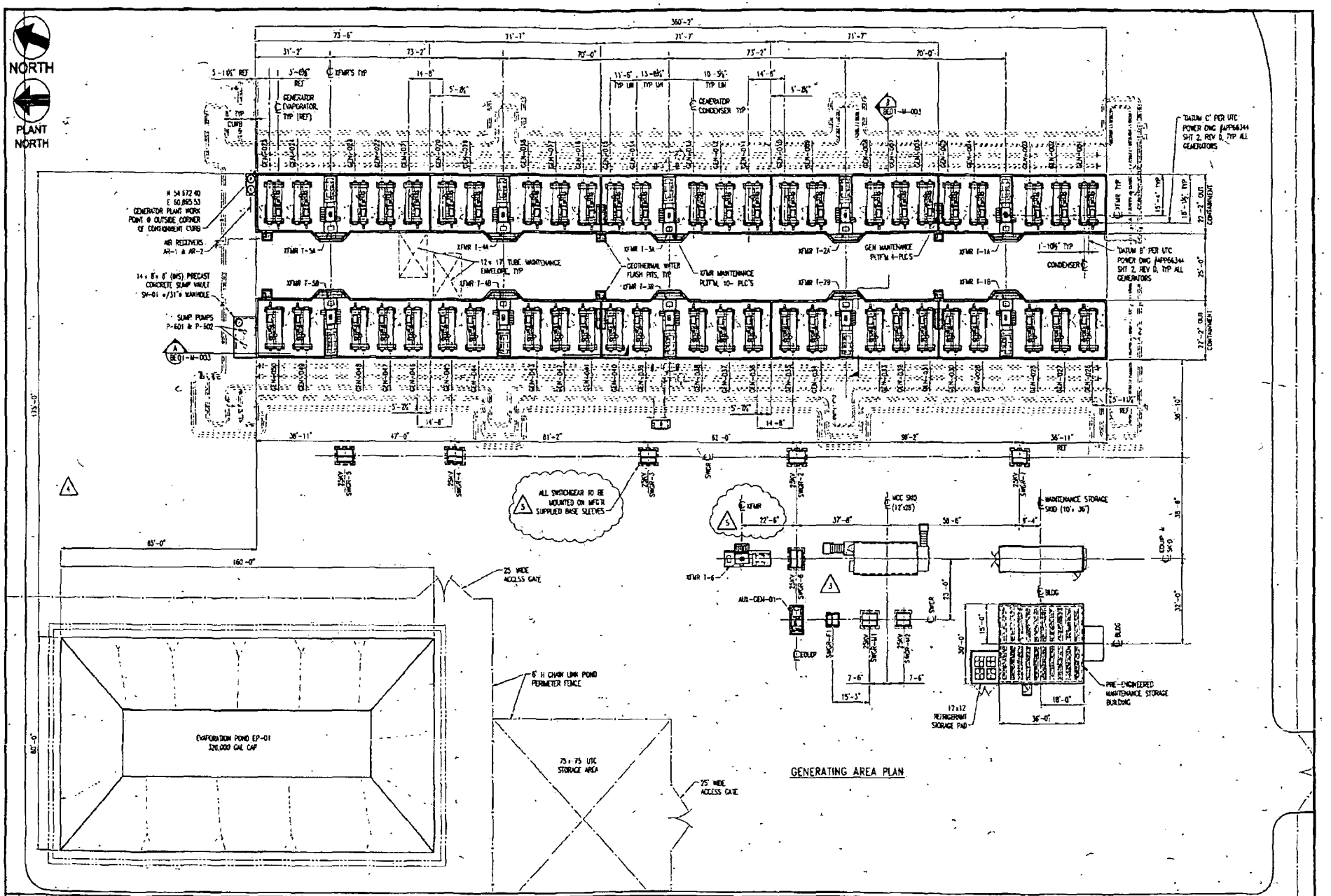
DCP		
IH	7-3-08	
EH	7-16-08	
EH	7-16-08	
EH	7-17-08	

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GENERAL ARRANGEMENT
GENERATING AREA SITE PLAN

1"=30'-0"

443-006

H101-SP-100 2



NO.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER
5	7-30-08	TH	BH	REVISED ASS SWGR VTC, RELOCATED XFMR T-1A		
4	7-7-08	TH	BH	RELOCATED & RESIZED POND		
3	6-19-08	TH	BH	SWGR NUMBERING, 480W BLDG AREA, PLN'D CB-N, METERING & SCADA		
2	5-5-08	TH	BH	REV'D POND, CONC, LOCATED XFMR'S & GENERATORS, REV'D PROPANE STATIONS		
1	5-15-08	BH	BH	REV'D PROPANE VAPORIZERS, MOVED FLASH PIPE, GENERAL UPDATE	SITE PLAN	BE01-SP-100
0	4-21-08	TH	BH	ISSUED FOR PERMIT	COOLING TOWER AREA PLAN EA	BE01-M-002

CONFIDENTIAL

Intermountain Consumer Professional Engineers, Inc.
CONSULTING ENGINEERS
1141 E. SOUTH UNION AVE.
MIDVALE, UTAH 84047
PHONE (801) 256-2121 FAX (801) 566-4399

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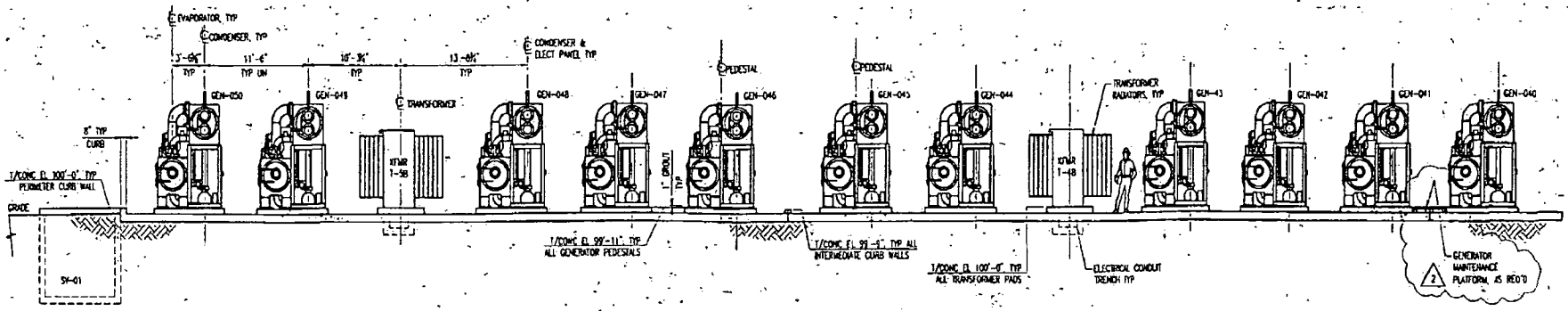
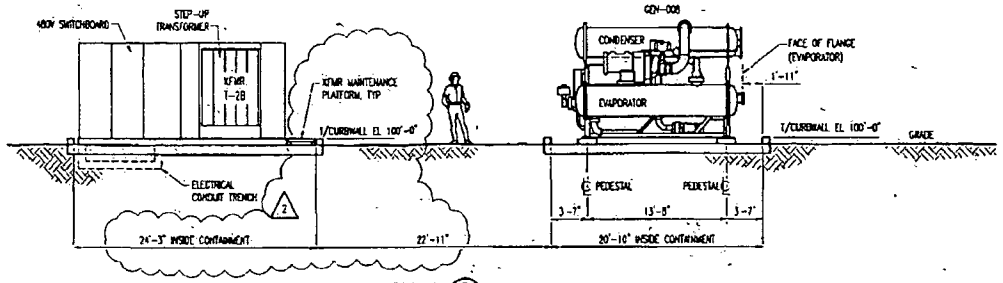
Designed By	DH	4-21-08
Drawn By	DH	4-21-08
Checked By	BH	4-21-08
Approved By	BH	4-21-08

THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
GENERAL ARRANGEMENT
GENERATING AREA PLAN

SCALE: 1/16" = 1'-0"
PROJECT NO. 443-005
DRAWING NO. BE01-M-001
REVISION 5



SECTION A
BE01-M-001



SECTION B
BE01-M-001

NO.	DATE	BY	APP	REVISION
2	6-6-08	TH	BH	GENERAL UPDATE
1	5-19-08	AA	BH	ISSUED FOR CONSTRUCTION
0	4-21-08	TH	BH	ISSUED FOR PERMIT

REFERENCE DRAWING

NUMBER

CONFIDENTIAL

Intermountain Consumer Professional Engineers, Inc.
CONSULTING ENGINEERS
1140 E. SOUTH UNION AVE.
MIDVALE, UTAH 84047
BUS (801) 255-3111 FAX (801) 566-6399

Des. By	O'LEARY	4-21-08
Drawn By	O'LEARY	4-21-08
Ck'd By	BH	4-21-08
CHK'D	BH	4-21-08
APPD		
APPR		

THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
GENERAL ARRANGEMENT
GENERATING AREA SECTIONS

SCALE: 3/16" = 1'-0"
Project No. 443-005

DRAWING NO. BE01-M-003

REVISION 2

WQCC DISCHARGE PERMIT APPLICATION PROCESS § 20.6.2 NMAC, et seq.

OCD discharge permit (5 Yr.) typical process:

1. Submit geothermal discharge permit application w/ processing fee ($100).
2. OCD reviews application to determine whether application is "Administratively Complete" within 15 days of receipt.
3. Administrative completeness determination starts public notice process w/ draft permit issuance (30-day public notice in regional & local newspapers), notification(s), signage, etc.

WQCC DISCHARGE PERMIT APPLICATION PROCESS § 20.6.2 NMAC, et seq.

OCD discharge permit (5-Yr.) typical process:

4. Final discharge permit generally issued within 60-days of administrative completeness, unless public comments are received that warrant a public hearing under an OCD Hearing Examiner.

5. At completion of hearing, based on the Hearing Examiner's conclusion(s), the Division may issue the final permit, which may include additional conditions.

6. The discharge permit fee is $1700 renewable every 5-years.

OCD DISCHARGE PERMIT

What does it do?

- Prevents contamination of surface (storm water) and ground water by evaluating chemical process areas relative to storm water pollution prevention infra-structure, monitoring at or near potential point source areas where treatment, storage, and spills/leaks may occur.
- Prevents the owner/operator from discharging above WQSs to surface and ground water.
- Provides for OCD inspections with immediate modifications to the permit to protect the environment as conditions warrant.

OUTSTANDING WQCC ISSUES

The following issues have not been sufficiently addressed in the application:

Ground Water & Surface Water:

- Fresh water appears to be present from water table to depth of injection w/ no cap rock or impermeable zones separating fresh from non-fresh water zones. Consequently, cooling tower blow-down with spent produced water may need to be recycled, reused or treated to meet WQSs before any injection is allowed. Currently, the applicant believes that the Nalco paper w/ proposed chemicals & cooling tower blow-down & dilution with spent produced water (~ 1300 mg/L TDS) will meet WQSs & protect wildlife before injection. OCD will require WQ testing in Horquilla Fm. @ Prod. & Injection wells to establish background conditions in geothermal reservoir.

- Daily testing of the cooling tower blow-down & produced spent water stream to characterize & verify that fluid may be reused, stored and/or that it meets WQSs or needs treatment before injection will be required.

OUTSTANDING WQCC ISSUES

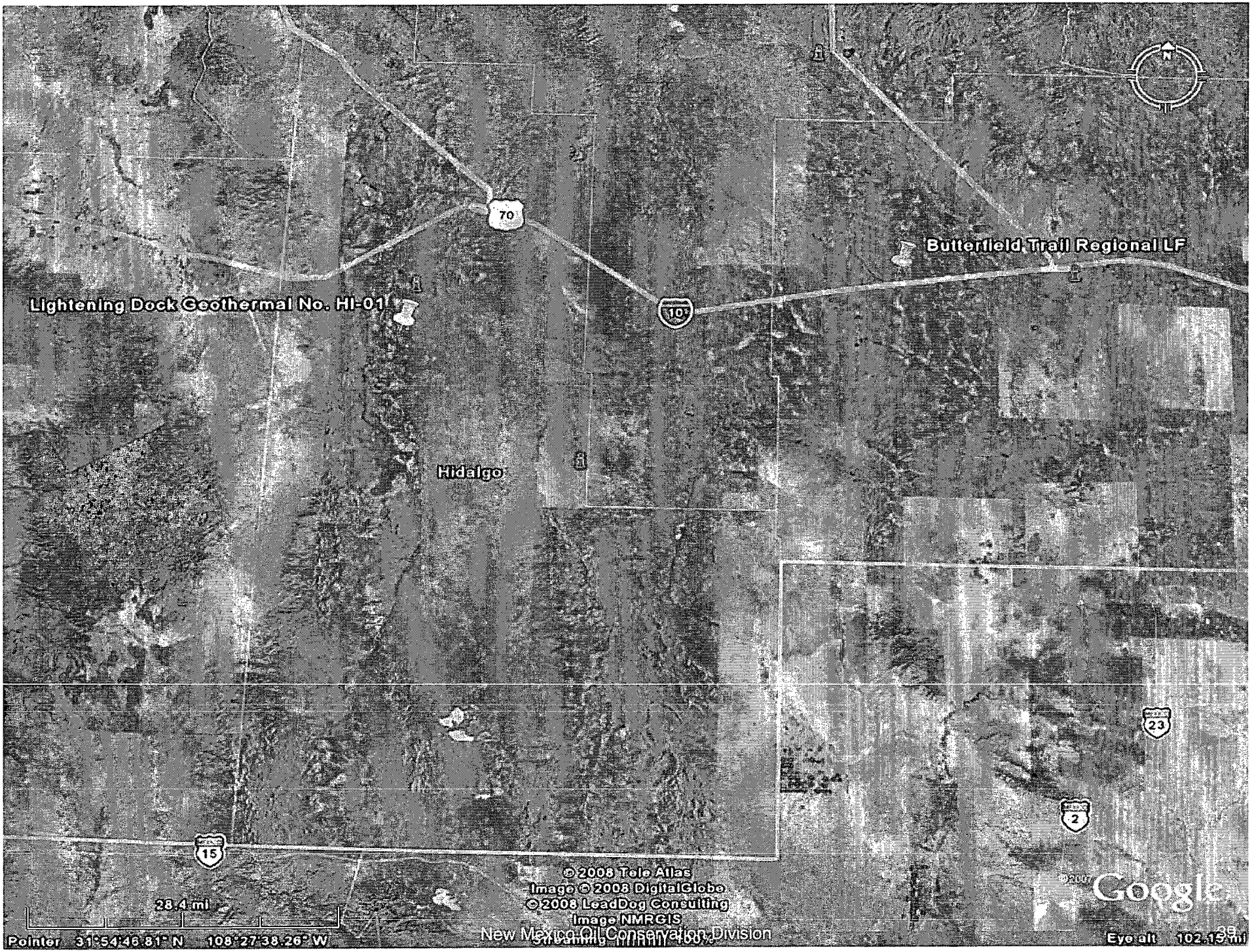
The following issues have not been sufficiently addressed in the application:

Ground Water & Surface Water:

- Water table monitoring of seasonal flow direction & hydraulic gradient w/ upgradient & downgradient water quality monitoring from potential point source locations will be required to monitor for environmental impacts.
- Focus on hydrogeologic characterization & water quality sampling of aquifer(s) (if possible) during drilling and well development activities.
- Proper ASTM field geotechnical applications must be applied during construction.

Waste:

- Proper disposition of all wastes.



New Mexico Oil Conservation Division

PROJECT GOING FORWARD

If the geothermal power generation plant is permitted by the OCD, the following will occur:

- OCD sends final version of discharge permit w/ public hearing considerations to applicant for signature & return w/ final fee of $1700. The OCD must receive a final signed DP w/ final fee.
- Well bonds or financial assurance must be approved via letter from OCD.
- Once bonds are approved, OCD Artesia may approve well APDs for the Administrative Record.
- Geothermal exploration drilling & well testing may begin w/ OCD geothermal forms documentation of geothermal resource per well for verification & documentation of well construction, hydrogeology, depth, temperatures w/ verification that a high-temp. geothermal reservoir(s) exists.

PROJECT GOING FORWARD

If the geothermal power generation plant is permitted by the OCD, the following will occur:

Geothermal Production/Injection Wells

- If a high-temp. geothermal reservoir(s) exists & owner/operator wishes to produce the reservoir & inject, signed Forms G-104 and G-112 per well must be submitted and approved by the OCD Santa Fe before geothermal well production & injection may begin.

- Other agencies (i.e., USGS & NMBGM) may receive copies of geothermal forms or be directed to OCD Online "GTHT-1" for forms & records.

- Injection wells must comply with WQCC and OCD geothermal regulations, while production/development wells must comply with OCD geothermal regulations.

NM RENEWABLE ENERGY PROGRAM

Mr. Stephen Lucero

(505) 476-3324

Stephen.Lucero@state.nm.us

NM Energy Conservation & Management Division

1220 S. St. Francis Dr.

Santa Fe, New Mexico 87505

Office: (505) 476-3024

Fax: (505) 476-3462

Websites: www.emnrd.state.nm.us/ecmd

www.cleanenergynm.org

NMED LT GEOTHERMAL CONTACT INFORMATION

Mr. John Hall
(505) 827-1049
John.Hall@state.nm.us

NM Environment Department
Harold Runnels Building Room N2250
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502
Phone: (505) 827-2900
Fax: (505) 827-2965

Website:
www.nmenv.state.nm.us/gwb/gwqbhome.html

OCD HT GEOTHERMAL CONTACT INFORMATION

Mr. Carl Chavez

(505) 476-3491

CarlJ.Chavez@state.nm.us

NM Oil Conservation Division

1220 S. St. Francis Drive

Santa Fe, New Mexico 87505

Office: (505) 476-3440

Fax: (505) 476-3462

Website: www.emnrd.state.nm.us/ocd

Go to: "OCD Online, Imaging, Administrative Order.... (GTHT-1)"

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

October 1, 2008

Mr. Steve Brown
Raser Power System, LLC
5152 North Edgewood Drive, Suite 375
Provo, Utah 84604

Re: Lightning Dock Geothermal HI-01 Discharge Permit Application (GT-1)
Public Hearing December 1, 2008 9:00 a.m.
Special Events Center
502 W 2nd Street
Lordsburg, NM 88045
(575) 542-8844 (call for directions)

Dear Mr. Brown:

The Oil Conservation Division (OCD) of the New Mexico Energy Minerals and Natural Resources Department (EMNRD) has determined that there is a substantial public interest in the geothermal discharge permit application filed on behalf of Raser Power System, LLC, which warrants a public hearing under 20.6.2 NMAC.

A letter from Americulture, Inc. letter (letter), dated July 11, 2008, included issues under the Water Quality Act. A copy of the letter is attached. The OCD was delegated authority by the Water Quality Control Commission for the protection of surface and ground water on July 21, 1989. The hearing will focus specifically on Water Quality Act issues. If it is determined that there are OCD-regulated high temperature (>250 °F) geothermal reservoir issues that fall under the authority of the OCD, a separate hearing may be required under OCD Geothermal Regulations.

Pursuant to Subsection K of 20.6.2.3108 NMAC, the OCD shall give notice of the hearing at least 30 days prior to the hearing in accordance with Subsection H of 20.6.2.3108 NMAC. A copy of the notice of public hearing is attached.

Please contact Carl Chavez of my staff at (505)-476-3491 or E-mail CarlJ.Chavez@state.nm.us if you have any questions.

Sincerely:

Wayne Price
Environmental Bureau Chief

cc: Mr. Damon Seawright, Americulture, Inc., 25 Tilapia Trail, Animas, NM 88020
Persons on Facility-Specific Mailing List

Enclosures: Americulture, Inc. Letter
Notice of Public Hearing

NOTICE OF PUBLIC HEARING

State of New Mexico
Energy, Minerals and Natural Resources Department,
Oil Conservation Division

Discharge permit for the Lightning Dock Geothermal No. 1 (GT-001)

The State of New Mexico, through its Oil Conservation Division, hereby gives notice that the division will conduct a public hearing on **Monday, December 1, 2008** beginning at 9:00 a.m. at the Special Events Center, 502 W. 2nd Street, in Lordsburg, New Mexico to consider the application for a discharge permit for the Lightning Dock Geothermal No. 1 geothermal power plant. The application was filed by Raser Power System, LLC, 5152 North Edgewood Drive, Suite 375, Provo, Utah 84604.

The Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe geothermal power plant (5 production/development wells & 3 Class V geothermal injection wells) will be located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant will be within the Animas River Valley approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). Development wells are located within the SW/4; NW/4; and NE/4 of Section 7. Class V injection wells will be located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of about 3,400 feet below ground level. High temperature geothermal water from development wells will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 350 gpm of shallow low temperature geothermal reservoir water with a TDS concentration of approximately 300 mg/L will be mixed with cooling tower chemical additives and cycled through the cooling tower unit. All of the cooling tower blow-down effluent (180~225 °F) will be injected into the Class V injection wells with the exception of effluent that is routed back into a lined evaporation pond during operation or cessation of operation. Each Class V well will have a maximum injection rate of between 4,000 to 5,000 gpm at an average pressure of about 75 psig. The flow rate of each development or Class V well may be subject to the correlative rights of any future geothermal operators in the high temperature geothermal reservoir. Lined evaporation ponds at the surface will temporarily store any excess development or well test water for injection into the high temperature geothermal reservoir. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated

surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The division will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in requesting further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact Wayne Price, Environmental Bureau Chief of the Oil Conservation Division, at 1220 S. St. Francis Drive, Santa Fe, NM 87505, (505) 476-3490. The discharge permit application and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday. The discharge permit application and draft permit are also posted on the division's web site: http://www.emnrd.state.nm.us/ocd/ENV-DraftPublicEtc.htm.

The rule governing public participation at the hearing is 20.6.2.3110 NMAC. Any person who wishes to present technical evidence at the hearing must, at least 10 days before the hearing, file with the division and serve on the applicant a statement of intent to present evidence. The filing may be mailed to the division at the above address, or faxed to the division at (505) 476-3462, attention Wayne Price. The statement must include the name of the person filing the statement; indicate whether the person supports or opposes the proposed discharge plan proposal; give the name of each witness; estimate of the length of the direct testimony of each witness; provide a list of exhibits, if any, to be offered into evidence at the hearing; and provide a summary or outline of the anticipated direct testimony of each witness. A person who does not file a statement of intent to present evidence may present a general non-technical statement in support of or in opposition to the proposed discharge plan. At the hearing, all persons shall be given a reasonable chance to submit data, views or arguments orally or in writing and to examine witnesses testifying at the hearing.

Unless otherwise allowed by the hearing officer, testimony shall be presented in the following order: testimony by and examination of the applicant supporting the facts relied upon to justify the proposed discharge plan and demonstrate that it meets the requirements of the regulations; testimony by and examination of technical witnesses supporting or opposing approval, or supporting or opposing conditional approval, in any reasonable order; testimony by the general public; and rebuttal testimony, if appropriate.

The hearing officer shall issue a report within thirty days after the close of the hearing record. The report shall be served on the applicant, the division, and all persons who

request copies in advance in writing. The report will also be available for public inspection at the division's office in Santa Fe and at the Artesia district office, 1301 West Grand Ave., Artesia, NM 88210. The director shall issue a decision in the matter no later than thirty days after receipt of the hearing report. The decision shall be served on the applicant, the division, and all persons who request copies in writing. The decision will also be available for public inspection at the division's office in Santa Fe and at the Artesia district office and on the division's website.

If you are a person with a disability who is in need of a reader, amplifier, qualified sign language interpreter, or any other form of auxiliary aid or service to attend or participate in the hearing, please contact Mr. Wayne Price at (505) 476-3490 or through the New Mexico Relay Network (1-800-659-1779) at least ten days prior to the hearing, so the division can make reasonable accommodations.

Para obtener más información sobre esta solicitud en español, sírvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México 87505 (Contacto: Dorothy Phillips, 505-476-3461).

GIVEN under the Seal of New Mexico Oil Conservation Division at Santa Fe, New Mexico, on this 1st Day of October 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

Mark Fesmire, Director

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

May 28, 2008

Mr. Steve Brown
Lightning Dock Geothermal No. HI-01
5152 North Edgewood Drive Suite 375
Provo, Utah 84604

Re: Lightning Dock Geothermal No. HI-01 Discharge Permit (GT-001)
Near Animas, NM
Hidalgo County, New Mexico

Dear Mr. Brown:

The New Mexico Oil Conservation Division (NMOCD) has received Los Lobos Renewable Power, LLC's (owner/operator) application, filing and permit fees, on the behalf of Lightning Dock Geothermal No.1 (HI-01), dated May 12, 2008, for authorization to install 3 Class V Geothermal Injection Wells, 5 Production or Development Wells, and a "Binary Cycle" 15 MWe power plant with expansion capability. The proposed discharge site is located in the NE ¼ of the SW ¼ of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The submittal provided the required information in order to deem the new application "administratively" complete.

Therefore, the July 2006 New Mexico Water Quality Control Commission regulations (WQCC) notice requirements of 20.6.2.3108 NMAC must be satisfied and demonstrated to the NMOCD. Geothermal discharge water shall not be produced, discharged or reinjected until the NMOCD notice period passes, and NMOCD sends and receives back from the owner/operator a signed discharge permit.

If there are any questions regarding this matter, please do not hesitate to contact me at (505) 476-3491 or carlj.chavez@state.nm.us. On behalf of the staff of the NMOCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Carl Chavez
Environmental Engineer

CC/cc

xc: OCD District Office

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.3106 NMAC); the following discharge permit application(s) has been submitted to the Director of the New Mexico Oil Conservation Division ("NMOCD"), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 476-3440:

(GT-001) Lightning Dock Geothermal No. 1 (HI-01) LLC. Mr. Steve Brown, 5152, North Edgewood Drive Suite 375, Provo, Utah 84604 has submitted an application for a new discharge permit for the Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe Geothermal Power Plant (5 Production/Development Wells & 3 Class V Geothermal Injection Wells) located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant is located approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). The development wells are located within the SW/4; NW/4; and NE/4 of Section 7. The Class V Wells are located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of 3400 feet below ground level. Geothermal water will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 1500 gpm of shallow ground water with a TDS concentration of approximately 300 mg/L will be cycled through the cooling tower unit. Of this, approximately 425 gpm of cooling tower blow-down effluent along with the remainder of produced water (180~225 °F) will be injected into the geothermal reservoir at a maximum injection rate of between 4,000 to 5,000 gpm, and average pressure of about 75 psig per Class V Well. Lined evaporation ponds at the surface will temporarily store any excess produced or well test water for reinjection into the geothermal

reservoir. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The NMOCD has determined that the application is administratively complete and has prepared a draft permit. The NMOCD will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact the Environmental Bureau Chief of the Oil Conservation Division at the address given above. The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of at least thirty (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines that there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

Para obtener más información sobre esta solicitud en español, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México (Contacto: Dorothy Phillips, 505-476-3461)

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 28th Day of May 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

Mark Fesmire, Director

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, March 12, 2009 5:51 PM
To: Bonham, Sherry, EMNRD
Cc: Perrin, Charlie, EMNRD; 'Jay Hamilton'; 'mike.hayter@rasertech.com'; 'Patrick_Barnes@wellsfargois.com'
Subject: Lightning Dock Geothermal No. 1 (GTHT-001) APD Submittals
Attachments: APD from Los Lobos 3-12-2009.pdf

Sherry:

Please find attached the APDs submitted by Jay Hamilton (Hamilton Environmental) for Los Lobos Renewable Power, LLC. I have copied Mike Hayter of Raser Technologies and he should be copied in any e-mails to Jay Hamilton regarding any Artesia District Office issues with the submitted APDs.

When the APDs are approved, and if they are approved, I would appreciate receipt of API# assigned to each well to include in the final draft discharge permit that I am working on for the April 7, 2009 public hearing in Lordsburg, NM.

I would also note that the API# per well must be included in the bonds that are being developed in cooperation with David Brooks and I by Wells Fargo Bank.

Your prompt review of the attached APDs would be appreciated. Please contact me if you have questions. Thank you.

Jay Hamilton
Hamilton Environmental, L.L.C.
485 West 1400 North
Orem, Utah 84057

Office (801) 224-4585
Fax (801) 224-1893
Cell (801) 361-2102
è-mail hamiltonenviro@yahoo.com

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Jay Hamilton [mailto:hamiltonenviro@yahoo.com]
Sent: Monday, March 09, 2009 3:24 PM
To: Chavez, Carl J, EMNRD
Subject: Re:

Carl,

You should receive them shortly.

Thanks,

Jay

From: "Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>
To: Jay Hamilton <hamiltonenviro@yahoo.com>
Sent: Monday, March 9, 2009 1:05:05 PM
Subject: RE:

Jay:

There were no attachments to your e-mail. Could you please send me electronic attachments? Thanks.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Jay Hamilton [mailto:hamiltonenviro@yahoo.com]
Sent: Monday, March 09, 2009 1:44 PM
To: Chavez, Carl J, EMNRD; Price, Wayne, EMNRD; Fesmire, Mark, EMNRD
Cc: Steve Brown; Jim Rosser; Michael Hayter
Subject:

Carl,

Please see atachment for the amended C101 and C102.

I will forward a original hard copy in the mail today.

Thanks,

Jay

This inbound email has been scanned by the MessageLabs Email Security System.

Confidentiality Notice: This e-mail, including all attachments is for the sole use of the intended recipient(s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited unless specifically provided under the New Mexico Inspection of Public Records Act. If you are not the intended recipient, please contact the sender and destroy all copies of this message. -- This email has been scanned by the Sybari - Antigen Email System.

RECEIVED
2009 MAR 2 PM 1 24

LIGHTNING DOCK
CURRENT API#S, WELL NUMBERS AND OGRID NO.

CURRENT API#s	OCD WELL NO#s	RASER WELL NO#s
30-023-20013	#137	#13-07 ✓
30-023-20014	#337	#33-07 ✓
30-023-20015	#457	#45-07 ✓
30-023-20016	#477	#47-07 ✓
30-023-20017	#537	#53-07 *
30-023-20018	#428	#42-18 ✓
30-023-20019	#532	#53-12 ✓
30-023-20020	#517	#51-07 ✓

* <100' from 2-track Rd

OGRID NO.: 261071

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	13-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3781.0	South	530.1	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4100
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .2 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: steve.brown@rasertech.com

Date: 4/21/08 Phone: 801 765 1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1. HI-01 LLC	13-07

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4100

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3781'	South	530'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

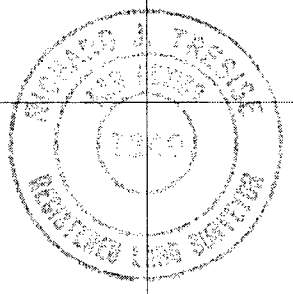
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

[16]

• 13-07



[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/21/08

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard D. Trevino Jr. 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
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1000 Rio Brazos Road, Aztec, NM 87410
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State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27. 2

Submit to appropriate District Of

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

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	Lightning Dock No 1, HI-01 LLC	33-07

[9] Proposed Pool 1	[10] Proposed Pool 2

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UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3721.2	South	1789.4	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4100
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
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SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Steven Brown	Title:
Title: Manager	Approval Date: / Expiration Date:
E-mail Address: steve.brown@rasatech.com	
Date: 4/21/08 / Phone: 801 765 1200	Conditions of Approval Attached ☐

OIL CONSERVATION DIVISION

Approved by:

District I
1625 N. French Dr., Hobbs, NM 88240
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State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
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☐ AMENDED REPORT

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	07	25S	19W		3721'	South	1789'	West	Hidalgo

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Same									

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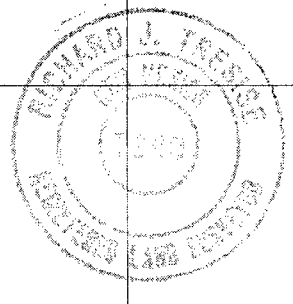
[16]

33-07 •



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Signature — Date: 4/21/08

Printed Name: Shawn Bran

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Richard J. Tresise 4/16/08

NMRLS 7240
Certificate Number

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State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

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[3] Property Code	[5] Property Name	[6] Well No.
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[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

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12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@rasertech.com

Date: 4/21/08 Phone: 281 765 1242

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
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WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	45-07

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4100

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		2360'	South	2278'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

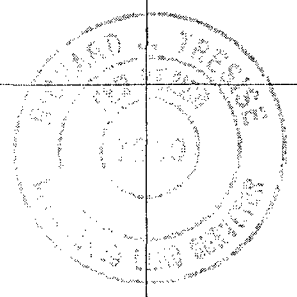
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

16

45-07 •



[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/21/08

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 31, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Trease 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
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1000 Rio Brazos Road, Aztec, NM 87410
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State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	47-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		1219.1	South	2266.3	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4100
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@rmaertech.com

Date: 4/21/08 Phone: 801.765.1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
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1301 W. Grand Avenue, Artesia, NM 88210
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State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
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Santa Fe, NM 87505

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WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1. HI-01 LLC	47-07

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4100

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		1219'	South	2266'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

[16]

47-07 •

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/21/08

Steven Braun
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 31, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Treese 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
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State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	53-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3775.3	South	3052.1	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4100
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet | Distance from nearest fresh water well .4 miles | Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature: SBrown

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@rpsertech.com

Date: 4/21/09 Phone: 801.765-1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
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State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
Submit to Appropriate District Office
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☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	53-07

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4106

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3775'	South	3052'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

[16]

53-07 •

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/18/08

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Treisse 4-16-08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REP(

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	42-18

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	18	25S	19W		1307.0	North	2123.1	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(I) Injection Well	R	P – Land BLM – Geothermal	4100
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve-Brown@newtechwy.com

Date: 4/21/08 Phone: 801.765.1240

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

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Revised October 12, 2005
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☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	42-18

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4106

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	18	25S	19W		1307'	North	2123'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

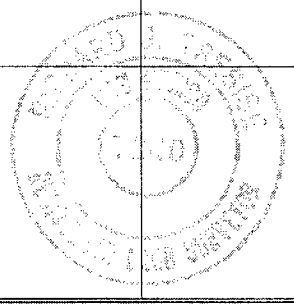
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

[16]

42-18 •



[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/2/08

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Mense 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
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1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-10
May 27, 200

Submit to appropriate District Offic

☐ AMENDED REPOR

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5152 North Edgewood Drive Suite 375 Provo, Utah	261071
	[3] API Number 30 -023-20019

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HJ-01 LLC	532

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	12	25S	20W		1574.8	North	3350	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(I) Injection	R	P-Land BLM – Geothermal	4103
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet	Horquilla	Patterson Drilling Company	May 2009

Depth to Groundwater	40 feet	Distance from nearest fresh water well	.4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic X 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☐

Drilling Method:
Fresh Water ☐ Brine X Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25'	9.625"	36.0 lb/ft	3,400'	980 Sacks	

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zone. Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Steve Brown	
Title: Member	
E-mail Address:	
Date: March 06, 2009	Phone: (801) 765-1200

OIL CONSERVATION DIVISION

Approved by:	
Title:	
Approval Date:	Expiration Date:
Conditions of Approval Attached ☐	

District I
1625 N. French Dr., Hobbs, NM 88240
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1301 W. Grand Avenue, Artesia, NM 88210
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State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
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Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
		Horquilla

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1	532

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4103

[10] Surface Location

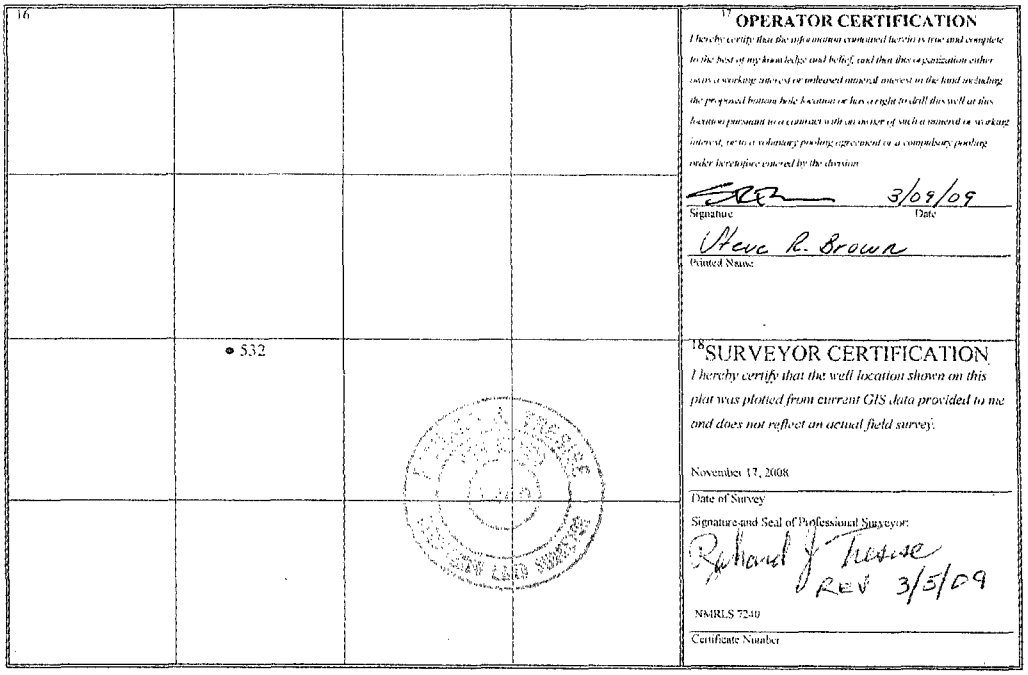
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	12	25S	20W		1574.8'	North	3350'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.



[17] OPERATOR CERTIFICATION

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3/09/09
Signature Date

Steve R. Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from current GIS data provided to me and does not reflect an actual field survey.

November 17, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Thorne REV 3/5/09

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-10
Nov. 11, 200

Submit to appropriate District Offic

☐ AMENDED REPOR

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	261071
	[3] API Number 30 – 023-20020

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	517

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		169.2	North	2406.9	East	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(I) Injection Well	R	P – Land BLM – Geothermal	4108
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet	Horquilla	Patterson Drilling Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ __45 mils thick Clay ☐ Pit Volume:__45,000bbls

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zone Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Kevon Brown

Title: Member

E-mail Address:

Date: Nov 17, 2008 Phone: 801 765-1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
		Horquilla

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1	517

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4108

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		169.2'	North	2406.9'	East	Hidalgo

[11] Bottom Hole Location If Different From Surface

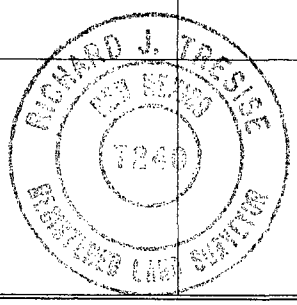
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

16

• 517



[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: Nov 17, 2008

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from current GIS data provided to me and does not reflect an actual field survey.

November 17, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J Truesdell 11/17/08

NMRLS 7240
Certificate Number

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Wednesday, December 10, 2008 4:41 PM
To: 'Jay Hamilton'; Price, Wayne, EMNRD; Fesmire, Mark, EMNRD; VonGonten, Glenn, EMNRD
Cc: Steve Brown; Michael Hayter; Brent Cook
Subject: RE: Lightning Dock - Solid Wastes

Jay:

Thanks for the clarification on OCD waste concerns. This information was provided to Mr. Nelson (NMED- Solid Waste Bureau) to determine which facilities may accept waste from your facility.

Regarding the reserve pit vs. well pit. I was under the impression one reserve pit would be constructed and used for annual well testing, etc. too. If Raser thinks 2 pits at each well location are needed, this is ok; however, you would reduce your footprint by constructing only 1 pit. Of course, drill cuttings would likely need to be removed from the reserve pit within 6 months of well completion in order to be reused. Think about it.

I have drafted a list of items from the hearing that the OCD needs to discuss with Raser's and AmeriCulture's experts. Mr. Wayne Price sent out an e-mail requesting a meeting to discuss the facility with our Senior Hydrologist, Mr. Glenn von Gonten. Wayne will be back next week, but he was hoping to hear back from Raser and AmeriCulture to facilitate a meeting to discuss draft items in an agenda and any hydrologic details that Mr. von Gonten raises. Let me know if I need to resend Wayne's e-mail from last week requesting a meeting. If not, please respond to the e-mail with a proposed date and time for meeting where we can meet in person to discuss here in Santa Fe or perhaps and telephone conference call may suffice?

Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Jay Hamilton [mailto:hamiltonenviro@yahoo.com]
Sent: Wednesday, December 10, 2008 2:15 PM
To: Chavez, Carl J, EMNRD; Price, Wayne, EMNRD; Fesmire, Mark, EMNRD
Cc: Steve Brown; Michael Hayter; Brent Cook
Subject: Fw: Lightning Dock - Solid Wastes

Carl

Thanks, for your input regarding OCD's concerns with the handling of solid wastes that may be generated at the Lightning Dock facility.

Please refer to the original submission of the Plan of Operations dated February 1, 2008, where Raser Technologies outlined "Methods of Waste Materials" and April 21, 2008 when the "Discharge Plan Application for Brine Extraction" was submitted to the OCD. Refer to the following sections in the Discharge Plan Application for details:

- Type and Quantities of Fluids Stored or Used at the Facility

- Transfer, Storage and Disposal of Fluids and Solids
- Solid Disposal
- Off-site Disposal

I believe this information should address your concerns.

A local waste contractor will provide a disposal container and serve the disposal needs for Lightning Dock. After construction of the facility, the plant will generate very limited amounts of solid waste in the form of paper, rubbish, etc. The plant will be in operation 24/7 but will be manned by only 2-4 employees.

We believe as does OCD the possibility exists that some some geothermal waste may need to be hauled off-site and disposed of according to local, state and federal regulations and with the approval of OCD (see "Discharge Plan Application for Brine Extraction"). Raser understands some solid wastes may need to be hauled to an adjoining county or state. Raser will identify a landfill that will fulfill their disposal needs and meet local, state and federal regulations.

At each site where Raser Technologies has completed geothermal drilling, geothermal reservoirs have had varied fluid chemistry. At each location drill cuttings and geothermal fluids have been dried, tested and met local, state and federal regulation and were approved to be closed in place with no hauling required.

Raser understands at the Lightning Dock site geothermal fluids chemistry has not yet been determined at the proposed drilling depths.

As stated in the previous documents, Raser will collect geothermal fluids at the appropriate depths and have them analyzed for the chemical constituents of concern. Raser will then dispose of the drill cuttings and geothermal fluids in a manner that meets local, state and federal regulations and only with the approval of the OCD.

In the large site map presented to OCD the Lightning Dock site shows a Reserve Pit and Well Pit at each well location. The Reserve Pit (approx. 250' x 100') is used during the drilling and testing process and will be closed after the process is completed. The Well Pit (100' x 80') is used to supplement the operation of the well. If during maintenance, testing or replacement of well components the well needs to shut down it may be necessary to drain the piping into the Well Pit. The Well Pits will be monitored during the life of the well. The Reserve and Well Pits will be constructed and lined according to the pond construction detail and pond liner specifications as presented to OCD in the supplemental information dated August 1, 2008.

Carl, I talked to Mike and he mentioned that during the hearing OCD stated there were some concerns they would like to have addessed before the final permit approval. Would you gather those concerns in a list and forward them on to me. I will get the information to you in the next week.

Thanks,

Jay

This inbound email has been scanned by the MessageLabs Email Security System.

Chavez, Carl J, EMNRD

From:	Altomare, Mikal, EMNRD
Sent:	Thursday, November 20, 2008 2:54 PM
To:	damon@vtc.net; msheridan@hollandhart.com
Cc:	Price, Wayne, EMNRD; Chavez, Carl J, EMNRD; Fesmire, Mark, EMNRD
Subject:	Case No. 14246- Application of Raser Power System
Importance:	High
Attachments:	geothermalentry.pdf

Mr. Seawright and Mr. Sheridan,

Please find attached the Oil Conservation Division's Entry of Appearance for Case No. 14246 regarding the Application of Raser Power System, LLC for Approval of a Discharge Plan, set for public hearing on December 1, 2008.

If the attachment does not transmit properly or you are unable to open it, please contact me.

Sincerely,
Mikal Altomare

---

border=0> Mikal M. Altomare
Assistant General Counsel
Oil Conservation Division
Energy, Minerals & Natural Resources Department
1220 South St. Francis Drive
Santa Fe, NM 87505
Tel 505.476.3480 ~ Fax 505.476.3462
mikal.altomare@state.nm.us

CONFIDENTIAL-------- This transmission contains confidential information subject to the attorney-client and/or attorney work product privilege. It is intended solely for the use of the intended recipient. Use or dissemination of the information herein contained by any other person is strictly prohibited. If you have received this e-mail in error, please immediately advise the sender.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE APPLICATION OF THE APPLICATION OF RASER POWER SYSTEM, LLC FOR APPROVAL OF A DISCHARGE PLAN PURSUANT TO THE NEW MEXICO WATER QUALITY ACT, HIDALGO COUNTY, NEW MEXICO

CASE NO.14246

RECEIVED
2008 NOV 20 PM 2 43

OIL CONSERVATION DIVISION'S ENTRY OF APPEARANCE

Mikal Altomare hereby enters her appearance in the above-captioned matter pursuant to 19.15.14.1208 NMAC on behalf of the Oil Conservation Division.

RESPECTFULLY SUBMITTED, this 20th day of November, 2008 by

Mikal Altomare
Assistant General Counsel
Energy, Minerals and Natural Resources Department of the State of New Mexico
1220 S. St. Francis Drive
Santa Fe, NM 87505
(505) 476-3480
FAX: 505 476-3462
e-mail: mikal.altomare@state.nm.us

CERTIFICATE OF SERVICE

I certify that I e-mailed a copy of this Entry to Mark Sheridan, Holland & Hart PA, msheridan@hollandhart.com, counsel for Raser Power System, LLC, and Dr. Damon Seawright, PhD, Americulture, damon@vtc.net, this 20th day of November 2008.

Mikal Altomare

Chavez, Carl J, EMNRD

From: Damon Seawright [damon@vtc.net]
Sent: Tuesday, November 18, 2008 7:55 PM
To: Brooks, David K., EMNRD
Cc: 'Jeffrey Harris'; Chavez, Carl J, EMNRD; 'Gary Seawright'
Sensitivity: Personal
Attachments: Hearing Notice Pre-Hearing Statement Rqst 11-13-08 (6).pdf; WQCAHearingNotice12-1-2008.pdf

Dear David,

I wanted to draw your attention to an important discrepancy between the NMOCD Rules listed in as controlling, in various pieces of correspondence, pertaining to the forthcoming Lightning Dock Geothermal HI-01 Discharge Permit Application (GT-1) Public Hearing, December 1, 2008. For your convenience, I have attached two such items. The first, signified by you, references NMOCD Rule 1211.B [19.15.14.1211.B NMAC] as controlling with regard to pre-hearing statements. Conversely, the Notice of Public Hearing, signified by Mark Fesmire of OCD, cites 20.6.2.3110 NMAC as controlling. The requirements for pre-hearing statements in these rules differ. It is our understanding that 20.6.2.3110 NMAC should control. Please advise.

Regards,

Damon Seawright
President
AmeriCulture, Inc.
25 Tilapia Trail
Animas, NM 88020
(505)670-5220
damon@vtc.net

This inbound email has been scanned by the MessageLabs Email Security System.

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

November 13, 2008

Raser Power System, LLC
Attn: Mr. Steve Brown
5152 N. Edgewood Drive, Suite 375
Provo, UT 84604
FAX No. 801-374-3314

AmericCulture
Attn: Dr. Damon E, Seawright, Ph.D
25 Tilapia Trail
Animas, NM 88020
FAX No. 575-548-2631

New Mexico Oil Conservation Division
Attn: Mr. Carl Chavez
1220 S. St. Francis Drive
Santa Fe, NM 87505
FAX No. 505-476-3450

Re: Lightning Dock Geothermal HI-01 Discharge Permit Application (GT-1)
Public Hearing, December 1, 2008

Gentlemen:

Please be advised that, pursuant to NMOCD Rule 1211.B [19.15.14.1211.B NMAC], a copy of which is enclosed, parties intending to present technical testimony at the referenced hearing are required to file a pre-hearing statement with the Oil Conservation Division.

Pre-hearing statements should be directed to Florene Davidson, Administrator, New Mexico Oil Conservation Division, 1220 St. Francis Dr., Santa Fe, NM 87505, or faxed to Ms. Davidson at 505-476-3462. Two copies of the pre-hearing statement must be received at the Division's Santa Fe office not later than 5:00 P.M. on Friday, November 21, 2008. In addition, a copy of the pre-hearing statement must be transmitted by facsimile or email prior to such time to each other party who has appeared in the case. As of this date, the parties to whom this letter is addressed are the only parties who have appeared in this matter.

If you have questions or other concerns, please feel free to contact the undersigned.

Very truly yours,

David K. Brooks

David K. Brooks
Hearing Examiner
505-476-3450
david.brooks@state.nm.us

NOTICE OF PUBLIC HEARING

State of New Mexico
Energy, Minerals and Natural Resources Department,
Oil Conservation Division

Discharge permit for the Lightning Dock Geothermal No. 1 (GT-001)

The State of New Mexico, through its Oil Conservation Division, hereby gives notice that the division will conduct a public hearing on **Monday, December 1, 2008** beginning at 9:00 a.m. at the Special Events Center, 502 W. 2nd Street, in Lordsburg, New Mexico to consider the application for a discharge permit for the Lightning Dock Geothermal No. 1 geothermal power plant. The application was filed by Raser Power System, LLC, 5152 North Edgewood Drive, Suite 375, Provo, Utah 84604.

The Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe geothermal power plant (5 production/development wells & 3 Class V geothermal injection wells) will be located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant will be within the Animas River Valley approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). Development wells are located within the SW/4; NW/4; and NE/4 of Section 7. Class V injection wells will be located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of about 3,400 feet below ground level. High temperature geothermal water from development wells will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 350 gpm of shallow low temperature geothermal reservoir water with a TDS concentration of approximately 300 mg/L will be mixed with cooling tower chemical additives and cycled through the cooling tower unit. All of the cooling tower blow-down effluent (180~225 °F) will be injected into the Class V injection wells with the exception of effluent that is routed back into a lined evaporation pond during operation or cessation of operation. Each Class V well will have a maximum injection rate of between 4,000 to 5,000 gpm at an average pressure of about 75 psig. The flow rate of each development or Class V well may be subject to the correlative rights of any future geothermal operators in the high temperature geothermal reservoir. Lined evaporation ponds at the surface will temporarily store any excess development or well test water for injection into the high temperature geothermal reservoir. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated

surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The division will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in requesting further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact Wayne Price, Environmental Bureau Chief of the Oil Conservation Division, at 1220 S. St. Francis Drive, Santa Fe, NM 87505, (505) 476-3490. The discharge permit application and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday. The discharge permit application and draft permit are also posted on the division's web site: http://www.emnrd.state.nm.us/ocd/ENV-DraftPublicEtc.htm.

The rule governing public participation at the hearing is 20.6.2.3110 NMAC. Any person who wishes to present technical evidence at the hearing must, at least 10 days before the hearing, file with the division and serve on the applicant a statement of intent to present evidence. The filing may be mailed to the division at the above address, or faxed to the division at (505) 476-3462, attention Wayne Price. The statement must include the name of the person filing the statement; indicate whether the person supports or opposes the proposed discharge plan proposal; give the name of each witness; estimate of the length of the direct testimony of each witness; provide a list of exhibits, if any, to be offered into evidence at the hearing; and provide a summary or outline of the anticipated direct testimony of each witness. A person who does not file a statement of intent to present evidence may present a general non-technical statement in support of or in opposition to the proposed discharge plan. At the hearing, all persons shall be given a reasonable chance to submit data, views or arguments orally or in writing and to examine witnesses testifying at the hearing.

Unless otherwise allowed by the hearing officer, testimony shall be presented in the following order: testimony by and examination of the applicant supporting the facts relied upon to justify the proposed discharge plan and demonstrate that it meets the requirements of the regulations; testimony by and examination of technical witnesses supporting or opposing approval, or supporting or opposing conditional approval, in any reasonable order; testimony by the general public; and rebuttal testimony, if appropriate.

The hearing officer shall issue a report within thirty days after the close of the hearing record. The report shall be served on the applicant, the division, and all persons who

request copies in advance in writing. The report will also be available for public inspection at the division's office in Santa Fe and at the Artesia district office, 1301 West Grand Ave., Artesia, NM 88210. The director shall issue a decision in the matter no later than thirty days after receipt of the hearing report. The decision shall be served on the applicant, the division, and all persons who request copies in writing. The decision will also be available for public inspection at the division's office in Santa Fe and at the Artesia district office and on the division's website.

If you are a person with a disability who is in need of a reader, amplifier, qualified sign language interpreter, or any other form of auxiliary aid or service to attend or participate in the hearing, please contact Mr. Wayne Price at (505) 476-3490 or through the New Mexico Relay Network (1-800-659-1779) at least ten days prior to the hearing, so the division can make reasonable accommodations.

Para obtener más información sobre esta solicitud en español, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México 87505 (Contacto: Dorothy Phillips, 505-476-3461).

GIVEN under the Seal of New Mexico Oil Conservation Division at Santa Fe, New Mexico, on this 1st Day of October 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

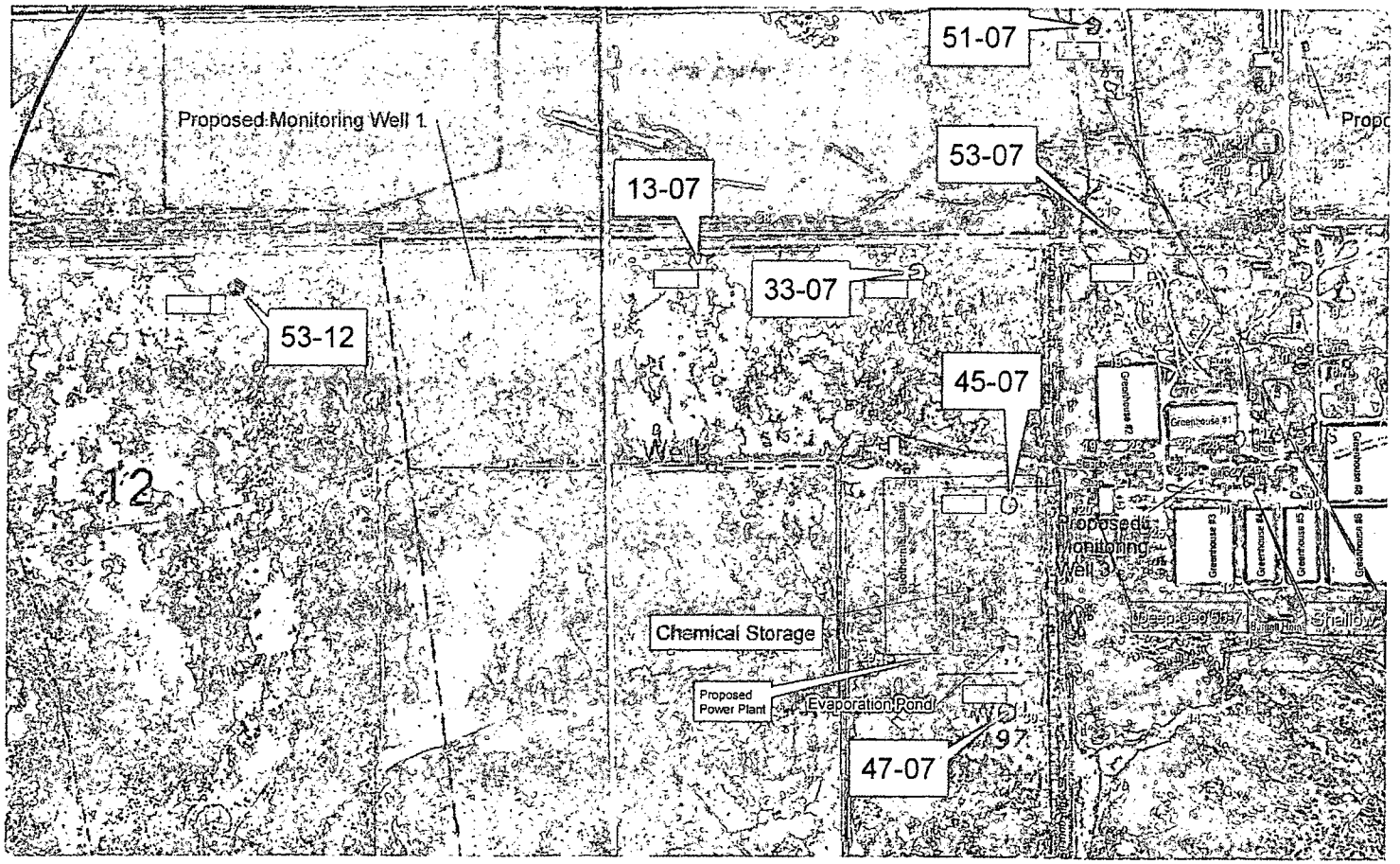
Mark Fesmire, Director

DOCKET: EXAMINER HEARING - MONDAY – DECEMBER 1, 2008

9:00 A.M. – 502 W 2nd Street
Special Events Center
Lordsburg, New Mexico

Docket Nos. 42-08 and 43-08 are tentatively set for December 18, 2008 and January 8, 2009. Applications for hearing must be filed at least 30 days in advance of hearing date. OCD Rule 1211.B requires parties who intend to present evidence at an adjudicatory hearing to file a pre-hearing statement no later than the Friday before the hearing, and serve a copy on opposing counsel of record. If the OCD does not receive a pre-hearing statement from the applicant by the close of business on the Friday before the hearing, the hearing may be continued at the applicant's request. The following case will be heard by an Examiner.

1. **CASE 14246: Application of Raser Power System, LLC for Approval of a Discharge Plan Pursuant to the New Mexico Water Quality Act, Hidalgo County, New Mexico.** Raser Power Systems, LLC has filed an application for approval of a discharge plan pursuant to the New Mexico Water Quality Act for its proposed Lightning Dock Geothermal No. 1 geothermal power plant, to be located in the NW/4 SW/4 of Section 7, Township 25 South, Range 19 West, in Hidalgo County, New Mexico. The plant will be within the Animas River Valley approximately 10 miles south of Interstate Highway 10 on CR 3387 (east side of Geothermal Road). The discharge plan proposes construction of five Class V injection wells in the NE/4 NW/4 of Section 18-25S-19W. Consideration will be given to well construction, monitoring, testing and operation, including potential for groundwater impacts.


51-07
Proposed Monitoring Well 1
53-07
13-07
33-07
53-12
45-07
12
Proposed Monitoring Well 3
Chemical Storage
Proposed Power Plant
Evaporation Pond
47-07
97

Hidalgo County HERALD
A Division of Sunrise Design, LLC
212 E. Motel Dr. Suite B
Lordsburg, NM 88045
575-542-8705

INVOICE

DATE: 10/24/2008

BILL TO:

Fran A. Chavez
1220 South St.Francis Drive
Room 346
Santa Fe, NM 87501

INVOICE #: 17565

P.O. NUMBER : 52100-0000016117

TERMS: Net 30

RUN DATE: 10/24

QUANTITY	DESCRIPTION	PRICE EACH	AMOUNT
225	Legal Notice / 1 Week - Affidavit Attached - Notice Of Public Hearing (Monday, December 1, 2008)	0.56	126.00T

It's been a pleasure working with you!

Sales Tax (7.25%)	$9.14
Total Invoice	$135.14

Ok to pay
11/18/08

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
SANTA FE, NEW MEXICO

The State of New Mexico, through its Oil Conservation Division, hereby gives notice that the division will conduct a public hearing on **Monday, December 1, 2008** beginning at 9:00 a.m. at the Special Events Center, 502 W. 2nd Street, in Lordsburg, New Mexico to consider the application for a discharge permit for the Lightning Dock Geothermal No. 1 geothermal power plant. The application was filed by Raser Power System, LLC, 5152 North Edgewood Drive, Suite 375, Provo, Utah 84604.

Given under the Seal of the State of New Mexico Oil Conservation Commission at Santa Fe, New Mexico on this 3rd day of November, 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

Mark E. Fesmire, P. E.
Division Director

S E A L

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

November 13, 2008

Raser Power System, LLC
Attn: Mr. Steve Brown
5152 N. Edgewood Drive, Suite 375
Provo, UT 84604
FAX No. 801-374-3314

AmericCulture
Attn: Dr. Damon E, Seawright, Ph.D
25 Tilapia Trail
Animas, NM 88020
FAX No. 575-548-2631

New Mexico Oil Conservation Division
Attn: Mr. Carl Chavez
1220 S. St. Francis Drive
Santa Fe, NM 87505
FAX No. 505-476-3450

Re: Lightning Dock Geothermal HI-01 Discharge Permit Application (GT-1)
Public Hearing, December 1, 2008

Gentlemen:

Please be advised that, pursuant to NMOCD Rule 1211.B [19.15.14.1211.B NMAC], a copy of which is enclosed, parties intending to present technical testimony at the referenced hearing are required to file a pre-hearing statement with the Oil Conservation Division.

Pre-hearing statements should be directed to Florene Davidson, Administrator, New Mexico Oil Conservation Division, 1220 St. Francis Dr., Santa Fe, NM 87505, or faxed to Ms. Davidson at 505-476-3462. Two copies of the pre-hearing statement must be received at the Division's Santa Fe office not later than 5:00 P.M. on Friday, November 21, 2008. In addition, a copy of the pre-hearing statement must be transmitted by facsimile or email prior to such time to each other party who has appeared in the case. As of this date, the parties to whom this letter is addressed are the only parties who have appeared in this matter.

If you have questions or other concerns, please feel free to contact the undersigned.

Very truly yours,

David K. Brooks

David K. Brooks
Hearing Examiner
505-476-3450
david.brooks@state.nm.us

NOTICE OF PUBLIC HEARING

State of New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division

Discharge permit for the Lightning Dock Geothermal No. 1 (GT-001)

The State of New Mexico, through its Oil Conservation Division, hereby gives notice that the division will conduct a public hearing on Monday, December 1, 2008, beginning at 9:00 a.m. at the Special Events Center, 502 W. 2nd Street, in Lordsburg, New Mexico to consider the application for a discharge permit for the Lightning Dock Geothermal No. 1 geothermal power plant. The application was filed by Raser Power System, LLC, 5152 North Edgewood Drive, Suite 375, Provo, Utah 84604.

The Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe geothermal power plant (5 production/development wells & 3 Class V geothermal injection wells) will be located in the NW/4 SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant will be within the Animas River Valley approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). Development wells are located within the SW/4; NW/4; and NE/4 of Section 7. Class V injection wells will be located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of about 3,400 feet below ground level. High temperature geothermal water from development wells will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 350 gpm of shallow low temperature geothermal reservoir water, with a TDS concentration of approximately 300 mg/L will be mixed with cooling tower chemical additives and cycled through the cooling tower unit. All of the cooling tower blowdown effluent (180-225 °F) will be injected into the Class V injection wells with the exception of effluent that is routed back into a lined evaporation pond during operation or cessation of operation. Each Class V well will have a maximum injection rate of between 4,000 to 5,000 gpm at an average pressure of about 75 psig. The flow rate of each development or Class V well may be subject to the correlative rights of any future geothermal operators in the high temperature geothermal reservoir. Lined evaporation ponds at the surface will temporarily store any excess development or well test water for injection into the high temperature geothermal reservoir. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The division will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in receiving further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact Jayne Price, Environmental Bureau Chief of the Oil Conservation Division, at 1220 S. St. Francis Drive, Santa Fe, NM 87505, (505) 476-3490. The discharge permit

STATE OF NEW MEXICO
County of Bernalillo SS

Bill Tafoya, being duly sworn, declares and says that he is Classified Advertising Manager of **The Albuquerque Journal**, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made of assessed as court cost; that the notice, copy of which is hereto attached, was published in said paper in the regular daily edition, for 1 times, the first publication being on the 14 day of Oct, 2008, and the subsequent consecutive publications on _____, 20___.

Sworn and subscribed to before me, a Notary Public, in and for the County of Bernalillo and State of New Mexico this 14 day of Oct of 2008.

11/14/08 ok to pay

PRICE 144.07

Statement to come at end of month.

ACCOUNT NUMBER C80932

OFFICIAL SEAL
Dyn Sloane
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 4-11-10

CLA-22-A (R-1/93)

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The rule governing public participation at the hearing is 20.6.2.3110 NMAC. Any person who wishes to present technical evidence at the hearing must, at least 10 days before the hearing, file with the division and serve on the applicant a statement of intent to present evidence. The filing may be mailed to the division at the above address, or faxed to the division at (505) 476-3462, attention Wayne Price. The statement must include the name of the person filing the statement; indicate whether the person supports or opposes the proposed discharge plan proposal; give the name of each witness; estimate of the length of the direct testimony of each witness; provide a list of exhibits, if any, to be offered into evidence at the hearing; and provide a summary or outline of the anticipated direct testimony of each witness. A person who does not file a statement of intent to present evidence may present a general non-technical statement in support of or in opposition to the proposed discharge plan. At the hearing, all persons shall be given a reasonable chance to submit data, views or arguments orally or in writing and to examine witnesses testifying at the hearing.

Unless otherwise allowed by the hearing officer, testimony shall be presented in the following order: testimony by and examination of the applicant supporting the facts relied upon to justify the proposed discharge plan and demonstrate that it meets the requirements of the regulations; testimony by and examination of technical witnesses supporting or opposing approval, or supporting or opposing conditional approval, in any reasonable order; testimony by the general public; and rebuttal testimony, if appropriate.

The hearing officer shall issue a report within thirty days after the close of the hearing record. The report shall be served on the applicant, the division, and all persons who request copies in advance in writing. The report will also be available for public inspection at the division's office in Santa Fe and at the Artesia district office, 1301 West Grand Ave., Artesia, NM 88210. The director shall issue a decision in the matter no later than thirty days after receipt of the hearing report. The decision shall be served on the applicant, the division, and all persons who request copies in writing. The decision will also be available for public inspection at the division's office in Santa Fe and at the Artesia district office and on the division's website.

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Para obtener mas informacion sobre esta solicitud en espanol sir-

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Para obtener mas informacion sobre esta solicitud en espanol, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo Mexico); Oil Conservation Division (Depto. Conservacio n Del Petroleo), 1220 South St. Francis Drive, Santa Fe, New Mexico 87505 (Contacto: Dorothy Phillips, 505-476-3461).

GIVEN under the Seal of New Mexico Oil Conservation Division at Santa Fe, New Mexico, on this 10th Day of October 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
Mark Fesmire, Director
Journal: October 14, 2008.

STATE OF NEW MEXICO
County of Bernalillo SS

Bill Tafoya, being duly sworn, declares and says that he is Classified Advertising Manager of **The Albuquerque Journal**, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made of assessed as court cost; that the notice, copy of which is hereto attached, was published in said paper in the regular daily edition, for 1 times, the first publication being on the 14 day of Oct, 2008, and the subsequent consecutive publications on _____, 20___.

Sworn and subscribed to before me, a Notary Public, in and for the County of Bernalillo and State of New Mexico this 14 day of Oct of 2008.

11/14/08 ok to pay

PRICE 144.07

Statement to come at end of month.

ACCOUNT NUMBER C80932

CLA-22-A (R-1/93)

OFFICIAL SEAL
Lyn Sloane
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 4-11-10

Hidalgo County HERALD

A Division of Sunrise Design, LLC
212 E. Motel Dr. Suite B
Lordsburg, NM 88045
575-542-8705

RECEIVED
2008 NOV 10 PM 3 14

STATEMENT

Date	10/31/2008

Amount Due	$135.14

Billed To:

Fran A. Chavez
1220 South St.Francis Drive
Room 346
Santa Fe, NM 87501

Payment Enclosed	

Date	Invoice # and Description	Amount	Balance
09/30/2008	Balance forward		0.00
10/24/2008	INV #17565. Legal Notice / 1 Week - Affidavit Attached - Notice Of Public Hearing (Monday, December 1, 2008)	135.14	135.14

Current	1-30 Days Past Due	31-60 Days Past Due	61-90 Days Past Due	90+ Days Past Due	Amount Due
0.00	135.14	0.00	0.00	0.00	$135.14

THANK YOU FOR YOUR BUSINESS!

WE NOW ACCEPT MASTERCARD & VISA!!!
Prompt payment will be appreciated.

All past due accounts are subject to 1.5% interest charge (18%annually) or a minimum charge of $3.00 late fee.

Hidalgo County HERALD
A Division of Sunrise Design, LLC
212 E. Motel Dr. Suite B
Lordsburg, NM 88045
575-542-8705

INVOICE

DATE: 10/24/2008

BILL TO:

Fran A. Chavez
1220 South St.Francis Drive
Room 346
Santa Fe, NM 87501

INVOICE #: 17565

P.O. NUMBER : 52100-0000016117

TERMS: Net 30

RUN DATE: 10/24

QUANTITY	DESCRIPTION	PRICE EACH	AMOUNT
225	Legal Notice / 1 Week - Affidavit Attached - Notice Of Public Hearing (Monday, December 1, 2008)	0.56	126.00T

It's been a pleasure working with you!

Sales Tax (7.25%)	$9.14
Total Invoice	$135.14

AFFIDAVIT OF PUBLICATION

State of New Mexico,
County of Hidalgo,
City of Lordsburg

I, Brenda J. Hood, Publisher of the Hidalgo County Herald, a newspaper of record in the aforesaid city, county and state, hereby attest that the following legal notice for **Fran A. Chavez:**

Notice of Public Hearing – Monday , December 1, 2008

was published for ***1*** consecutive week(s), from: October 24, 2008 through: October 24, 2008

Amount for this legal notice is: $ 135.14

Brenda J. Hood - Publisher

State of New Mexico
County of Hidalgo

Subscribed and sworn to before me on November 5, 2008

Notary Public: Deborah A Greene
My commission expires: October 29, 2012

LEGAL NOTICE

NOTICE OF PUBLIC HEARING
State of New Mexico
Energy, Minerals and Natural Resources Department, Oil Conservation Division
Discharge permit for the Lightning Dock Geothermal No. 1 (GT-001)

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GIVEN under the Seal of New Mexico Oil Conservation Division at Santa Fe, New Mexico, on this 15th Day of October 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
Mark Fesmire, Director
024c

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mr. Steve Brown
Raser Power System, LLC
5152 North Edgewood Dr., Suite 375
Provo, Utah 84604

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X L. Tolsma ☐ Agent ☐ Addressee

B. Received by (Printed Name) L. Tolsma
C. Date of Delivery 10/6/08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7001 1940 0004 7923 1008

PS Form 3811, August 2001 Domestic Return Receipt 102595-01-M-2509

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mr. Damon Seawright
Americulture, Inc.
25 Tilapia Trail
Animas, New Mexico 88020

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Susan Ashley ☑ Agent ☐ Addressee

B. Received by (Printed Name) Susan Ashley
C. Date of Delivery 10-9-08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☑ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number

NOTICE OF PUBLIC HEARING

State of New Mexico
Energy, Minerals and Natural Resources Department,
Oil Conservation Division

Discharge permit for the Lightning Dock Geothermal No. 1 (GT-001)

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GIVEN under the Seal of New Mexico Oil Conservation Division at Santa Fe, New Mexico, on this 10th Day of October 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

Mark Fesmire, Director

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Wednesday, October 15, 2008 3:38 PM
To: 'hcherald@aznex.net'
Subject: GT-001 Notice of Public Hearing Request
Attachments: 2008 10-1 NOTICE OF PUBLIC HEARING.doc

Dear Ms. Brenda Hood.:

Please publish (for one day only) the attached Public Notice in the classified notice section of your respective newspaper.

For billing purposes, please find below the PO# for each of your newspapers:

Hidalgo County Herald (PO# 52100-0000016117) Notice of Public Hearing Description: GT-001 (see attached notice of public hearing)

You are vendor No. 0000054234. Please ship and bill invoice for payment to:

Fran A. Chavez
1220 South St. Francis Drive, Room 346
Santa Fe, NM 87501
(505) 476-3477

Please send me an affidavit of proof of publication for the above notice that you process and contact me if you have questions. Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

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Energy, Minerals and Natural Resources Department,
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Discharge permit for the Lightning Dock Geothermal No. 1 (GT-001)

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surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The division will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in requesting further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact Wayne Price, Environmental Bureau Chief of the Oil Conservation Division, at 1220 S. St. Francis Drive, Santa Fe, NM 87505, (505) 476-3490. The discharge permit application and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday. The discharge permit application and draft permit are also posted on the division's web site: http://www.emnrd.state.nm.us/ocd/ENV-DraftPublicEtc.htm.

The rule governing public participation at the hearing is 20.6.2.3110 NMAC. Any person who wishes to present technical evidence at the hearing must, at least 10 days before the hearing, file with the division and serve on the applicant a statement of intent to present evidence. The filing may be mailed to the division at the above address, or faxed to the division at (505) 476-3462, attention Wayne Price. The statement must include the name of the person filing the statement; indicate whether the person supports or opposes the proposed discharge plan proposal; give the name of each witness; estimate of the length of the direct testimony of each witness; provide a list of exhibits, if any, to be offered into evidence at the hearing; and provide a summary or outline of the anticipated direct testimony of each witness. A person who does not file a statement of intent to present evidence may present a general non-technical statement in support of or in opposition to the proposed discharge plan. At the hearing, all persons shall be given a reasonable chance to submit data, views or arguments orally or in writing and to examine witnesses testifying at the hearing.

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Para obtener más información sobre esta solicitud en español, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México 87505 (Contacto: Dorothy Phillips, 505-476-3461).

GIVEN under the Seal of New Mexico Oil Conservation Division at Santa Fe, New Mexico, on this 15th Day of October 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

Mark Fesmire, Director

Facsimile Transmission

From: Jenny Gomez
Fax Number:
Voice Phone:

To: CARL CHAVEZ
Company: N M DEPT OF ENERGY,MINERALS
Fax Number: 1 (505) 476-3462
Voice Phone: 1 (505) 827-7131

cc:

Fax Notes:

Date and time of transmission: Friday, October 10, 2008 11:59:20 AM
Number of pages including this cover sheet: 05

* * * Proof * * *

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7777 Jefferson NE
Albuquerque, NM 87109
(505)823-7777

Account Information

Phone:	(505) 827-7131
Name:	N M DEPT OF ENERGY,MINERALS
Account #:	C80932
Address:	OIL CONSERVATION DIV 1220 S ST FRANCIS DR SANTA FE, NM 87505
Client:	
Email:	
Placed by:	CARL CHAVEZ
Fax #:	

Ad Information

Classification:	0000-Legals - Government	**Size:**	1 x 241.000
Start date:	10-14-08	**Billed size:**	241.00 lines-6.5pt
Stop date:	10-14-08	**Ad #:**	5150693
Insertions:	1	**Ad type:**	Liner Ad
Rate code:	Government Legals		
Publications:	Journal Daily (AM)		

Ad Cost:	$ 134.96
Tax @ 6.7500%:	$
Tax @ 7.3125%:	$
Tax @ 7.9375%:	$
Total:	$ 144.07

ok to pay
Carl Chavez
12/15/08

Ad Copy:

NOTICE OF PUBLIC HEARING

State of New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division

Discharge permit for the Lightning Dock Geothermal No. 1 (GT-001)

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of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of about 3,400 feet below ground level. High temperature geothermal water from development wells will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 350 gpm of shallow low temperature geothermal reservoir water with a TDS concentration of approximately 300 mg/L will be mixed with cooling tower chemical additives and cycled through the cooling tower unit. All of the cooling tower blowdown effluent (160-225 F) will be injected into the Class V injection wells with the exception of effluent that is routed back into a lined evaporation pond during operation or cessation of operation. Each Class V well will have a maximum injection rate of between 4,000 to 5,000 gpm at an average pressure of about 75 psig. The flow rate of each development or Class V well may be subject to the correlative rights of any future geothermal operators in the high temperature geothermal reservoir. Lined evaporation ponds at the surface will temporarily store any excess development or well test water for injection into the high temperature geothermal reservoir. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

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GIVEN under the Seal of New Mexico Oil Conservation Division at Santa Fe, New Mexico, on this 10th Day of October 2006.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
Mark Fesmire, Director
Journal: October 14, 2006.

TRANSACTION REPORT

OCT-10-2008 FRI 11:24 AM

FOR:

RECEIVE

DATE	START	SENDER	RX TIME	PAGES	TYPE	NOTE	M#	DP
OCT-10	11:23 AM	RightFAX	1'16"	5	RECEIVE	OK		

Chavez, Carl J, EMNRD

From: Jim Rosser [Jim.Rosser@rasertech.com]
Sent: Friday, June 13, 2008 1:33 PM
To: Chavez, Carl J, EMNRD
Subject: FW: 30 Day Notice Information

Carl,

This is a weekly paper in Lordsburg and it is active.

We will post notices in Lordsburg, Deming, and Silver City. I should have the Spanish translation today so we can put it in next week.

Jim

From: Jim Rosser
Sent: Monday, June 02, 2008 12:01 PM
To: 'Jay Hamilton'
Subject: 30 Day Notice Information

For you information the Newspaper would be as follows:

Hidalgo Herald
212 E. Motel Drive
Lordsburg, NM 88045
hcherald@aznex.net
575-542-8705
575-542-8704 Fax

This is a weekly and copy needs to be in By Tuesday at 5 PM.

Jiim

This inbound email has been scanned by the MessageLabs Email Security System.

AFFIDAVIT OF PUBLICATION

State of New Mexico,
County of Hidalgo,
City of Lordsburg

I, Brenda Hood, Publisher of the Hidalgo County Herald, a newspaper of record in the aforesaid city, county and state, hereby attest that the following legal notice for
Los Lobos Geothermal, LLC:

Notice of Publication: Los Lobos Geothermal, LLC, Lightning Dock Geothermal No. 1, Animas, NM

was published for 1 consecutive week(s), from: June 20, 2008 through: June 20, 2008

Amount for this legal notice is:_____

Brenda Hood

Brenda Hood - Publisher

State of New Mexico
County of Hidalgo

Subscribed and sworn to before me on June 27, 2008

Deborah A Greene

Notary Public: Deborah A Greene
My commission expires: October 29, 2008

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Friday, October 10, 2008 10:40 AM
To: 'Jenny Gomez'
Subject: GT-001 Notice of Public Hearing Request

Attachments: 2008 10-1 NOTICE OF PUBLIC HEARING.doc; Albuquerque Journal 10-10-08.pdf

2008 10-1 NOTICE OF PUBLIC HEA...

Albuquerque Journal 10-10-08.p..

Dear Ms. Gomez:

Please publish (for one day only) the attached Public Notice in the classified notice section of your respective newspaper.

For billing purposes, please find below the PO# for each of your newspapers:

Albuquerque Journal (PO# 52100-0000016013) Notice of Public Hearing Description: GT-001 (see attached notice of public hearing)

You are vendor No. 0000049778. Please ship invoice for payment to:

Fran A. Chavez
1220 South St. Francis Drive, Room 346
Santa Fe, NM 87501
(505) 476-3477

Please send me an affidavit of proof of publication for the above notice that you process and contact me if you have questions. Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau 1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

-----Original Message-----
From: Jenny Gomez [mailto:legals@abqpubco.com]
Sent: Friday, October 10, 2008 10:37 AM
To: Chavez, Carl J, EMNRD
Subject: legals

Here you go!
~Jenny Gomez
Legal Advertising - Journal
Albuquerque Publishing Co.
Ph: (505) 823-3377
legals@abqpubco.com

This inbound email has been scanned by the MessageLabs Email Security System.

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Energy, Minerals and Natural Resources Department,
Oil Conservation Division

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STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

Mark Fesmire, Director

State of New Mexico
Purchase Order

PO Number to be on all Invoices and Correspondence

Dispatch via Print

Purchase Order	Date	Revision	Page
52100-0000016013	10/07/2008		1
Payment Terms	**Freight Terms**		**Ship Via**
Pay Now	FOB Destination		Best Way
Buyer	**Phone**		
FRAN A. CHAVEZ	505/476-3477		

Energy, Minerals & Resources
1220 South St. Francis Drive
Santa Fe NM 87505
United States

Vendor: 0000049778
ALBUQUERQUE PUBLISHING CO
P O DRAWER J-T
ALBUQUERQUE NM 87103

Ship To: 1220 South St. Francis Drive
Room 346
Santa Fe NM 87501
United States

Bill To: 1220 South St. Francis Drive
Room 346
Santa Fe NM 87501
United States

Origin: EXE **Exc\Excl #:** 13-1-98V

Line-Sch	Item/Description	Mfg ID	Quantity UOM	PO Price	Extended Amt	Due Date
1- 1	Advertisements for Water Quality Discharge Permits		1.00 EA	350.00	350.00	10/07/2008
	52100-19900-0710000000-546900- -0740- - -109-80000					

Schedule Total 350.00

Item Total 350.00

Total PO Amount 350.00

Agency Approval - I certify that the proposed purchase represented by this document is authorized by and is made in accordance with all State (and if applicable Federal) legislation rules and regulation. I further certify that adequate unencumbered cash and budget expenditure authority exists for this proposed purchase and all other outstanding purchase commitments and accounts payable.

Authorized Signature

STATE OF NEW MEXICO SPD-101A (07/92)
GENERAL SERVICES DEPARTMENT- PURCHASING DIVISION
TERMS AND CONDITIONS UNLESS OTHERWISE SPECIFIED

1. GENERAL: When the State Purchasing Agent issues a purchase document in response to the Vendors bid, a binding contract is created.
2. VARIATION IN QUANTITY: No variation in the quantity of any item called for by this order will be accepted unless such variation has been caused by conditions of loading, shipping, packing or allowances in manufacturing process, and then only to the extent, if any, specified elsewhere in this order.
3. ASSIGNMENT:
   A: Neither the order, nor any interest therein, nor claim thereunder, shall be assigned or transferred by the Vendor, except as set forth in subparagraph 3B below or as expressly authorized in writing by the STATE PURCHASASING AGENTS OFFICE. No such assignment or transfer shall relieve the Vendor from the obligations and liabilities under this order.
   B: Vendor agrees that any and all claims for overcharge resulting from antitrust violations which are borne by the State as to goods, services, and materials purchased in connection with this bid are hereby assigned to the State.
4. STATE FURNISHED PROPERTY: State furnished property shall be returned to the state upon request in the same condition as received except for ordinary wear, tear, and modifications ordered hereunder.
5. DISCOUNTS: Prompt payment discounts will not be considered in computing the low bid. Discounts for payment within 20 days will be considered after the award of the contract. Discounted time will be computed from the date of receipt of the merchandise or invoice, whichever is later.
6. INSPECTION: Final inspection and acceptance will be made at the destination. Supplies rejected at the destination for non-conformance with specifications shall be removed, at the Vendors risk and expense, promptly after notice of rejection.
7. INSPECTION OF PLANT: The State Purchasing Agent may inspect, at any reasonable time, the part of the contractors, or any subcontractors plant or place of business, which is related to the performance of this contract.
8. COMMERCIAL WARARANTY: The Vendor agrees that the supplies or services furnished under this order shall be covered by the most favorable commercial warranties the Vendor gives to any customer for such supplies or services, and that the rights and remedies provided herein shall extend to the State and are in addition to and do not limit any rights afforded to the State by any other cause of this order. Vendor agrees not to disclaim warranties of fitness for a particular purpose or merchantability.
9. TAXES: The unit price shall exclude all State taxes.
10. PACKING, SHIPPING AND INVOICING:
    A: The States purchase document number and the Vendors name, users name and location shall be shown on each packing and delivery ticket, package, bill of lading and other correspondence in connection with the shipment. The users count will be accepted by the Vendor as final and conclusive on all shipments not accompanied by a packing ticket.
    B: The Vendors invoice shall be submitted in triplicate, duly certified and shall contain the following information: order number, description of supplies or services, quantities, unit prices and extended totals. Separate invoices shall be rendered for each and every complete shipment.
    C: Invoices must be submitted to the using agency and NOT THE STATE PURCHASING AGENT.
11. DEFAULT: The State reserves the right to cancel all or any part of this order without cost to the State, if the Vendor fails to meet the provisions of this order and, except as otherwise provided herein, to hold the Vendor liable for any excess cost occasioned by the State due to the Vendors default. The Vendor shall not be liable for any excess costs if failure to perform the order arises out of causes beyond the control and without the fault or negligence of the Vendor, such causes include, but are not restricted to, acts of God or of the public enemy, acts of the State or of the Federal Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargos, unusually severe weather and defaults of subcontractors due to any of the above, unless the State shall determine that the supplies or services to be furnished by the subcontractor where obtainable from other sources in sufficient time to permit the Vendor to meet the required delivery scheduled. The rights and remedies of the State provided in this paragraph shall not be exclusive and are in addition to any other rights now being provided by law or under this order.
12. NON-COLLUSION: In signing this bid, the Vendor certifies he/she has not, either directly or indirectly, entered into action in restraint of free competitive bidding in connection with this proposal submitted to the State Purchasing Agent.
13. NON-DISCRIMINATION: Vendors doing business with the State of New Mexico must be in compliance with the Federal Civil Rights Act of 1964 and Title VII of that Act, Rev., 1979.
14. THE PROCUREMENT CODE: Sections 13-1-28 through 13-1-199 NMSA 1978 imposes civil and criminal penalties for its violation. In addition, the New Mexico criminal statutes impose felony penalties for bribes, gratuities and kickbacks.
15. All bid items are to be NEW and most current production, unless otherwise specified.

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

May 28, 2008

Mr. Steve Brown
Lightning Dock Geothermal No. HI-01
5152 North Edgewood Drive Suite 375
Provo, Utah 84604

Re: Lightning Dock Geothermal No. HI-01 Discharge Permit (GT-001)
Near Animas, NM
Hidalgo County, New Mexico

Dear Mr. Brown:

The New Mexico Oil Conservation Division (NMOCD) has received Los Lobos Renewable Power, LLC's (owner/operator) application, filing and permit fees, on the behalf of Lightning Dock Geothermal No.1 (HI-01), dated May 12, 2008, for authorization to install 3 Class V Geothermal Injection Wells, 5 Production or Development Wells, and a "Binary Cycle" 15 MWe power plant with expansion capability. The proposed discharge site is located in the NE ¼ of the SW ¼ of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The submittal provided the required information in order to deem the new application "administratively" complete.

Therefore, the July 2006 New Mexico Water Quality Control Commission regulations (WQCC) notice requirements of 20.6.2.3108 NMAC must be satisfied and demonstrated to the NMOCD. Geothermal discharge water shall not be produced, discharged or reinjected until the NMOCD notice period passes, and NMOCD sends and receives back from the owner/operator a signed discharge permit.

If there are any questions regarding this matter, please do not hesitate to contact me at (505) 476-3491 or carlj.chavez@state.nm.us. On behalf of the staff of the NMOCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Carl Chavez
Environmental Engineer

CC/cc

xc: OCD District Office

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.3106 NMAC); the following discharge permit application(s) has been submitted to the Director of the New Mexico Oil Conservation Division ("NMOCD"), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 476-3440:

(GT-001) Lightning Dock Geothermal No. 1 (HI-01) LLC. Mr. Steve Brown, 5152, North Edgewood Drive Suite 375, Provo, Utah 84604 has submitted an application for a new discharge permit for the Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe Geothermal Power Plant (5 Production/Development Wells & 3 Class V Geothermal Injection Wells) located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant is located approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). The development wells are located within the SW/4; NW/4; and NE/4 of Section 7. The Class V Wells are located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of 3400 feet below ground level. Geothermal water will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 1500 gpm of shallow ground water with a TDS concentration of approximately 300 mg/L will be cycled through the cooling tower unit. Of this, approximately 425 gpm of cooling tower blow-down effluent along with the remainder of produced water (180~225 °F) will be injected into the geothermal reservoir at a maximum injection rate of between 4,000 to 5,000 gpm, and average pressure of about 75 psig per Class V Well. Lined evaporation ponds at the surface will temporarily store any excess produced or well test water for reinjection into the geothermal

reservoir. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The NMOCD has determined that the application is administratively complete and has prepared a draft permit. The NMOCD will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact the Environmental Bureau Chief of the Oil Conservation Division at the address given above. The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of at least thirty (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines that there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

Para obtener más información sobre esta solicitud en español, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México (Contacto: Dorothy Phillips, 505-476-3461)

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 28th Day of May 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

Mark Fesmire, Director

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

May 28, 2008

Mr. Steve Brown
Lightning Dock Geothermal No. 1 (HI-01) LLC.
5152 North Edgewood Drive, Suite 375
Provo, Utah 84604

Re: **DRAFT Lightning Dock Geothermal No. 1 HI-01 Discharge Permit (GT-001)**
Class V Geothermal Injection Wells (3)
Production or Development Wells (5)

Dear Mr. Brown:

Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC and more specifically 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation and injection for the **Lightning Dock Geothermal No. 1 (HI-01) LLC** (***Owner/Operator)***. The power plant is located in the NE/4 SW/4 of Section 7, Township 25 South and Range 19 West, NMPM, Hidalgo County, New Mexico. The wells are located in Township 25 South and Range 19 West, NMPM, Hidalgo County, New Mexico:

Class V Geothermal Injection Wells

48-07 located in the NE/4, NW/4 of Section 18, 1307 FNL 2123 FWL;
68-07 located in the NW/4, NE/4 of Section 18, 1297.2 FNL 3350.4 FWL; and
88-07 located in the NE/4, NE/4 of Section 18, 1278.3 FNL 4978.1 FWL.

Production or Development Wells

23-07 located in the SW/4, NW/4 of Section 7, 3781 FSL 530.1 FWL;
43-07 located in the SE/4, NW/4 of Section 7, 3721.2 FSL 1789.4 FWL;
63-07 located in the SW/4 NE/4 of Section 7, 3775.3 FSL 3052.1 FWL.
45-07 located in the NE/4, SW/4 of Section 7, 2360 FSL 2278.2 FWL; and
47-07 located in the SE/4 SW/4 of Section 7, 1219.1 FSL 2266.3 FWL.

The approval is under the conditions specified in the enclosed **Attachment To The Discharge Permit**. Enclosed are two copies of the conditions of approval. **Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 working days of receipt of this Letter including permit fees.**

Please be advised that approval of this permit does not relieve the owner/ operator of responsibility should operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3491) or E-mail carlj.chavez@state.nm.us. On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Wayne Price
Environmental Bureau Chief

LWP/cc
Attachments-1
xc: OCD District Office

DRAFT
ATTACHMENT TO THE DISCHARGE PERMIT
Lightning Dock Geothermal No. 1 (HI-01) LLC. (GT-001)
DISCHARGE PERMIT APPROVAL CONDITIONS

May 28, 2008

Water Quality Management Fund
C/o: Oil Conservation Division
1220 S. Saint Francis Drive
Santa Fe, New Mexico 87505

1. **Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of $100.00, plus a renewal flat fee (*see* WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division ("OCD") has received the required $100.00 filing fee and $1700.00 Class V Geothermal Well permit fee.

2. **Permit Expiration and Renewal:** Pursuant to WQCC Regulation 20.6.2.3109.H.4 NMAC, this permit is valid for a period of five years. **The permit will expire on January 23, 2014** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation 20.6.2.3106.F NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. ***Expired permits are a violation of the Water Quality Act {Chapter 74, Article 6, NMSA1978} and civil penalties may be assessed accordingly.***

3. **Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by the OCD pursuant to the Geothermal Resources Conservation Act (Chapter 71, Article 5 NMSA 1978, et seq.), Sections §71-5-1 through §71-5-24; and Geothermal Power (Title 19, Chapter 14 NMAC 1983, et seq.) Parts §19.14.1 through §19.14.132.

4. **Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its May 12, 2008 discharge permit application, including attachments and subsequent amendments and these conditions for approval. Permit applications that reference previously approved plans on file with the

division shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.

5. Modifications: WQCC Regulation 20.6.2.3107.C, 20.6.2.3109 and 20.6.2.5101.I NMAC addresses possible future modifications of a permit. The owner/operator (discharger) shall notify the OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at 20.6.2.3103 NMAC is being or will be exceeded, or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use, or that the Water Quality Standards for Interstate and Intrastate streams as specified in 20.6.4 NMAC are being or may be violated in surface water in New Mexico.

6. Waste Disposal and Storage: The owner/operator shall dispose of all wastes at an OCD-approved facility. Only geothermal RCRA-exempt wastes may be disposed of by injection in a Class II well. RCRA non-hazardous, non-exempt geothermal wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Any waste stream that is not listed in the discharge permit application must be approved by the OCD on a case-by-case basis.

A. OCD Rule 712 Waste: Pursuant to OCD Rule 712 (19.15.9.712 NMAC) disposal of certain non-domestic waste without notification to the OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

B. Waste Storage: The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store geothermal waste on-site for more than 180 days unless approved by the OCD.

7. Drum Storage: The owner/operator must store all drums, including empty drums, containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks, or buckets on an impermeable pad with curbing.

8. Process, Maintenance and Yard Areas: The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance, and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

9. Above Ground Tanks: The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (e.g., liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.

10. Labeling: The owner/operator shall clearly label all tanks, drums, and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

11. Below-Grade Tanks/Sumps and Pits/Ponds.

A. All below-grade tanks and sumps must be approved by the OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. All existing below-grade tanks and sumps without secondary containment and leak detection must be tested annually or as specified herein. Systems that have secondary containment with leak detection shall have a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

B. All pits and ponds, including modifications and retrofits, shall be designed by a certified registered professional engineer and approved by the OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports, location, foundation, liners, and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

C. The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted, or otherwise rendered non-hazardous to wildlife, including migratory birds. Where netting is not feasible, routine witnessing and/or discovery of dead wildlife and migratory birds shall be reported to the appropriate wildlife agency with notification to the OCD in order to assess and enact measures to prevent the above from reoccurring.

D. The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to the OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps, or other OCD-approved methods. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

12. Underground Process/Wastewater Lines:

A. The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh water or fluids that are gases at atmospheric temperature and pressure. A comprehensive listing of process/wastewater pipelines shall be submitted to the OCD within 3 months of permit issuance. Pressure rated pipe shall be tested by pressuring up to one and one-half times the normal operating pressure, if possible, or for atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure, and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by the OCD.

B. The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size, and approximate location. All new underground piping must be approved by the OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to the OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

13. Class V Wells: The owner/operator shall close all Class V wells (e.g., septic systems, leach fields, dry wells, etc.) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic sanitary effluent wastes, unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal

systems at OCD-regulated facilities that inject sanitary effluent and non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program. Class V wells that inject domestic sanitary effluent waste only, must be permitted by the New Mexico Environment Department (NMED).

14. Housekeeping: The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

15. Spill Reporting: The owner/operator shall report all unauthorized discharges, spills, leaks and releases and conduct corrective action pursuant to WQCC Regulation 20.5.12.1203 NMAC; OCD Rule 116 (19.15.3.116 NMAC). The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days. The Division shall in compliance with 19.14.36.8 NMAC be notified of any fire, break, leak, spill or blowout occurring at any geothermal drilling, producing, transporting, treating, disposal or utilization facility in the State of New Mexico by the person operating or controlling the facility.

16. OCD Inspections: The OCD may place additional requirements on the facility and modify the permit conditions based on OCD inspections.

17. Storm Water: The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) including any oil sheen in any storm water run-off. The owner/operator shall notify the OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

18. Unauthorized Discharges: The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) unless specifically listed in the permit application and approved herein.

An unauthorized discharge is a violation of this permit.

19. Vadose Zone and Water Pollution: The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000-.4116 NMAC (Prevention and Abatement of Water Pollution). The OCD may require the owner/operator to modify its permit for investigation, remediation, abatement, and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement and submit subsequent reports will be a violation of the permit.

20. Additional Site Specific Conditions: N/A

21. Geothermal Well(s) Identification, Operation, Monitoring, Bonding and Reporting.

A. Geothermal Well Identification:

Class V Geothermal Injection Wells:

Well # 48-07 (API# 30-025-)
Well # 68-07 (API# 30-025-)
Well # 88-07 (API# 30-025-)

Production or Development Wells:

Well # 23-07 (API# 30-025-)
Well # 43-07 (API# 30-025-)
Well # 63-07 (API# 30-025-)
Well # 45-07 (API# 30-025-)
Well # 47-07 (API# 30-025-)

B. Well Work Over Operations: OCD approval will be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form G-101 "Application For Permit To Drill, Deepen, or Plug Back- Geothermal Resources Well" (OCD Rule 19.14.52 NMAC) with appropriate copies sent to the OCD Environmental Bureau and District Office.

C. Production/Injection Method: High temperature (250 – 300 °F) geothermal water is brought to surface from the Horquilla Formation or geothermal reservoir at 3,400 feet below ground level by 5 production or development wells (~ 3,000 gpm per well). Hot water is routed in parallel through 50 binary cycle (self-contained heat exchanger, evaporator & condenser) power generation units. Condensed produced or effluent water (~ 225 °F) is routed to a lined evaporation

pond(s) for injection (~ 75 psig per well) via 3 Class V geothermal wells into the geothermal reservoir.

D. Well Pressure Limits: The operating surface injection and/or test pressure per injection well measured at the wellhead shall be at a flow rate and pressure that will not adversely affect public health and the environment. The operator shall have a working pressure limiting device or controls to prevent overpressure. Any pressure that causes damage to the system shall be reported to OCD within 24 hours of discovery.

E. Mechanical Integrity Testing: At least once every five years and after any well work over, the geothermal reservoir will be isolated from the casing or tubing annuals and the casing pressure tested at a minimum of 600 psig for 30 minutes. A passing test shall be within +/- 10% of the starting test pressure. All pressure tests must be performed per the scheduled shown below and witnessed by OCD unless otherwise approved.

Testing Schedule:

2008- 30 minute @ minimum 600 psig casing test only (set packer above casing shoe to isolate formation from casing)
2013- 30 minute @ minimum 600 psig casing test only (set packer above casing shoe to isolate formation from casing)

F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the geothermal reservoir and geologic/engineering data demonstrating that continued geothermal extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. OCD may require the operator to perform additional well surveys, tests, and installation of subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the wells.

Any subsidence must be reported within 24 hours of discovery.

G. Production/Injection Volumes: After placing any geothermal well on production, the owner or operator thereof shall file in duplicate a monthly production report, Form G-108, which report shall be due in

the Santa Fe office of the division by the 20th day of each month or included in the annual report. The operator shall also document the production from each well and each lease during the preceding calendar month.

H. Analysis of Injection and Geothermal Reservoir Fluids: After placing any well on injection or disposal in a geothermal resources field or area, the owner or operator thereof shall file in duplicate a monthly injection report, Form G-110, which report shall be due in the Santa Fe office of the division by the 20th day of each month or included in the annual report. The operator shall show the zone or formation into which injection is being made, the volume injected, the average temperature of the injected fluid and the average injection pressure at the wellhead. The analysis of the injection and geothermal reservoir fluids shall be recorded monthly and submitted with Form G-110. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.

I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within ¼ mile from a Class V Geothermal Injection Well.

J. Annual Geothermal Temperature and Pressure Tests: Production or development wells shall undergo an annual test that shall be submitted on Form G-111 by the operator within 30 days of the completion of the test. Flowing temperatures and flowing pressure tests at the wellhead shall be recorded after at least 72 hours of continuous flow at normal producing rates. The well shall then be shut in for 24 hours and shut-in pressure at the wellhead recorded. Results of these tests shall be submitted in duplicate to the Santa Fe office of the division.

K. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing, tubing or packer, or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and the operator receives OCD approval to re-start injection operations.

L. Bonding or Financial Assurance:

Class V Geothermal Injection Wells: The operator shall maintain at a minimum a cash bond (i.e., Assignment of Cash Collateral Deposit or Multi-Well Cash Financial Assurance Bond Geothermal Injection) in the amount of

$50,000.00 to restore the site, plug and abandon wells, pursuant to OCD rules and regulations.

Production or Development Wells: The operator shall maintain at a minimum a cash bond (i.e., $10,000.00 Multi-Well Geothermal Plugging Bond and/or $5,000.00 One Well Geothermal Plugging Bond).

If warranted, OCD may require additional financial assurance for closure of the power plant or facility (see Section 23 below).

M. Annual Report:

All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:

1. Cover sheet marked as "Annual Geothermal Well Report, name of operator, GT permit #, API# of well(s), date of report, and person submitting report.

2. Brief summary of geothermal well operations including description and reason for any remedial or major work on the well(s). Copy of Form G-101.

3. Production and injection volumes as required above in 21.G. including a running total should be carried over to each year. The total mass produced, dry steam produced, flow rates, temperatures and pressures, average injection pressures, temperatures, etc.

4. A copies of the chemical analyses as required above in 21.H.

5. A copies of any mechanical integrity test chart, including the type of test, i.e., EPA 5-Yr. casing test, date, time, etc. as required above in 21 E and 21J.

6. Brief explanation describing deviations from normal production methods.

7. A copy of any leaks and spills reports, information provided under Section 15 above.

8. If applicable, results of any groundwater monitoring.

9. Information required from cavity/subsidence 21.F. above.

10. An updated Area of Review (AOR) summary (20.6.2 NMAC) when new wells are drilled within ½ mile of the power plant.

11. A "Miscellaneous" section to include any other issues that needs to be brought to the Division's attention.

12. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.

22. **Transfer of Discharge Permit:** Pursuant to WQCC 20.6.2.5101.H the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer brine well operations until proper bonding or financial assurance is in place and approved by the division. OCD reserves the right to require a modification of the permit during transfer.

23. **Closure:** The owner/operator shall notify the OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the operator shall submit for OCD approval, a closure plan including a completed C-103 form for plugging and abandonment of the well(s). Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure.

24. **Certification: Lightning Dock Geothermal No. 1 (HI-01) LLC (Owner/Operator)**, by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained here. **Owner/Operator** further acknowledges that the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of this permit administratively.

Conditions accepted by: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

_____
Company Name-print name above

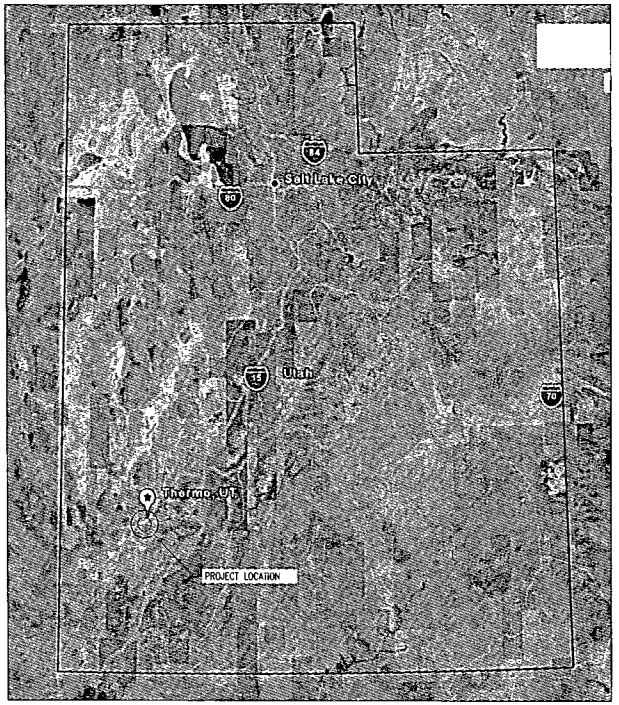
_____
Company Representative- print name

_____
Company Representative- signature

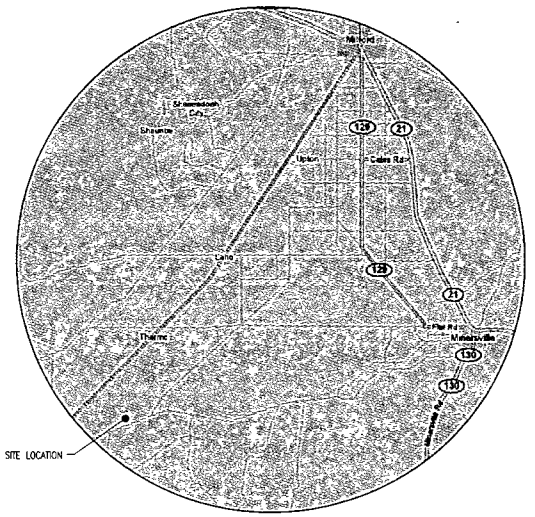
Title_____

THERMO, UTAH

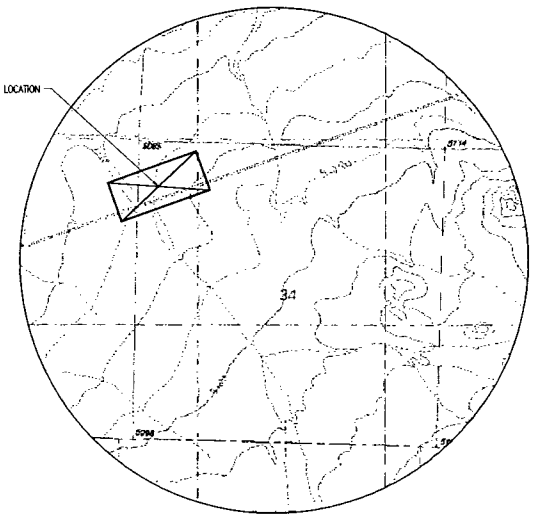
GEOTHERMAL GENERATION PLANT



PROJECT LOCATION MAP



SITE LOCATION MAP



TOPOGRAPHICAL MAP

DESIGN CRITERIA

PROJECT LEGAL DESCRIPTION:
BEGINNING AT A POINT N00°32'09"W 1297.65 FEET ALONG THE WEST SECTION LINE FROM THE WEST QUARTER CORNER OF SECTION 34, TOWNSHIP 30 SOUTH, RANGE 12 WEST, SALT LAKE BASE AND MERIDIAN; THENCE FROM SAID POINT OF BEGINNING S69°11'44"W 303.63 FEET; THENCE N20°48'16"W 700.00 FEET; THENCE N69°11'44"E 562.13 FEET TO A POINT ON THE SAID WEST SECTION LINE OF SECTION 34; THENCE N69°11'44"E 1037.87 FEET; THENCE S20°48'16"E 700.00 FEET; THENCE S69°11'44" W 1269.37 FEET TO THE POINT OF BEGINNING AND CONTAINS 25.712 ACRES.

PROJECT DESCRIPTION: 10 MW ADVANCED BINARY GEOTHERMAL POWER PLANT.

GOVERNING CODES: IBC 2006; UFC 2006; UMC 2006; UPC 2006

BUILDING DEPARTMENT: BEAVER COUNTY

SEISMIC: S_{DS} = 0.522; S_{D1} = 0.248, CATEGORY 1, SOIL FACTOR D

WIND LOADS: 90 MPH, EXPOSURE C

SNOW LOADS: 43 PSF GROUND/30 PSF. DESIGN

FROST DEPTH: 30"

PROJECT DATA

PROJECT NAME: THERMO (BE-01)

ENGINEERS:

PRINCIPAL:	ROBERT I. NASH
CIVIL:	NED HARDEN - UT 156976
MECHANICAL:	ROBERT I. NASH - UT 170971
ELECTRICAL:	STEVE NASH - UT 164510
ELEVATION =	5071'-6" MSL
OPERATION =	8322 HOURS/YR
CAPACITY =	10 MW

No.	DATE	BY	APP	REVISION
1	5-8-08	TH	BN	REVISED PROJECT LOCATION (LEGAL DESCRIPTION)
0	4-21-08	TH		ISSUED FOR PERMIT

REFERENCE DRAWING

NUMBER

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Intermountain Consumer Professional Engineers, Inc.
CONSULTING ENGINEERS
1145 S. SOUTH UNION AVE.
MIDVALE, UTAH 84047
BUS. (801) 255-1111 FAX. (801) 566-0088

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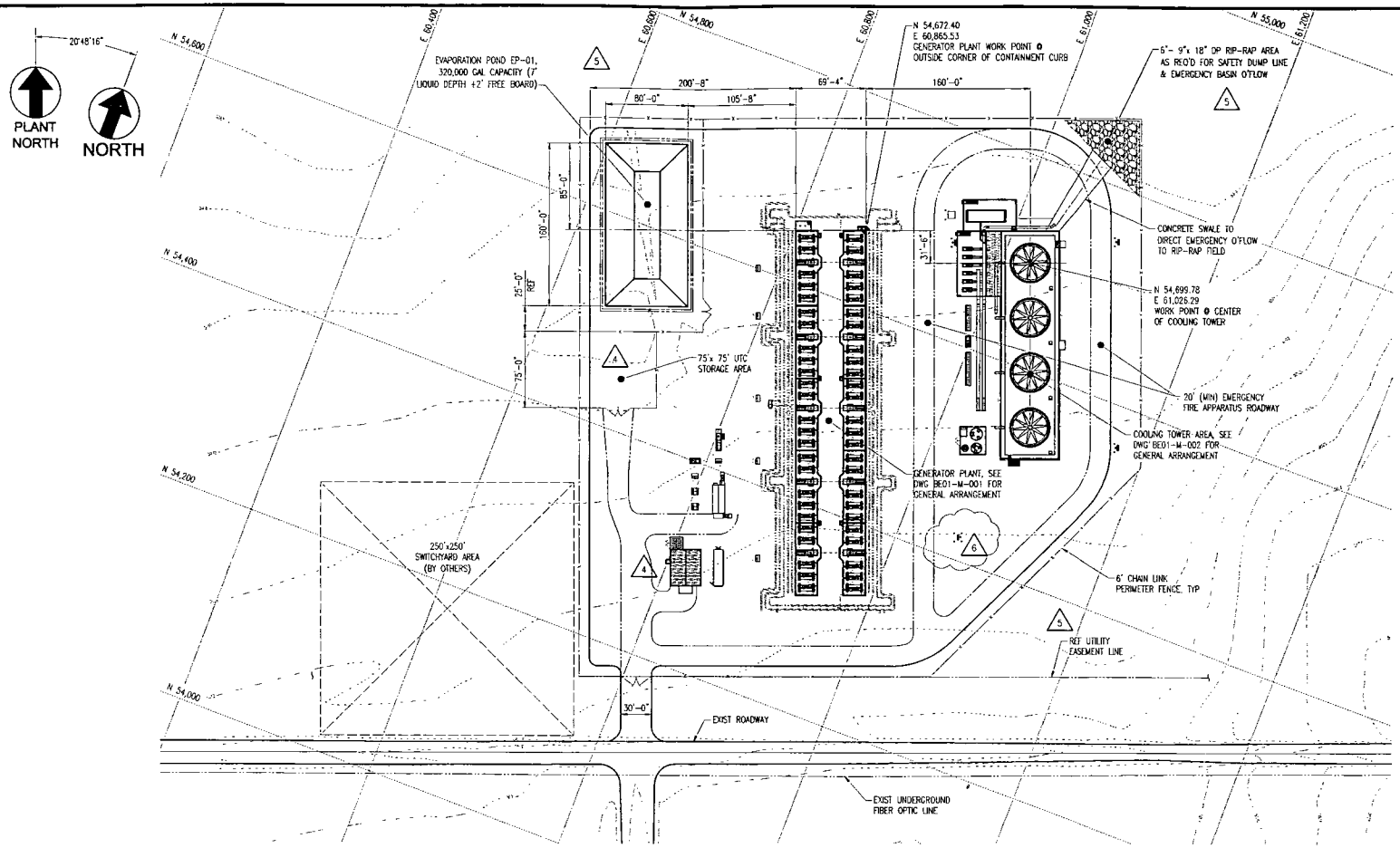
Drawn By:	TH	4-21-08
Chkd. By	BN	4-21-08
ENGR.	RH	4-21-08
SUPV.		Date
APPD.		Date

THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
PROJECT COVER SHEET

SCALE: NTS
Project No. 443-005
DRAWING No. BE01-A-001
REVISION 1



GENERATING AREA SITE PLAN

0 25' 50' 100'

SCALE: 1"= 50'-0"

NOTES:

1. FOR EQUIPMENT, SEE EQUIPMENT LIST.
2. PROJECT DATUM EL 100'-0"= 5071'-0"
3. THIS IS AN UNMANNED SITE WITHOUT PERMANENT WATER OR RESTROOM FACILITIES.

No.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER
5	7-7-08	TH	BIN	EXPANDED PERIMETER, ENLARGED POND, GENERAL UPDATE		
4	6-19-08	TH	BIN	REV'D DATUM PER AS BUILT, UTC STORAGE AREA, MOVED MAINTENANCE BLDG		
3	5-2-08	TH	BIN	REW'D WEST PONDS, RESIZED & RELOCATED EVAP POND		
2	5-15-08	TH	BIN	GENERAL UPDATE	SITE GRADING PLAN	BE01-CV-100
1	5-2-08	TH	BIN	GENERAL UPDATE	COOLING TOWER AREA PLAN CA	BE01-M-002
6	7-18-08	TH	BIN	RELOCATED HYDRANT	GENERATOR AREA PLAN CA	BE01-M-001

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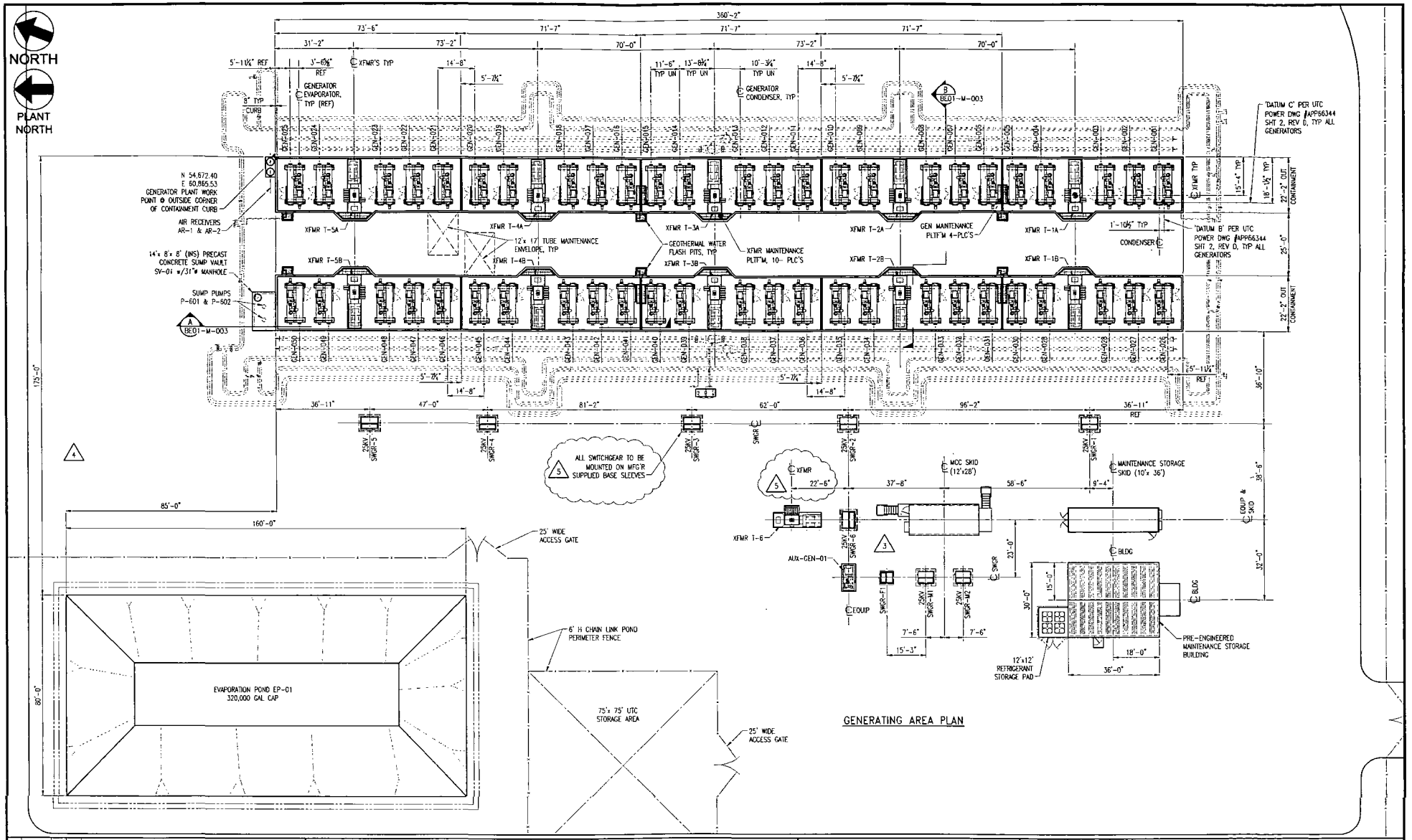
Des. By:	TH	Date 4-21-08
Drawn By:	TH	Date 4-21-08
Ch'k'd. By:	NH	Date 4-21-08
ENGR.	NH	Date 4-21-08
APP'D.		Date
Appd.		Date

THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
GENERAL ARRANGEMENT
GENERATING AREA SITE PLAN

SCALE	DRAWING No.	REVISION
1"=50'-0"	BE01-SP-100	6
Project No. 443-005		



No.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER
5	7-30-08	TH	BN	REVISED ASS SWGR MTG, RELOCATED XFMR T-6		
4	7-7-08	TH	BN	RELOCATED & RESIZED POND		
3	6-19-08	TH	BN	SWGR NUMBERING, MAINT BLDG AREA, REM'D CB-M, METERING & SCADA		
2	5-5-08	TH	BN	REV'D POND, CONC, LOCATED XFMR'S & GENERATORS, REM'D PROPANE STATIONS		
1	5-15-08	TH	BN	REM'D PROPANE VAPORIZERS, MOVED FLASH PITS, GENERAL UPDATE	SITE PLAN	BE01-SP-100
0	4-21-08	TH	BN	ISSUED FOR PERMIT	COOLING TOWER AREA PLAN GA	BE01-M-002

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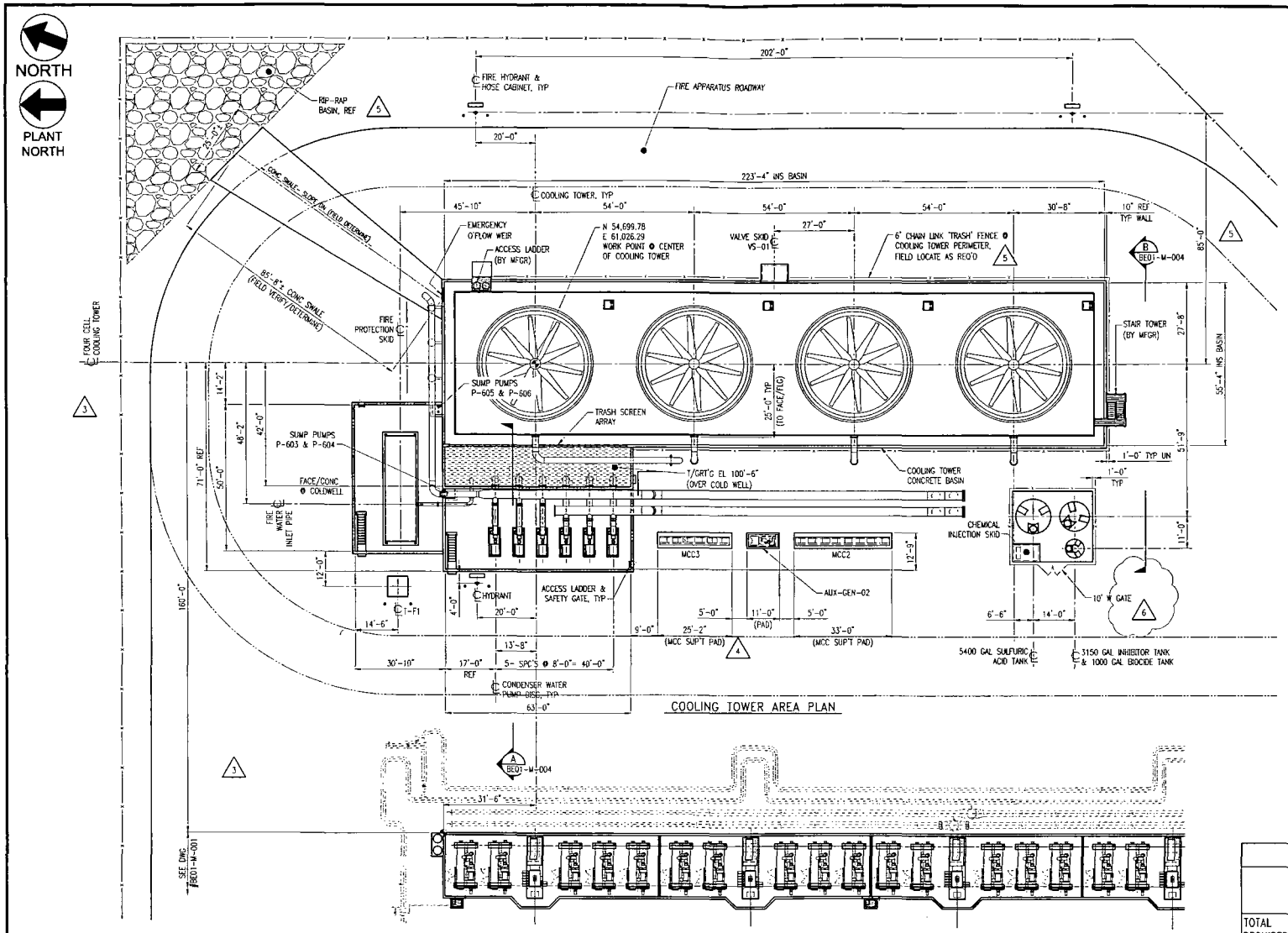
Des. By.	TH	Date 4-21-08
Drawn By.	TH	Date 4-21-08
Civil By.	BN	Date 4-21-08
ENGR.	RH	Date 4-21-08
APPD.		Date
APPD.		Date

THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
GENERAL ARRANGEMENT
GENERATING AREA PLAN

SCALE 1/16" = 1'-0"
Project No. 443-005
DRAWING No. BE01-M-001
REVISION 5



COOLING TOWER AREA PLAN

NFPA/FIRE PROTECTION REQUIREMENTS		
	CAPACITY (REQ'D)	SERVICE
	1450 GPM @ 100 PSI	COOLING TOWER FIRE PROTECTION SYSTEM
	500 GPM @ 100 PSI	FIRE HYDRANT
TOTAL REQUIRED:	2 HOUR SUPPLY REQUIRED (MIN)= 234,000 GALLONS	1950 GPM @ 100 PSI
AVAILABLE:	299,990 GALLONS	COOLING TOWER BASIN CAPACITY (DOES NOT INCLUDE THE COLD WELL)

No.	DATE	BY	APP	REVISION
5	7-7-08	TH	BIN	OTFLOW SWALE, ROADWAY, MOVED HYDRANTS, GENERAL UPDATE
4	6/30/08	PLC	BIN	RELOCATED MCC2, MCC3 & AUX GEN
3	6-3-08	TH	BIN	UPDATED FIRE PROTECTION SKID PIT, REM'D PROPANE STATION, GENERAL REVISION
2	5-15-08	TH	BIN	MOVED CHEMICAL TANKS, PROPANE STATION-- GENERAL UPDATE
1	5-2-08	JW	BIN	GENERAL UPDATE
6	7-18-08	TH	BIN	RELOCATED HYDRANT (OFF SHEET)

REFERENCE DRAWING	NUMBER
SITE PLAN	BE01-SP-100
GENERATOR AREA PLAN GA	BE01-M-001

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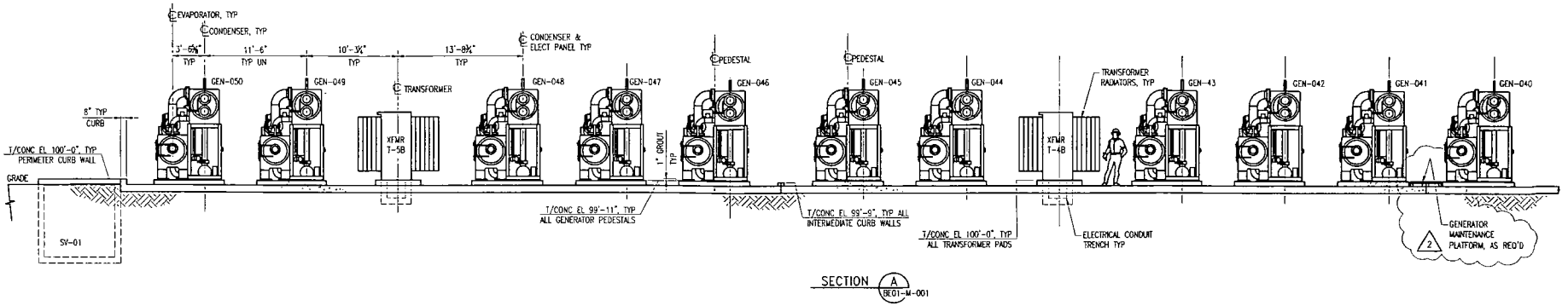
		Date
Des. By	O'LEARY	4-21-08
Drawn By	O'LEARY	4-21-08
Ck'd By	BIN	4-21-08
ENGR.	RH	4-21-08
APPD.		Date
APPD.		Date

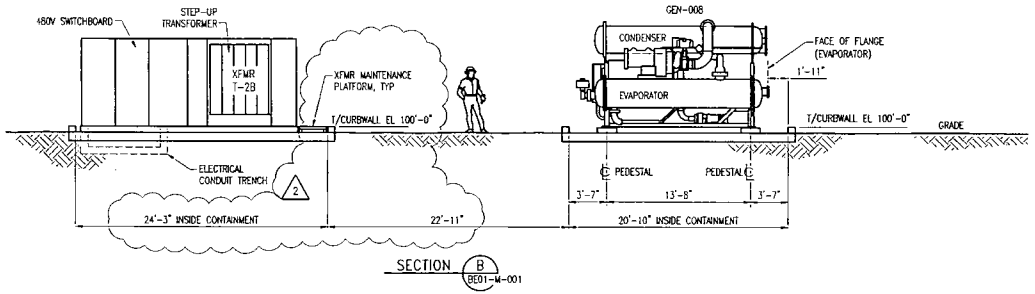
THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
COOLING TOWER AREA GENERAL ARRANGEMENT PLAN & SECTION

SCALE	DRAWING No.	REVISION
1/16" = 1'-0"	BE01-M-002	6

Project No. 443-005



SECTION A BE01-M-001



SECTION B BE01-M-001

No.	DATE	BY	APP	REVISION
2	6-6-08	TH	BIN	GENERAL UPDATE
1	5-19-08	AA	NH	ISSUED FOR CONSTRUCTION
0	4-21-08	TH	BIN	ISSUED FOR PERMIT

REFERENCE DRAWING

NUMBER

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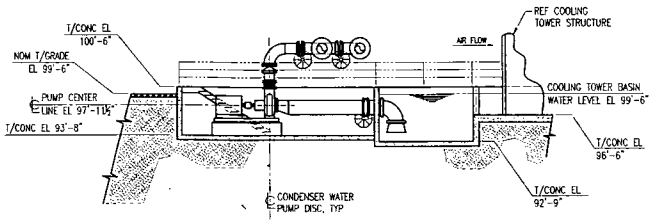
Des. By	D'LEARY	4-21-08
Drawn By	D'LEARY	4-21-08
Ch'k'd. By	BN	4-21-08
ENGR.	RH	4-21-08
APPD.		Date
APPD.		Date

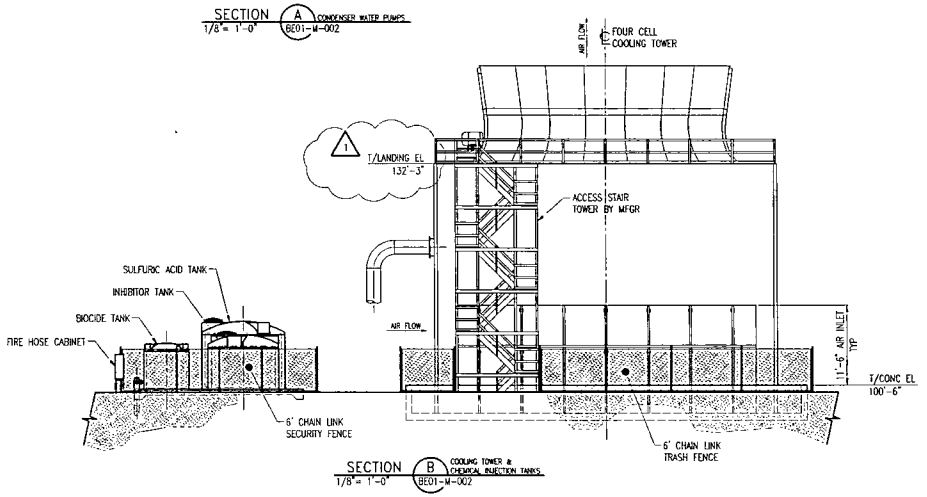
THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
GENERAL ARRANGEMENT
GENERATING AREA SECTIONS

SCALE	DRAWING No.	REVISION
3/16" = 1'-0"	BE01-M-003	2

Project No. 443-005



SECTION A (BE01-M-002) CONDENSER WATER PUMPS
1/8" = 1'-0"



SECTION B (BE01-M-002) COOLING TOWER & CHEMICAL INJECTION TANKS
1/8" = 1'-0"

No.	DATE	BY	APP	REVISION
1	6-3-08	TH		CORRECTED T/LANDING ELEVATION
0	5-15-08	TH		ISSUED FOR CONSTRUCTION

REFERENCE DRAWING

NUMBER

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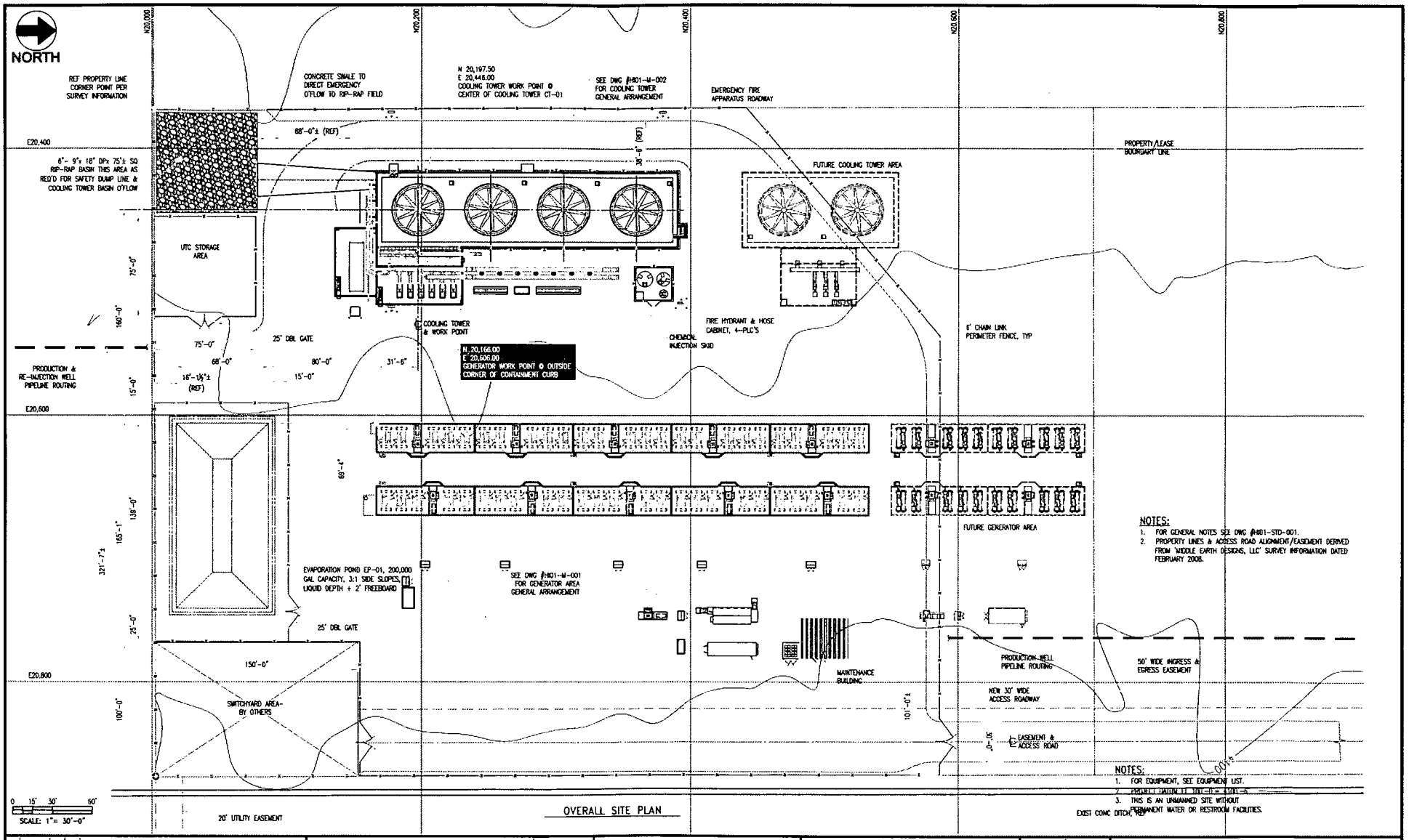
		Date
Des. Dr.	TH	4-21-08
Drawn Dr.	TH	5-13-08
Chk'd. En.	TB	5-13-08
ENG°.	BIN	4-21-08
APPD.		Date
APPD.		Date

THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
GENERAL ARRANGEMENT
COOLING TOWER AREA SECTIONS

SCALE: 1/8" = 1'-0"
Project No. 443-005
DRAWING No. BE01-M-004
REVISION 1



OVERALL SITE PLAN

No.	DATE	BY	APP	REVISION
2	7-17-08	TH	BN	ISSUED FOR PERMIT
1	6-25-08	TH	BN	GENERAL UPDATE
0	05/29/08	DCP	BN	ISSUED FOR CONSTRUCTION

REFERENCE DRAWING

NUMBER

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ICPE		
TH	7-3-08	
BN	7-16-08	
BN	7-16-08	
BN	7-17-08	

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GENERAL ARRANGEMENT
GENERATING AREA SITE PLAN

1"=30'-0"

443-006

HI01-SP-100 | 2

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, September 09, 2008 9:56 AM
To: 'Jay Hamilton'
Subject: FW: FW: Power Point w/ some info. to consider for Lightening Dock

FYI. In addition, we spoke this morning about the monitoring program w/ proposed MWs, big map w/ EP, PP & RP locations to scale on the big map, updated cross-section (smaller one) and a large one if we go to hearing. Please contact me if you have questions. Thanks.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Jay Hamilton [mailto:hamiltonenviro@yahoo.com]
Sent: Friday, July 25, 2008 11:37 AM
To: Chavez, Carl J, EMNRD
Cc: Jim Rosser
Subject: Re: FW: Power Point w/ some info. to consider for Lightening Dock

Carl,

I will be getting this information back to you shortly.

Thanks,

Jay

"Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us> wrote:

> Jay and Jim:
>
> As a follow-up to the permit application (see e-mail msg. below), the NMOCD needs a schematic diagram(s) of the surface facility as finally proposed. You may recall that we have verbally grappled with surface layout of a drill pit(s), evaporation pond(s) and proposed cooling tower blow-down pit (lined vs. unlined). On May 6, 2008, the NMOCD sent you a power point presentation with a message (see below) based on the thermal nature of the water, liner considerations, and were requesting a diagram(s) of surface features as a final proposal to understand the engineering design proposed in the application. There are issues about how many evaporation ponds would be needed, their dimensions, especially because of the anticipated high volume of water used in drilling, testing, and storing; the ergonomics influencing the number of ponds, etc.,; and their engineering design, construction and mointoring. Would there be multiple drilling pits, one for each well that could be converted to an evaporation pond(s). Would the facility be able to house the gigantic pond(s) on its premises. Unlined blow-down pits were discouraged and you were consulting with your engineering group to see how they could handle the blow-down without infiltration, how they could address the types of chemicals used at the cooling tower to minimize impacts to surface and ground water and even possibly scrap the blow-down pit and reinject or implement other engineering controls or designs to address the cooling tower blow-down discharge to a pit, etc. You were also going to look into implementing closed-loop drilling at the site.

Based on the above, the NMOCD is requesting:

1) An updated diagram(s) of the location of any pit or evaporation pond. This shall include design drawings of any pit or pond construction.

2) A monitoring plan with chemicals of concern, sampling protocol, monitor location and design to address any discharges to surface and ground water and ensure that WQCC Water Quality Standards are not exceeded.

3) GPS coordinates (decimal) of all production/development wells, injection wells and the center of any discharge pit are needed to compare distances to other operators in the area. You had sent some GPS coordinates, but the OCD Internet system must have prevented me from receiving the information. This information is crucial to assessing the proximity of your wells to nearby operators in the area.

4) A detailed evaluation of the chemicals that are proposed for the cooling tower and scientific/engineering explanation of why they are the most suitable chemicals to use at the site given the location of the nursery and fish farm immediately downgradient from the cooling tower blow-down discharge area and the contaminant hydrogeology considerations that prove no adverse impact(s) would result to surface water, ground water, wildlife, fresh water, etc. in the area. The NMOCD had requested that you check into Chemical Companies with chemical products that have undergone Whole Effluent Toxicity (WET) Testing and have been proven to be environmentally friendly products to control scale. Companies like Nalco, Betz, etc. all have chemical products that are pollution prevention friendly products that will accomplish the same goal while protecting water resources and wildlife. The NMOCD had provided a website in Michigan with a listing of environmentally friendly cleaning products used at refineries, oil and gas treatment facilities, etc. The discharge permit has language that discharges cannot exceed the WQCC WQSs. As I recall, you sent the chemicals that Nevada allowed you to use in Nevada without assessing products that are environmentally friendly. The NMOCD may regard any blow-down pit to be a UIC Class V Well that will require pre-treatment before allowing any discharge?

Please submit this information to me as an addendum to the application. This information will be required as we move forward to permit the facility. Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Chavez, Carl J, EMNRD
Sent: Tuesday, May 06, 2008 8:41 AM
To: 'Jay Hamilton'
Cc: Gum, Tim, EMNRD; Price, Wayne, EMNRD
Subject: Power Point w/ some info. to consider for Lightening Dock

Jay:

Please find attached a power point with some info. on liners, construction methods, etc. for you to consider for Lightening Dock Geothermal No. HI-01. Mr. Tim Gum of OCD District 2 will provide any guidance on the evaporation ponds, drilling pit onsite or offsite disposal requirements, etc. As discussed, the OCD would prefer that closed loop drilling systems be used and cuttings be disposed off-site if there is a RCRA Subtitle D Landfill (i.e., Deming) that has "Special Waste" designation. Please contact Tim (contact info. provided below) to learn more about field requirements.

FYI, liners with excellent thermal properties are: Chlorosulfonated Polyethylene- Reinforced (CSPE-R),

Ethylene Propylene Diene Monomer (EPDM), and Flexible Polypropylene (FPP).

Thank you.

Tim Gum - District Supervisor
Phone extension: 102
Mobile: (575) 626-0824

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

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2008 SEP 8 AM 9 47

INFORMATION REQUESTED BY NMOCD 8/1/2008

1) An updated diagrams(s) of the location of any pit or evaporation pond. This shall include design drawings of any pit or pond construction.

- See Enclosed Site Map with Pond Locations
- See Enclosed Diagrams with Pond and Piping Locations
- See Design Drawings of Pit or Pond Construction
- See Enclosed Containment Pond Liner Specifications

2) A monitoring plan with chemical of concern, sampling protocol, monitor location and design to address any discharges to surface and ground water and ensure that WQCC Water Quality Standards are not exceeded.

General System Description of Cooling Tower Water to Geothermal Water Reinjection

The Geothermal Water System is intended to consist of up-to four (4) Production and three (3) Reinjection Wells and a Closed Piping System that circulates through the Geothermal Energy Generators which produce Electrical Energy via the Binary Rankin Cycle. The Geothermal Water is circulated at various flows (based upon the Resource Temperature) from about 11,000GPM to 13,000GPM. This Power Generation Process also requires a Cooling Water System to complete the Rankin Cycle process to heat and cool the Cycle Media/Refrigerant. The Cooling Water system will draw water from either Plant Wells or an Existing Local Source and circulate through the Generators and a Cooling Tower at varying Flow-Rates of about 46,000GPM to 50,000GPM.

The inherent designed Mechanical/Physical cooling characteristics of the Cooling Tower evaporate approximately 2% to 4% of the Cooling Water flow (1,000GPM to 2,000GPM), dependant mainly upon local weather conditions at any point in time. This evaporation tends to concentrate the Cooling Water; therefore, at any level of water chemistry/quality from potable to non-potable, the constant evaporation of the Cooling Tower will concentrate water to levels which are not acceptable for the Generation Equipment, Cooling Tower, and/or the piping of which contain the water itself in the closed system. To offset this concentration "Fresh" Cooling Water can be added to the cooling loop at a rate of double, triple, or more than the evaporation rate. To decrease the amount of additional water needed, the Cooling Water Loop can be Chemically or Mechanically Treated to allow for higher levels of compatibility with the Equipment and Piping Materials. In either of these two cases, some water will need to be discharged in a form of a Blow-Down Stream consisting of concentrated Dissolved and Suspended Solids that were originally present in the Cooling Water Source.

To maintain the Project Zero Discharge, Minimal Evaporation, and Minimal Water Consumption characteristics, this Blowdown Stream will be injected into the Geothermal Reinjection Well Stream. To assure that the Quality of this Cooling Water Blowdown water

and to assure that any Chemical Addition of the Water Treatment System does not exceed the "original chemistry" of the Geothermal Water Stream, a Geothermal Water / Cooling Tower Blowdown Water Quality Monitoring System will be included in the Design. This System will employ real-time monitoring equipment capable of on-line monitoring and recording of Water Chemistry for both Historical and Reporting requirements. This data collection and reporting will also include the reporting to the Plant PLC Controller which will adjust not only the Cooling Water and Chemical Injection Systems; but, will also be able to administratively (1) Limit the amount of Blowdown Flow, (2) divert some or all flow to the Plant Evaporation Pond, or (3) take other steps to limit and/or stop Cooling Tower Blowdown Flow to the Geothermal Water Reinjection, up-to and including a total Plant Shut-Down until such time as the Chemistry of the Injection Flow is within acceptable Range. This "Acceptable Range" can be set and/or regulated administratively, as stipulated in/by Permit; however, the Chemistry of the Geothermal Reinjection Flow shall not exceed those levels as found in the Production/Reinjection Well Stream.

a. The proposed chemicals to be used in the cooling tower will include bleach for primary biocide control, sulfuric acid for pH control, Nalco 3DT189 for scale and corrosion control, along with Nalco 960 as required for supplemental biocide. Nalco 7408 - As a precautional measure, a Nalco 7408 feed system will be set up to scavenge any excess residual oxidant prior to effluent re-jection. Attached are the product bulleting and MSDS for the Nalco specialty chemicals specified.

b. The sampling protocol will be continuous monitoring of chemistry using a 3D Trasar control system. A bulletin summarizing the various control capabilities of the 3 Trasar system is also attached for your review. The pH sensor will control the acid injection pump as to maintain tower pH between 7.8-8.0. The conductivity sensor will control Cooling Tower conductivity between 1900-2000 mmhos, as to maintain a <1360 TDS in the Blow Down at all times. The controller will also activate the inhibitor pump as to maintain our target dosage of 75-80 ppm of Nalco 3DT189. The ORP sensor will activate the bleach pump as to maintain a free residual halogen level of 0.2-0.3 ppm. Operations will sample tower water daily and test for conductivity, TDS and pH using a daily calibrated hand held Myron L 6P analyzer, 3DT 189 inhibitor level using a handheld Flourometer, and free residual oxidant using a Hach DR-890 spectrophotometer test. This will ensure control systems are working properly and within calibration tolerance. All continuously monitored parameters from the controller will be sent to the control room via a 4-20 mA output. This will allow continuous monitoring and any alarms will be viewed and addressed immediately.

c. The controller sample point and grab sample location will be on the cooling tower return header.

d. The 3D Trasar unit is able to continuously sample the cooling water and adjust the chemical feed system based on the parameter setting specified above. The 3D Trasar system is a complete water treatment control and monitoring system, which

continuously measures key system parameters, detects upsets, takes appropriate corrective action and communicates with system users. With strict effluent chemistry restrictions it will be very important to focus on controlling the blowdown as closely as possible to maintain targets at all times. Real-time monitoring of specific conductance will allow the system to blow down and make up water as necessary to maintain the required chemistry in the system by preventing the system from over-cycling and breaking the permitted ion concentration. Typical treatment and control strategies to cooling towers can allow over-treated or over-cycled and under-treated or under-cycled at times to be discharged. With the 3DTrasar system we will be able to monitor all of these variables independently and maintain each one separately.

e. The water discharged from the cooling tower will be limited to 3.5 cycles of concentration, or approximately 1900-2000 mmhos; which calculates to approximately 1300-1350 ppm TDS, with a max. of 1400 ppm. At these cycles of concentration, TDS of the cooling tower blowown will never exceed the levels of dissolved solids measured in the Hot Well 55-7, thereby ensuring that the cooling tower blowdown reinjected with the Hot Brine will not contribute any additional solids to the aquifer.

f. Rasser Technology will use automation along with daily wet testing to ensure all of the above protocols are maintained. It is anticipated that our primary water treatment company will be Nalco. Their technical engineering staff out of El Paso, TX. will provide technical consulting on a twice per month or TBD basis. They will provide routine testing, operations training, and SPC and graphical monitoring of the water systems at the plant. Daily log sheets, along with DCS controller data and Nalco's Service Reports will be used to verify that the systems are being properly treated and that all state guidelines are being maintained as permitted.

3. GPS coordinates (decimal) of all production/development wells, injection wells and the center of any discharge pits are needed to compare distances to other operators in the area.

- See enclosed Table

4. A detailed evaluation of the chemicals proposed for the cooling tower and scientific/engineering explanation as to why they are the most suitable chemicals to use at the site given the location of the nursery and fish farm immediately down-gradient from the cooling tower blow-down discharge area and the contaminant hydrogeology considerations that prove no adverse impact(s) would result to surface water, ground water, wildlife, fresh water, etc. in the area.

- See enclosed Nalco - Letter of Suitability

1) Enclosed Site Map With Pond Locations

Enclosed Diagrams With Pond and Piping Locations

Enclosed Containment Pond Liner Specifications

Lightning Dock
Proposed Action
and
National Hydrologic Dataset
Water Inventory
Animas Valley, NM

WELL # 13-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3781.0 feet along the west section line;
Thence, East, a distance of 530.1 feet to the location of said well.

WELL # 33-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3721.2 feet along the west section line;
Thence, East, a distance of 1789.4 feet to the location of said well.

WELL # 53-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3775.3 feet along the west section line;
Thence, East, a distance of 3052.1 feet to the location of said well.

WELL # 45-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 2510.0 feet along the west section line;
Thence, East, a distance of 2428.2 feet to the location of said well.

WELL # 47-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 1219.1 feet along the west section line;
Thence, East, a distance of 2266.3 feet to the location of said well.

WELL # 42-18
Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1307.0 feet along the west section line;
Thence, East, a distance of 2123.1 feet to the location of said well.

WELL # 62-18
Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1297.2 feet along the west section line;
Thence, East, a distance of 3350.4 feet to the location of said well.

WELL # 82-18
Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1278.3 feet along the west section line;
Thence, East, a distance of 4978.1 feet to the location of said well

Project Area 1 Mile Buffer (Geothermal Lease)

Proposed Wells

Injection

Production

Well Pits

60' x 80' x 6'

Geothermal Lease

Proposed Power Plant

Raser Surface Agreement

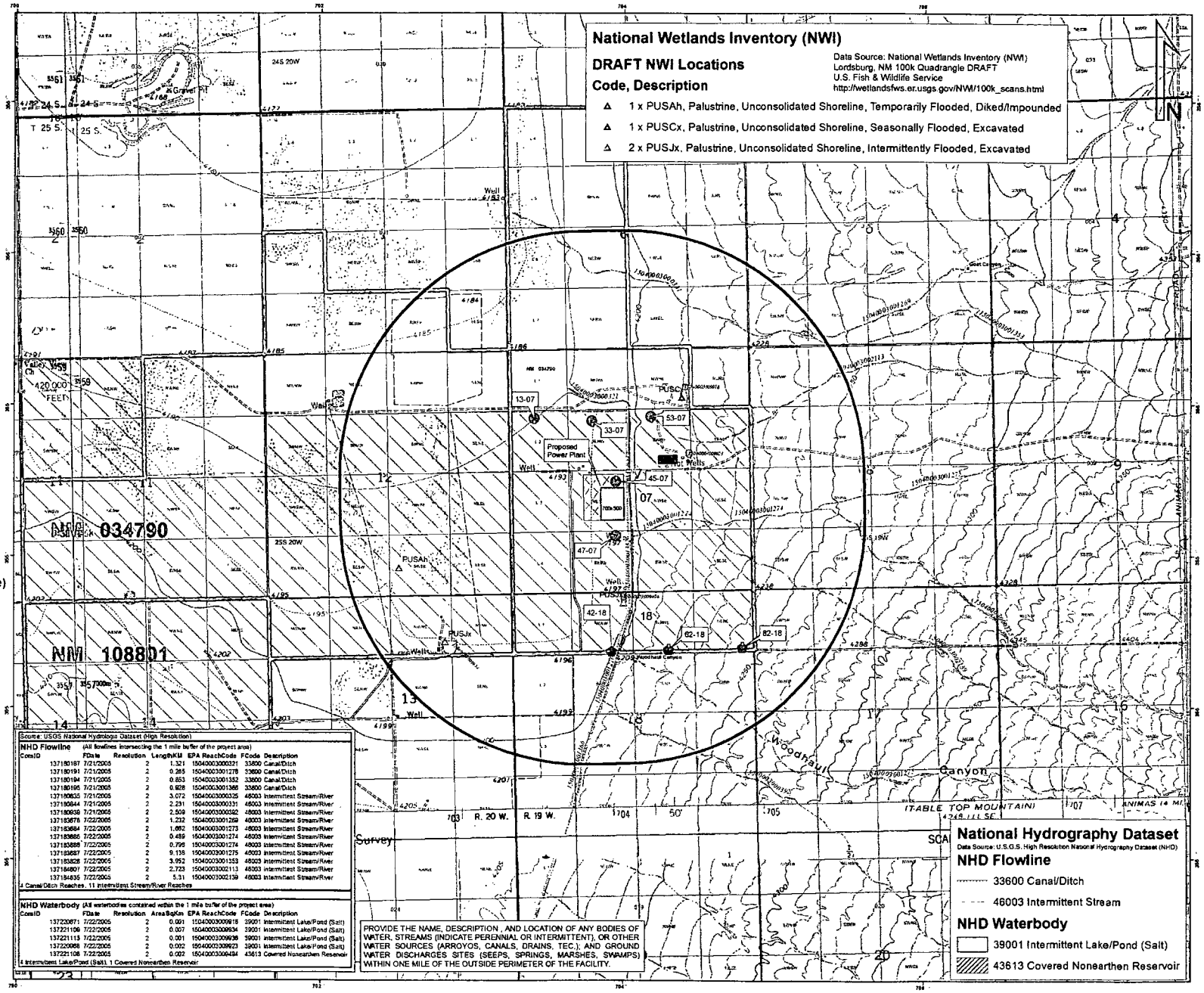
ROSETTE, INC.

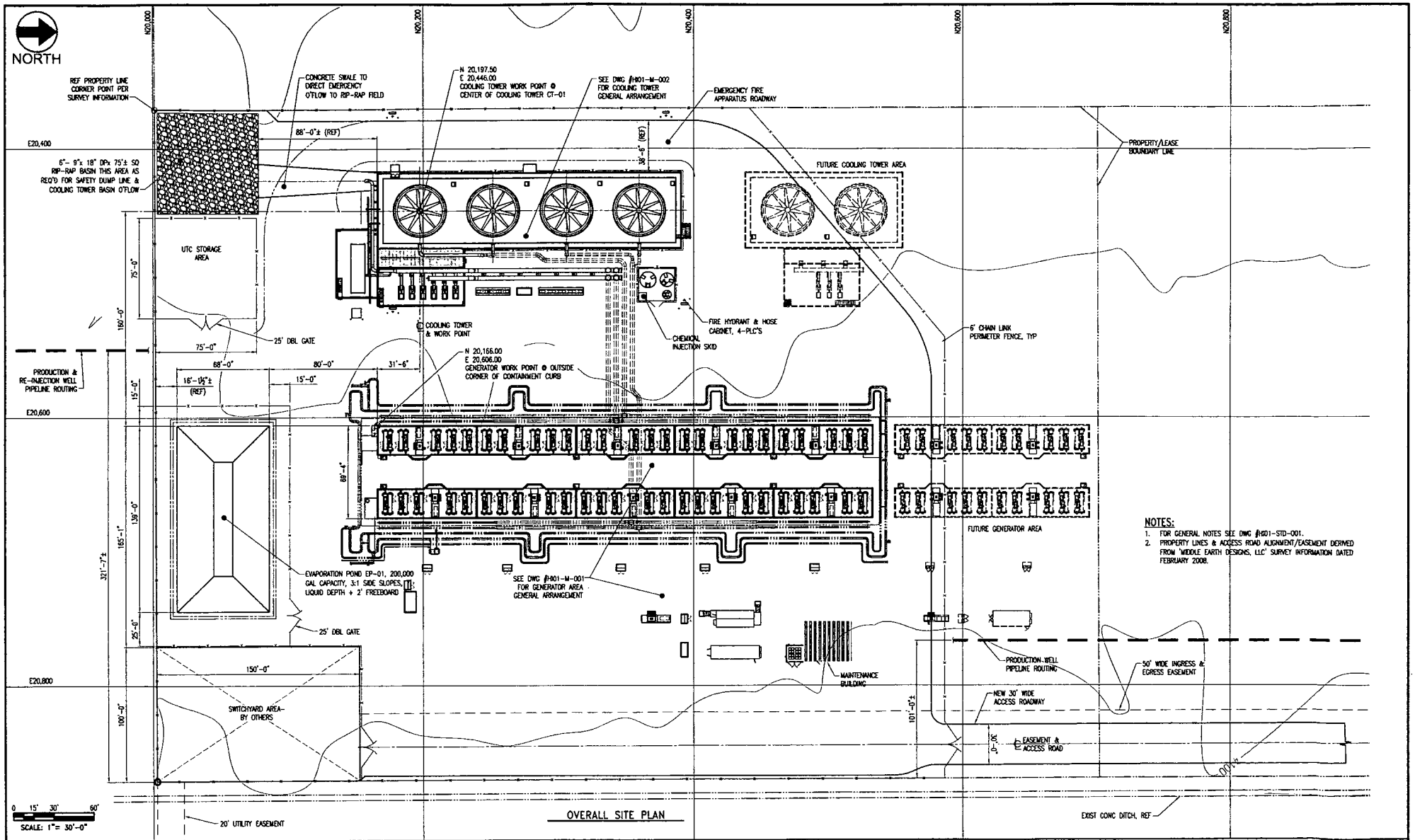
Raser Federal Geothermal Lease

Imagery:
USGS Digital Raster Graphics
1:24,000 scale Quadrangles
Coordinate System: UTM Zone 12 NAD83
Contour elevations reported in feet
National Geodetic Vertical Datum 1929

0 0.5 1 Miles

0 0.5 1 1.5 Km





OVERALL SITE PLAN

No.	DATE	BY	APP	REVISION
2	7-17-08	TH	BN	ISSUED FOR PERMIT
1	6-25-08	TH	BN	GENERAL UPDATE
0	05/29/08	DCP	BN	ISSUED FOR CONSTRUCTION

REFERENCE DRAWING

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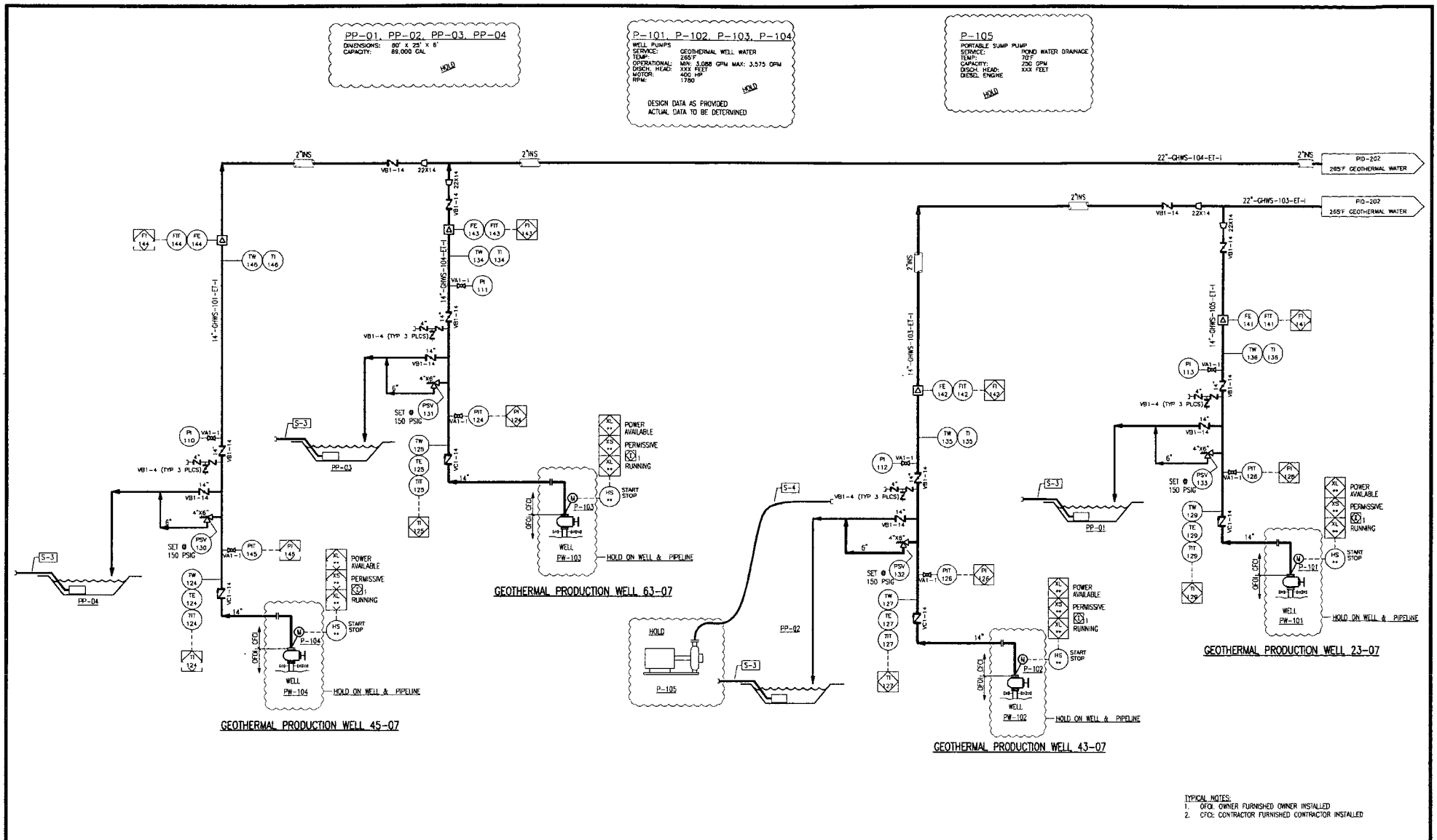
ENGR.	BN	Date 7-16-08
APPD.	BN	Date 7-17-08
APPD.		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GENERAL ARRANGEMENT
GENERATING AREA SITE PLAN

SCALE	DRAWING No.	REVISION
1"=30'-0"	H01-SP-100	2
Project No. 443-006		



TYPICAL NOTES:
1. OFCI: OWNER FURNISHED OWNER INSTALLED
2. CFCI: CONTRACTOR FURNISHED CONTRACTOR INSTALLED

No.	DATE	BY	APP	REVISION
D	08/05/08	DCP	BN	ISSUED FOR BID
C	07/17/08	DCP	BN	ISSUED FOR PERMIT
B	05/24/08	DCP	BN	ISSUED FOR REVIEW

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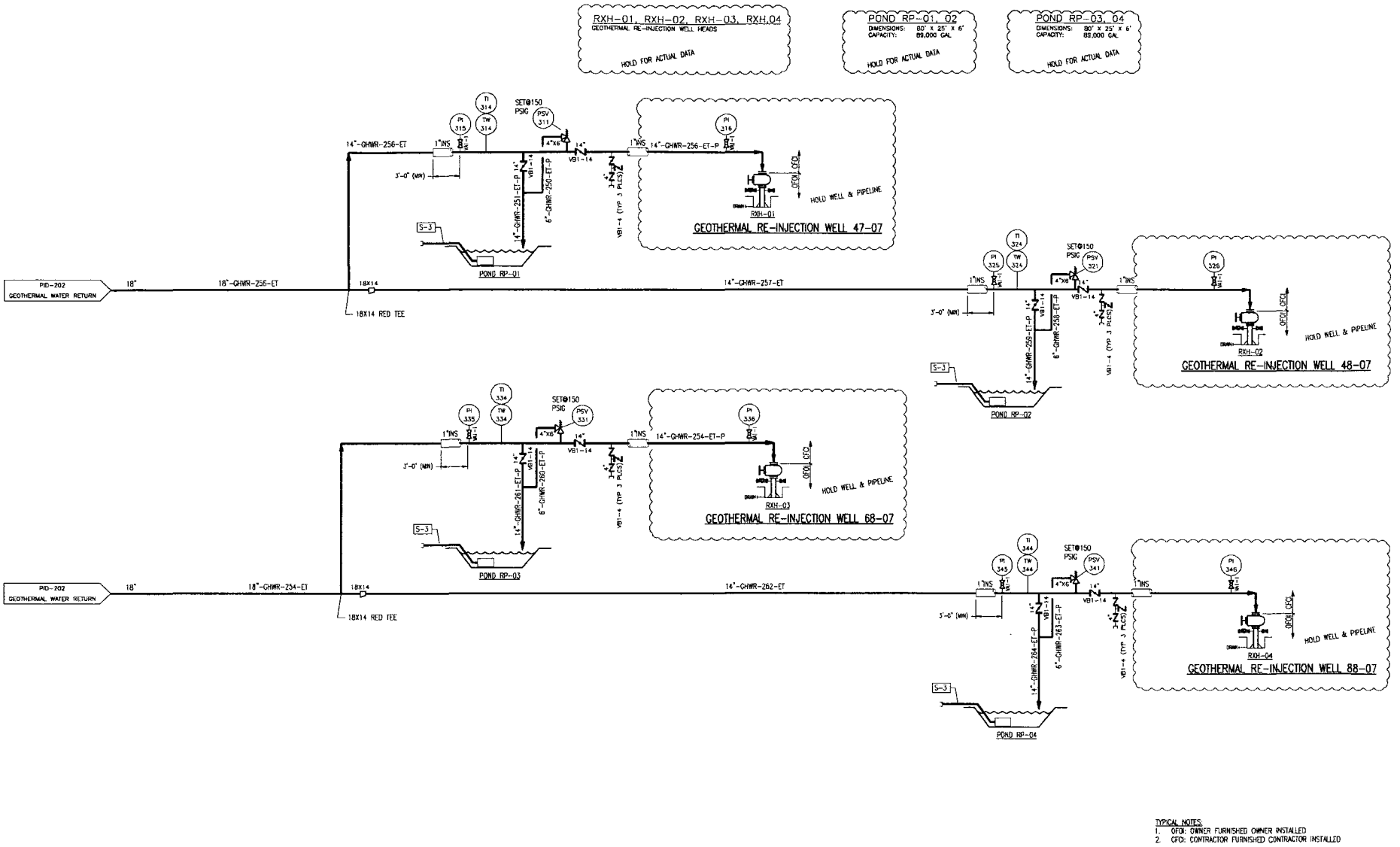
ENGR.	BN/RH	Date
APPD.	BN	Date 08/05/08
APPD:		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL PRODUCTION WELLS
PROCESS & INSTRUMENTATION DIAGRAM

SCALE: NA
Project No. 443-006
DRAWING No. HI01-PID-201
REVISION D



TYPICAL NOTES:
1. OFOI: OWNER FURNISHED OWNER INSTALLED
2. CFCI: CONTRACTOR FURNISHED CONTRACTOR INSTALLED

No.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER
D	08/05/08	DCP	BN	ISSUED FOR BID		
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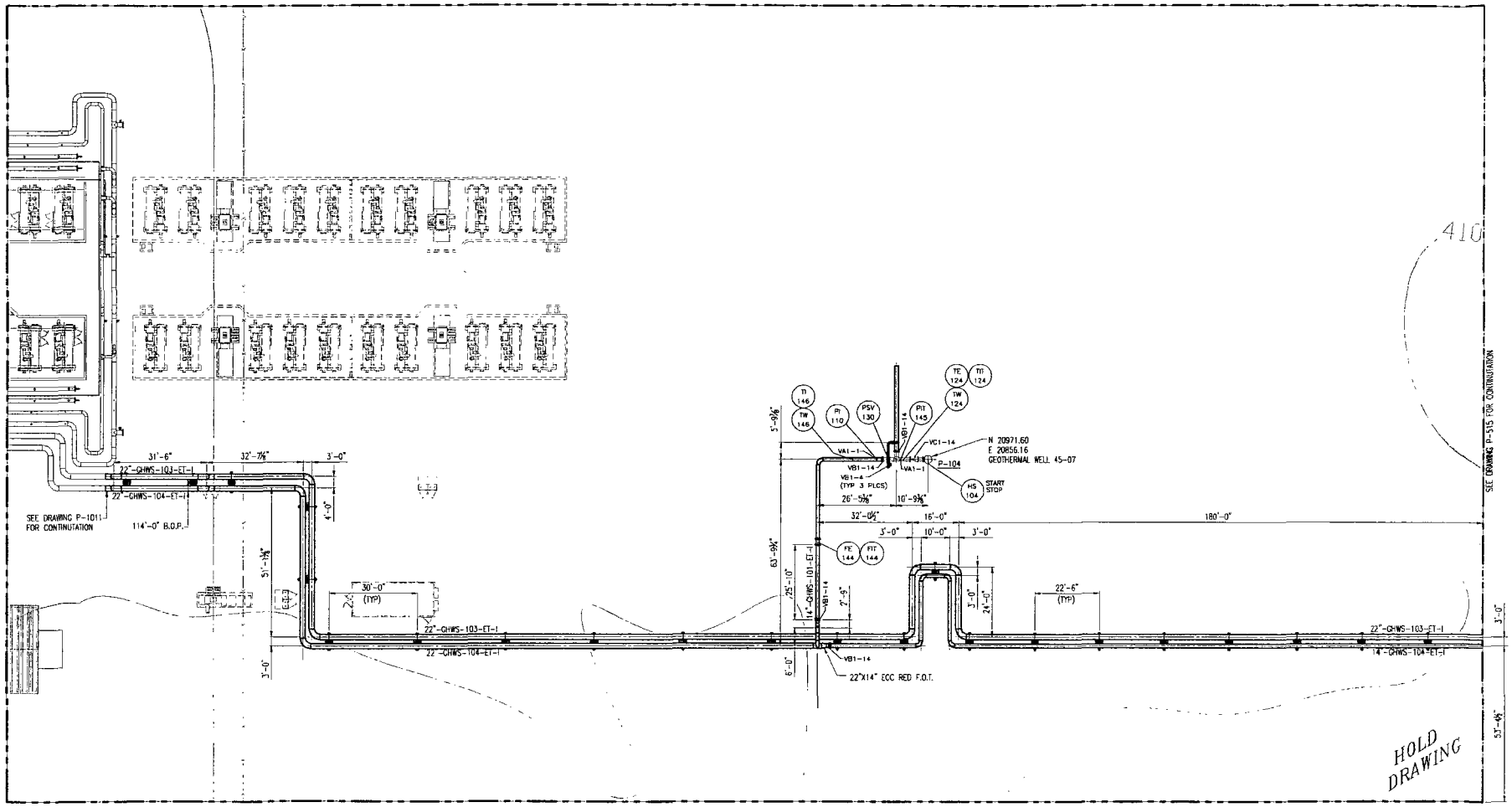
ENGR.	RH/DW	Date
APPD.	BN	Date 08/05/08
APPD.		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PROCESS & INSTRUMENTATION DIAGRAM

SCALE:
Project No. 443-006
DRAWING No. H101-PID-203
REVISION D



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ENGR.		
APPD.	BIN	08/05/08
APPD.		

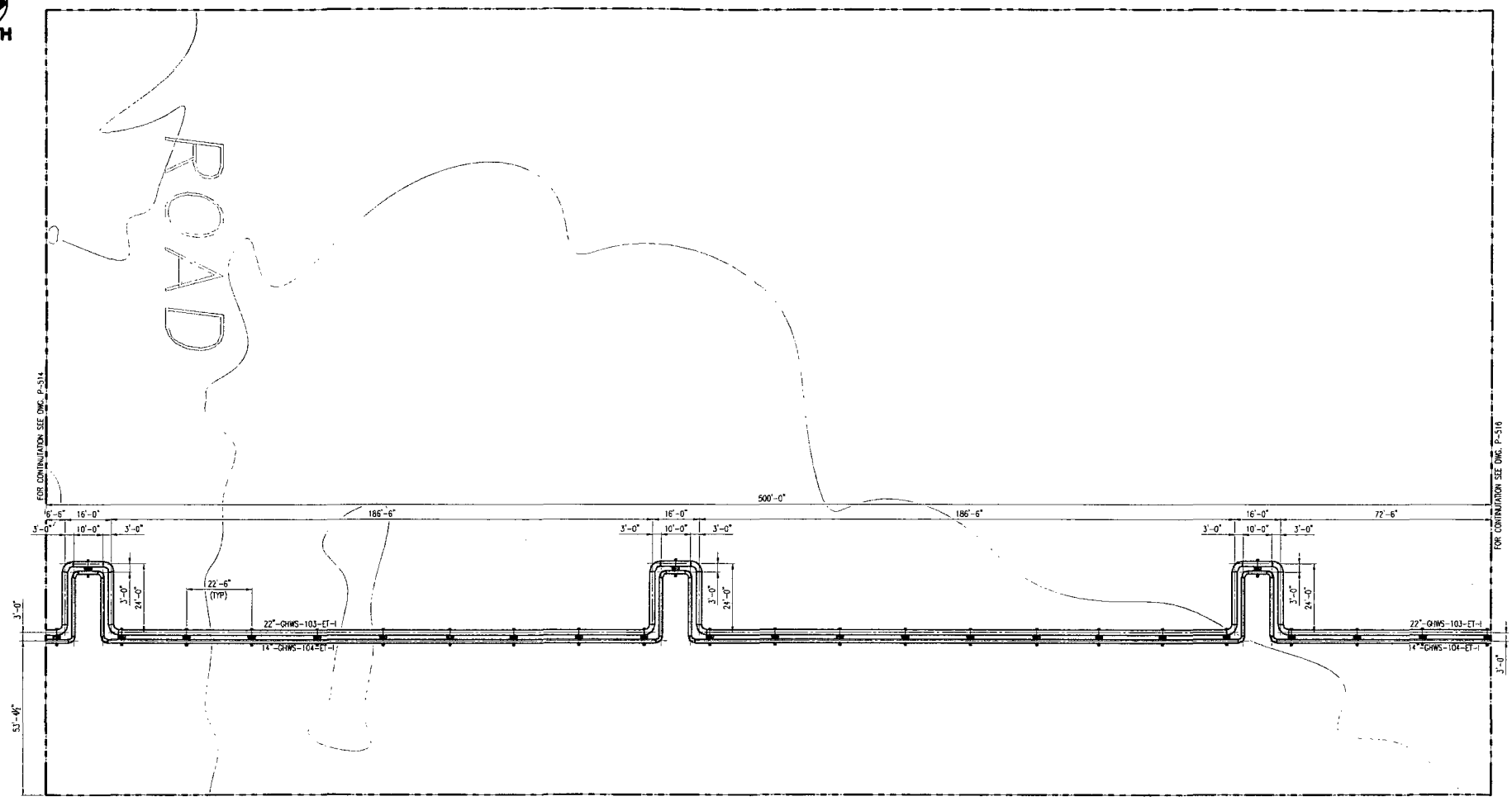
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. HI01-P-514

REVISION A



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SCALE: 1/16"= 1'-0"

HOLD DRAWING

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APPD.		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE	DRAWING No.	REVISION
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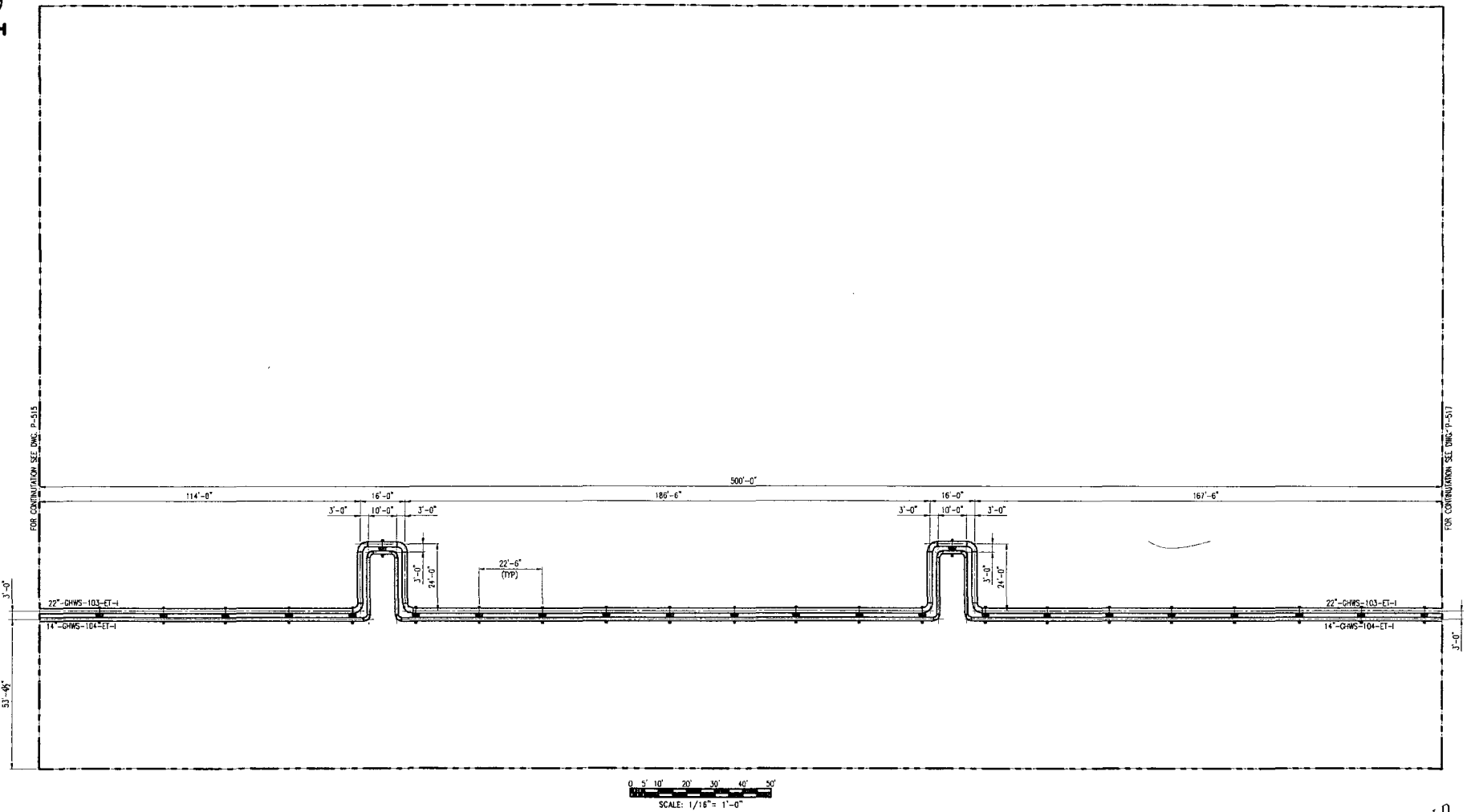
Project No. 443-006		



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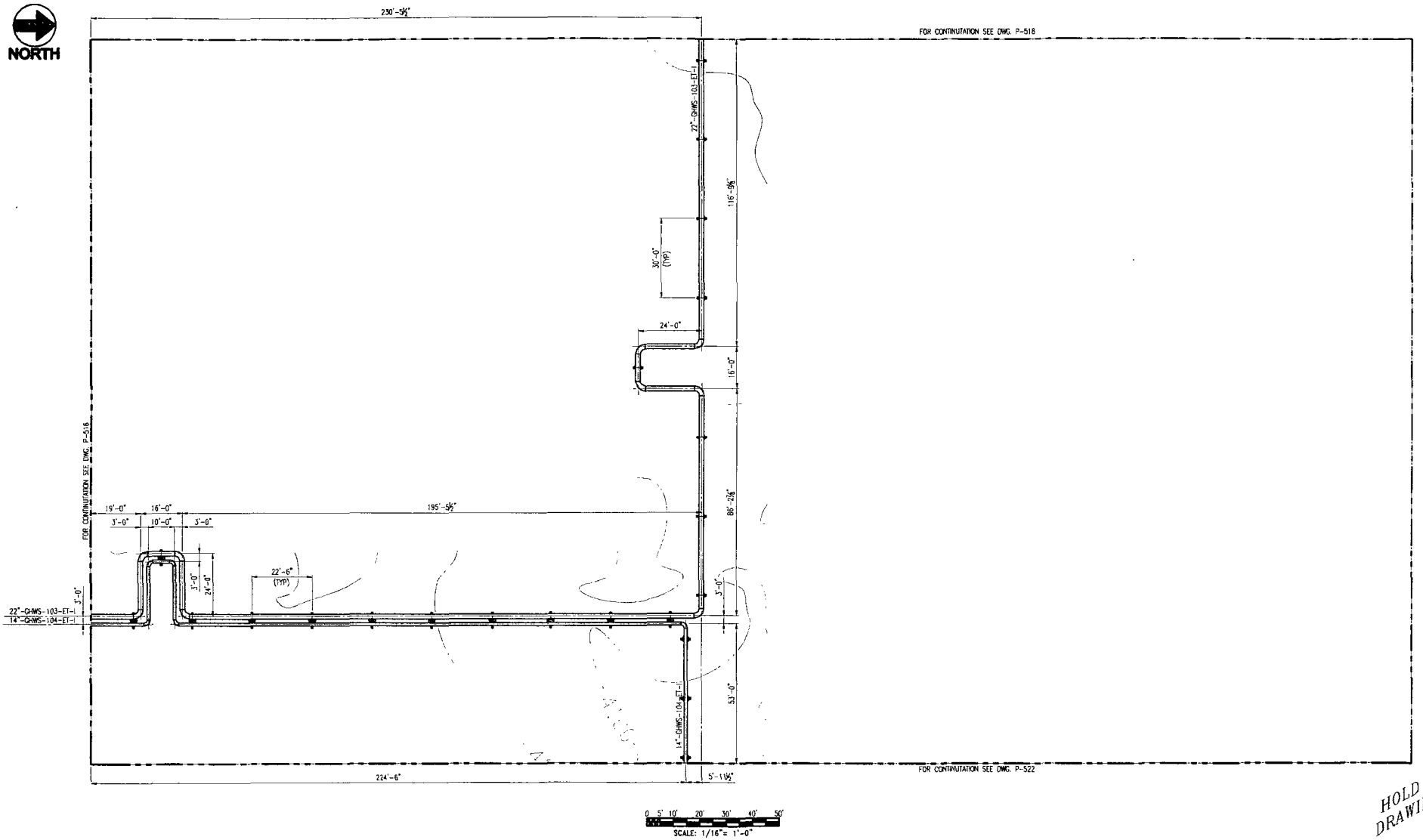
APPD:	BIN	Date 08/05/08
APPD:		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"
Project No. 443-006
DRAWING No. HI01-P-516
REVISION A



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APPD.	Date	

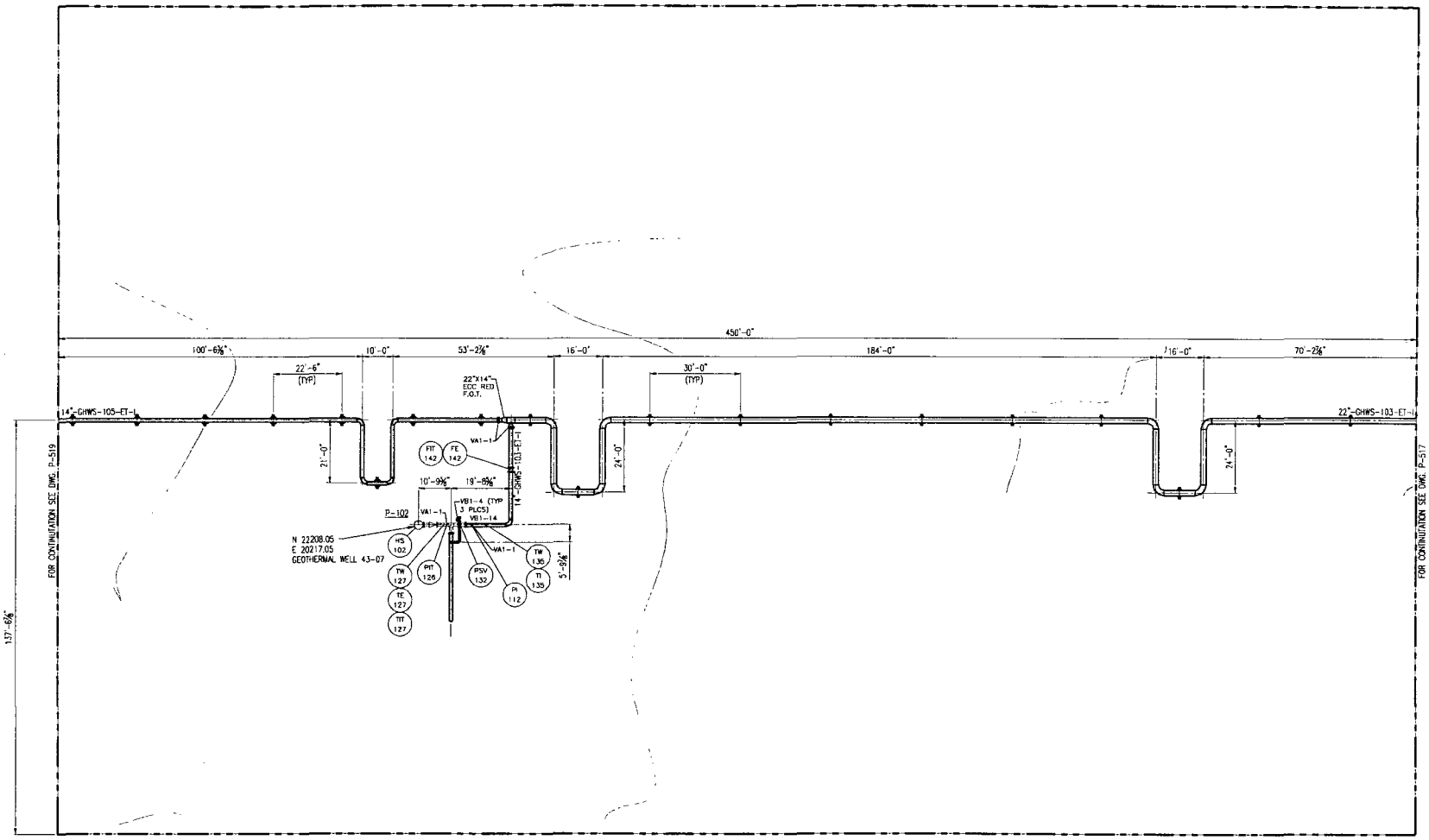
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. HI01-P-517

REVISION A



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SCALE: 1/16"= 1'-0"

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APPD.	Date

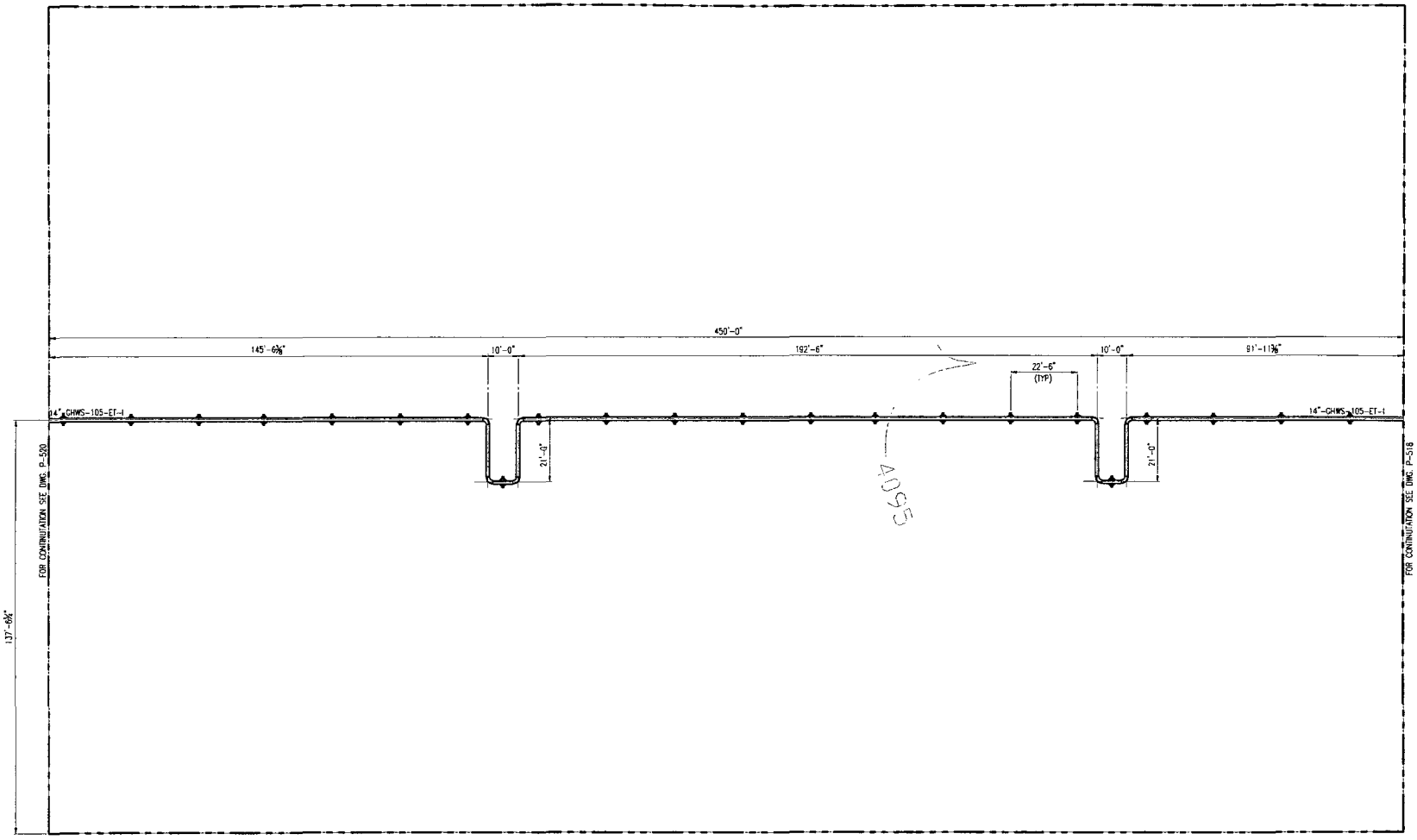
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. H101-P-518

REVISION A



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SCALE: 1/16"= 1'-0"

HOLD DRAWING

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Des. By: DCP	Date	08/01/08
Drawn By: DCP/BS	Date	
Ck'd. By	Date	08/05/08
ENGR.	Date	
APPD.	Date	08/05/08
APPD.	Date	

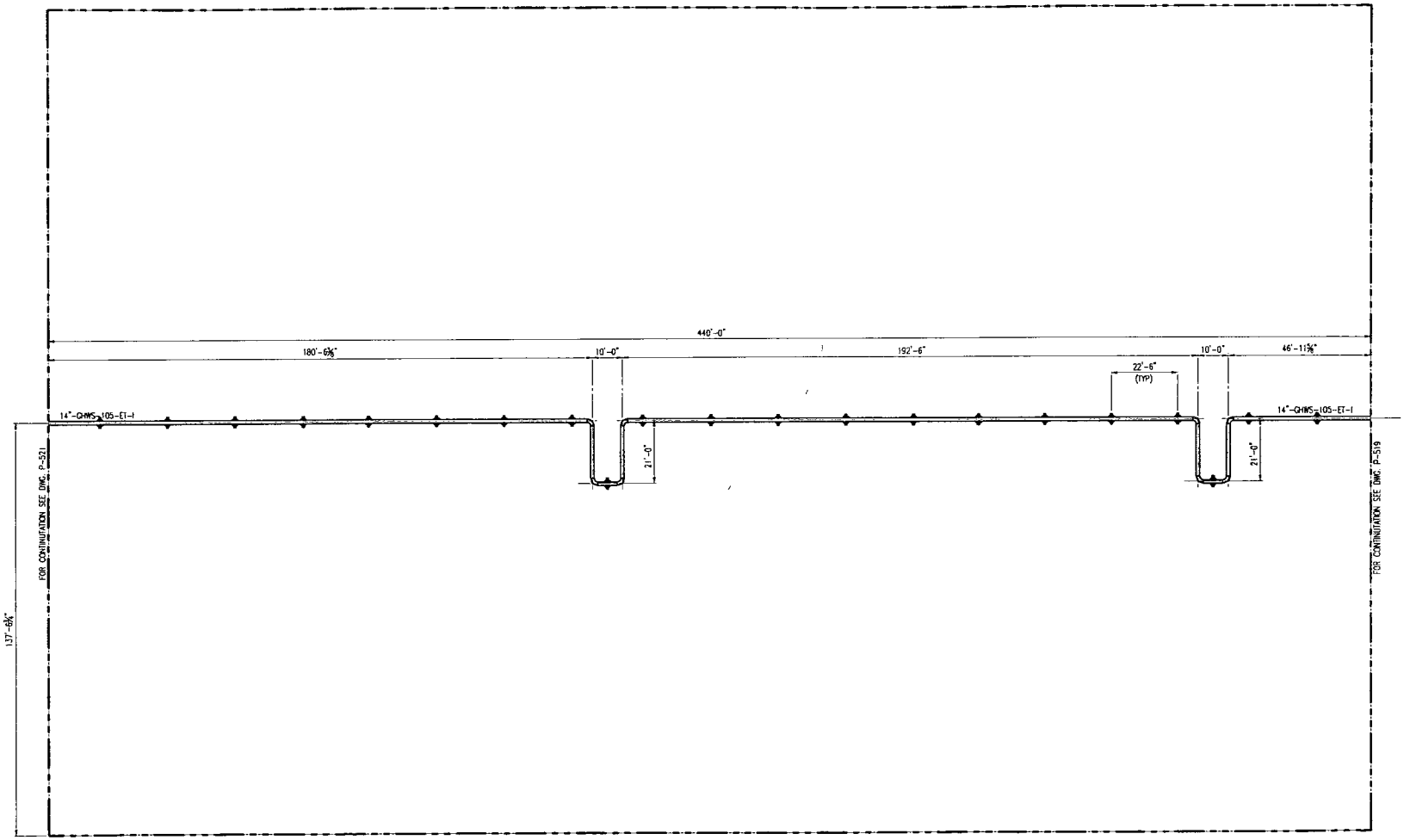
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. H101-P-519

REVISION A



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP.	REVISION
B	08/05/08	DCP	BN	ISSUED FOR BID

REFERENCE DRAWING

NUMBER

CONFIDENTIAL

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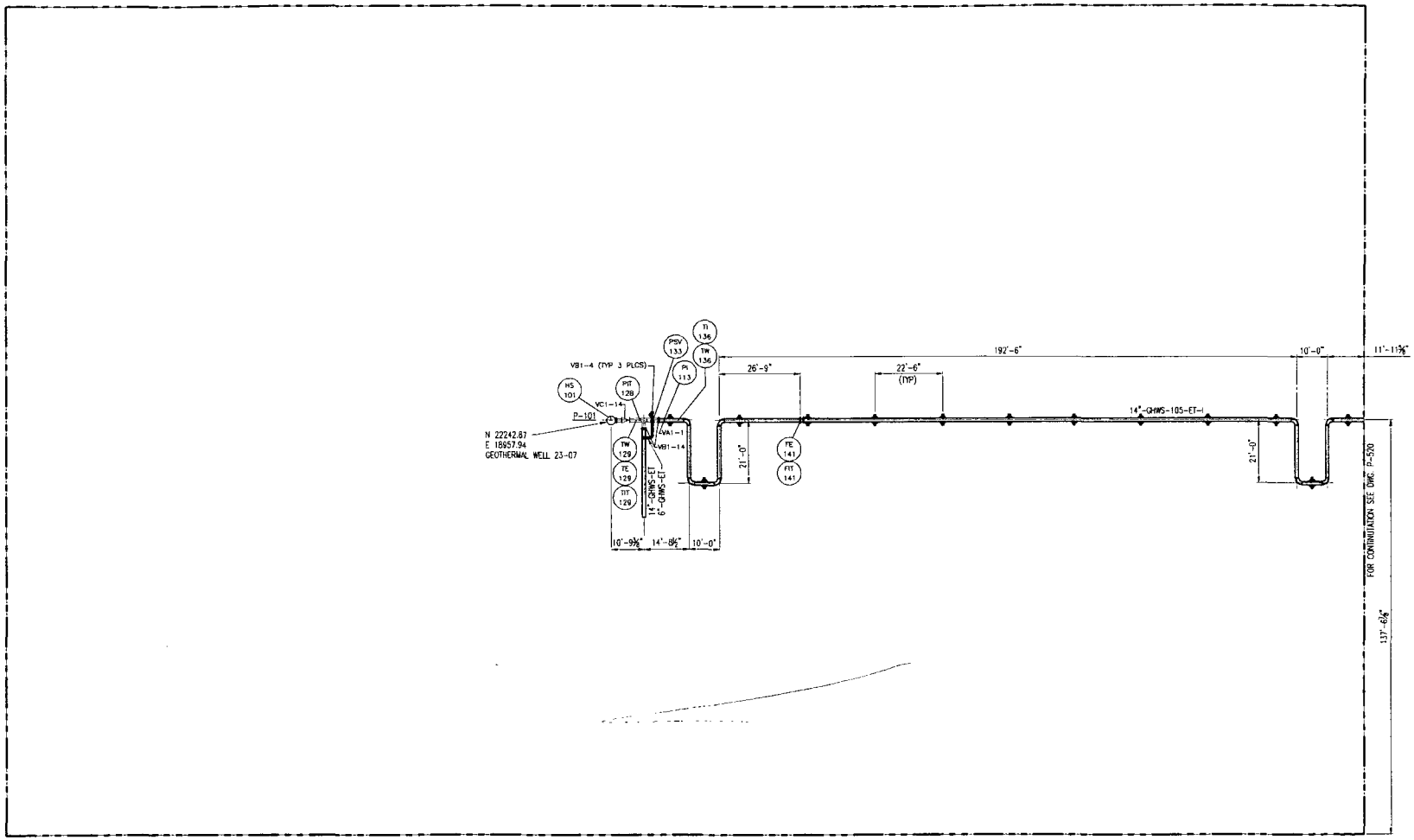
Des. By:	DCP	08/01/08
Drawn By:	DCP/BS	Date
Chk'd. By:	BN	08/05/08
ENGR.	RH	Date
APPD.	BN	08/05/08
APPD.		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE:	DRAWING No.	REVISION
1/16"=1'-0"	HI01-P-520	A
Project No. 443-006		



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16" = 1'-0"

HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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Drawn By	DCP	Date
Ch'd. By	BIN	Date 08/05/08
ENGR.	RH	Date
APPD.	BIN	Date 08/05/08
APPD.		Date

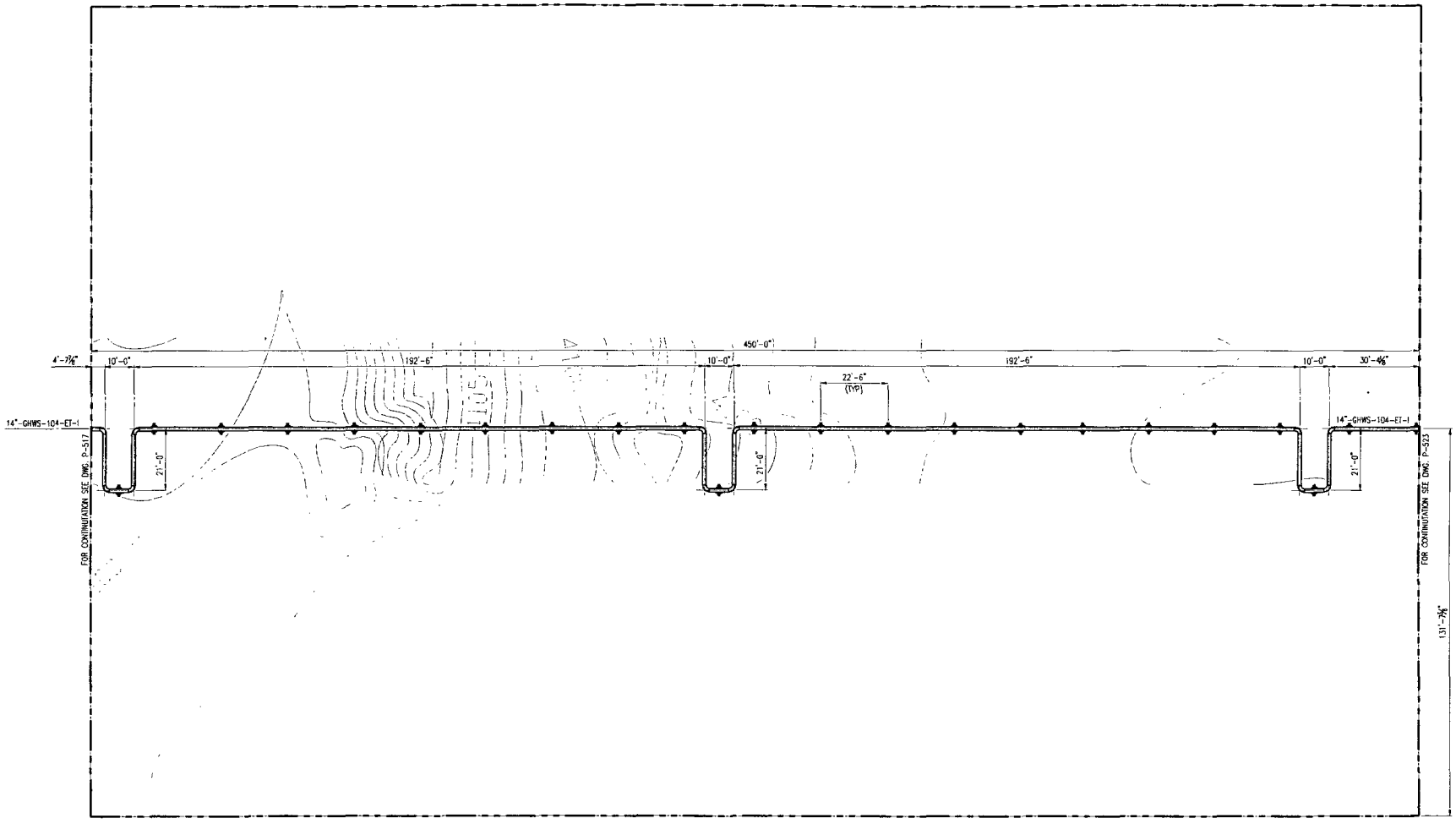
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. H101-P-521

REVISION A



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	12/10/07	DCP	BN	PRELIMINARY – ISSUED INFORMATION ONLY

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Dwg By:	DCP	Date 06/27/07
Drawn By:		Date
Chk'd. By:		Date
ENGR.		Date
APPD.		Date
APPD.		Date

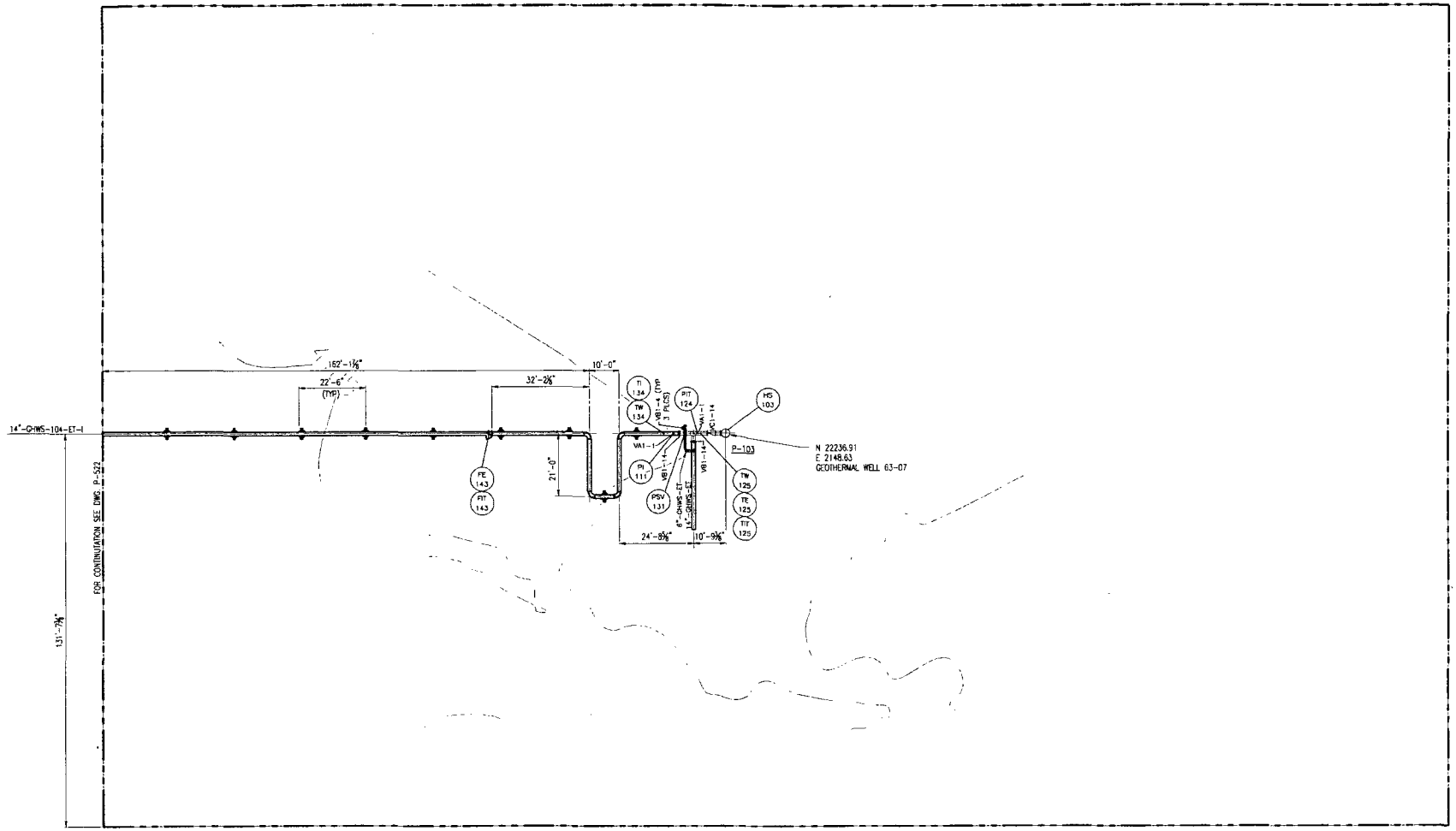
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. H101-P-522

REVISION A



HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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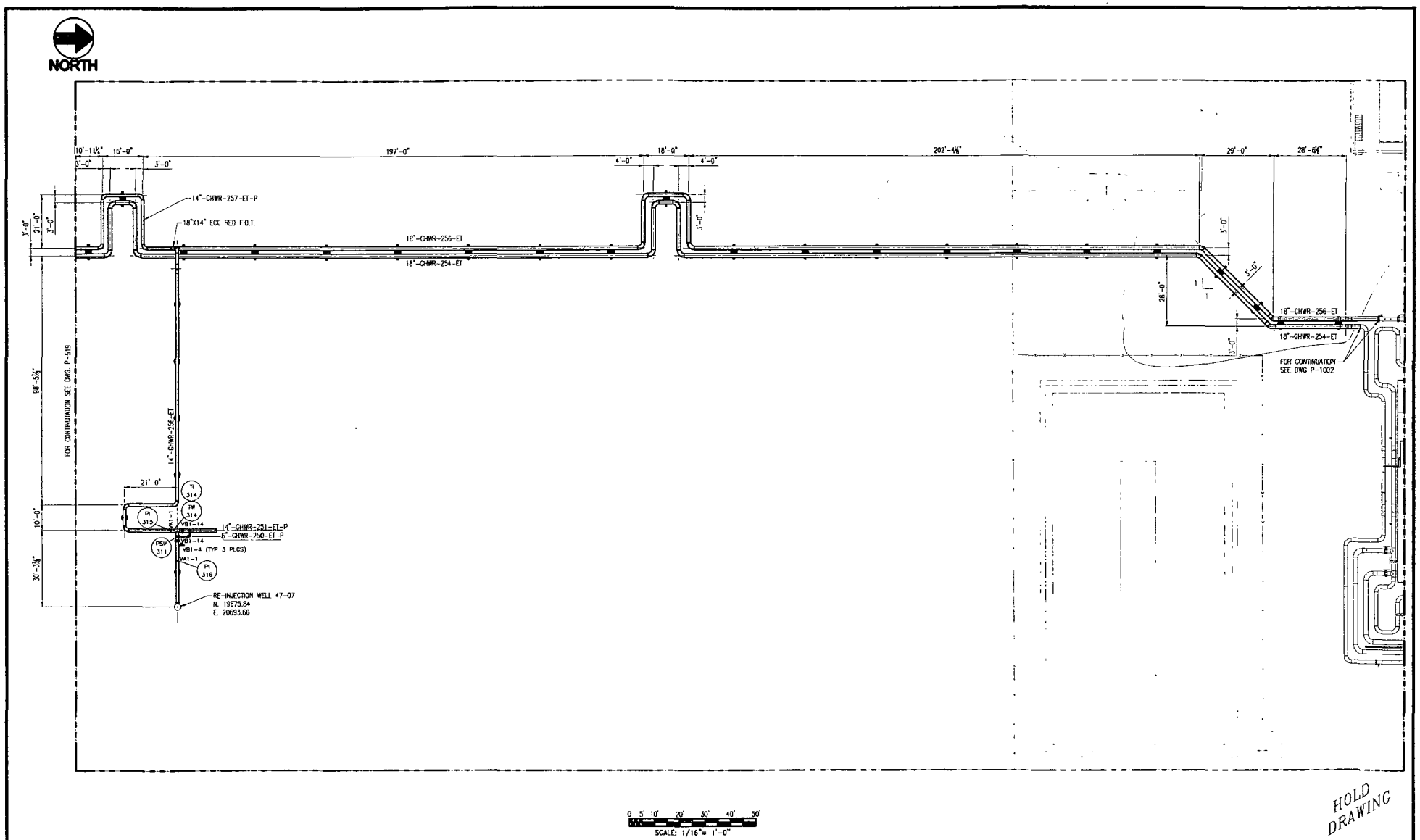
Drawn By:	BS/DCP	Date
Ch'd. By:	BIN	Date 08/05/08
ENGR	RH	Date
APPD.	BIN	Date 08/05/08
APPD.		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER SUPPLY
PARTIAL PIPING PLAN

SCALE	DRAWING No.	REVISION
1/16"=1'-0"	H101-P-523	A
Project No. 443-006		



HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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Drawn By:	DCP	Date
Chk'd. By:	BIN	Date 08/05/08
ENGR.	RH	Date
APPD:	BIN	Date 08/05/08
APPD		Date

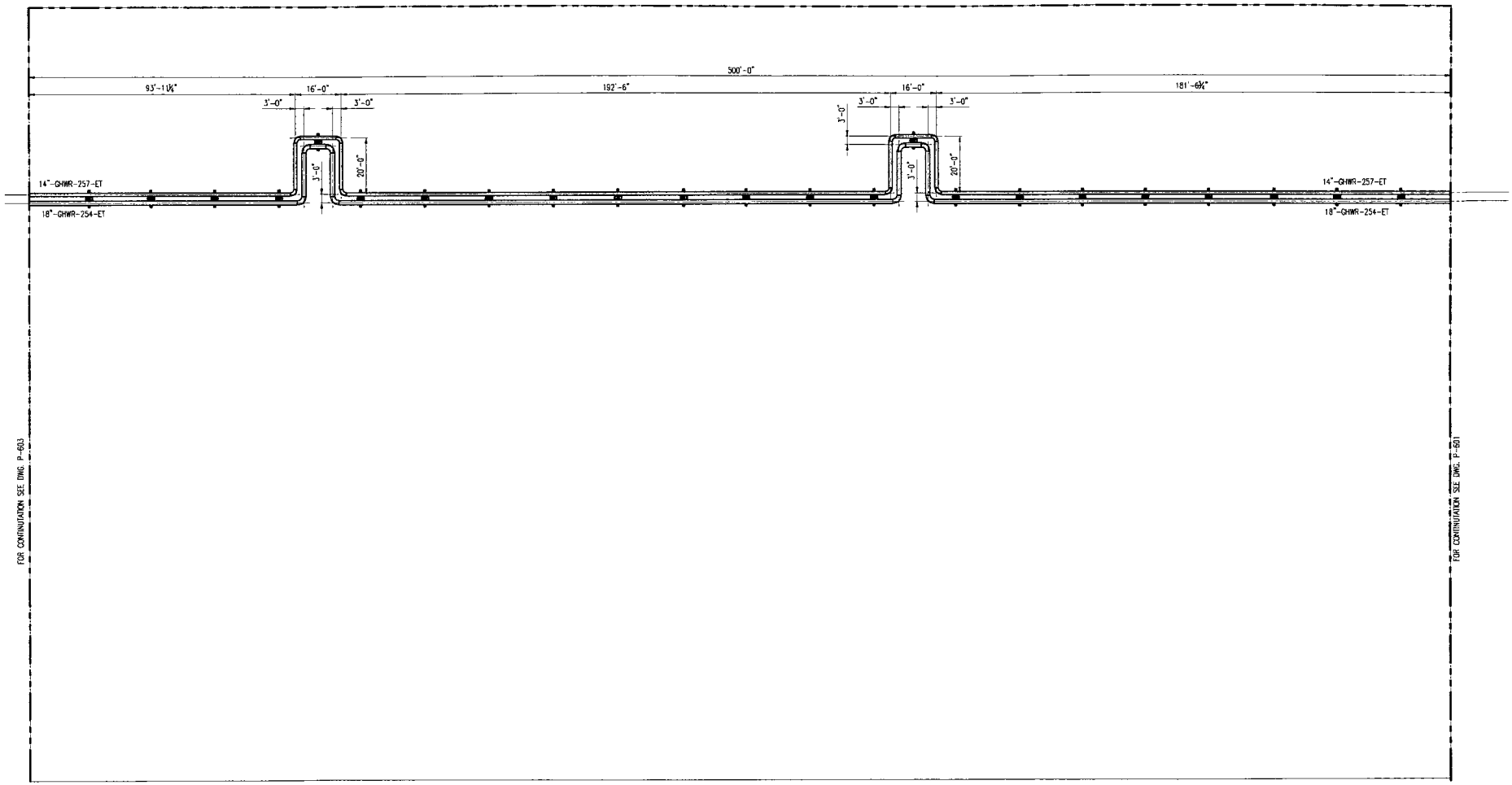
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. H101-P-601

REVISION A



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP.	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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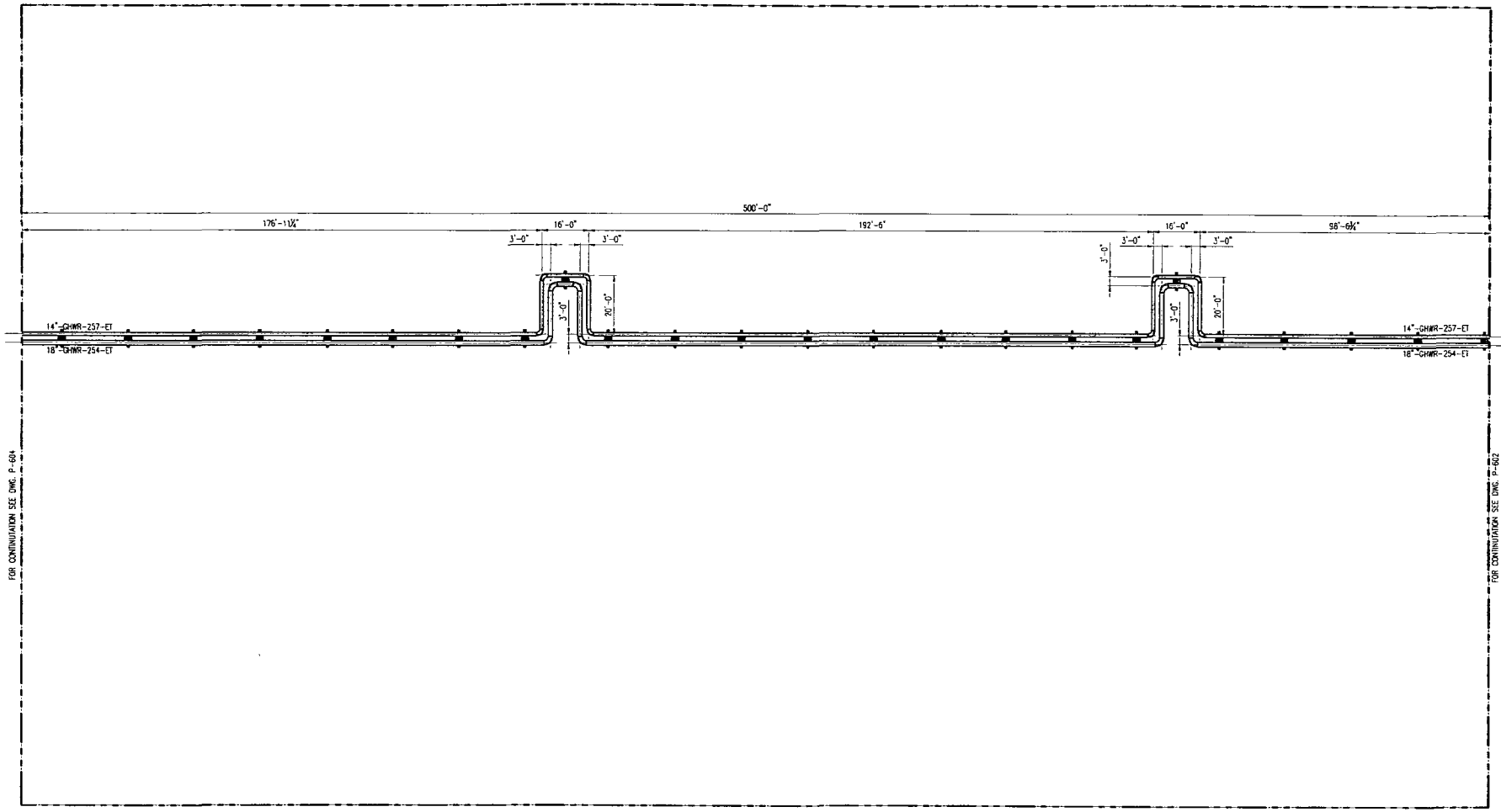
Drawn By	DCP	Date
Chk'd. By	BIN	08/05/08
ENGR.	RH	Date
APP'D.	BIN	08/05/08
APP'D.		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE	DRAWING No	REVISION
1/16"=1'-0"	HI01-P-602	A
Project No 443-006		



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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Drawn By:	DCP	Date 08/05/08
Ch'd by:	BIN	Date 08/05/08
ENGR.	RH	Date
APP'D.	BIN	Date 08/05/08
APP'D.		Date

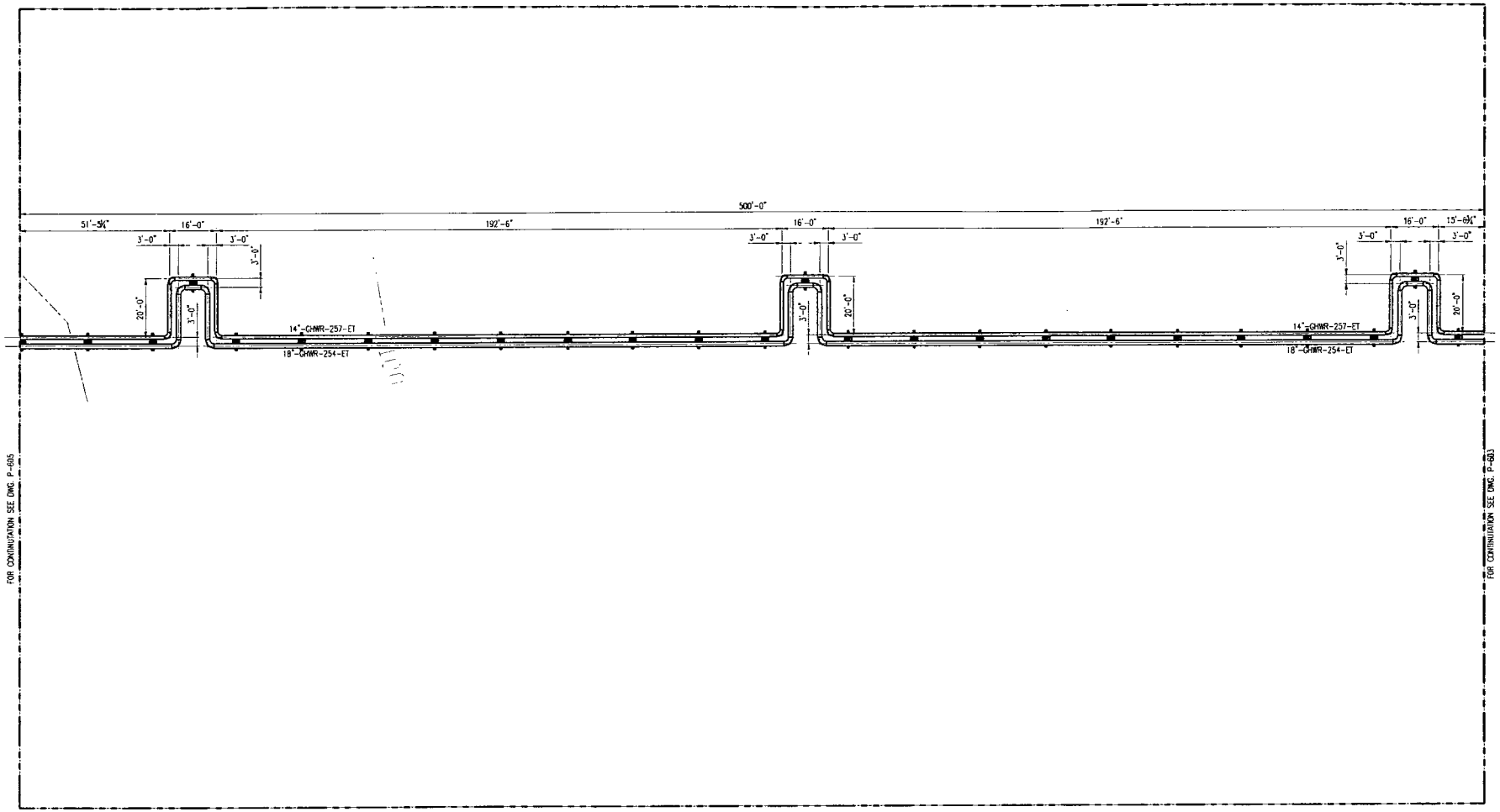
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. HI01-P-603

REVISION A



SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER
A	08/05/08	DCP	BIN	ISSUED FOR BID		

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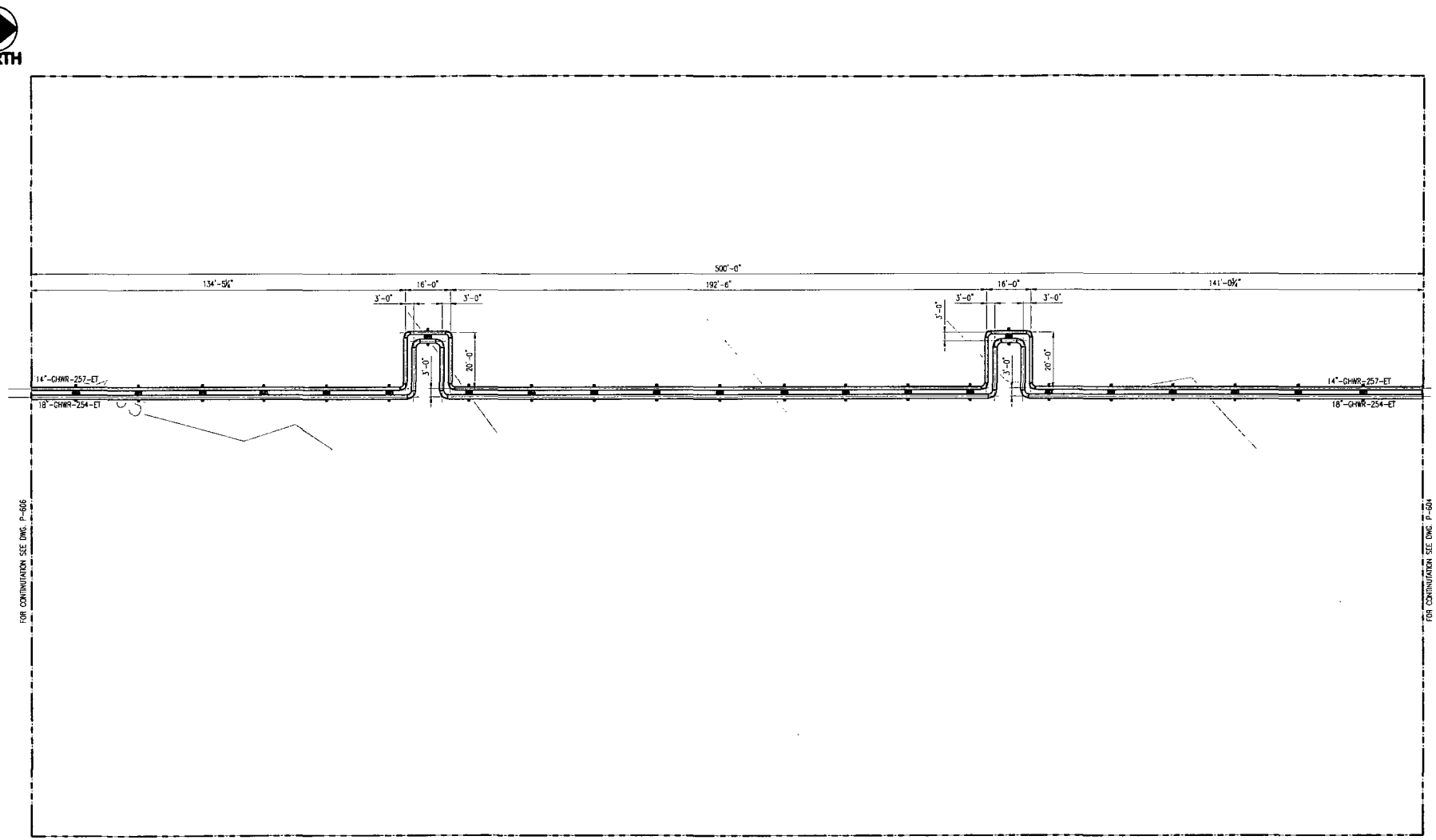
		Date
Lyes by:	DCP	08/01/08
Drawn By:	DCP	Date
Chk'd By:	BIN	08/05/08
ENGR.	RH	Date
APPD.	BIN	08/05/08
APPD		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE	DRAWING No	REVISION
1/16"=1'-0"	H101-P-604	A
Project No. 443-006		



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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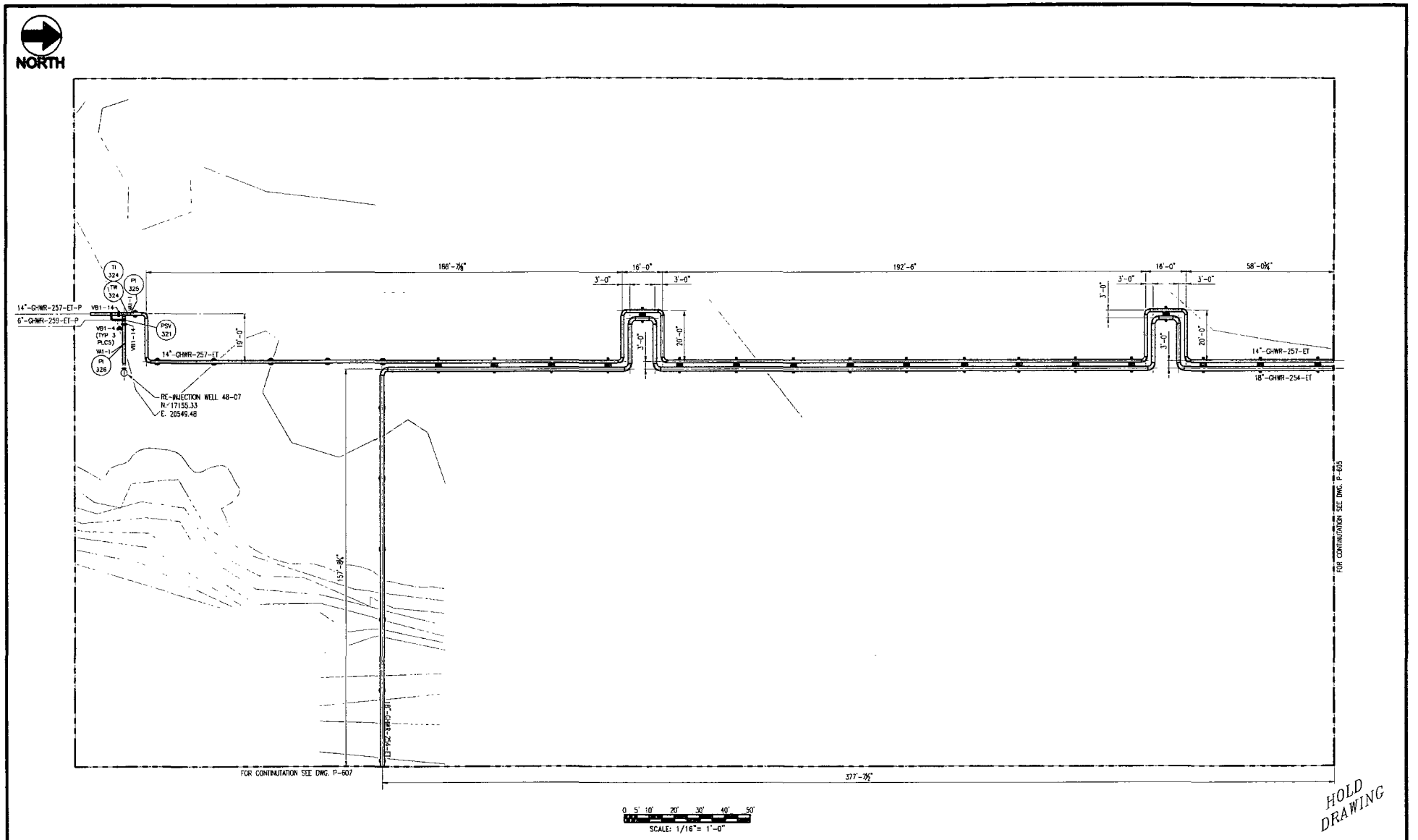
Drawn By:	DCP	Date
Chk'd. By:	BIN	Date 08/05/08
ENGR.	RH	Date
APPR.	BIN	Date 08/05/08
APPR.		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE	DRAWING No.	REVISION
1/16"=1'-0"	HI01-P-605	A

Project No. 443-006



No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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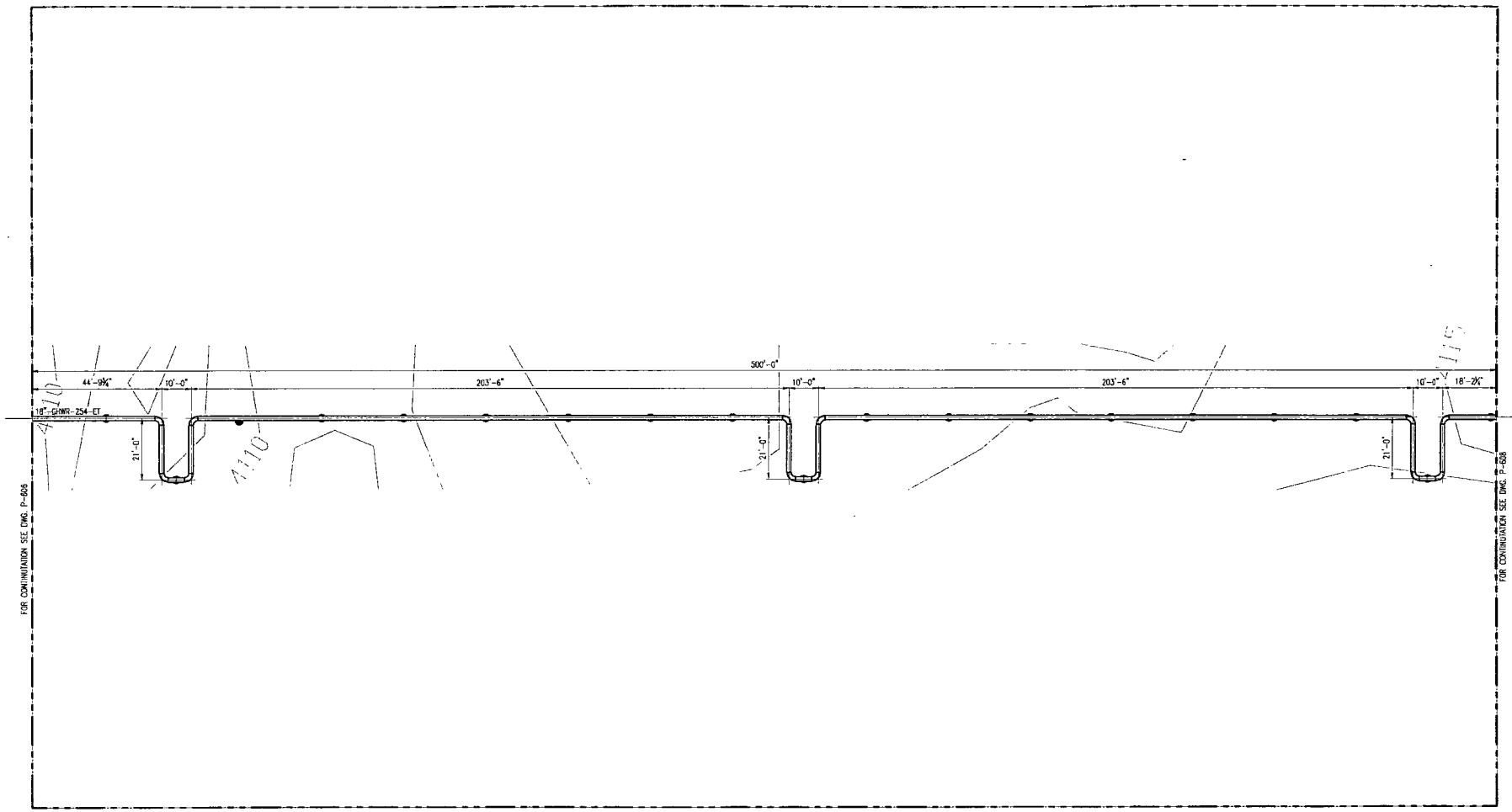
Drawn By:	DCP	Date
Chk'd. By:	BIN	Date 08/05/08
ENGR.	RH	Date
APPD.	BIN	Date 08/05/08
APPD.		Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE	DRAWING No.	REVISION
1/16"=1'-0"	HI01-P-606	A
Project No. 443-006		

NORTH



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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Des By: DCP	Date 08/01/08	
Drawn By: DCP	Date	
Chk'd By: BIN	Date 08/05/08	
ENGR. RH	Date	
APPD. BIN	Date 08/05/08	
APPD.	Date	

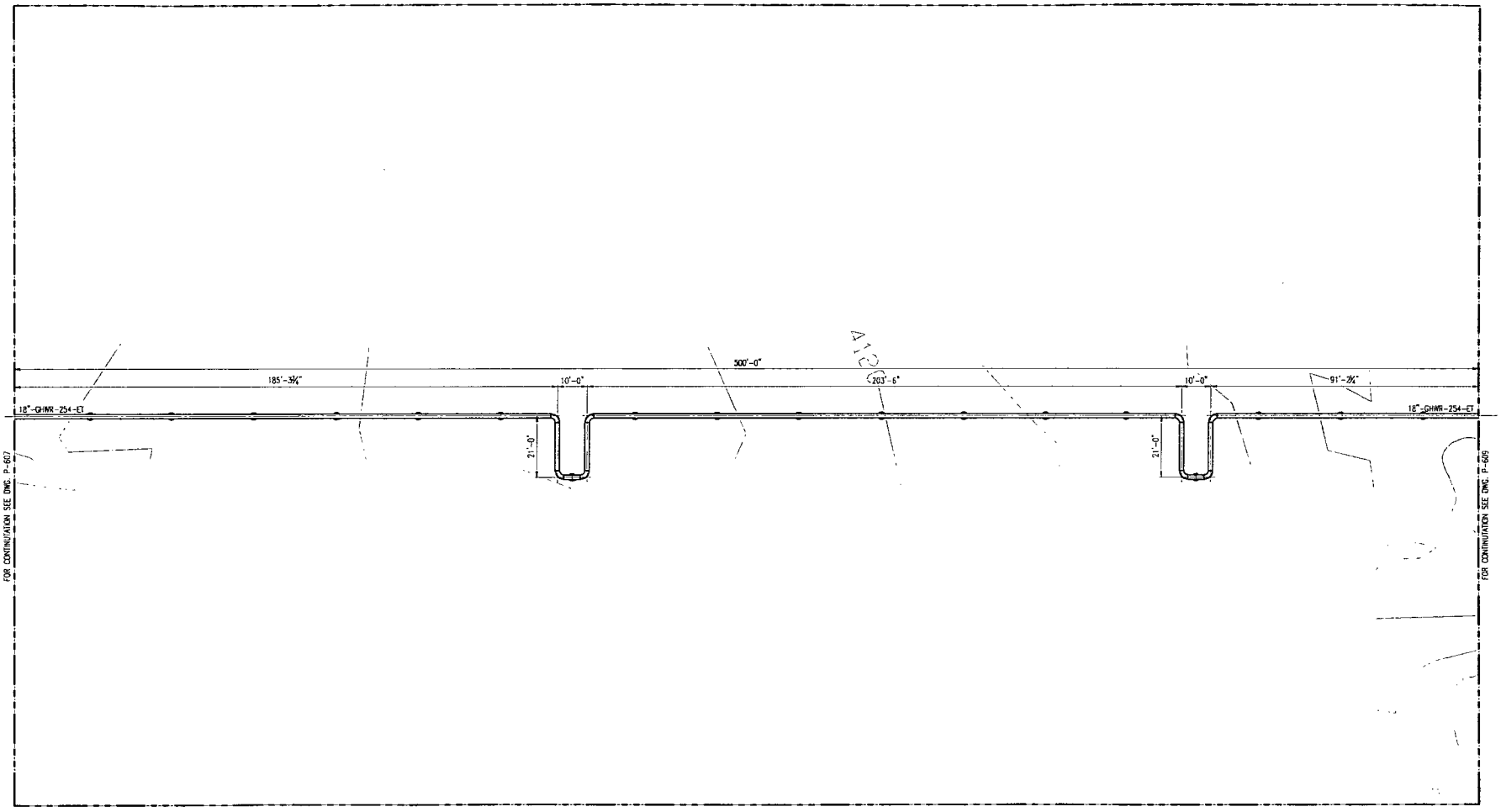
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. H101-P-607

REVISION A



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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Drawn By:	DCP	Date
Chk'd By:	BIN	Date 08/05/08
ENGR.	RH	Date
APP'D.	BIN	Date 08/05/08
APP'D.		Date

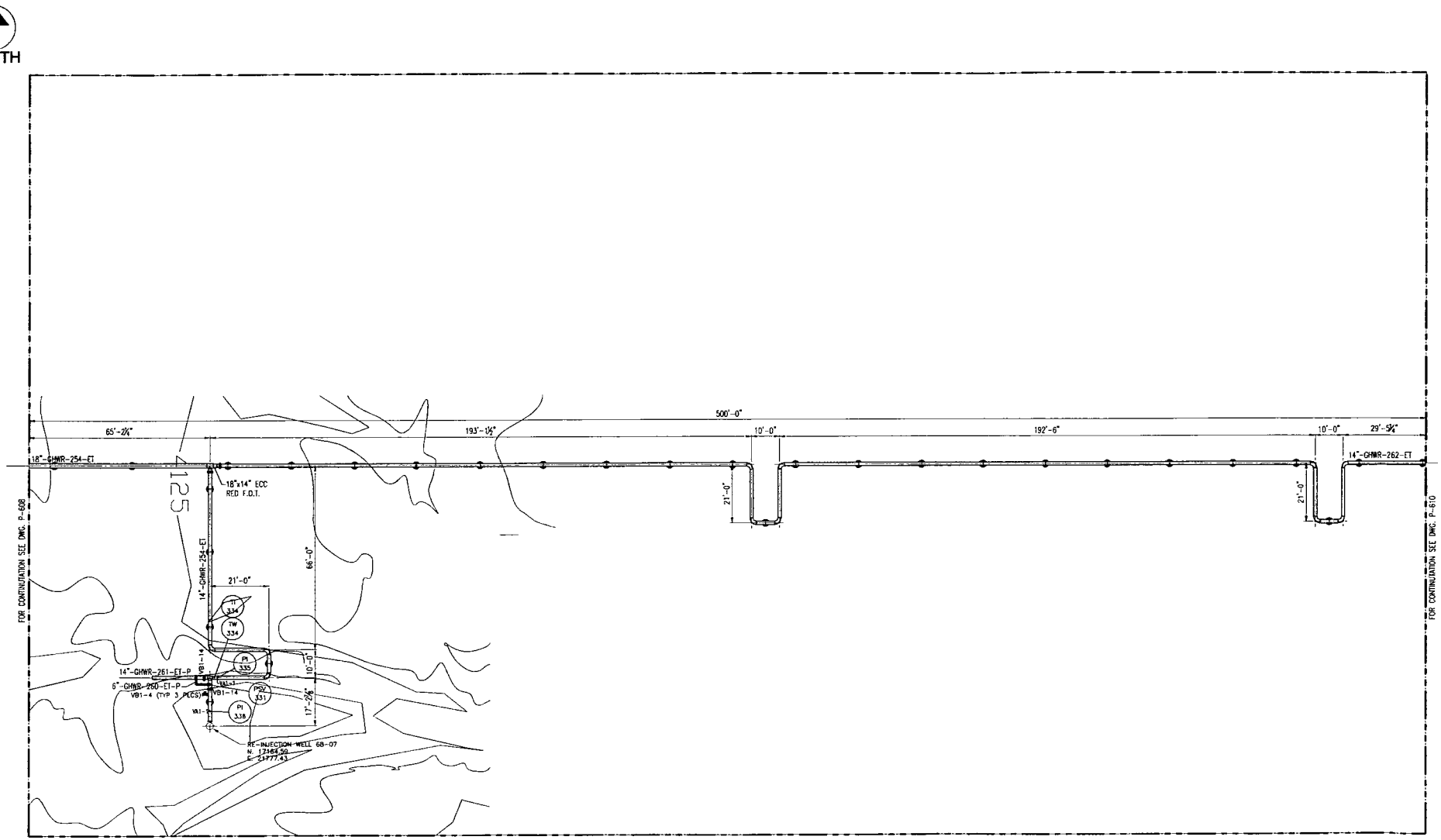
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

DRAWING No. HI01-P-608

REVISION A



HOLD DRAWING

No.	DATE	BY	APP	REVISION
A	08/05/08	DCP	BIN	ISSUED FOR BID

REFERENCE DRAWING

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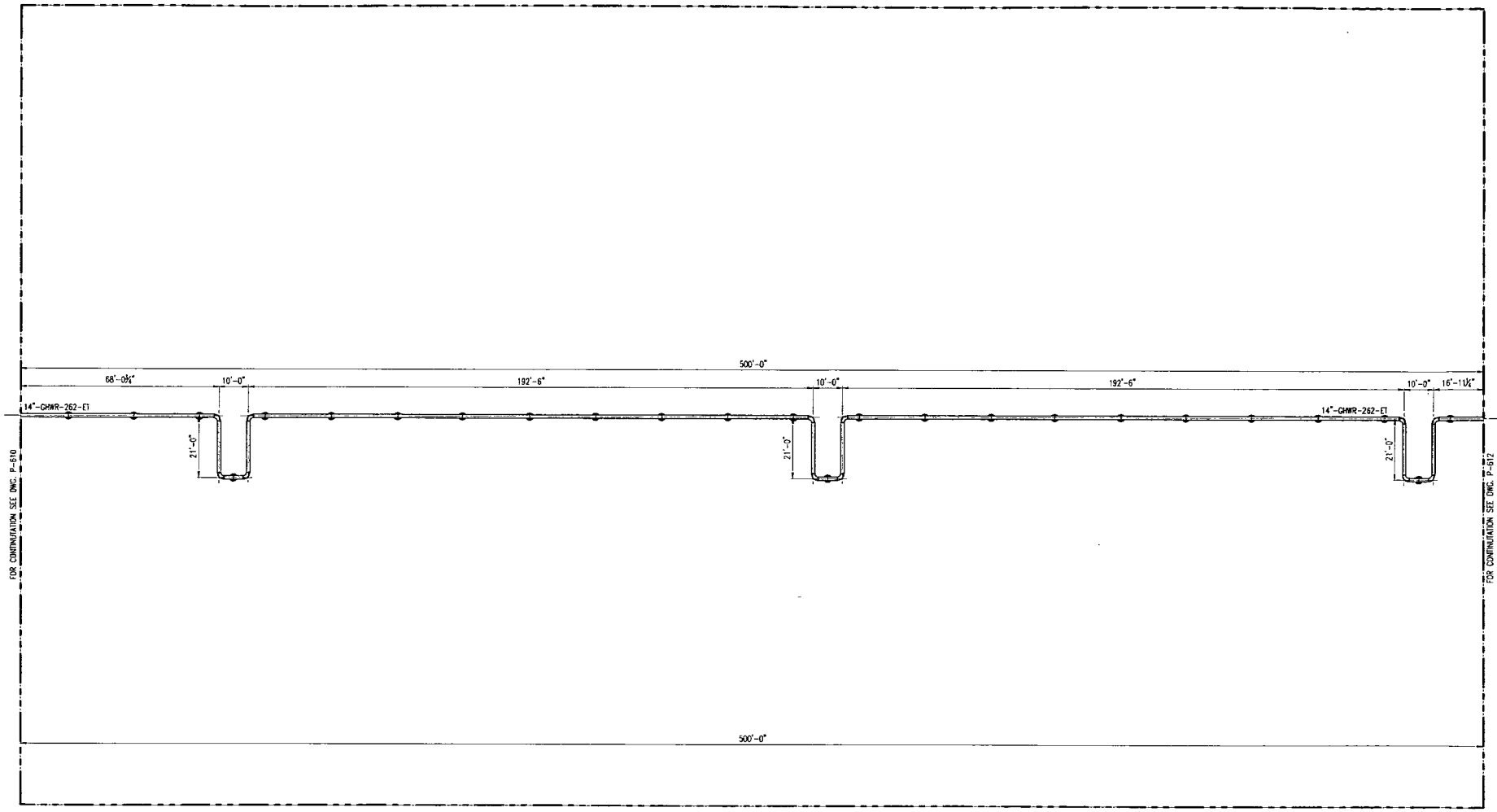
		Date
Des By:	DCP	08/01/08
Drawn By:	DCP	
Ch'd. By:	BIN	08/05/08
ENGR.	RH	
APP'D	BIN	08/05/08
APP'D.		

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE:	DRAWING No.	REVISION
1/16"=1'-0"	HI01-P-609	A
Project No. 443-006		



0 5' 10' 20' 30' 40' 50'

SCALE: 1/16"= 1'-0"

HOLD DRAWING

No.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER
A	08/05/08	DCP	BN	ISSUED FOR BID		

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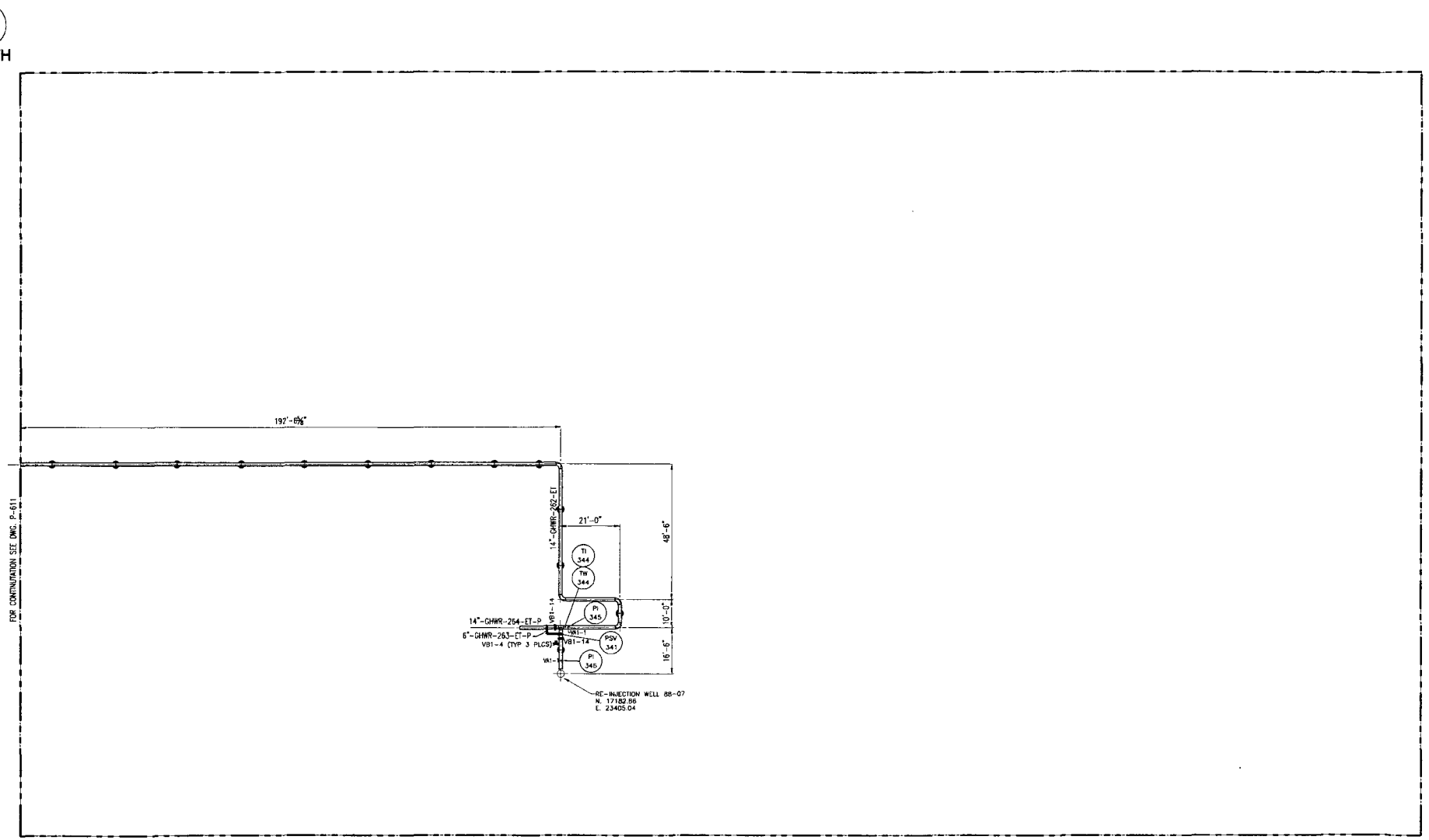
Des. By: DCP	Date	08/01/08
Drawn By: DCP	Date	
Ck'd By: BN	Date	08/05/08
ENGR RH	Date	
APPD. BN	Date	08/05/08
APPD.	Date	

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE	DRAWING No.	REVISION
1/16"=1'-0"	HI01-P-611	A

Project No. 443-006



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A	08/05/08	DCP	BN	ISSUED FOR BID

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Drawn By:	DCP	Date
Chk'd By:	BN	Date 08/05/08
ENGR.	RH	Date
APP'D	BN	Date 08/05/08
APP'D		Date

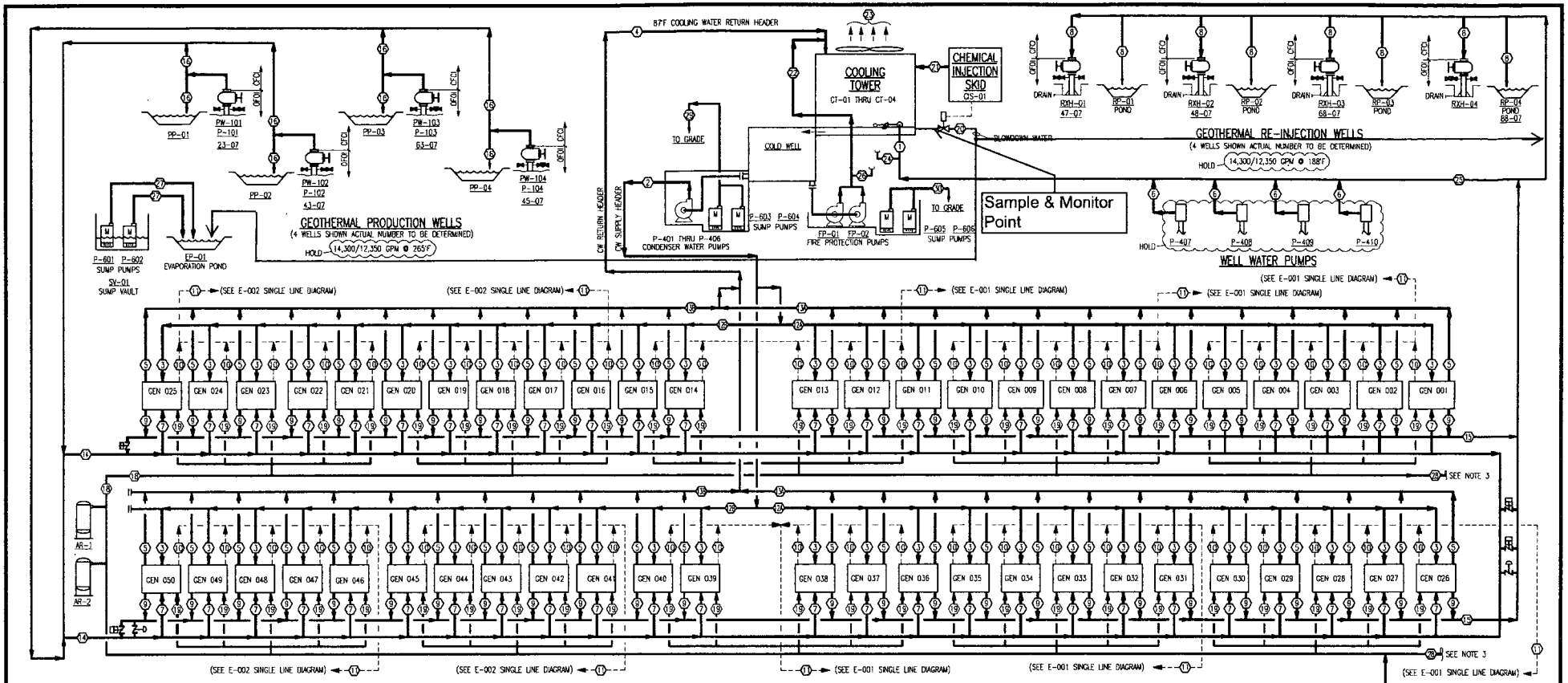
LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GEOTHERMAL WATER RETURN
PARTIAL PIPING PLAN

SCALE: 1/16"=1'-0"

Project No. 443-006

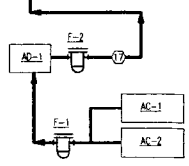
DRAWING No. H101-P-612

REVISION A



MATERIAL	RATE	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑	㉒	㉓	㉔	㉕	㉖	㉗	㉘	㉙	㉚
MAKEUP WATER (MAX/AVG)	GPM	1389/1175					325																								
CW SUPPLY HEADER (MAX/OPERATING)	GPM		49,250/46,250										12,805/12,025	11,820/11,100																	
CW SUPPLY (MAX/OPERATING)	GPM			985/925																											
CW RETURN HEADER (MAX/OPERATING)	GPM				49,250/46,250										12,805/12,025																
CW RETURN (MAX/OPERATING)	GPM					985/925										11,820/11,100															
GHW SUPPLY HEADER (MAX/OPERATING)	GPM																7,150/6,175			3575/3088											
GHW SUPPLY (MAX/OPERATING)	GPM							286/247																							
GHW RETURN HEADER (MAX/OPERATING)	GPM								3575/3088									7,150/6,175													
GHW RETURN (MAX/OPERATING)	GPM									286/247																					
COMPRESSED AIR	SCFM																				60	30	0.82						9.5		
3PH/480V POWER GENERATED	kW										256																				
3PH/480V POWER GENERATED	kW											1,275																			
BLOWDOWN WATER (MAX/AVG)	GPM																						463/390								
CHEMICAL ADDITION	GPM																							T.B.D.							
FIRE PROTECTION	GPM																								1450						
AUXILIARY WATER	GPM																									200					
EVAPORATION (MAX/AVG)	GPM																								926/785						
GEOTHERMAL WATER	GPM																										1200				
FIRE HYDRANT	GPM																											500			
SUMP PUMP FLOW	GPM																											.75		75	25

TYPICAL NOTES:
1. OFCI: OWNER FURNISHED OWNER INSTALLED
2. OFCI: CONTRACTOR FURNISHED CONTRACTOR INSTALLED
3. AIR SUPPLY TO MISCELLANEOUS PLANT VALVES



INSTRUMENT AIR SYSTEM

No.	DATE	BY	APP	REVISION
D	08/05/08	DCP	BIN	ISSUED FOR BID
C	07/17/08	DCP	BIN	ISSUED FOR PERMIT
B	06/24/08	DCP	BIN	ISSUED FOR REVIEW

REFERENCE DRAWING

NUMBER

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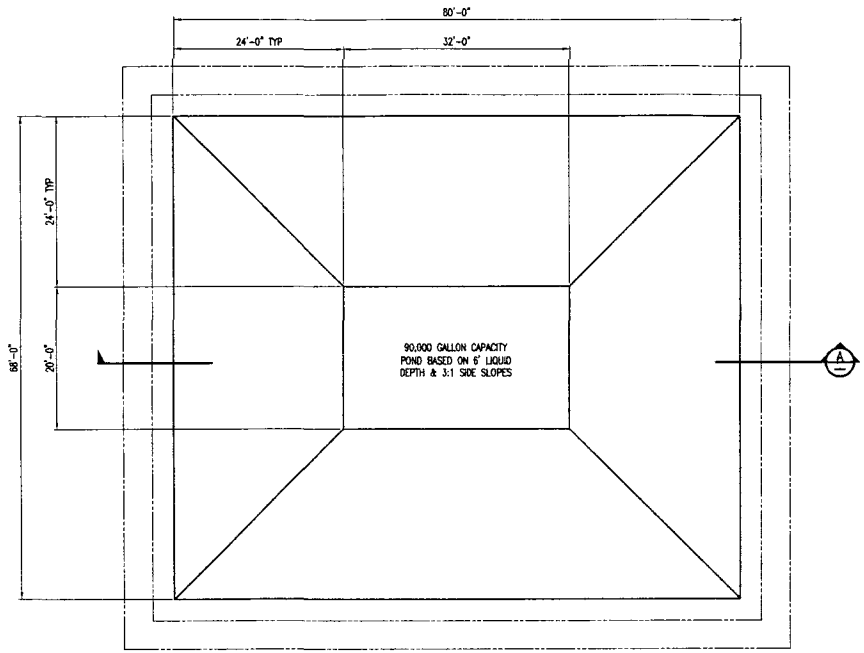
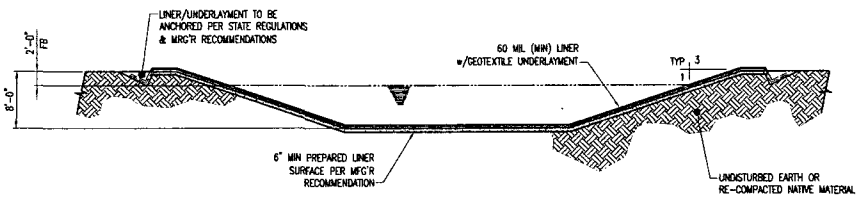
	Date By	Date
Drawn By:	DCP	04/15/08
Ck'd By:	BIN	07/17/08
ENGR.	BIN	
APP'D.	BIN	08/05/08
APP'D.		

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
PROCESS FLOW DIAGRAM

SCALE	DRAWING No.	REVISION
NA	H101-PFD-1	D
Project No. 443-006		



PLAN
1/8" = 1'-0"



SECTION A — TYP SECTION THROUGH POND
1/8" = 1'-0"

NOTES:
1. WORK IN CONJUNCTION WITH SPECIFICATION #15252 FOR CONTAINMENT POND LINERS.

No.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER
A	8-29-08	TH		ISSUED FOR REVIEW & COMMENT		

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Des By:	TH	Date 8-29-08
Drawn By:	TH	Date 8-29-08
Chk'd. By:		Date
ENGR.		Date
APPD.		Date
APPD.		Date

THERMO GEOTHERMAL GENERATING PLANT #1
BEAVER COUNTY, UTAH
90,000 GAL CAP CONTAINMENT POND
PLAN & SECTION

SCALE: 1/8" = 1'-0"
Project No. 443-005
DRAWING No. BE01-CV-102
REVISION A

CONTAINMENT POND LINERS

Approval: BN

Original Issue Date: 04/15/08

Current Revision Date: 08/28/08

PART 1 - GENERAL

1.1. DESCRIPTION

A. Scope of Work:

1. This Specification covers: Part 1 – General, Part 2 – Products, engineering, design, fabrication, inspection, testing, and shipping, and Part 3 – Execution installation of linings may be offered by the Vendor.

B. Definitions:

1. Capacity : US gallons
2. Pressure: Pounds per square inch (PSIG)
3. Buyer: Lightning Dock #1 LLC
4. Owner : Lightning Dock #1, LLC
5. Seller: Vendor, Supplier, Manufacturer, Fabricator or Bidder as hereinafter referred to as Seller. Seller will supply the specified items as required by Part 1 –General and Part 2 – Products of this specification.
6. Contractor: The Owner will provide a Contractor to provide the installation services and interconnecting piping as required in Part 3 – Execution of this specification.

C. Operating conditions:

1. Ponds PP-01; PP-02; PP-03; PP-04; EP-01; RP-01; RP-02; RP-03; RP-04.
   - Number of ponds: Nine
   - Dimensions: Refer to Drawings
   - Capacity: Refer to Drawings
   - Water Temperature: 266 degrees F.
     300 degrees F Spike (upset condition)
   - Use: Receives Geothermal well water. A pond liner is required for each listed pond.

1.2. DESIGN CONDITIONS

A. Refer to specification section 01010 for Project Site Conditions.

1.3. SUBMITTALS

A. Product Data: Include specifications, samples, and reference installations.

B. Installation Detail: For the type of liners proposed.

C. Maintenance Data: For the type of liners proposed.

1.4. QUALITY ASSURANCE

A. In accordance with ASTM tests for thickness, breaking strength, flexibility, tear strength, UV resistance, and adhesions.

1.5. DELIVERY, STORAGE, AND HANDLING

A. Retain shipping protective covers and protective coatings during storage.

B. Protect units against damage during shipment.

C. Comply with manufacturer's rigging instructions for handling.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lange Containment
2. Watersaver Company, Inc.
3. Firestone.
4. Or approved equal.

2.2. GENERAL

A. The liner material shall be:
1. UV resistant
2. Tear resistant
3. Puncture resistant.
4. Suitable for water temperatures specified.
5. Maintain flexibility in cold weather (-20°F)

B. The minimum liner thickness shall be 60 mil.

C. Provide a geotextile underlayment for the sloped sides of each pond. Side slopes shall be 3 feet (horizontal) to 1 foot (vertical).

D. Where possible the liners will be seamless. Where seaming is performed, the seams will be hot-wedge with double track weld with a 4-6 inch overlap. The seaming will be performed by a qualified individual.

E. The factory assembled units shall be folded and rolled on coves not to exceed a width of 10' 8".

F. Provide an installation plan for each pond lining and label each roll with the membrane type, thickness, dimensions, and an arrow indicating the direction for unrolling.

G. Include the requirements for perimeter anchor trenches. Backfill will be provided by others. The manufacturer shall recommend any intermediate slope anchoring, toe of slope anchoring and/or bottom ballast requirements.

H. Include all adhesives and primers necessary for the installation of the liners.

I. Include the services of a field representative to supervise and provide instruction during the installation and inspection of the linings.

2.3. MATERIALS

A. The following liners have been selected to be used on the site because of their thermal properties: Chlorosulfonated Polyethylene-Reinforced (CSPE-R), Ethylene Propylene Diene Monomer (EPDM) and Flexible Polypropylene (PPF). No other liners will be selected unless approved.

2.4. WORK BY OTHERS

A. Site preparation, including soil compaction, and backfill.

B. Removal of all vegetation.

C. Underlay installation

D. Lining installation including lap seaming

E. Anchoring including ballast, and any recommended intermediate and/or toe slope anchors.

F. Chain link perimeter fencing.

PART 3 - EXECUTION

3.1. INSTALLATION

A. Follow manufacturer's written instructions for written instructions for laying, seam welds and perimeter details, for underlayment and linings.

B. Prepare the pond surfaces to be smooth, dry, free of rocks, roots, vegetation and any foreign material.

C. Survey the ponds prior to the start of installation.

D. Use sand bags as required to hold down the liners in windy conditions.

3.2. ADDITIONAL SPECIFICATIONS

Work shall conform to the appropriate sections of the following specifications.

- 02100 – Site Preparation and Earthwork

END OF SPECIFICATION 443-006-15252

B. Removal of all vegetation.

C. Underlay installation

D. Lining installation including lap seaming

E. Anchoring including ballast, and any recommended intermediate and/or toe slope anchors.

F. Chain link perimeter fencing.

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3.2. ADDITIONAL SPECIFICATIONS

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- 02100 – Site Preparation and Earthwork

END OF SPECIFICATION 443-006-15252

2) Product Bulleting and MSDS

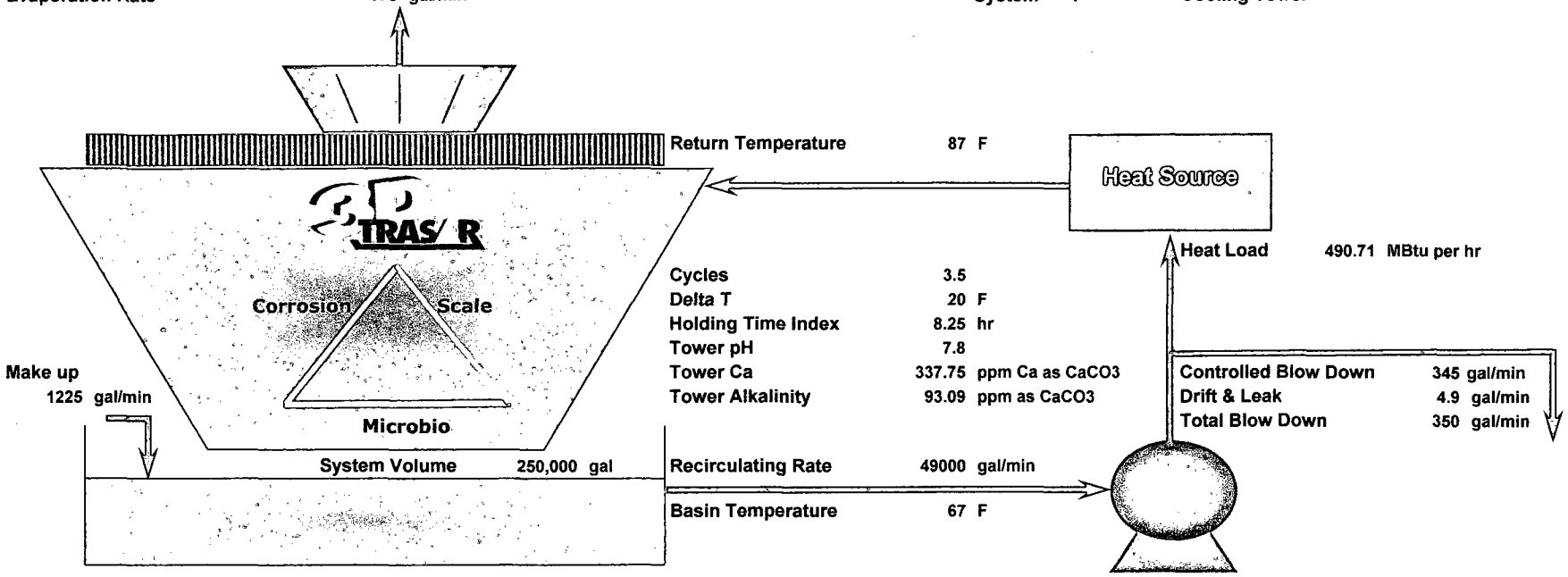
3D Trasar Control System

System Summary

NALCO

Customer	:	Ligthning Dock	
Location	:	Lordsburg, NM	
System	:	Cooling Tower	

Evaporation Efficiency	90 %
Evaporation Rate	875 gal/min



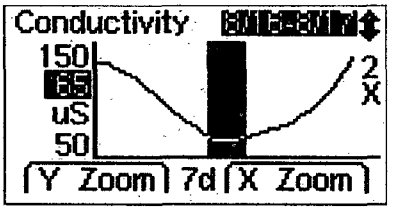
Product Category or Control Parameter	Product Number or Additive	Dosage or Control Set Point	Control Method	Annual Usage	Units	Price per Unit	Annual Cost
Cycles of Concentration		3.5	Conductivity Set Point				
pH	H2SO4	7.8	Automatic	522,553	lb/Year	$ 0.15	$ 78,383
Multifunctional	3DT189	75 ppm	TRASAR	114,929	lb/Year	$ 1.57	$ 180,439
Scale Inhibitor	-	-	-	-	lb/Year		$ -
Copper Corrosion Inhibitor	1336	4.2 ppm	Slaved	6,436	lb/Year	$ 2.54	$ 16,348
Mild Steel Corrosion Inhibitor	-	-	-	-	lb/Year		$ -
Oxidizing Biocide	Bleach	0.8 ppm	ORP Control	171,627	lb/Year	$ 0.20	$ 34,325
Bromine	-	-	-	-	lb/Year		$ -
Non-Oxidizing Biocide	7330	100 ppm	-	2,000	lb/Year	$ 3.50	$ 7,000
Algaecide	-	-	-	-	lb/Year		$ -
Biodispersant	-	-	-	-	lb/Year		$ -
Bioreporter	-	-	-	-	lb/Year		$ -
Scale & Corrosion Control							$ 196,786
pH Control Agent							$ 78,383
Primary Oxidizing Biocide							$ 34,325
Other Bio Control Programs							$ 7,000
Total Treatment Costs							$ 316,494

3D TRASAR Benefits - *Continued*

3D TRASAR Data Management offers continuous access to real-time data from your cooling water system. You can access this data in a format that you find most useful:

At the Controller

View data directly on the 3D TRASAR 5500's display.

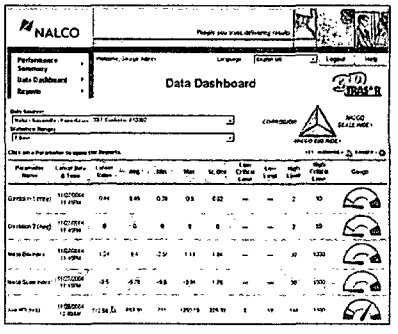


On the Go

Get alarms wherever you are via text message.

Via the Internet

Access your data from anywhere in the world via the 3D TRASAR Web. 3D TRASAR sends data to the Internet using phone, LAN or wireless technology.



At your Facility

Send real-time data and alarms to your DCS or SCADA.

In addition, when 3D TRASAR is used in conjunction with Nalco's full Risk Management Solutions program for cooling water, you have the data required to demonstrate due diligence and compliance with best practices associated with *Legionella* Risk Reduction. For more information please refer to www.nalco.com/ehs.

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Europe: Ir. G. Tjalmaweg 1 • 2342 BV Oegstgeest • The Netherlands
Asia Pacific: 2 International Business Park • #02-20 The Strategy Tower 2 • Singapore 609930
Latin America: Av. das Nações Unidas 17.891 • 6° Andar 04795-100 • São Paulo • SP • Brazil

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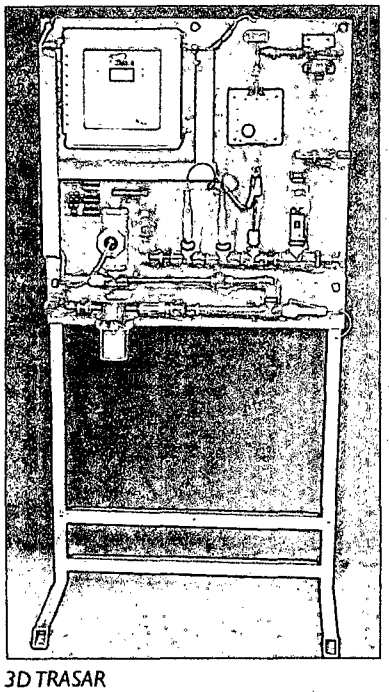
3D TRASAR® Systems

Stress and Data Management for Cooling Systems



3D TRASAR

The 3D TRASAR system is a complete water treatment control and monitoring system. 3D TRASAR continuously measures key system parameters, detects upsets, takes appropriate corrective action and communicates with system users. 3D TRASAR minimizes total cost of operation (TCO) and prevents operational problems.

3D TRASAR Benefits

3D TRASAR Scale Control continuously monitors the scaling potential of your cooling water. By maximizing cycles of concentration, you save water and chemicals. Control action prevents system degradation.

3D TRASAR Corrosion Monitoring continuously monitors corrosion trends, alerting you and your Nalco Sales Engineer to any abnormal corrosion conditions.

3D TRASAR Bio-Control applies biocide based on the measured bio-activity in your cooling system. 3D TRASAR Bio-Control measures and controls both sessile and plank tonic bio-activity, a capability unique to 3D TRASAR.

Table 1 – *3D TRASAR delivers complete Stress Management for Cooling Systems. Fully upgradeable and customizable*

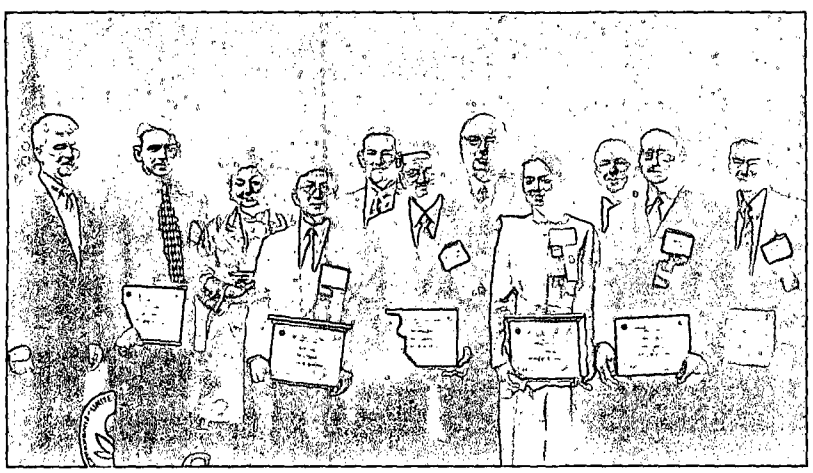
	3D TRASAR
3D TRASAR Fluorometer	X
Modem	X
Web Accessibility	X
Conductivity Measurement and Control	X
pH Measurement and Control	X
ORP Measurement and Control	X
Biocide Timers	X
Nalco Scale Control	X
Nalco Bio-Control	X
Nalco Corrosion Monitoring	X

(Continued on Reverse Side)

Nalco 3D TRASAR® Technology for Cooling Water Wins 2008 Presidential Green Chemistry Challenge Award

U.S. Presidential Green Chemistry Challenge Award

Nalco 3D TRASAR Technology for Cooling Water has been recognized with a 2008 Presidential Green Chemistry Challenge Award. The honor was given in the area of greener reaction conditions.



Nalco representatives accept the 2008 Presidential Green Chemistry Challenge Award at a ceremony held in Washington, D.C. on June 24, 2008.

Since 1996, the Presidential Green Chemistry Challenge Award has been given by the United States Environmental Protection Agency for outstanding chemical technologies that incorporate the principles of green chemistry into chemical design, manufacture and use. An independent panel of experts convened by the American Chemical Society selected the winners from nearly 100 nominations. Nalco is proud to be a 2008 winner of this prestigious award.

Innovative 3D TRASAR Technology for Cooling Water

Cooling water touches many facets of human life, including cooling for comfort in commercial buildings and cooling industrial processes. Cooling systems require treatment programs to control microbiological growth, mineral deposits and corrosion. Nalco developed 3D TRASAR technology for on-line monitoring of the condition of cooling water continuously, adding appropriate chemicals only when needed, rather than on a fixed schedule.

(Continued on Reverse Side)

3D TRASAR programs provide the ultimate proactive defense against corrosion, scale and fouling for water systems. There is no other offering like the patented 3D TRASAR program.

Nalco's 3D TRASAR technology:

- Integrates the technologies necessary to anticipate system variability and then automatically responds to keep the system in perfect balance.
- Combines unique detection technologies, proprietary software, automated feed, advanced chemistries and instant communications into a single package.
- Takes a system to a new dimension of total control, giving complete peace of mind and allowing customers to focus on other priorities.

The technique saves water and energy, optimizes the use of water-treatment chemicals, reduces air and wastewater emissions and extends equipment life. Further, a 3D TRASAR-equipped cooling system operates closer to its capabilities by virtue of eliminating the system variability and thereby offering savings in energy costs to the user.

In 2007, more than 5,000 customer locations in the United States, Canada and Europe used 3D TRASAR technology for their cooling systems, saving an estimated 40.2 billion gallons (152 million cubic meters) of water. That's equal to the annual domestic water use for the combined populations of Atlanta, Boston and Denver.

Besides cooling water applications, the 3D TRASAR platform has been expanded to control and optimize conditions in boiler operations, reverse osmosis systems and process applications for a broad range of industrial and institutional customers.

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NALCO

Product Bulletin

3D TRASAR® 3DT189

Cooling Water Corrosion and Deposit Inhibitor

PRODUCT DESCRIPTION AND APPLICATION

3D TRASAR products are part of an innovative water treatment program that uses proven technology to prevent operational problems. 3D TRASAR compensates for both routine and special causes of system variation. 3D TRASAR programs provide a return on your investment through their unique control and diagnostic capabilities.

3D TRASAR 3DT189 is designed for use in systems with recirculating water calcium concentrations between 50 and 1000 ppm (as $CaCO_3$) at the targeted cycles when the pH is less than 8.7. Because **3D TRASAR 3DT189** contains no molybdate or zinc, it should be considered as a more environmentally friendly chemistry to meet the regulatory needs of many customers.

3D TRASAR 3DT189 is a balanced blend of corrosion and scale inhibitors designed for use in open recirculating water systems.

3D TRASAR 3DT189 contains:

- Dual function phosphonate inhibitor for both cathodic (pitting) corrosion and calcium carbonate scale. The active material is a patented, proprietary chemical called Phosphinosuccinic Oligomer (PSO).
- Phosphoric Acid inhibitor for anodic corrosion
- Organic High Stress Polymer (HSP) dispersant.
- Blend of both benzotriazole (BZT) and tolyltriazole (TT) for copper corrosion inhibition.

3D TRASAR 3DT189 provides a superior alternative to traditional cooling water inhibitor blends containing pyrophosphate, orthophosphate, zinc, molybdate, etc. PSO is superior to pyrophosphate in that it will not revert to orthophosphate and is stable in the presence of oxidizing biocides. As a result, **3D TRASAR 3DT189** delivers lower total phosphate concentrations and less polymer demand. Additionally, because PSO does not revert to orthophosphate, **3D TRASAR 3DT189** can be effectively used in systems with long holding time indices (HTI's).

3D TRASAR 3DT189 contains a blend of Tolyltriazole (TT) and Benzotriazole (BZT). This blend of azoles is more halogen stable and provides improved copper and yellow metals corrosion protection.

PHYSICAL & CHEMICAL PROPERTIES

These properties are typical. Refer to the Material Safety Data Sheet (MSDS), SECTION 9, for the most current data.

Form	Liquid
Density	9.5 - 10.0 lb/gal
Specific Gravity @ 60°F (16°C)	1.17
pH (Neat)	1.8
Freeze-Thaw Recovery	Complete
Flash Point	Not Applicable

Odor	None
Freeze Point	18°F (-8°C)
Solubility in Water	Complete
Appearance	Light Yellow

ACTIVE CONSTITUENTS

Active	Function
Phosphoric Acid	Mild steel corrosion inhibition
Tagged High Stress Polymer (THSP)	Dispersant
Phosphinosuccinic Oligomer (PSO)	Mild steel corrosion and $CaCO_3$ scale inhibition
Benzotriazole (BZT)/Tolyltriazole (TT)	Copper corrosion inhibition
TRASAR Technology	Product Monitoring and Control

REGULATORY APPROVALS

Please refer to SECTION 15 of the Material Safety Data Sheet (MSDS) for the most recent approval information. This product is intended for industrial use only. It must not be fed to potable water systems of any type.

MATERIALS OF COMPATIBILITY

The following data is for the product as supplied and should be useful in specifying materials of construction of tanks, pumps, valves, piping, etc. used for storing, feeding, or transporting material.

Compatible	Not Compatible
Buna-N	Brass
Hypalon	304 SS
EPDM	Neoprene
Polyethylene	Viton
Polypropylene	Polyurethane
CPVC	Coated steel drum
PORTA-FEED® Liner	316 SS (Welded)
HDPE	Mild Steel
Plasite 4300 liner (vinyl ester resin)	
Plasite 7122 liner (epoxy phenolic)	
316 SS (Unwelded)	

Nalco recommends the use of certain polymer-based materials for the feed system, specifically rigid polyethylene, polypropylene, PVC and CPVC, or possibly lined metal tubing. The use of 316SS feed systems is not preferred, as tests designed specifically for storage applications conducted at elevated temperatures indicated susceptibility to pitting in some instances. However, the attack was confined to the welded regions on 316SS specimens. 316SS tubing and components without welds, such as pump heads and feed lines, which we expect to always be flooded with product, may be acceptable.

DOSAGE AND FEEDING

For complete dosage and feeding recommendations, consult your Nalco representative.

ENVIRONMENTAL AND TOXICITY DATA

Biological Oxygen Demand (5-day BOD_5)	9240 ppm
Chemical Oxygen Demand (COD)	190,000 ppm
Total Organic Carbon (TOC)	62,000 ppm

Refer to SECTIONS 11 and 12 of the MSDS for all available mammalian and aquatic toxicity information.

SAFETY AND HANDLING

3D TRASAR 3DT189 is an acidic product and may cause skin and eye irritation. Chemical-resistant gloves and safety goggles should be worn when handling **3D TRASAR 3DT189.** Read SECTION 8 of the Material Safety Data Sheet for specific personal protective equipment (PPE) recommendations and SECTION 3 for health effects information.

STORAGE

3D TRASAR 3DT189 should be stored in a location where the product temperature can be maintained between 22°F (-6°C) and 110°F (43°C). In cold climates, heat tracing and insulation of exposed containers and transfer lines may be necessary.

The recommended in-plant storage limit for **3D TRASAR 3DT189** is twelve months.

3D TRASAR 3DT189 should be protected from freezing.

REMARKS

If you need assistance or more information on this product, please call your nearest Nalco Representative. For more news about Nalco Company, visit our website at www.nalco.com.

For **Medical and Transportation Emergencies** involving Nalco products, please see the Material Safety Data Sheet for the phone number.

ADDITIONAL INFORMATION

3D TRASAR, TRASAR, PORTA-FEED and NALCO are registered trademarks of Nalco Company (5-27-05)

Nalco Company, 1601 West Diehl Road, Naperville, Illinois 60563-1198

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NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

3D TRASAR 3DT189

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **3D TRASAR 3DT189**

APPLICATION : COOLING WATER TREATMENT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2 FLAMMABILITY : 0 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Substituted aromatic amine	Proprietary	1.0 - 5.0
Phosphoric Acid	7664-38-2	1.0 - 5.0
Sulfuric Acid	7664-93-9	1.0 - 5.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Irritating to eyes.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Irritating, and may injure eye tissue if not removed promptly.

SKIN CONTACT :
Can cause mild irritation.

INGESTION :
Not a likely route of exposure. No adverse effects expected.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Get medical attention. Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. If reflexive vomiting occurs, rinse mouth and repeat administration of water.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : Not applicable

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled.

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
Buna-N, Hypalon, EPDM, Polyethylene, Polypropylene, HDPE (high density polyethylene), PVC, Epoxy phenolic resin

UNSUITABLE CONSTRUCTION MATERIAL :
Brass, Stainless Steel 304, Neoprene, Viton, Polyurethane, 100% phenolic resin liner, Stainless Steel 316L

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :

Substance(s)	
Phosphoric Acid	TWA: 1 mg/m3 STEL: 3 mg/m3
Sulfuric Acid	TWA: 0.2 mg/m3 Thoracic fraction

OSHA/PEL :

Substance(s)	
Phosphoric Acid	TWA: 1 mg/m3 STEL: 3 mg/m3
Sulfuric Acid	TWA: 1 mg/m3

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended., The choice of work glove depends on work conditions and what chemicals are handled, but we have positive experience under light handling conditions using gloves made from, PVC, ., Gloves should be replaced immediately if signs of degradation are observed., Breakthrough time not determined as preparation, consult PPE manufacturers.

SKIN PROTECTION :
Wear standard protective clothing. See general advice.

EYE PROTECTION :
When handling this product, the use of splash chemical goggles is recommended.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Yellow

ODOR	None
SPECIFIC GRAVITY	1.151 @ 77 °F / 25 °C
DENSITY	9.56 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	1.8
VISCOSITY	5.4 cst
INITIAL BOILING POINT	212 °F / 100 °C
VAPOR PRESSURE	0.5 mm Hg @ 100 °F / 37.8 °C
VOC CONTENT	0.4 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
Bases Contact with strong alkalies (e.g. ammonia and its solutions, carbonates, sodium hydroxide (caustic), potassium hydroxide, calcium hydroxide (lime), cyanide, sulfide, hypochlorites, chlorites) may generate heat, splattering or boiling and toxic vapors. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of sulfur, Oxides of phosphorus, Oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	3,750 mg/l	Product
Rainbow Trout	96 hrs	1,830 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs		1,908 mg/l	Product
Ceriodaphnia dubia	48 hrs	1,875 mg/l		Product

PERSISTENCY AND DEGRADATION :

Total Organic Carbon (TOC) : 62,000 mg/l

Chemical Oxygen Demand (COD) : 190,000 mg/l

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	9,240 mg/l	Product

The organic portion of this preparation is expected to be readily biodegradable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D002

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.
Technical Name(s) :	PHOSPHORIC ACID, SULFURIC ACID
UN/ID No :	UN 3264
Hazard Class - Primary :	8
Packing Group :	III
Flash Point :	Not applicable
DOT Reportable Quantity (per package) :	71,530 lbs
DOT RQ Component :	Sulfuric Acid

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.
Technical Name(s) :	PHOSPHORIC ACID, SULFURIC ACID
UN/ID No :	UN 3264
Hazard Class - Primary :	8
Packing Group :	III
IATA Cargo Packing Instructions :	820

IATA Cargo Aircraft Limit : 60 L (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.
Technical Name(s) :	PHOSPHORIC ACID, SULFURIC ACID
UN/ID No :	UN 3264
Hazard Class - Primary :	8
Packing Group :	III

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Substituted aromatic amine : Eye irritant
Phosphoric Acid : Corrosive
Sulfuric Acid : Corrosive

CERCLA/SUPERFUND, 40 CFR 117, 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Sulfuric Acid	71,530 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product contains the following substance(s) which is listed in Appendix A and B as an Extremely Hazardous Substance. Listed below are the statutory Threshold Planning Quantity (TPQ) for the substance(s) and the Reportable Quantity (RQ) of the product. If a reportable quantity of product is released, it requires notification to your State Emergency Response Commission. You may also be required to notify the National Response Center - See CERCLA/SUPERFUND, above.

Extremely Hazardous Substance	TPQ	RQ
Sulfuric Acid	1,000 lbs	71,530 lbs

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard

- Fire Hazard
- Sudden Release of Pressure Hazard
- Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product contains the following substance(s), (with CAS # and % range) which appear(s) on the List of Toxic Chemicals

Hazardous Substance(s)	CAS NO	% (w/w)
Sulfuric Acid	7664-93-9	1.0 - 5.0

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Phosphoric Acid • Sulfuric Acid	Sec. 311

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation:

Substance(s)	Citations
• Methanol	Sec. 112, Sec. 111

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Other ingredients determined not to be hazardous, including water	Proprietary
Phosphoric Acid	7664-38-2

Sulfuric Acid	7664-93-9
Substituted aromatic amine	Proprietary

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
E - Corrosive Material, D2A - Materials Causing Other Toxic Effects - Very Toxic Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
This product contains substance(s) which are found on the Non-Domestic Substances List (NDSL).

INTERNATIONAL CHEMICAL CONTROL LAWS

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

16. OTHER INFORMATION

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 02/14/2007
Version Number : 1.6

NALCO

Product Bulletin

Towerbrom® 960

Cooling Water Biocide

PRODUCT DESCRIPTION AND APPLICATION

Towerbrom 960 is a quick dissolving, broad-spectrum, granular oxidizing biocide. It is a dry blend of stabilized chlorine and sodium bromide. The quick dissolving feature of **Towerbrom 960** makes it ideal for slug feed biological control or shock feed system clean-up.

When **Towerbrom 960** is introduced into a system, it initially forms stabilized chlorine, providing the *oxidizing* power needed for effective biological slime removal at any pH. Simultaneously, the hypochlorous acid begins converting the bromide to hypobromous acid, which is more effective as a *biocide* when the system pH is above 7.5, and when certain contaminants such as ammonia are present. As the hypobromous acid is used up, it reverts to bromide ion, where it can be reactivated to hypobromous acid by any hypochlorous acid still in the system. This process continues to provide a powerful mixed oxidant system until all the hypochlorous acid is consumed. Then the system continues as a "bromine system" until all the hypobromous acid is consumed and reverts to bromide ion.

Typical **Towerbrom 960** Uses:

- **Daily Slug Feed** - Slug dose daily for cost-effective biological control. Automate with an Automated Towerbrom Feeder. The slug dosed program is a BIO-MANAGE® best practice recommendation to vary the stress on a system to maximize biological control.
- **Shock Halogenation** - Complement an existing biocide treatment when clean-up is needed.

PHYSICAL & CHEMICAL PROPERTIES

These properties are typical. Refer to Material Safety Data Sheet (MSDS), SECTION 9, for the most current data.

Form	Dry, Granular Solid
Appearance	White Granular
Bulk Density	63 lb/Ft^3 [1010 kg/m^3]
pH (1% Solution)	6 - 7
Solubility	10%
VOC Content	0.0 %
Odor	Oxidant - Chlorine

ACTIVE CONSTITUENTS

Sodium dichloroisocyanurate	90%
Sodium bromide	7%
Available Halogen	57% available halogen as chlorine

REGULATORY APPROVALS

Towerbrom 960 must be applied according to appropriate national and local regulations.

As with all biocides applied in the United States, **Towerbrom 960** is regulated by the U.S. EPA under The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). It is a violation of federal law to use this product or any biocide in a manner inconsistent with its product label. Individual states also require registration in addition to the federal registration. State registrations must be verified prior to use.

U.S. EPA Registration Number 935-71-1706 is approval for Towerbrom 960 use in:

Recirculating water systems:

Air washer water systems, commercial/industrial water cooling systems, evaporative condenser water systems, ornamental ponds and aquaria, heat exchange water systems, lakes/ponds/reservoirs (without human or wildlife use), industrial scrubbing systems, industrial auxiliary water systems, industrial process water, industrial waste disposal systems, pasteurizer/warmer/cannery cooling water systems.

Pulp and paper mill water systems

Once-through water systems (open or closed cycle, fresh or salt water)

Towerbrom 960 is not approved for use in potable water, swimming pools or spas.
Towerbrom 960 is registered for use in Canada. Registration number: 27663

MATERIALS OF COMPATIBILITY

For Concentrated Towerbrom 960 Solutions

Compatible	Not Compatible
PVC	Polypropylene
CPVC	Mild Steel/Cast Iron
Kynar (PVDF)	304/316/C-20 Stainless Steel
Teflon (PTFE, TFE)	Copper/Bronze/Brass
Polyethylene	Aluminum
Hastelloy -C	Buna-N (Nitrile)
Viton (FPM)	Natural Rubber
Ceramic	Hypalon
Graphite	Nordel (EPDM)
Linear Polyethylene	Neoprene
FRP (Bisphenol)	Cross Linked Polyethylene
FRP (Derakane)	FRP (Isophthalic)
Plasite 4100 (Vinyl Ester)	

DOSAGE AND FEEDING

The specific dosage of **Towerbrom 960** will vary depending on the characteristics of your system and the BIO-MANAGE objectives for your microbio control program. Your Nalco representative will recommend the optimum dosage for cost-effective control and results.

ENVIRONMENTAL AND TOXICITY DATA

Biological Oxygen Demand (5-day BOD_5)	Not Available
Chemical Oxygen Demand (COD)	Not Available
Total Organic Carbon (TOC)	Not Available

CERCLA/SUPERFUND, 40 CFR 117, 302: Notification of spills of this product is not required. Refer to MSDS, SECTIONS 11 and 12, for all mammalian and aquatic information.

SAFETY AND HANDLING

Handling/Exposure to product:

1. Refer to the MSDS, SECTION 8 for personal protection information and SECTION 3 for health effects information before handling.
   Some standard use guidelines are listed here:
   - Do not get in eyes, on skin or on clothing
   - Use with adequate ventilation
   - Avoid breathing dust from product
   - Protect hands with PVC, Neoprene or Butyl gloves
   - Protect eyes with a face shield and chemical splash goggles
   - Protect clothing with a chemical resistant apron
2. Spills
   Clean up all spills promptly by sweeping and scooping up spilled material. Use recovered material in system normally treated with product according to label instructions. **Do not return recovered material to storage container.** Do not place recovered material in trash or combine with any other materials. Wash down any remaining minor quantities of spilled product with large volume of water. Refer to MSDS SECTION 13 for disposal considerations.

STORAGE

Always store **Towerbrom 960** in the original shipping container and away from heat and open flames. For pails, keep lid tightly closed when not in use and do not allow moisture or any other contaminants to enter the stored material. Never return spilled or damp material to a storage container. Store pails and bins indoors or in a protected area when not in use. Be sure bins are stored where water cannot collect under the outlet valve. Do not rinse bins prior to returning.

REMARKS

If you need assistance or more information on this product, please call your nearest Nalco Representative. For more news about Nalco Company, visit our website at www.nalco.com.

For **Medical and Transportation Emergencies** involving Nalco products, please see the Material Safety Data Sheet for the phone number.

ADDITIONAL INFORMATION

BIO-MANAGE and NALCO are registered trademarks of Nalco Company (10-22-04)
Towerbrom is a registered trademark of, and is used under license from Occidental Chemical Company
pHREEdom is a registered trademark of Calgon Corporation

Nalco Company, 1601 West Diehl Road, Naperville, Illinois 60563-1198

Subsidiaries and Affiliates in Principal Locations Around the World
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NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

TOWERBROM® 960

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **TOWERBROM® 960**

APPLICATION : BIOCIDEBIOCIDE

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 3 / 3 FLAMMABILITY : 1 / 1 INSTABILITY : 2 / 2 OTHER : OXIDIZER
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Dichloroisocyanurate	2893-78-9	60.0 - 100.0
Sodium Bromide	7647-15-6	5.0 - 10.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
CORROSIVE. CAUSES EYE AND SKIN DAMAGE. IRRITATING TO NOSE AND THROAT. HARMFUL OR FATAL IF SWALLOWED. Prolonged ingestion of large amounts may cause adverse central nervous system effects. Strong Oxidizer.
Do not get in eyes, on skin, on clothing. Remove contaminated clothing and wash before reuse.
Wear goggles and face shield and rubber gloves when handling.
Not flammable but can act as an oxidizing agent, enhancing the burning rate of other materials. Water Reactive; material will react with water and may release a flammable or toxic gas. In addition, nitrogen trichloride, which can present an explosion hazard, can be generated slowly by the reaction of small quantities of water with a high concentration of this product. Decomposes; flammable and/or toxic gases will form at elevated temperatures (thermal decomposition).

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Corrosive. Will cause eye burns and permanent tissue damage.

SKIN CONTACT :
May cause severe irritation or tissue damage depending on the length of exposure and the type of first aid administered.

INGESTION :
Not a likely route of exposure. Corrosive; causes chemical burns to the mouth, throat and stomach. Can cause central nervous system depression, nausea, dizziness, vomiting, or unconsciousness.

INHALATION :
Not a likely route of exposure. Irritating, in high concentrations, to the eyes, nose, throat and lungs. Toxic by inhalation.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
Excessive exposure may cause central nervous system effects, nausea, vomiting, anesthetic or narcotic effects.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
PROMPT ACTION IS ESSENTIAL IN CASE OF CONTACT. Immediately flush eye with water for at least 15 minutes while holding eyelids open. Get immediate medical attention.

SKIN CONTACT :
Remove contaminated clothing. Wash off affected area immediately with plenty of water. Get immediate medical attention.

INGESTION :
DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink. Get immediate medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Probable mucosal damage may contraindicate the use of gastric lavage. Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Use water spray to cool containers exposed to fire and massive quantities of water to dilute material involved in a fire or spilled from containers. Do not use ABC or other dry chemical fire extinguishers since there is the potential for a violent reaction.

FIRE AND EXPLOSION HAZARD :
Not flammable but can act as an oxidizing agent, enhancing the burning rate of other materials. Water Reactive; material will react with water and may release a flammable or toxic gas. In addition, nitrogen trichloride, which can present an explosion hazard, can be generated slowly by the reaction of small quantities of water with a high concentration of this product. Decomposes; flammable and/or toxic gases will form at elevated temperatures (thermal decomposition).

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Ensure clean-up is conducted by trained personnel only. Ensure adequate ventilation. Do not touch spilled material. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
Sweep up and shovel. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations). DO NOT allow water to come into contact with this material.

ENVIRONMENTAL PRECAUTIONS :
This product is toxic to fish. Do not discharge effluent containing this active ingredient into lakes, streams, ponds, estuaries, oceans or other waters, unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Avoid generating dusts. Keep the containers closed when not in use.

STORAGE CONDITIONS :
Store the containers tightly closed. Store in suitable labelled containers. Store separately from bases. Keep in dry place. Store away from organic chemicals and other oxidizable materials, reducing agents, acids and alkalis. DO NOT allow water to come into contact with this material.

SUITABLE CONSTRUCTION MATERIAL :
Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended. Local exhaust ventilation may be necessary when dusts or mists are generated.

RESPIRATORY PROTECTION :
If dusts are generated, use an approved air-purifying respirator. An organic vapor/acid gas cartridge with dust/mist prefilter may be used. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Neoprene gloves, PVC gloves, Butyl gloves

SKIN PROTECTION :
Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots. A full slicker suit is recommended if gross exposure is possible.

EYE PROTECTION :
Wear a face shield with chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Eye wash station and safety shower are necessary. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Crystalline, Granular
APPEARANCE	White
ODOR	Slight Pungent
SOLUBILITY IN WATER	Moderate
pH (1 %)	6 - 7
MELTING POINT	Decomposes 460 - 480 °F / 240 - 250 °C

VOC CONTENT 0.0 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Moisture
Avoid temperatures greater than 400 °F

MATERIALS TO AVOID :
Do not bring in contact with organic materials and reducing agents. DO NOT allow water to come into contact with this material.

HAZARDOUS DECOMPOSITION PRODUCTS :
Oxides of nitrogen (NOx), disodium oxide, bromine, and traces of phosgene (under fire conditions); chlorine (released in presence of moisture) and other chlorine containing compounds; hypobromous acid, hypochlorous acid, and cyanuric acid (released when dissolved in water); nitrogen trichloride, an explosion hazard (generated slowly by the reaction of small quantities of water with high concentration of this product).

11. TOXICOLOGICAL INFORMATION

The following results are for the product.

ACUTE ORAL TOXICITY :

Species	LD50	Test Descriptor
Rat	710 mg/kg	

ACUTE DERMAL TOXICITY :

Species	LD50	Test Descriptor
Rabbit	> 2g/kg	

ACUTE INHALATION TOXICITY :

Species	LC50	Test Descriptor
Rat	0.6 mg/l (4 hrs)	

PRIMARY SKIN IRRITATION :

Draize Score	Test Descriptor
7.2 / 8.0	

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Moderate

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product along with results on the active substances.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	0.7 mg/l	50% Active Ingredient
Sheepshead Minnow	96 hrs	3.42 mg/l	
Inland Silverside	96 hrs	2.7 mg/l	50% Active Ingredient

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	2.5 mg/l		50% Active Ingredient
Mysid Shrimp (Mysidopsis bahia)	48 hrs	3.54 mg/l		
Mysid Shrimp (Mysidopsis bahia)	96 hrs	4.4 mg/l		50% Active Ingredient
Ceriodaphnia dubia	48 hrs	1.02 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	50 - 70%	30 - 50%

The portion in water is expected to float on the surface.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: High
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D001, D003

Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	DICHLOROISOCYANURIC ACID, SALTS, MIXTURE
Technical Name(s) :	Sodium Dichloroisocyanurate
UN/ID No :	UN 2465
Hazard Class - Primary :	5.1
Packing Group :	II
Flash Point :	None

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	DICHLOROISOCYANURIC ACID, SALTS, MIXTURE
Technical Name(s) :	Sodium Dichloroisocyanurate
UN/ID No :	UN 2465
Hazard Class - Primary :	5.1
Packing Group :	II
IATA Cargo Packing Instructions :	511
IATA Cargo Aircraft Limit :	25 KG (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	DICHLOROISOCYANURIC ACID, SALTS, MIXTURE
Technical Name(s) :	Sodium Dichloroisocyanurate
UN/ID No :	UN 2465
Hazard Class - Primary :	5.1
Packing Group :	II

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Dichloroisocyanurate : Oxidizer, Irritant
Sodium Bromide : Eye irritant

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
X	Fire Hazard
-	Sudden Release of Pressure Hazard
X	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 121816

This product is acceptable for treatment of cooling and retort water (G5) in and around food processing areas.

FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT (FIFRA) :
EPA Reg. No. 935-71-1706
In all cases follow instructions on the product label.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 111 (40 CFR 60, Volatile Organic Compounds), Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
This product is a registered biocide and is exempt from State Right to Know Labelling Laws.

Heterocyclic salt	Proprietary

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
Pesticide controlled products are not regulated under WHMIS.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's

general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Moderate

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

TOWERBROM® 960

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

Prepared By : Product Safety Department
Date issued : 07/13/2005
Version Number : 1.11

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO® 7408

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® 7408**

APPLICATION : CHLORINE SCAVENGER

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 1 / 2 FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Bisulfite	7631-90-5	30.0 - 60.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Harmful if swallowed. Contains Sulfite. Causes asthmatic signs and symptoms in hyper-reactive individuals. Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Skin, Eye, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause mild irritation.

SKIN CONTACT :
Can cause mild irritation.

INGESTION :
Not a likely route of exposure. May cause asthmatic-like attack.

INHALATION :
Irritant to respiratory system. Causes asthmatic signs and symptoms in hyper-reactive individuals.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
Ingestion of sulfite can cause a severe allergic reaction in asthmatics and some sulfite sensitive individuals. The resulting symptoms can include difficulty in breathing, flushed skin and a rash. Chronic exposure to sulfites may cause symptoms of upper respiratory disease and affect sense of taste and smell.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. If irritation persists, repeat flushing. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms persist, call a physician.

INGESTION :
Induce vomiting if the patient is fully conscious. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If breathing is difficult, administer oxygen. Get medical attention.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Keep containers cool by spraying with water. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Ensure clean-up is conducted by trained personnel only. Ensure adequate ventilation. Do not touch spilled material. Stop or reduce any leaks if it is safe to do so. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Avoid eye and skin contact. Do not take internally. Do not get in eyes, on skin, on clothing. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labelled. Keep the containers closed when not in use. Use with adequate ventilation.

STORAGE CONDITIONS :
Protect product from freezing. Store the containers tightly closed. Store separately from acids. Store in suitable labelled containers. Amine and sulphite products should not be stored within close proximity or resulting vapors may form visible airborne particles.

SUITABLE CONSTRUCTION MATERIAL :
HDPE (high density polyethylene), Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use., Brass, Neoprene, Polyurethane, Viton, Hypalon, EPDM, Polypropylene, Polyethylene, PVC

UNSUITABLE CONSTRUCTION MATERIAL :
Stainless Steel 304, Buna-N, Epoxy phenolic resin, 100% phenolic resin liner

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below. Exposure limits are listed for sulfur dioxide (SO2) since this product evolves SO2 when open to the atmosphere.

ACGIH/TLV :

Substance(s)	
Sodium Bisulfite	TWA: 5 mg/m3
Sulfur Dioxide	TWA: 2 ppm , 5.2 mg/m3 STEL: 5 ppm , 13 mg/m3

OSHA/PEL :

Substance(s)	
Sodium Bisulfite	TWA: 5 mg/m3
Sulfur Dioxide	TWA: 2 ppm , 5 mg/m3 STEL: 5 ppm , 13 mg/m3

ENGINEERING MEASURES :
General ventilation is recommended. Local exhaust ventilation may be necessary when dusts or mists are generated.

RESPIRATORY PROTECTION :
If significant mists, vapors or aerosols are generated an approved respirator is recommended. An approved respirator must be worn if the occupational exposure limit is likely to be exceeded.

HAND PROTECTION :
Neoprene gloves, Nitrile gloves, Butyl gloves, PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Keep an eye wash fountain available. Keep a safety shower available.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Yellow
ODOR	Pungent

SPECIFIC GRAVITY	1.37 @ 77 °F / 25 °C
DENSITY	11.4 lb/gal
BULK DENSITY	11.4 lb/ft3
SOLUBILITY IN WATER	Complete
pH (1 %)	4.1
VISCOSITY	2.8 cps @ 77 °F / 25 °C
FREEZING POINT	34 °F / 1.1 °C
BOILING POINT	219 °F / 104 °C
VAPOR PRESSURE	32 mm Hg @ 77 °F / 25 °C 76 mm Hg @ 99.9 °F / 37.7 °C
VAPOR DENSITY	2.2 (Air = 1)
VOC CONTENT	0.00 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. SO2 may react with vapors from neutralizing amines and may produce a visible cloud of amine salt particles.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of sulfur

11. TOXICOLOGICAL INFORMATION

The following results are for a similar product.

ACUTE ORAL TOXICITY :

Species	LD50	Test Descriptor
Rat	4.1 g/kg	Similar Product

Rating : Non-Hazardous

ACUTE DERMAL TOXICITY :

Species	LD50	Test Descriptor
Rabbit	3 g/kg	Similar Product

Rating : Non-Hazardous

PRIMARY SKIN IRRITATION :

Draize Score	Test Descriptor
1.0 / 8.0	Similar Product

Rating : Slightly irritating

PRIMARY EYE IRRITATION :

Draize Score	Test Descriptor
9.4 / 110.0	Similar Product

Rating : Practically non-irritating

SENSITIZATION :
Sulfites can cause an allergic reaction in sensitive individuals.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product and a similar product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	> 100 mg/l	Product
Fathead Minnow	96 hrs	382 mg/l	Similar Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	275 mg/l		Product
Daphnia magna	48 hrs	728 mg/l		Similar Product

CHRONIC FISH RESULTS :

Species	Exposure	NOEC / LOEC	End Point	Test Descriptor
Fathead Minnow	7 Days	250 mg/l / 500 mg/l	Growth	Product

CHRONIC INVERTEBRATE RESULTS :

Species	Test Type	NOEC / LOEC	End Point	Test Descriptor
Ceriodaphnia dubia	3 Brood	250 mg/l / 500 mg/l	Reproduction	Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	BISULPHITES, AQUEOUS SOLUTION, N.O.S.
Technical Name(s) :	SODIUM BISULPHITE
UN/ID No :	UN 2693
Hazard Class - Primary :	8
Packing Group :	III
Flash Point :	None
DOT Reportable Quantity (per package) :	12,500 lbs
DOT RQ Component :	SODIUM BISULFITE

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	BISULPHITES, AQUEOUS SOLUTION, N.O.S.
Technical Name(s) :	SODIUM BISULPHITE
UN/ID No :	UN 2693
Hazard Class - Primary :	8
Packing Group :	III
IATA Cargo Packing Instructions :	820
IATA Cargo Aircraft Limit :	60 L (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	BISULPHITES, AQUEOUS SOLUTION, N.O.S.
Technical Name(s) :	SODIUM BISULPHITE
UN/ID No :	UN 2693
Hazard Class - Primary :	8
Packing Group :	III

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Bisulfite : Respiratory irritant

CERCLA/SUPERFUND, 40 CFR 117, 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product.

RQ Substance	RQ
Sodium Bisulfite	12,000 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives, 21 CFR 176.170 Components of paper and paperboard in contact with aqueous and fatty foods and 21 CFR 176.180 Components of paper and paperboard in contact with dry foods.

Limitations: no more than required to produce intended technical effect.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Sodium Bisulfite	Sec. 311

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Sodium Bisulfite	7631-90-5
Water	7732-18-5

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
E - Corrosive Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
This product complies with Parts XI - XV of the HSNO Act (1996).

THE PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippine Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 05/03/2006
Version Number : 1.13

Product Bulletin

NALCO® 7408

Dechlorination Chemical

PRODUCT DESCRIPTION AND APPLICATION

NALCO 7408 is a fast-acting dechlorination agent used to reduce the levels of residual chlorine in chlorinated water supplies without increasing objectionable chloramines. **NALCO 7408** is a bisulfite-based material that reacts instantaneously with chlorine. It does not include any catalyst and, therefore, reacts more slowly with oxygen.

Its primary use is dechlorination of water, feedwater for reverse osmosis (RO), feedwater to ion exchange units, and waste water. **NALCO 7408** is also used for chlorine and oxygen scavenging in systems that cannot tolerate the presence of a catalyst.

PHYSICAL & CHEMICAL PROPERTIES

These properties are typical.

Form:	Liquid
Density @77°F [25°C]:	11.4 lb/gal [1.37 kg/L]
Specific Gravity @77°F [25°C]:	1.37
Odor:	Pungent sulfurous
pH (1% Solution):	4.1
Freeze-Thaw Recovery:	Unstable
Flash Point (PMCC):	None
Crystallization Point:	37°F [3°C]
Freeze Point (precipitation point)	30°F[-1°C]
VOC	None

ACTIVE CONSTITUENTS

Sodium Bisulfite

REGULATORY APPROVALS

See MSDS for regulatory information.

MATERIALS OF COMPATIBILITY

Compatible	Not Compatible	Not Tested
Polyethylene	Aluminum	Plasite 4005
Fiberglass DK-411	Brass	Plasite 6000
PVC	Mild Steel	Plasite 7122
Buna-N	Nickel	Copper
Polypropylene	Neoprene	Polyurethane
Natural Rubber	Hypalon	
Teflon	Stainless Steel 304	
Viton	Stainless Steel 316	

Plexiglas
Vinyl

DOSAGE AND FEEDING

PRODUCT FEEDING AND PROGRAM COMPATIBILITY

NALCO 7408 should be fed at a point where thorough instantaneous mixing is available as close to the chlorine contact point as feasible. **NALCO 7408** can be fed neat or diluted.

CONSEQUENCES OF UNDERFEED

Dechlorination

Underfeed of **NALCO 7408** will cause free chlorine to remain in the water going to the ion exchanger or reverse osmosis (RO) membrane. This chlorine will react with the resin or membrane structure causing degradation and/or hydrolysis (check manufacturing specifications).

Oxygen Scavenging

Underfeed of **NALCO 7408** will result in serious oxygen corrosion to the feedwater system. The greatest damage will occur in the economizer or feedwater preheaters. Oxygen corrosion will also increase iron levels in the feedwater. Iron deposits will form in the high heat flux areas of the boiler causing tube failures.

CONSEQUENCES OF OVERFEED

Dechlorination

Moderate overfeed of **NALCO 7408** will cause no permanent damage to any part of the boiler feed system. It will exchange out on the ion exchange resin or be removed by the RO membrane and cause reduced run lengths that would be directly proportional to the extent of overfeed. Slight overfeed should have no noticeable effect on the operation of the ion exchangers or RO membranes since the vast majority of ionic load would be coming from the water itself.

ENVIRONMENTAL AND TOXICITY DATA

Please see the Material Safety Data Sheet.

SAFETY AND HANDLING

Read the Material Safety Data Sheet before using this product.

Caution: May cause irritation to skin and eyes. Avoid contact with skin, eyes and clothing. Do not take internally. In case of contact, wash skin with soap and water; for eyes, immediately flush with large amounts of water for at least 15 minutes, and get medical attention. Remove contaminated clothing and wash before re-use.

The maximum storage temperature is 120°F [49°C]. Keep from freezing. At temperatures below 30°F [-1°C], product will precipitate. **NALCO 7408 is not freeze-thaw stable.** Bulk **NALCO 7408** should be stored in lined or fiberglass tanks. Avoid excessive aeration. Fill bulk tanks from the bottom.

STORAGE

NALCO 7408 has a maximum recommended in-plant **storage life of six months** in factory-sealed containers.

REMARKS

If you need assistance or more information on this product, please call your nearest Nalco Representative. For more news about Nalco Company, visit our website at www.nalco.com.

For **Medical and Transportation Emergencies** involving Nalco products, please see the Material Safety Data Sheet for the phone number.

ADDITIONAL INFORMATION

NALCO is a registered trademark of Nalco Company (11-14-05)

Nalco Company, 1601 West Diehl Road, Naperville, Illinois 60563-1198

Subsidiaries and Affiliates in Principal Locations Around the World
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3) Table - GPS Coordinates,etc

Point	Northing	Easting	Elevation_ft	Latitude	Longitude	Lon_DD	Lat_DD	Type
13-07	3558910.89	703409.37	4093.50	32 08 53.85836 N	108 50 35.68577 W	-108.843246047	32.148293989	Production
33-07	3558894.73	703790.05	Not Reported	32 08 53.08608 N	108 50 21.17591 W	-108.839215530	32.148079466	Production
53-07	3558924.51	704178.10	4106.15	32 08 53.79925 N	108 50 06.34996 W	-108.835097211	32.148277569	Production
45-07	3558492.72	703950.69	4100.20	32 08 39.93403 N	108 50 15.35634 W	-108.837598983	32.144426119	Production
47-07	3558134.93	703950.84	Not Reported	32 08 28.32208 N	108 50 15.62475 W	-108.837673542	32.141200577	Production
42-18	3557370.38	703925.44	4105.73	32 08 03.52565 N	108 50 17.17906 W	-108.838105294	32.134312681	Injection
62-18	3557380.71	704299.56	4124.75	32 08 03.61680 N	108 50 02.90173 W	-108.834139369	32.134338000	Injection
82-18	3557396.23	704795.41	4150.62	32 08 03.79627 N	108 49 43.97739 W	-108.828882608	32.134387853	Injection

UTM Zone 12 NAD83 Elevation Reported in ft Contact Surveyor for Datum NAD83 NAD83 NAD83 NAD83

* Not Reported indicates locations where sites were calculated from Legal Descriptions and survey results have not been reported.

4) Nalco - Letter of Suitability

NALCO

Mr. Jay Hamilton

CC. Mr. Jim Rosser

I appreciate you allowing us to assist you all in choosing the appropriate chemistry for your cooling water program for the Lightning Dock Project. As we have discussed, the nearby Tilapia hatchery is going to be of primary concern when determining which chemistries will be suitable for this system. Although contamination is not likely, it is important to protect the environment from even the slightest possibility of toxic conditions.

The primary operational concerns that need to be addressed in the cooling water will be Corrosion, scaling, fouling, and microbiological contamination$_{(c,s,f,m)}$. The appropriate chemistry for each concern has been specified below with an explanation of why we need to utilize each in efforts to guarantee the safety of the Tilapia. Our laboratory studies have not been tested on Tilapia specifically so we have referenced the results for a very similar fish, the Fathead Minnow. Fathead minnow is also a warm freshwater species that shares tilapia's geographical/climate distribution. Tilapia is also a hardy fish, similar in sensitivity to the fathead minnow.

3DT189$_{(c,s,f)}$ – This is a multifunctional corrosion, scale, and deposit control chemical that is designed to eliminate the variability in feeding separate chemicals to control individual tasks. By feeding one chemical we will eliminate a great deal of the risk of overfeeding any individual components that could potentially be hazardous if introduced to the water table. This product has a Fathead Minnow LC50 of 3,750 mg/L or ppm as product at 96 hours of exposure. We have designed a system that will allow you all to provide real-time control of the effluent at an exact residual concentration that is proposed at 80 mg/L or ppm. In the event that this residual is exceeded the controller's communication port will send an alarm to each of the Nalco representatives as well as plant personnel via email or telemetry. This product is virtually not toxic with critical limits that are much greater than the recommended dosage.

Nalco 3DT189:

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	3,750 mg/l	Product
Rainbow Trout	96 hrs	1,830 mg/l	Product

*See MSDS and product bulletins for additional product specifications

Bleach$_{(m)}$ – This chemical will be used for daily biological control. Operational personnel will be monitoring the free residual along with ORP monitoring and reporting to maintain the recommended 0.20 - 0.30 free halogen residual. Chlorine scavenger feed system will be readily available to scavenge excess halogen as necessary. I have attached the toxicity data for bleach although it does not specify the Fathead Minnow or Tilapia. All fish tested prove to have a much higher toxicity residual than your operation will involve. Toxicity data for LC50 show exposure limits to 96 hours while your system should have

real-time data monitoring and alarming capabilities to scavenge excess residual immediately when necessary.

Bleach – Cont'd

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	1.94 mg/l	Product
Bluegill Sunfish	96 hrs	5.3 mg/l	Product
Inland Silverside	96 hrs	16.88 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	1.57 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	33.76 mg/l		Product

Towerbrom 960$_{(m)}$ - A supplemental biocide is recommended for periods of high biological activity. This biocide has been shown to provide excellent biological remediation and is the choice remedial biocide when there is any chance of exposure to wildlife. This product has a Fathead Minnow LC50 of 0.70 mg/L or ppm as product at 96 hours of exposure. This product will also allow complete control for oxidant scavenging as a precautionary measure before re-injection takes place.

Towerbrom 960:

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	0.7 mg/l	50% Active Ingredient
Sheepshead Minnow	96 hrs	3.42 mg/l	
Inland Silverside	96 hrs	2.7 mg/l	50% Active Ingredient

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	2.5 mg/l		50% Active Ingredient
Mysid Shrimp (Mysidopsis bahia)	48 hrs	3.54 mg/l		
Mysid Shrimp (Mysidopsis bahia)	96 hrs	4.4 mg/l		50% Active Ingredient
Ceriodaphnia dubia	48 hrs	1.02 mg/l		Product

*See MSDS and product bulletins for additional product specifications

The chosen products all have the ability to closely controlled and monitored to insure safe effluent chemistry. Each product has negligible critical limit or will be limited to stay much below contaminant limits. This program has been determined to be the optimum choice when there is risk of exposure to wildlife habitat, fresh water, surface water or groundwater sources. The cooling water chemistry will prove harmless to wildlife and other surroundings through continuous monitoring and this environmentally conscious approach to preserving the quality of the cooling water system.

The following chemical will serve as the oxidant scavenger used to guarantee effluent limitations are not exceeded.

Nalco 7408 – As a precautionary measure, a Nalco 7408 feed system will be set up to scavenge any excess residual oxidant prior to effluent re-injection. This product is capable of scavenging any free oxidant at a very low dosage. Typical free chlorine residual due to bleach and Towerbrom 960 feed will be between 0.20 and 0.30 mg/L or

ppm. Nalco 7408 will be fed at 3.66 ppm per ppm of free oxidant to be scavenged. This will bring the theoretical maximum dosage of Nalco7408 to less than 10 ppm. This product has a Fathead Minnow LC50 of 382 mg/L or ppm as product at 96 hours of exposure. Critical limits are so much greater than maximum expected dosage that contamination with this product should not be a concern.

Nalco 7408:

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	> 100 mg/l	Product
Fathead Minnow	96 hrs	382 mg/l	Similar Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	275 mg/l		Product
Daphnia magna	48 hrs	728 mg/l		Similar Product

*See MSDS and product bulletins for additional product specifications

AmeriCulture

July 11, 2008

New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
Attn: Carl Chavez
1220 S. Saint Francis Drive
Santa Fe, NM 87505

Subject: Request for Public Hearing, pursuant to Notice of Publication by Los Lobos Geothermal, LLC for application GT-001 Lightning Dock Geothermal No. 1

Dear Carl,

We have reviewed the information found on the OCD website pertaining to the above notice. Based on this review, and in response to the Notice of Publication, we hereby request a public hearing that will allow AmeriCulture and other concerned parties to discuss Los Lobos Geothermal, LLC's proposed geothermal power generation project in Animas, New Mexico before the Oil Conservation Commission. We do not believe that the proposed injection scheme and wells comply with the intent or requirements of the rules and statutes of the State of New Mexico that govern water rights, geothermal operations, and geothermal well construction practices:

1. Burgett Geothermal and AmeriCulture utilize a shallow geothermal reservoir contained within a highly silicified Gila Conglomerate host within the outflow plume of the Lightning Dock geothermal system. Isotope and geochemical studies on production water shows the shallow geothermal fluids are dominated by outflow of deep-seated geothermal fluids with hardly any mixing with shallow cold ground water. The deeper geothermal reservoir is the presumptive target of Los Lobos Geothermal (LLG). Overproduction of this reservoir will result in the rapid thermal depletion of the shallower reservoir that both longstanding businesses rely upon, threaten the State's water interest and impair existing water rights and geothermal users.
2. Over production of the shallow reservoir will create a pressure gradient between the shallow geothermal reservoir and cold groundwater aquifer and induce mixing. Because the small geothermal reservoir is confined, pressure or head changes are transmitted more quickly across the reservoir at all depth intervals and locations compared to unconfined or semi-confined groundwater aquifers. Injection south and southeast will force cold geothermal and ground water to flow in and mix in the current geothermal production area. Planned production and injection by LLG will "quench" the shallow outflow plume reservoir with cold injection at the bottom and induced cold ground water inflow at the top. Thermal break through of cold water

25 Tilapia Trail, Animas, NM 88020 • Ph: 505.548.2328 Fax: 505.548.2631
e-mail: damon@americulture.com • www.americulture.com

into the LLG production wells in the deep reservoir will occur also from over production and poorly cited injection wells.

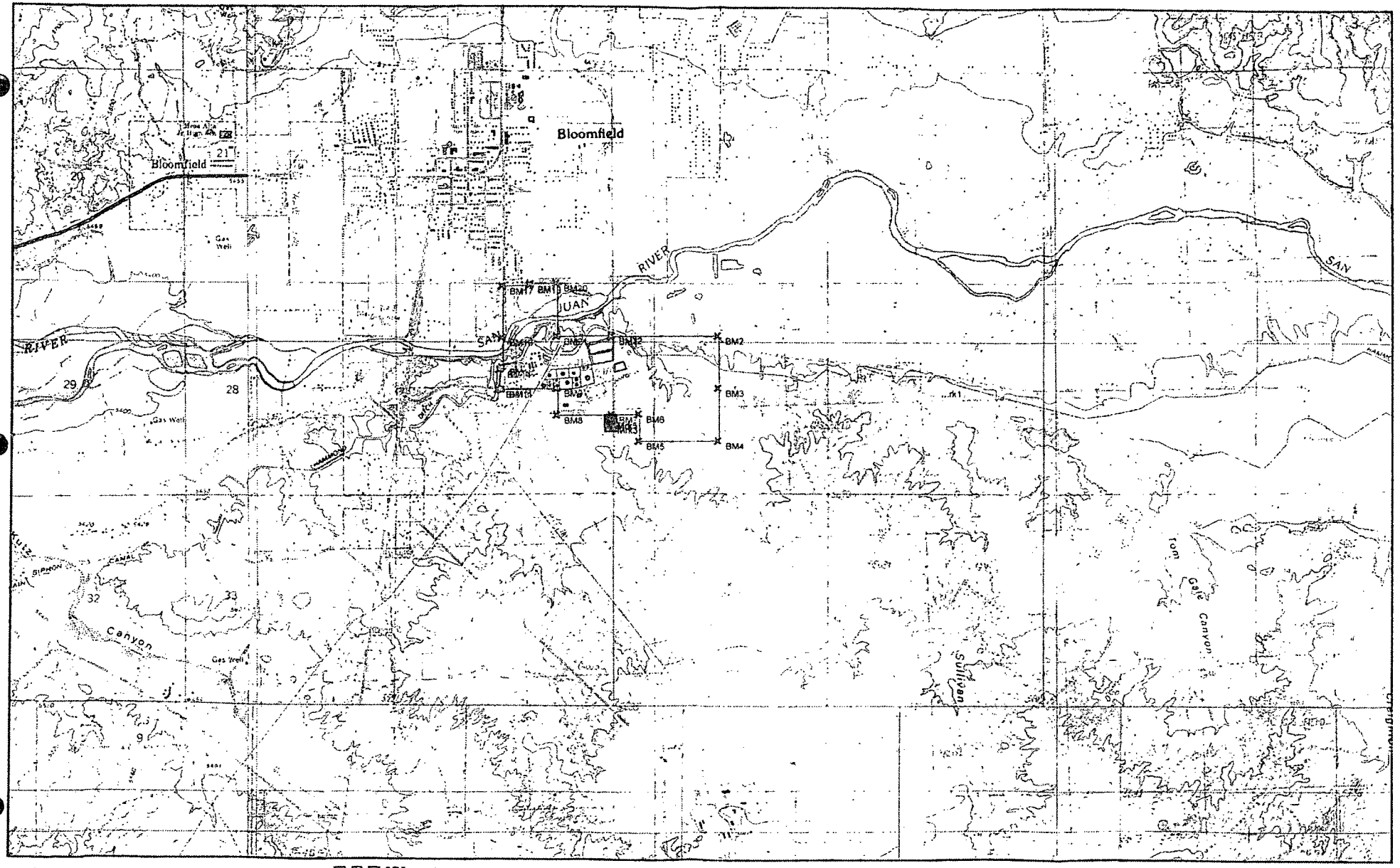
3. A 48 hr pump test of the AmeriCulture State 1 well shows that the deeper reservoir (encountered in Steam Reserve 55-7) is in hydraulic connection with the shallow outflow reservoir. This is the only pump test ever conducted at Lightning Dock to assess reservoir transmissivity, reservoir boundaries, and storage. A total or aggregate continuous production on the reservoir approaching or exceeding 2,000 gpm may result in significant long-term drawdown and affect adjacent shallow ground water rights in the Animas basin. The reservoir is already produced in excess of 1,000 gpm for at least the colder months and days of a year. More reservoir tests and geochemistry are required to understand sustainability of the resource for power production in excess of 1 to 2 MWe.
4. Heat flow information indicates that the total natural heat out put is less than 10 MWt (megawatt thermal). This is a very small geothermal system in terms of area and reservoir volume. The natural heat output is driven by a very intense (and almost point source) of thermal upflow. Injection and thermal sweep may be feasible with a larger system with the same thermal output. However, mining heat in this system is not sustainable for any reasonable period of time and will adversely affect current direct-use operations that are more important to the economy of the area than small-scale commercial electrical power generation.
5. The subsurface geology and hydrogeology relating to proposed injection wells 42-18, 62-18 and 82-18 are unknown. Furthermore, there is no mention of confining or cap rock and reservoir units and their depth ranges or thicknesses. As a result, the drilling program is grossly generic and not specific to the subsurface conditions at Lightning Dock. Accordingly, these wells should only be permitted as exploratory test holes until testing and the Class V injection well permitting process is complete within the Water Quality Control Commission (WQCC) procedures.
6. The thickness and depth of the freshwater zones stated in the permit are incorrect. Furthermore, the permit conductor casing (63 ft) does not agree with the casing program in the Drilling Plan (minimum 90 ft and a maximum 200 ft). It is uncertain whether 200 feet is long enough to protect shallow fresh ground water while drilling the surface 13 3/8 inch string to 1,500 ft. Justification for this important aspect of the well design should be included with the permit application.
7. All well applications have the same design even though the wells are in located in different locations from a subsurface geology standpoint. A discussion of the formation or criteria used to select the casing points should be included in the permit application.
8. There has been no well testing in the area of the well permits and therefore reservoir properties are unknown. This is especially critical for the injection wells in order to avoid destruction of the resource and thermal breakthrough on existing production wells.
9. It is inappropriate to simultaneously permit the 3 injection wells with the 5 production wells because there is no requirement to consider geohydrologic data gathered during an initial drilling effort in the location and construction of the injection wells.

10. In the Notice of Publication, the Horquilla Formation is listed as having a TDS of 1,300 mg/L. To our knowledge, no one has determined the water chemistry of this interval. All geothermal chemistry reported or measured to date came from Tertiary volcanics or basin fill deposits.
11. With reference to 20.6.2.3106 NMAC, the following deficiencies exist: 1) there is no plan submitted for evaporative ponds, design, and location, 2) there is no monitoring plan with sampling protocol, monitor locations, or monitor well design, and 3) no geotechnical data is presented or referenced for evaluation of site subsurface conditions and hydrogeology.
12. The AmeriCulture shallow geothermal wells are in direct communication with deep-seated geothermal waters. AmeriCulture also has a geothermal well whose production zone lies between 1,400 feet and 2,100 feet below ground level. AmeriCulture's fish are grown in a mixture of cold ground water and geothermal water. Therefore, injected chemicals should be limited to those approved for potable water. The anti-scaling chemicals listed in the application do not meet this description.

Based on the foregoing, AmeriCulture requests a public hearing. If you have further comments or questions please feel free to contact me at (505)670-5220.

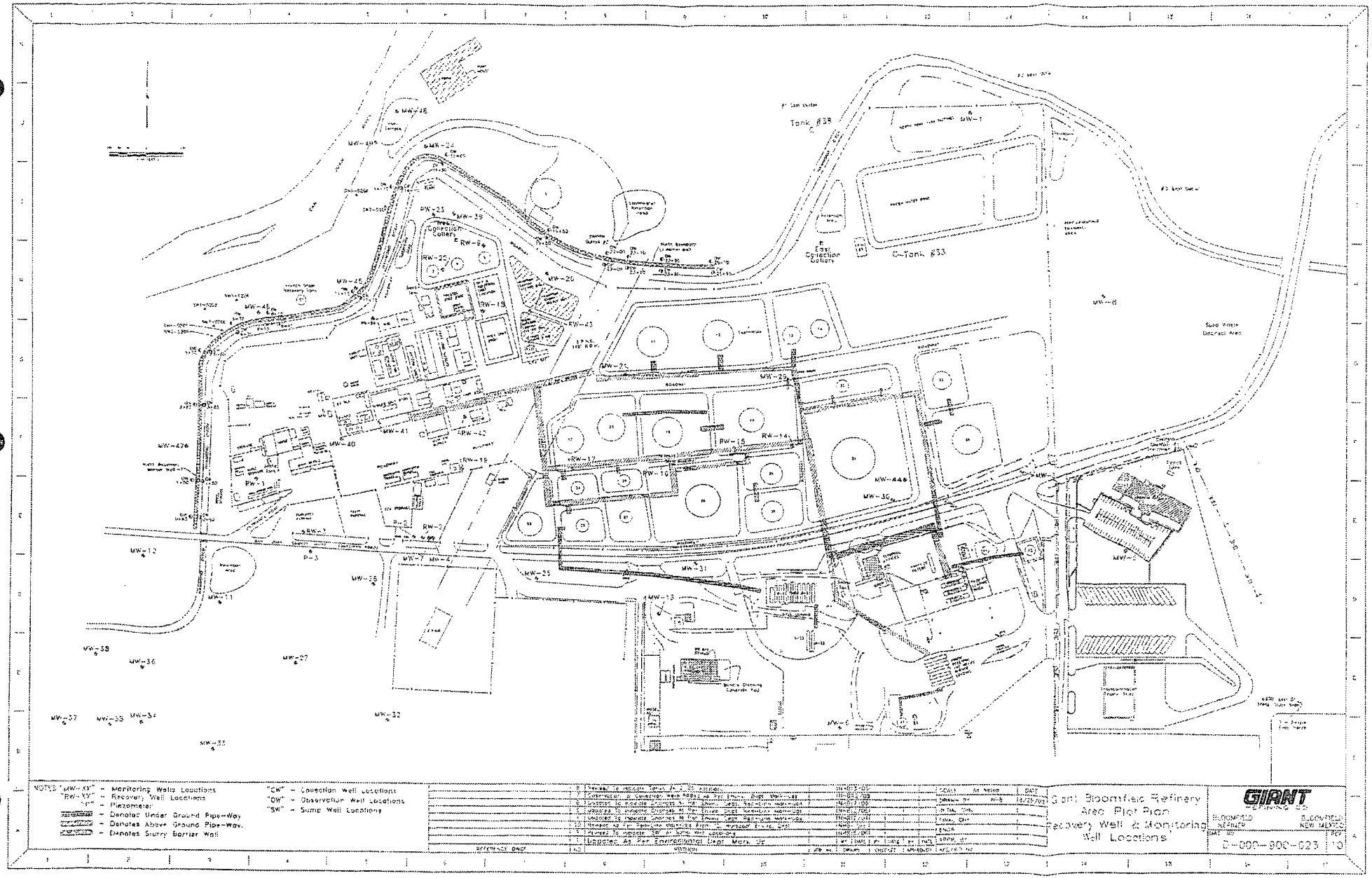
Sincerely Yours,

Damon E. Seawright, Ph.D.
Vice President



N ↑ Scale: 1 inch equals 2000 feet

Western Refining

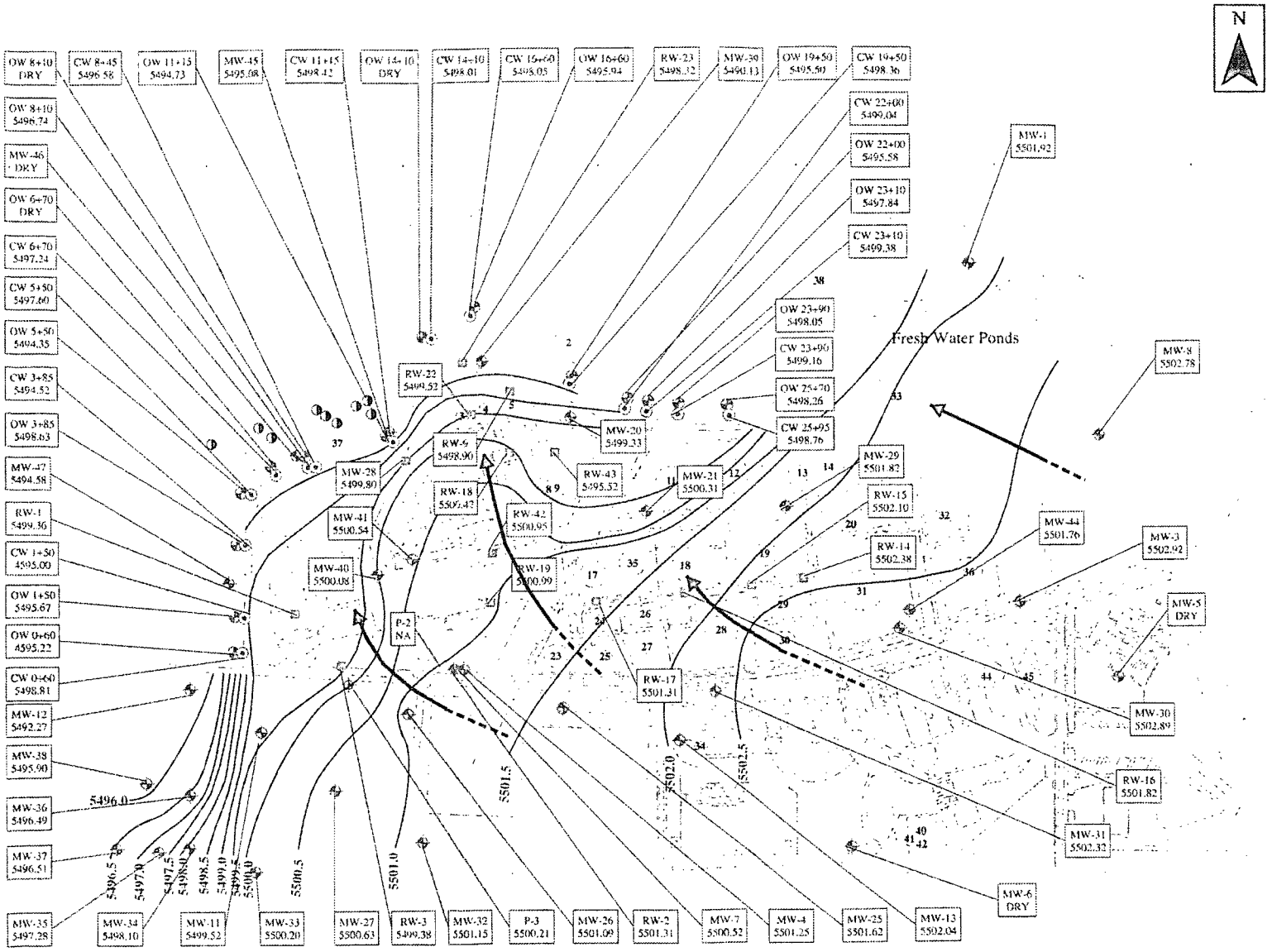


NOTES: "MW-XX" = Monitoring Wells Locations
"RW-YY" = Recovery Well Locations
"P-n" = Piezometer
= Denotes Under Ground Pipe-Way
= Denotes Above Ground Pipe-Way
= Denotes Slurry Barrier Wall
"CW" = Collection Well Locations
"OW" = Observation Well Locations
"SW" = Sump Well Locations

REVISIONS					
				SCALE: AS SHOWN	DATE:
				DRAWN BY:	
				CHECKED BY:	
				APPROVED BY:	
				ENGR.	
				SPVR.	
REFERENCE DWGS:					

San Juan Basin, New Mexico
Giant Bloomfield Refinery
Area Plot Plan
Recovery Well & Monitoring Well Locations

GIANT REFINING CO.
BLOOMFIELD REFINERY — BLOOMFIELD NEW MEXICO
DWG. NO. D-000-800-023 — REV. 10



Legend

- Monitoring Well
- Observation Well
- Recovery Well
- Piezometer
- Collection Well
- Seep
- Groundwater Elevation Contours
- Site
- Groundwater Flow Direction - dashed where inferred
- MW-13 5502.04 - Well ID - Groundwater Elevation (ft amsl)

Note:
Refer to Figure 10 for detail on seep locations along the San Juan River bluff.

0 500 1,000 1,500 2,000
Feet

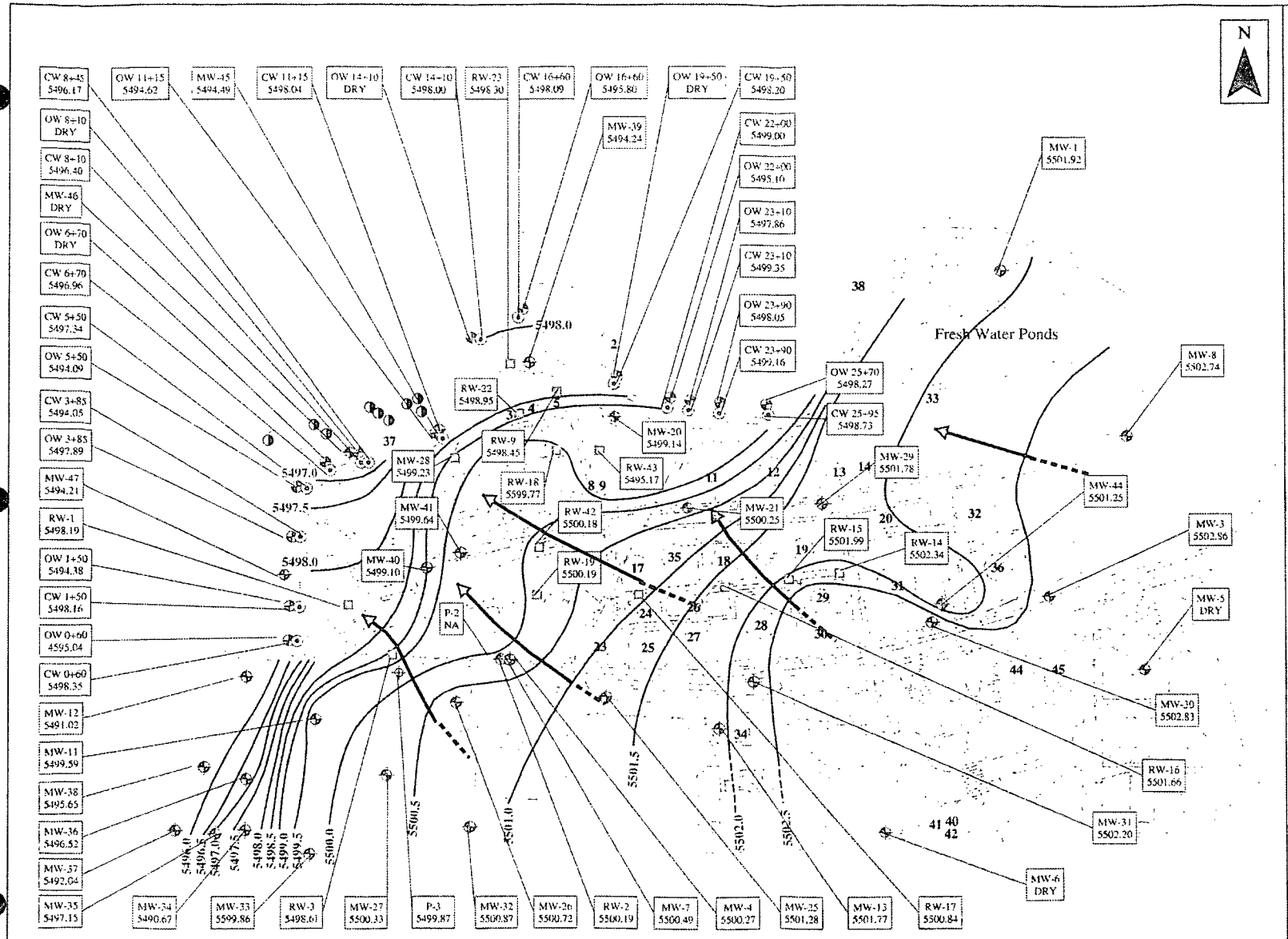
Western Refining

MALCOLM PIRNIE
4646 E. Van Buren St., Suite 400
Phoenix, AZ 85008

Groundwater Elevation and Flow Direction - April 2007
Bloomfield Refinery

April 2008 | **Figure 4**

M:\S127004\GIS\Projects_MXD\2008 Annual Groundwater Monitoring Report\Figure 4 - April 2007 Groundwater.mxd



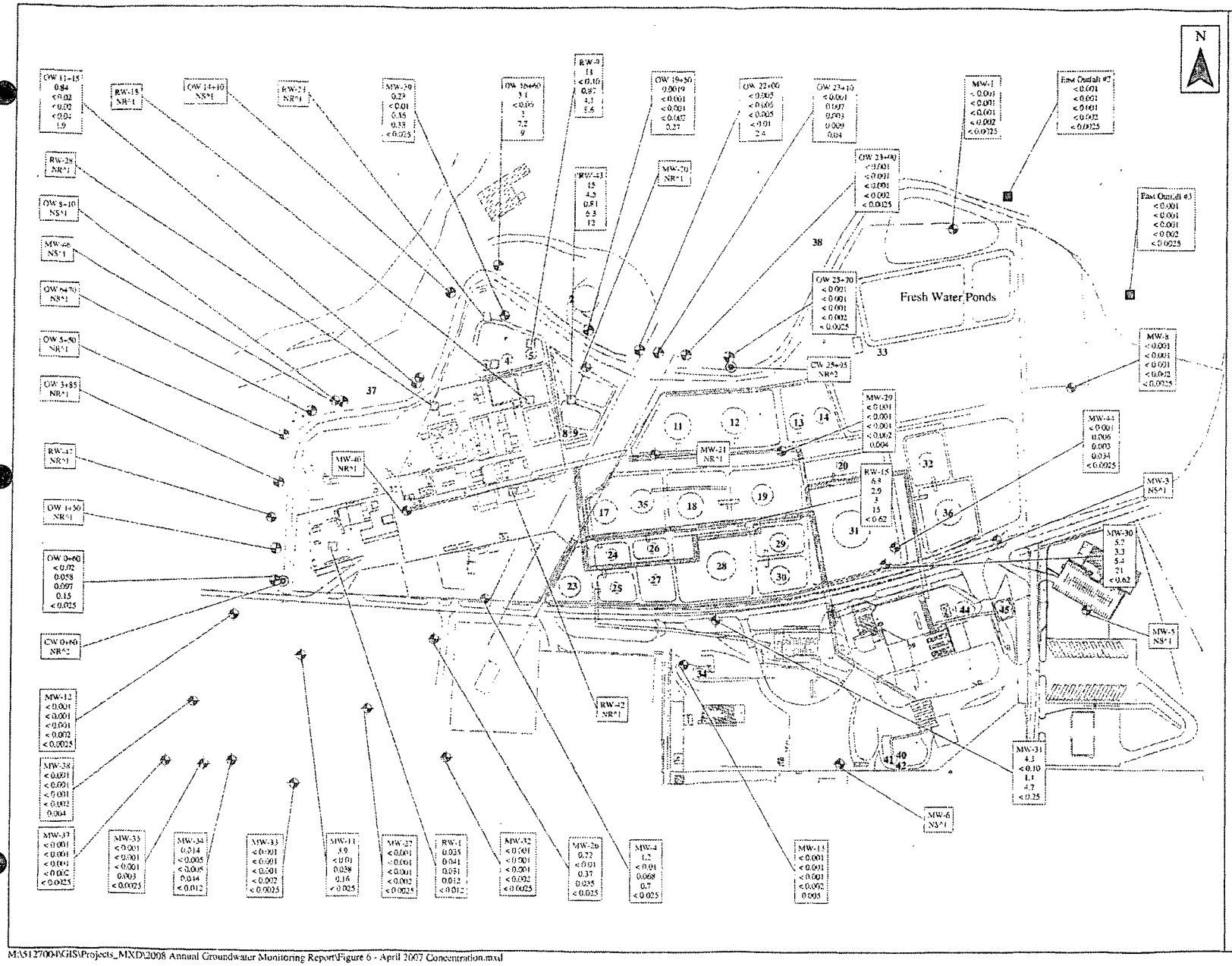
Western Refining

MALCOLM PIRNIE
4646 E. Van Buren St., Suite 400
Phoenix, AZ 85008

Groundwater Elevation and Flow Direction - August 2007
Bloomfield Refinery

April 2008 | **Figure 5**

M:\5127004\GIS\Projects_MXD\2008 Annual Groundwater Monitoring Report\Figure 5 - August 2007 Groundwater.mxd



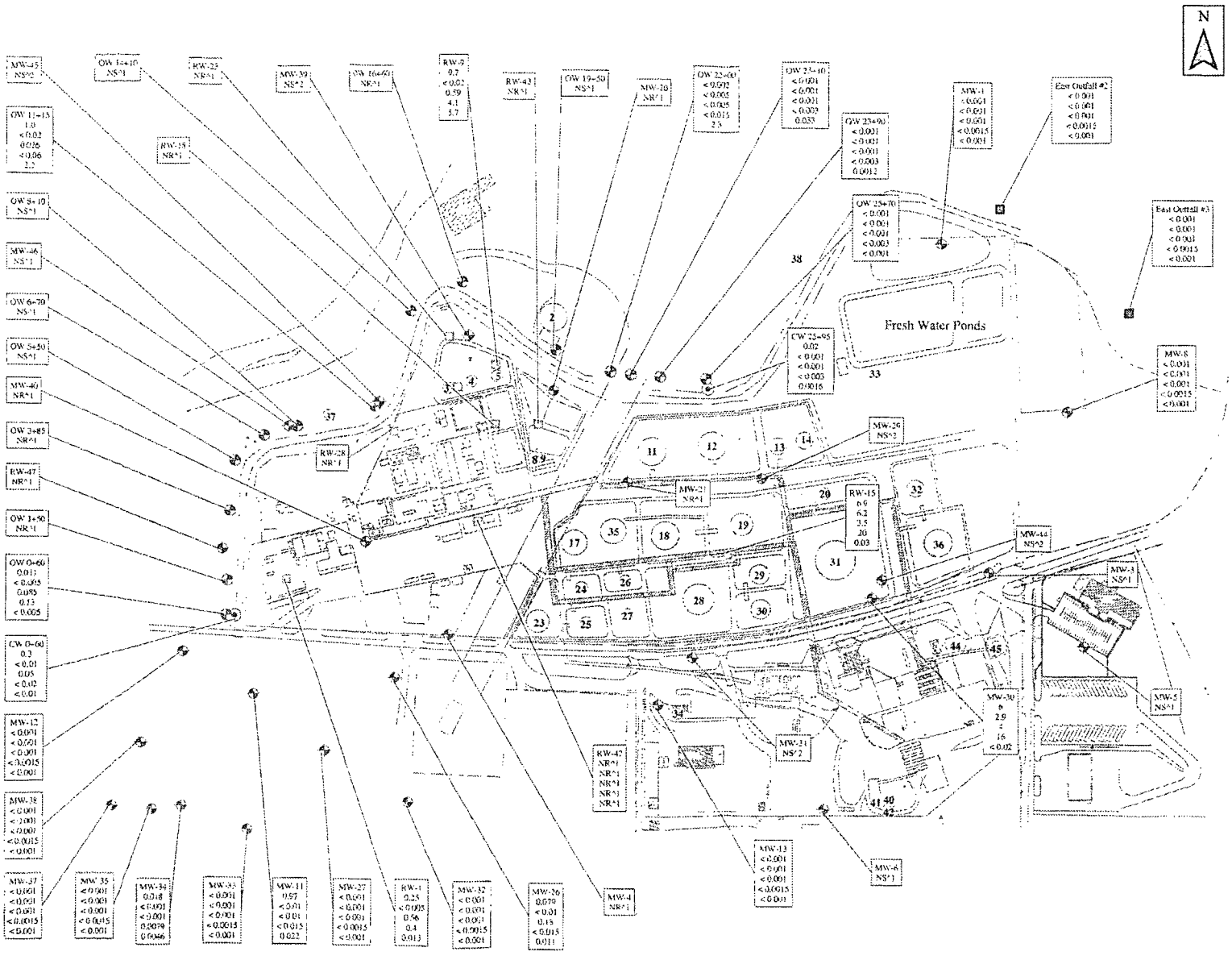
Western Refining

MALCOLM PIRNIE
4646 E. Van Buren St., Suite 400
Phoenix, AZ 85008

Groundwater BTEX and MTBE Concentration Map - April 2007
Bloomfield Refinery

April 2008	Figure 6

M:\S12700\GIS\Projects_MXD\2008 Annual Groundwater Monitoring Report\Figure 6 - April 2007 Concentration.mxd



Legend

- Observation Well
- Monitoring Well
- Recovery Well
- Outfall
- Collection Well
- Site

MW-38	
< 0.001	- Benzene
< 0.001	- Toluene
< 0.001	- Ethylbenzene
< 0.0015	- Xylenes, Total
< 0.001	- MTBE

Notes:

All concentrations in milligrams per liter (mg/L)

NS^1= Well is Dry or Not Enough Water to Sample- No sample

NS^2 = Sample Inadvertently not Collected this Sampling Event

NR^1= No Sample Required - Well Contains Separate Phase Hydrocarbon

0 500 1,000 1,500 2,000

Feet

Western Refining

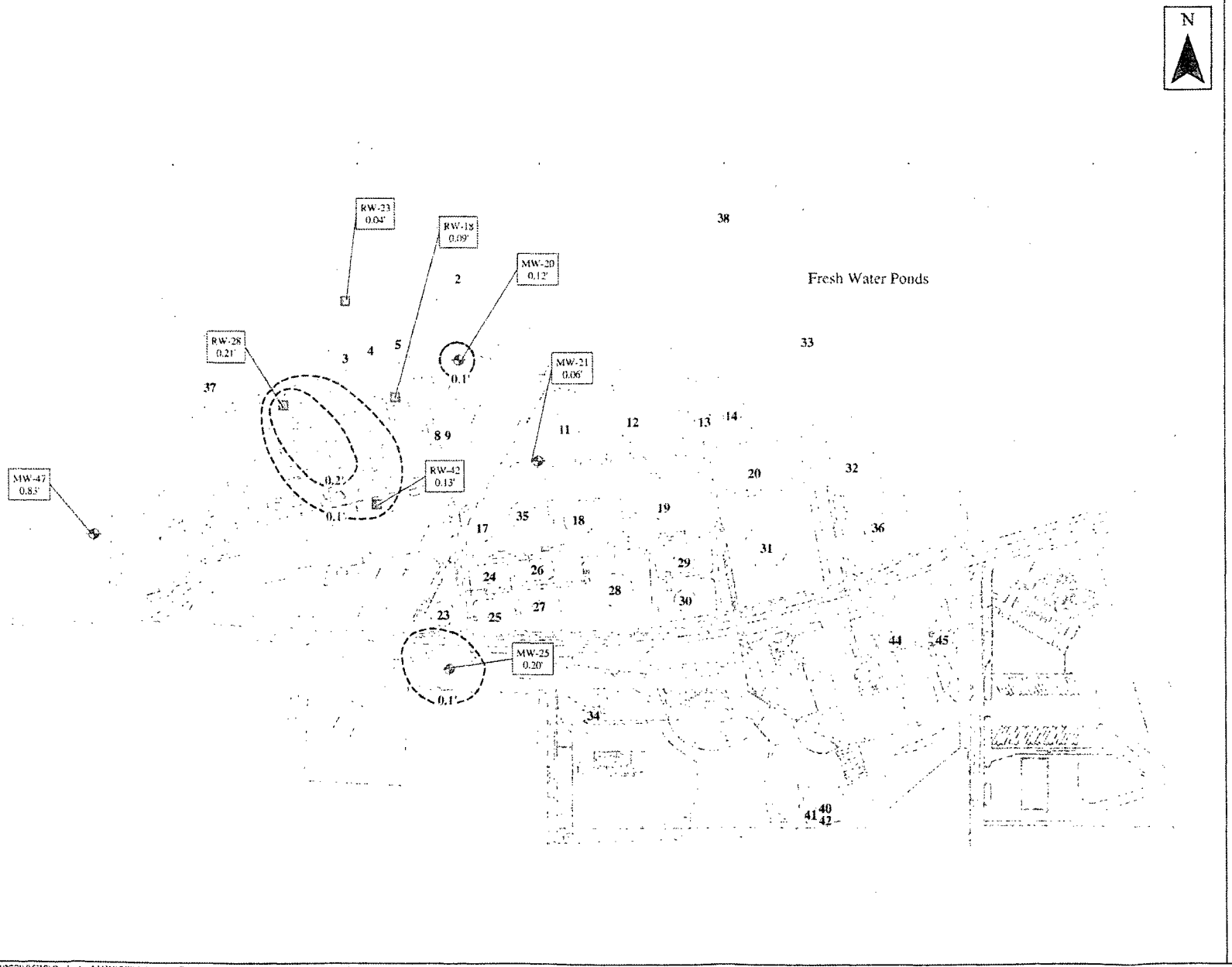
MALCOLM PIRNIE

4646 E. Van Buren St., Suite 400 Phoenix, AZ 85008

Groundwater BTEX and MTBE Concentration Map - August 2007 Bloomfield Refinery

April 2008 | **Figure 7**

M:\5127004\GIS\Projects_MXD\2008 Annual Groundwater Monitoring Report\Figure 7 - August 2007 Concentration.mxd



Legend

- Monitoring Well
- Recovery Well
- April 2007 Product Thickness
- Site
- MW-47 0.83' - Well ID - Product Thickness (feet)

0 500 1,000 1,500 2,000
Feet

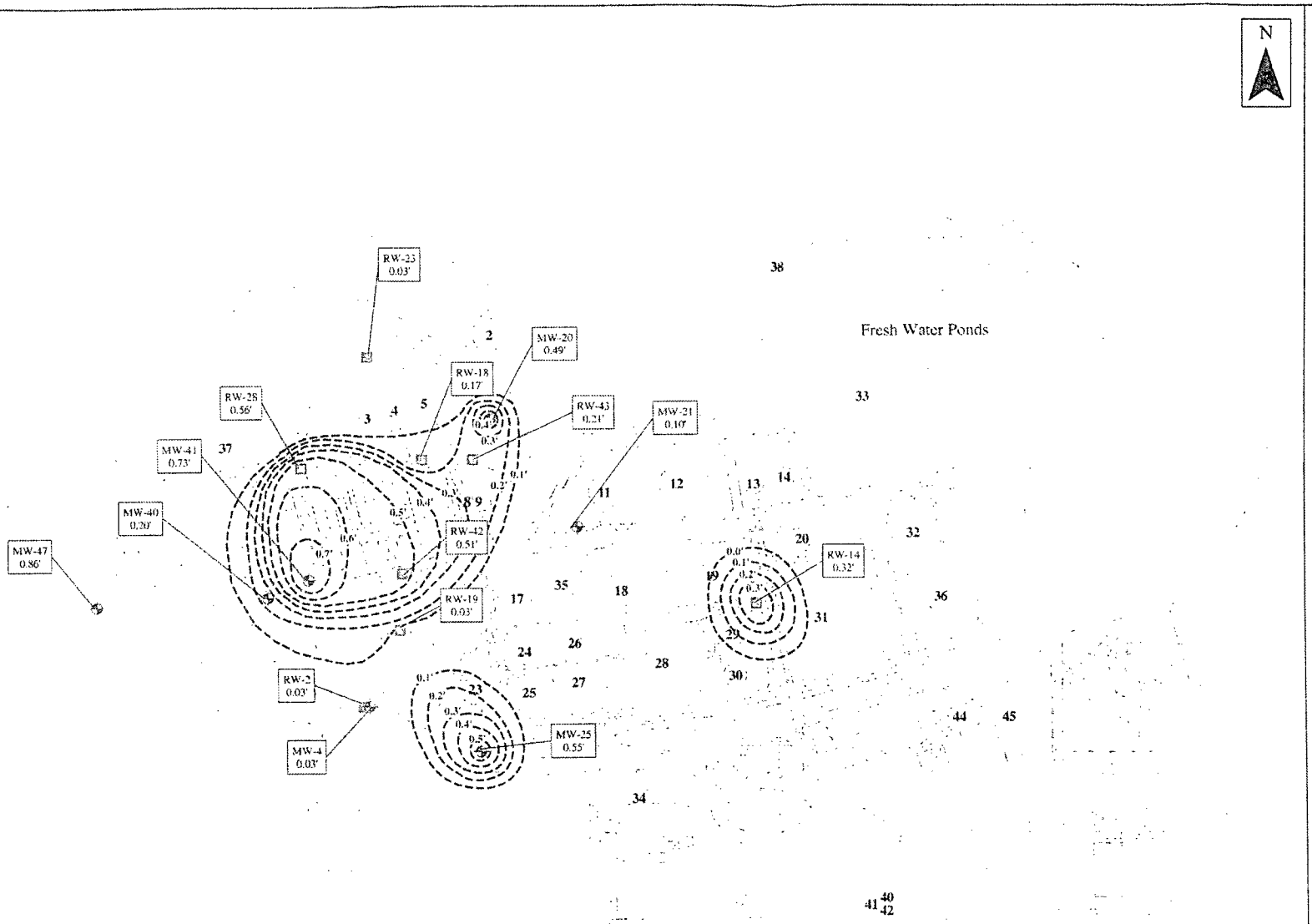
Western Refining

MALCOLM PIRNIE
4646 E. Van Buren St., Suite 400
Phoenix, AZ 85008

Product Thickness Map - April 2007
Bloomfield Refinery

April 2008 | **Figure 8**

M:\512700\GIS\Projects_MXD\2008 Annual Groundwater Monitoring Report\Figure 8 - April 2007 Product Thickness.mxd



Legend

- Monitoring Well
- Recovery Well
- Site
- August 2007 Product Thickness
- MW-47 0.86' - Well ID - Product Thickness (feet)

0 500 1,000 1,500 2,000

Feet

Western Refining

MALCOLM PIRNIE
4646 E. Van Buren St., Suite 400
Phoenix, AZ 85008

Product Thickness Map - August 2007
Bloomfield Refinery

April 2008 | **Figure 9**

M:\51270040\GIS\Projects_MXD\2008 Annual Groundwater Monitoring Report\Figure 9 - August 2007 Product Thickness.mxd

Chavez, Carl J, EMNRD

From: Jay Hamilton [hamiltonenviro@yahoo.com]
Sent: Monday, September 08, 2008 7:22 PM
To: Chavez, Carl J, EMNRD
Subject: Lightning Dock - Map with Fault Lines
Attachments: Map - Fault lines.doc

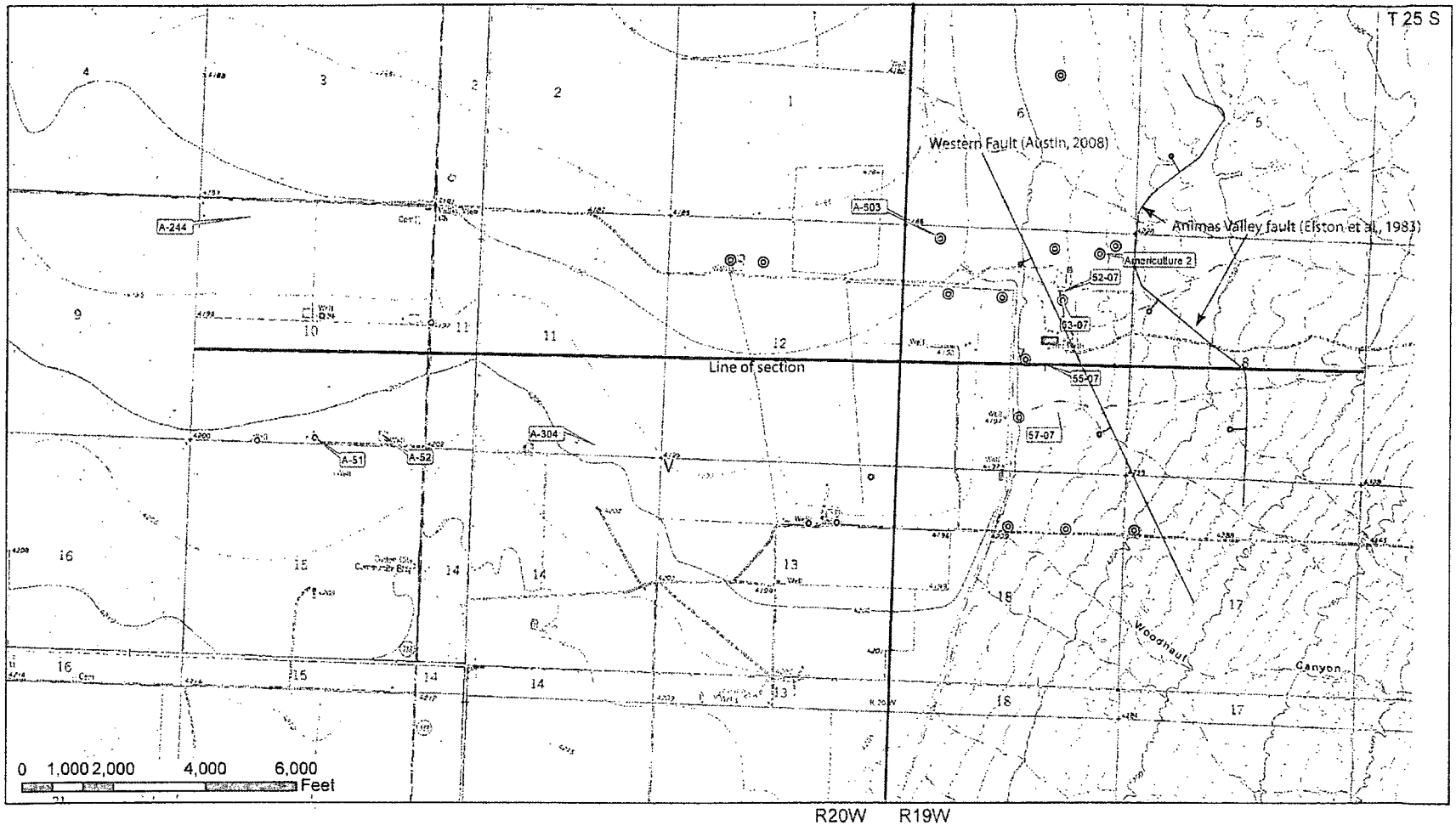
Carl,

This the map that we talked about with the Faul lines. I thought I would have you review before we put in on the BIG MAP.

Thanks,

Jay

This inbound email has been scanned by the MessageLabs Email Security System.



Map showing line of section and wells included on cross section. The location of the Animas fault is from Elston et al., 1983. The location of the Western fault is based on Richard Austin's write-up about the area. Faults are shown in red.

Chavez, Carl J, EMNRD

From: Jay Hamilton [hamiltonenviro@yahoo.com]
Sent: Monday, September 08, 2008 7:27 PM
To: Chavez, Carl J, EMNRD
Subject: Lightning Dock - Cross Section
Attachments: Diagram - Cross Section.doc

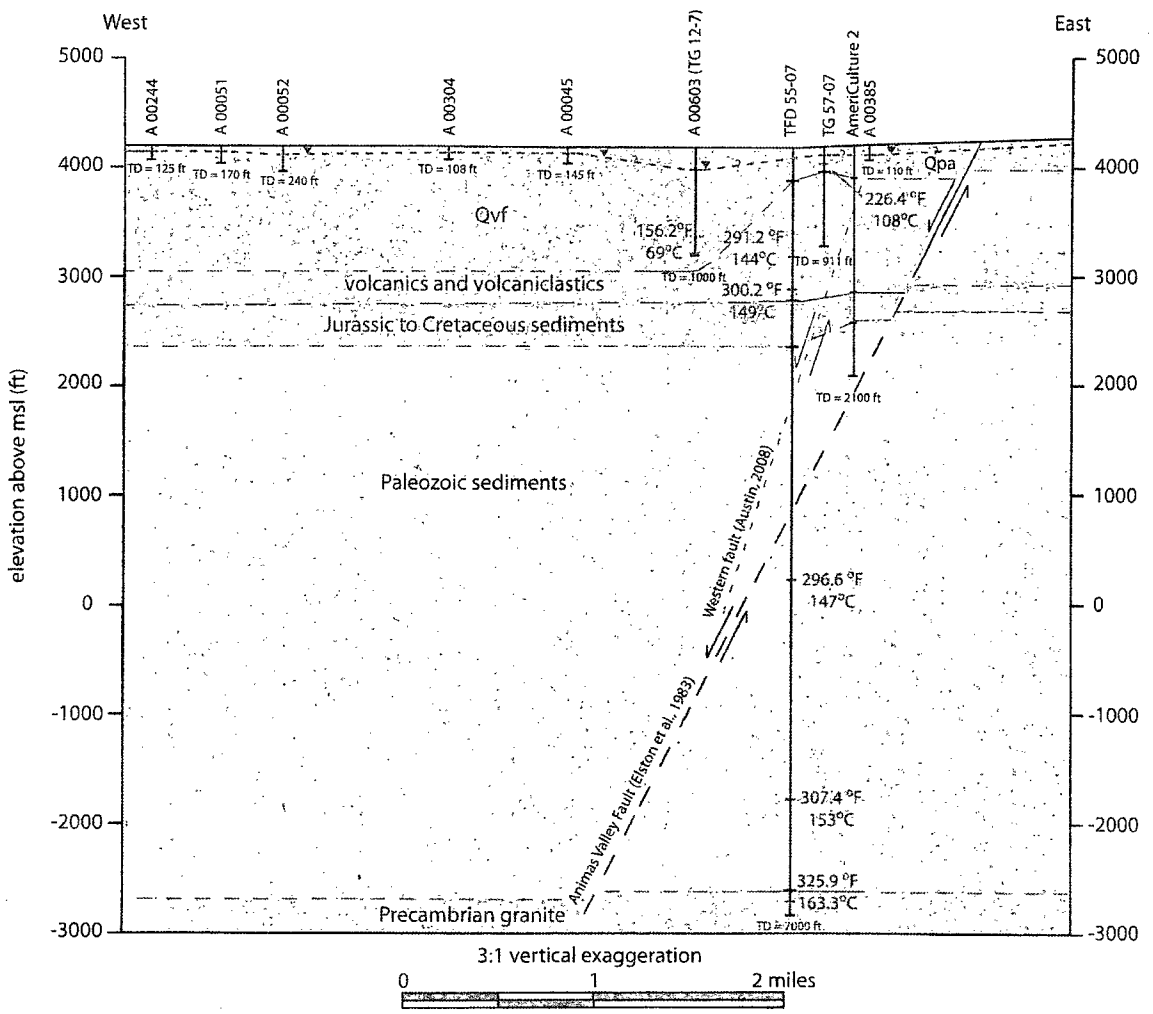
Carl,

Here is the Cross Section we had John Showmaker put together.

Jay

This inbound email has been scanned by the MessageLabs Email Security System.

Lightning Dock Area Cross-section



Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Friday, July 25, 2008 11:20 AM
To: 'Jay Hamilton'; Jim Rosser
Cc: Price, Wayne, EMNRD; Gum, Tim, EMNRD
Subject: FW: Power Point w/ some info. to consider for Lightening Dock
Attachments: 30 cjc Pit Rule Final.ppt

Jay and Jim:

As a follow-up to the permit application (see e-mail msg. below), the NMOCD needs a schematic diagram(s) of the surface facility as finally proposed. You may recall that we have verbally grappled with surface layout of a drill pit(s), evaporation pond(s) and proposed cooling tower blow-down pit (lined vs. unlined). On May 6, 2008, the NMOCD sent you a power point presentation with a message (see below) based on the thermal nature of the water, liner considerations, and were requesting a diagram(s) of surface features as a final proposal to understand the engineering design proposed in the application. There are issues about how many evaporation ponds would be needed, their dimensions, especially because of the anticipated high volume of water used in drilling, testing, and storing; the ergonomics influencing the number of ponds, etc.,; and their engineering design, construction and mointoring. Would there be multiple drilling pits, one for each well that could be converted to an evaporation pond(s). Would the facility be able to house the gigantic pond(s) on its premises. Unlined blow-down pits were discouraged and you were consulting with your engineering group to see how they could handle the blow-down without infiltration, how they could address the types of chemicals used at the cooling tower to minimize impacts to surface and ground water and even possibly scrap the blow-down pit and reinject or implement other engineering controls or designs to address the cooling tower blow-down discharge to a pit, etc. You were also going to look into implementing closed-loop drilling at the site.

Based on the above, the NMOCD is requesting:

1) An updated diagram(s) of the location of any pit or evaporation pond. This shall include design drawings of any pit or pond construction.

2) A monitoring plan with chemicals of concern, sampling protocol, monitor location and design to address any discharges to surface and ground water and ensure that WQCC Water Quality Standards are not exceeded.

3) GPS coordinates (decimal) of all production/development wells, injection wells and the center of any discharge pit are needed to compare distances to other operators in the area. You had sent some GPS coordinates, but the OCD Internet system must have prevented me from receiving the information. This information is crucial to assessing the proximity of your wells to nearby operators in the area.

4) A detailed evaluation of the chemicals that are proposed for the cooling tower and scientific/engineering explanation of why they are the most suitable chemicals to use at the site given the location of the nursery and fish farm immediately downgradient from the cooling tower blow-down discharge area and the contaminant hydrogeology considerations that prove no adverse impact(s) would result to surface water, ground water, wildlife, fresh water, etc. in the area. The NMOCD had requested that you check into Chemical Companies with chemical products that have undergone Whole Effluent Toxicity (WET) Testing and have been proven to be environmentally friendly products to control scale. Companies like Nalco, Betz, etc. all have chemical products that are pollution prevention friendly products that will accomplish the same goal while protecting water resources and wildlife. The NMOCD had provided a website in Michigan with a listing of environmentally friendly cleaning products used at refineries, oil and gas treatment facilities, etc. The discharge permit has language that discharges cannot exceed the WQCC WQSs. As I recall, you sent the chemicals that Nevada allowed you to use in Nevada without assessing products that are environmentally friendly. The NMOCD may regard any blow-down pit to be a UIC Class V Well that will require pre-treatment before allowing any discharge?

Please submit this information to me as an addendum to the application. This information will be required as we move forward to permit the facility. Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Chavez, Carl J, EMNRD
Sent: Tuesday, May 06, 2008 8:41 AM
To: 'Jay Hamilton'
Cc: Gum, Tim, EMNRD; Price, Wayne, EMNRD
Subject: Power Point w/ some info. to consider for Lightening Dock

Jay:

Please find attached a power point with some info. on liners, construction methods, etc. for you to consider for Lightening Dock Geothermal No. HI-01. Mr. Tim Gum of OCD District 2 will provide any guidance on the evaporation ponds, drilling pit onsite or offsite disposal requirements, etc. As discussed, the OCD would prefer that closed loop drilling systems be used and cuttings be disposed off-site if there is a RCRA Subtitle D Landfill (i.e., Deming) that has "Special Waste" designation. Please contact Tim (contact info. provided below) to learn more about field requirements.

FYI, liners with excellent thermal properties are: Chlorosulfonated Polyethylene- Reinforced (CSPE-R), Ethylene Propylene Diene Monomer (EPDM), and Flexible Polypropylene (FPP).

Thank you.

Tim Gum - District Supervisor
Phone extension: 102
Mobile: (575) 626-0824

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

Chavez, Carl J, EMNRD

From: Jim Rosser [Jim.Rosser@rasertech.com]
Sent: Tuesday, July 08, 2008 11:21 AM
To: Chavez, Carl J, EMNRD
Subject: Deming Headlight Affidavit
Attachments: Deming Headlight 30 Day Notice Affidavit.pdf

Carl,

I never received the first affidavit from Deming Headlight so they prepared another one for me. Attached is a scanned copy of the fax they sent me for your files.

Jim Rosser

This inbound email has been scanned by the MessageLabs Email Security System.

Confidentiality Notice: This e-mail, including all attachments is for the sole use of the intended recipient (s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited unless specifically provided under the New Mexico Inspection of Public Records Act. If you are not the intended recipient, please contact the sender and destroy all copies of this message. -- This email has been scanned by the Sybari - Antigen Email System.

NOTICE OF PUBLICATION

Las Lobos Geothermal, LLC Lightning Dock Geothermal No. 1 Animas, New Mexico

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.3108 NMAC), the following discharge permit application(s) has been submitted to the Director of the New Mexico Oil Conservation Division ("NMOCD"): 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, telephone no. (505) 476-3440:

[illegible] 7, T-[illegible] (NMOCD) has submitted an application for a new discharge permit for the Lightning Dock Geothermal No. 1 (GT-01) Binary Cycle Power Plant Geothermal Production/Development Wells & 3 Class V Geothermal Injection Wells located in the NW/4 SW/4 of Section 7, and in the NE/4 NW/4 of Section 18, all in Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. [illegible] approximately 10 miles southwest of [illegible] the discharge facilities will be located within the NW/4 SW/4 of Section 7. The facility will operate a binary cycle geothermal power generation facility. Approximately 1500 gpm of geothermal water will be produced from [illegible] production wells. Geothermal water will evaporate or [illegible] cooling towers, evaporation ponds, or condensate binary cycle power generation units. Approximately 1500 gpm of geothermal water with a TDS concentration of approximately 300 mg/l will be cycled through the cooling tower unit. Of the approximately 1420 gpm of cooled tower blowdown effluent, along with the remainder of produced water (1220 gpm) will be routed to a deep evaporation pond(s). The produced water will then be injected via Class V wells into the geothermal reservoir at a maximum injection rate and pressure of [illegible] gpm and 350 psig per well. Upon ceasing the power plant at the site will temporarily store produced water for reinjection into the geothermal reservoir. Geothermal water is considered a renewable and [illegible] resource. [illegible] Geothermal water is a [illegible] surface [illegible] supplies. [illegible] plan addresses construction, operation, monitoring, best management practices, and provides a contingency plan in the event of accidental [illegible] spills, leaks and other accidental discharges to surface [illegible]

LEGAL NOTICE

[illegible] NMOCD, has determined that the application is administratively complete and has prepared a draft permit. The NMOCD and Las Lobos Geothermal will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be placed on a facility-specific mailing list for this discharge plan application may contact Leonard Lowe at the Energy, Minerals and Natural Resources Department, Oil Conservation Division at the address given above or Las Lobos Geothermal, LLC at the following address:

Las Lobos Geothermal, LLC
5162 N. Edgewood Dr.
Suite 375
Provo, Utah 84604
Attention: Steve Brown

Lightning Dock Geothermal Public Notice

The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or modification, the Director shall allow a period of at least thirty (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines that there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

Para obtener más información en español, un esquema, servicios comunitarios por favor llame [illegible] Energy, Minerals and Natural Resources Department (Depto. De Energía, Minerales y Recursos Naturales de Nuevo Mexico), Oil Conservation Division (División de Conservación del Petróleo), 1220 South St. Francis Drive, Santa Fe, New Mexico (Contacto: Dorothy Phillips, 505-476-3461).

No. 4052 If (6-23)

CERTIFICATE OF PUBLICATION

STATE OF NEW MEXICO
COUNTY OF LUNA

I, Wayne Barnard do solemnly swear that I am the General Manager of the Deming Headlight published at Deming, Luna County, New Mexico, and that the article, a copy of which is hereto attached, has been published in said Deming Headlight 1 time.

Publication being on the 23rd day of June 2008

DEMING HEADLIGHT

By _____

Sworn to and subscribed before me the 23rd day of June 2008

_____

My commission expires 4/12/2010

OFFICIAL SEAL
Cynthia Varnhagen
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires 4/12/10

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

May 28, 2008

Mr. Steve Brown
Lightning Dock Geothermal No. HI-01
5152 North Edgewood Drive Suite 375
Provo, Utah 84604

Re: Lightning Dock Geothermal No. HI-01 Discharge Permit (GT-001)
Near Animas, NM
Hidalgo County, New Mexico

Dear Mr. Brown:

The New Mexico Oil Conservation Division (NMOCD) has received Los Lobos Renewable Power, LLC's (owner/operator) application, filing and permit fees, on the behalf of Lightning Dock Geothermal No.1 (HI-01), dated May 12, 2008, for authorization to install 3 Class V Geothermal Injection Wells, 5 Production or Development Wells, and a "Binary Cycle" 15 MWe power plant with expansion capability. The proposed discharge site is located in the NE ¼ of the SW ¼ of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The submittal provided the required information in order to deem the new application "administratively" complete.

Therefore, the July 2006 New Mexico Water Quality Control Commission regulations (WQCC) notice requirements of 20.6.2.3108 NMAC must be satisfied and demonstrated to the NMOCD. Geothermal discharge water shall not be produced, discharged or reinjected until the NMOCD notice period passes, and NMOCD sends and receives back from the owner/operator a signed discharge permit.

If there are any questions regarding this matter, please do not hesitate to contact me at (505) 476-3491 or carlj.chavez@state.nm.us. On behalf of the staff of the NMOCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Carl Chavez
Environmental Engineer

CC/cc

xc: OCD District Office

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.3106 NMAC); the following discharge permit application(s) has been submitted to the Director of the New Mexico Oil Conservation Division ("NMOCD"), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 476-3440:

(GT-001) Lightning Dock Geothermal No. 1 (HI-01) LLC. Mr. Steve Brown, 5152, North Edgewood Drive Suite 375, Provo, Utah 84604 has submitted an application for a new discharge permit for the Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe Geothermal Power Plant (5 Production/Development Wells & 3 Class V Geothermal Injection Wells) located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant is located approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). The development wells are located within the SW/4; NW/4; and NE/4 of Section 7. The Class V Wells are located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of 3400 feet below ground level. Geothermal water will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 1500 gpm of shallow ground water with a TDS concentration of approximately 300 mg/L will be cycled through the cooling tower unit. Of this, approximately 425 gpm of cooling tower blow-down effluent along with the remainder of produced water (180~225 °F) will be injected into the geothermal reservoir at a maximum injection rate of between 4,000 to 5,000 gpm, and average pressure of about 75 psig per Class V Well. Lined evaporation ponds at the surface will temporarily store any excess produced or well test water for reinjection into the geothermal

reservoir. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The NMOCD has determined that the application is administratively complete and has prepared a draft permit. The NMOCD will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact the Environmental Bureau Chief of the Oil Conservation Division at the address given above. The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of at least thirty (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines that there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

Para obtener más información sobre esta solicitud en español, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México (Contacto: Dorothy Phillips, 505-476-3461)

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 28th Day of May 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

S E A L

Mark Fesmire, Director

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

May 28, 2008

Mr. Steve Brown
Lightning Dock Geothermal No. 1 (HI-01) LLC.
5152 North Edgewood Drive, Suite 375
Provo, Utah 84604

Re: **DRAFT Lightning Dock Geothermal No. 1 HI-01 Discharge Permit (GT-001)**
Class V Geothermal Injection Wells (3)
Production or Development Wells (5)

Dear Mr. Brown:

Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC and more specifically 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation and injection for the **Lightning Dock Geothermal No. 1 (HI-01) LLC** (***Owner/Operator)***. The power plant is located in the NE/4 SW/4 of Section 7, Township 25 South and Range 19 West, NMPM, Hidalgo County, New Mexico. The wells are located in Township 25 South and Range 19 West, NMPM, Hidalgo County, New Mexico:

Class V Geothermal Injection Wells

48-07 located in the NE/4, NW/4 of Section 18, 1307 FNL 2123 FWL;
68-07 located in the NW/4, NE/4 of Section 18, 1297.2 FNL 3350.4 FWL; and
88-07 located in the NE/4, NE/4 of Section 18, 1278.3 FNL 4978.1 FWL.

Production or Development Wells

23-07 located in the SW/4, NW/4 of Section 7, 3781 FSL 530.1 FWL;
43-07 located in the SE/4, NW/4 of Section 7, 3721.2 FSL 1789.4 FWL;
63-07 located in the SW/4 NE/4 of Section 7, 3775.3 FSL 3052.1 FWL.
45-07 located in the NE/4, SW/4 of Section 7, 2360 FSL 2278.2 FWL; and
47-07 located in the SE/4 SW/4 of Section 7, 1219.1 FSL 2266.3 FWL.

The approval is under the conditions specified in the enclosed **Attachment To The Discharge Permit**. Enclosed are two copies of the conditions of approval. **Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 working days of receipt of this Letter including permit fees.**

Please be advised that approval of this permit does not relieve the owner/ operator of responsibility should operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3491) or E-mail carlj.chavez@state.nm.us. On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Wayne Price
Environmental Bureau Chief

LWP/cc
Attachments-1
xc: OCD District Office

DRAFT
ATTACHMENT TO THE DISCHARGE PERMIT
Lightning Dock Geothermal No. 1 (HI-01) LLC. (GT-001)
DISCHARGE PERMIT APPROVAL CONDITIONS

May 28, 2008

Water Quality Management Fund
C/o: Oil Conservation Division
1220 S. Saint Francis Drive
Santa Fe, New Mexico 87505

1. **Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of $100.00, plus a renewal flat fee (*see* WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division ("OCD") has received the required $100.00 filing fee and $1700.00 Class V Geothermal Well permit fee.

2. **Permit Expiration and Renewal:** Pursuant to WQCC Regulation 20.6.2.3109.H.4 NMAC, this permit is valid for a period of five years. **The permit will expire on January 23, 2014** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation 20.6.2.3106.F NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. ***Expired permits are a violation of the Water Quality Act {Chapter 74, Article 6, NMSA1978} and civil penalties may be assessed accordingly.***

3. **Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by the OCD pursuant to the Geothermal Resources Conservation Act (Chapter 71, Article 5 NMSA 1978, et seq.), Sections §71-5-1 through §71-5-24; and Geothermal Power (Title 19, Chapter 14 NMAC 1983, et seq.) Parts §19.14.1 through §19.14.132.

4. **Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its May 12, 2008 discharge permit application, including attachments and subsequent amendments and these conditions for approval. Permit applications that reference previously approved plans on file with the

division shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.

5. Modifications: WQCC Regulation 20.6.2.3107.C, 20.6.2.3109 and 20.6.2.5101.I NMAC addresses possible future modifications of a permit. The owner/operator (discharger) shall notify the OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at 20.6.2.3103 NMAC is being or will be exceeded, or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use, or that the Water Quality Standards for Interstate and Intrastate streams as specified in 20.6.4 NMAC are being or may be violated in surface water in New Mexico.

6. Waste Disposal and Storage: The owner/operator shall dispose of all wastes at an OCD-approved facility. Only geothermal RCRA-exempt wastes may be disposed of by injection in a Class II well. RCRA non-hazardous, non-exempt geothermal wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Any waste stream that is not listed in the discharge permit application must be approved by the OCD on a case-by-case basis.

A. OCD Rule 712 Waste: Pursuant to OCD Rule 712 (19.15.9.712 NMAC) disposal of certain non-domestic waste without notification to the OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

B. Waste Storage: The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store geothermal waste on-site for more than 180 days unless approved by the OCD.

7. Drum Storage: The owner/operator must store all drums, including empty drums, containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks, or buckets on an impermeable pad with curbing.

8. Process, Maintenance and Yard Areas: The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance, and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

9. Above Ground Tanks: The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (e.g., liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.

10. Labeling: The owner/operator shall clearly label all tanks, drums, and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

11. Below-Grade Tanks/Sumps and Pits/Ponds.

A. All below-grade tanks and sumps must be approved by the OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. All existing below-grade tanks and sumps without secondary containment and leak detection must be tested annually or as specified herein. Systems that have secondary containment with leak detection shall have a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

B. All pits and ponds, including modifications and retrofits, shall be designed by a certified registered professional engineer and approved by the OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports, location, foundation, liners, and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

C. The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted, or otherwise rendered non-hazardous to wildlife, including migratory birds. Where netting is not feasible, routine witnessing and/or discovery of dead wildlife and migratory birds shall be reported to the appropriate wildlife agency with notification to the OCD in order to assess and enact measures to prevent the above from reoccurring.

D. The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to the OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps, or other OCD-approved methods. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

12. Underground Process/Wastewater Lines:

A. The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh water or fluids that are gases at atmospheric temperature and pressure. A comprehensive listing of process/wastewater pipelines shall be submitted to the OCD within 3 months of permit issuance. Pressure rated pipe shall be tested by pressuring up to one and one-half times the normal operating pressure, if possible, or for atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure, and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by the OCD.

B. The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size, and approximate location. All new underground piping must be approved by the OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to the OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

13. Class V Wells: The owner/operator shall close all Class V wells (e.g., septic systems, leach fields, dry wells, etc.) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic sanitary effluent wastes, unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal

systems at OCD-regulated facilities that inject sanitary effluent and non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program. Class V wells that inject domestic sanitary effluent waste only, must be permitted by the New Mexico Environment Department (NMED).

14. Housekeeping: The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

15. Spill Reporting: The owner/operator shall report all unauthorized discharges, spills, leaks and releases and conduct corrective action pursuant to WQCC Regulation 20.5.12.1203 NMAC; OCD Rule 116 (19.15.3.116 NMAC). The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days. The Division shall in compliance with 19.14.36.8 NMAC be notified of any fire, break, leak, spill or blowout occurring at any geothermal drilling, producing, transporting, treating, disposal or utilization facility in the State of New Mexico by the person operating or controlling the facility.

16. OCD Inspections: The OCD may place additional requirements on the facility and modify the permit conditions based on OCD inspections.

17. Storm Water: The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) including any oil sheen in any storm water run-off. The owner/operator shall notify the OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

18. Unauthorized Discharges: The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) unless specifically listed in the permit application and approved herein.

An unauthorized discharge is a violation of this permit.

19. Vadose Zone and Water Pollution: The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000-.4116 NMAC (Prevention and Abatement of Water Pollution). The OCD may require the owner/operator to modify its permit for investigation, remediation, abatement, and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement and submit subsequent reports will be a violation of the permit.

20. Additional Site Specific Conditions: N/A

21. Geothermal Well(s) Identification, Operation, Monitoring, Bonding and Reporting.

A. Geothermal Well Identification:

Class V Geothermal Injection Wells:

Well # 48-07 (API# 30-025-)
Well # 68-07 (API# 30-025-)
Well # 88-07 (API# 30-025-)

Production or Development Wells:

Well # 23-07 (API# 30-025-)
Well # 43-07 (API# 30-025-)
Well # 63-07 (API# 30-025-)
Well # 45-07 (API# 30-025-)
Well # 47-07 (API# 30-025-)

B. Well Work Over Operations: OCD approval will be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form G-101 "Application For Permit To Drill, Deepen, or Plug Back- Geothermal Resources Well" (OCD Rule 19.14.52 NMAC) with appropriate copies sent to the OCD Environmental Bureau and District Office.

C. Production/Injection Method: High temperature (250 – 300 °F) geothermal water is brought to surface from the Horquilla Formation or geothermal reservoir at 3,400 feet below ground level by 5 production or development wells (~ 3,000 gpm per well). Hot water is routed in parallel through 50 binary cycle (self-contained heat exchanger, evaporator & condenser) power generation units. Condensed produced or effluent water (~ 225 °F) is routed to a lined evaporation

pond(s) for injection (~ 75 psig per well) via 3 Class V geothermal wells into the geothermal reservoir.

D. Well Pressure Limits: The operating surface injection and/or test pressure per injection well measured at the wellhead shall be at a flow rate and pressure that will not adversely affect public health and the environment. The operator shall have a working pressure limiting device or controls to prevent overpressure. Any pressure that causes damage to the system shall be reported to OCD within 24 hours of discovery.

E. Mechanical Integrity Testing: At least once every five years and after any well work over, the geothermal reservoir will be isolated from the casing or tubing annuals and the casing pressure tested at a minimum of 600 psig for 30 minutes. A passing test shall be within +/- 10% of the starting test pressure. All pressure tests must be performed per the scheduled shown below and witnessed by OCD unless otherwise approved.

Testing Schedule:

2008- 30 minute @ minimum 600 psig casing test only (set packer above casing shoe to isolate formation from casing)
2013- 30 minute @ minimum 600 psig casing test only (set packer above casing shoe to isolate formation from casing)

F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the geothermal reservoir and geologic/engineering data demonstrating that continued geothermal extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. OCD may require the operator to perform additional well surveys, tests, and installation of subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the wells.

Any subsidence must be reported within 24 hours of discovery.

G. Production/Injection Volumes: After placing any geothermal well on production, the owner or operator thereof shall file in duplicate a monthly production report, Form G-108, which report shall be due in

the Santa Fe office of the division by the 20th day of each month or included in the annual report. The operator shall also document the production from each well and each lease during the preceding calendar month.

H. Analysis of Injection and Geothermal Reservoir Fluids: After placing any well on injection or disposal in a geothermal resources field or area, the owner or operator thereof shall file in duplicate a monthly injection report, Form G-110, which report shall be due in the Santa Fe office of the division by the 20th day of each month or included in the annual report. The operator shall show the zone or formation into which injection is being made, the volume injected, the average temperature of the injected fluid and the average injection pressure at the wellhead. The analysis of the injection and geothermal reservoir fluids shall be recorded monthly and submitted with Form G-110. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.

I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within ¼ mile from a Class V Geothermal Injection Well.

J. Annual Geothermal Temperature and Pressure Tests: Production or development wells shall undergo an annual test that shall be submitted on Form G-111 by the operator within 30 days of the completion of the test. Flowing temperatures and flowing pressure tests at the wellhead shall be recorded after at least 72 hours of continuous flow at normal producing rates. The well shall then be shut in for 24 hours and shut-in pressure at the wellhead recorded. Results of these tests shall be submitted in duplicate to the Santa Fe office of the division.

K. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing, tubing or packer, or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and the operator receives OCD approval to re-start injection operations.

L. Bonding or Financial Assurance:

Class V Geothermal Injection Wells: The operator shall maintain at a minimum a cash bond (i.e., Assignment of Cash Collateral Deposit or Multi-Well Cash Financial Assurance Bond Geothermal Injection) in the amount of

$50,000.00 to restore the site, plug and abandon wells, pursuant to OCD rules and regulations.

Production or Development Wells: The operator shall maintain at a minimum a cash bond (i.e., $10,000.00 Multi-Well Geothermal Plugging Bond and/or $5,000.00 One Well Geothermal Plugging Bond).

If warranted, OCD may require additional financial assurance for closure of the power plant or facility (see Section 23 below).

M. Annual Report:

All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:

1. Cover sheet marked as "Annual Geothermal Well Report, name of operator, GT permit #, API# of well(s), date of report, and person submitting report.

2. Brief summary of geothermal well operations including description and reason for any remedial or major work on the well(s). Copy of Form G-101.

3. Production and injection volumes as required above in 21.G. including a running total should be carried over to each year. The total mass produced, dry steam produced, flow rates, temperatures and pressures, average injection pressures, temperatures, etc.

4. A copies of the chemical analyses as required above in 21.H.

5. A copies of any mechanical integrity test chart, including the type of test, i.e., EPA 5-Yr. casing test, date, time, etc. as required above in 21 E and 21J.

6. Brief explanation describing deviations from normal production methods.

7. A copy of any leaks and spills reports, information provided under Section 15 above.

8. If applicable, results of any groundwater monitoring.

9. Information required from cavity/subsidence 21.F. above.

10. An updated Area of Review (AOR) summary (20.6.2 NMAC) when new wells are drilled within ½ mile of the power plant.

11. A "Miscellaneous" section to include any other issues that needs to be brought to the Division's attention.

12. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.

22. Transfer of Discharge Permit: Pursuant to WQCC 20.6.2.5101.H the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer brine well operations until proper bonding or financial assurance is in place and approved by the division. OCD reserves the right to require a modification of the permit during transfer.

23. Closure: The owner/operator shall notify the OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the operator shall submit for OCD approval, a closure plan including a completed C-103 form for plugging and abandonment of the well(s). Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure.

24. Certification: Lightning Dock Geothermal No. 1 (HI-01) LLC (Owner/Operator), by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained here. **Owner/Operator** further acknowledges that the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of this permit administratively.

Conditions accepted by: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

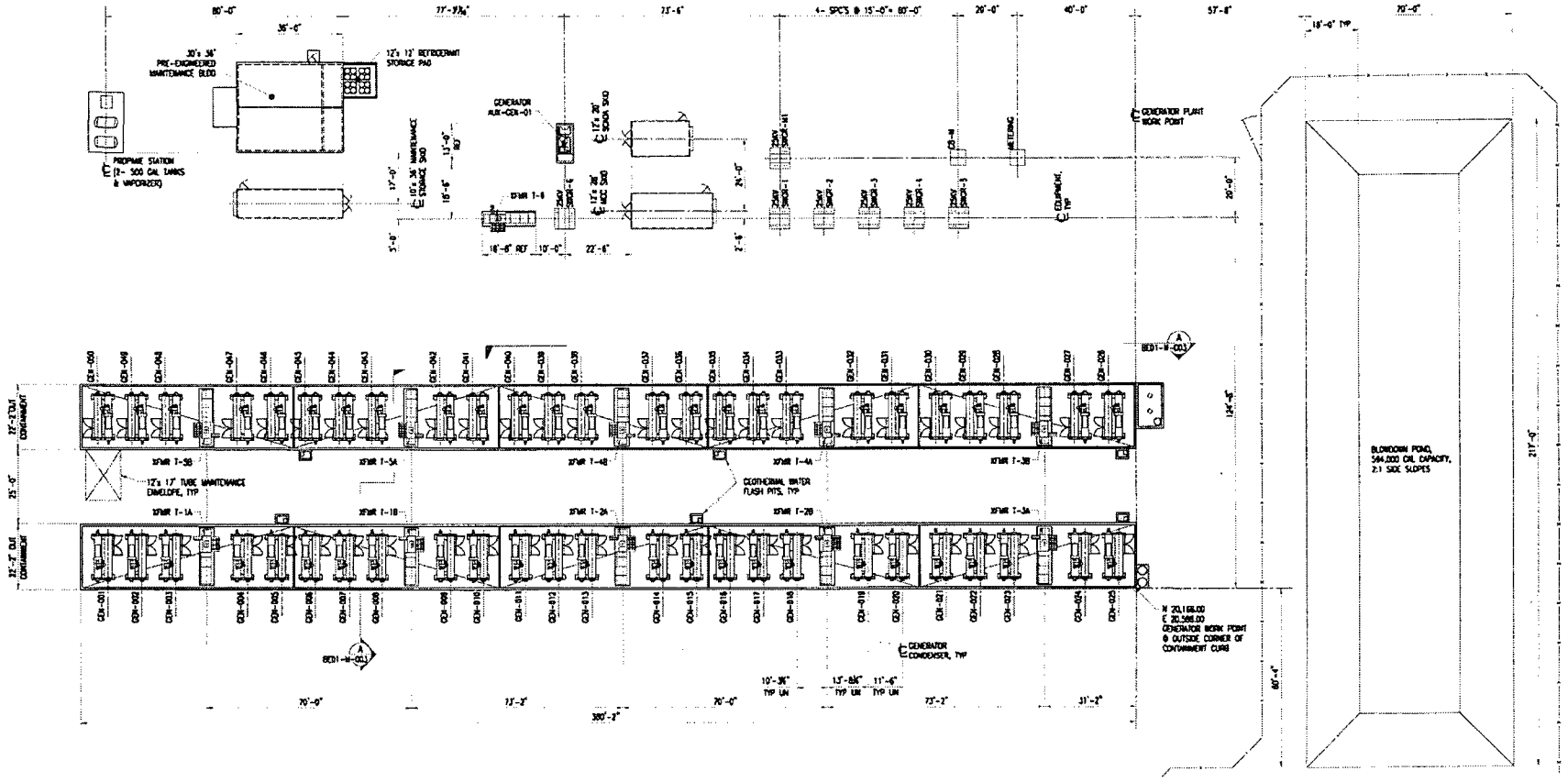
_____
Company Name-print name above

_____
Company Representative- print name

_____
Company Representative- signature

Title_____

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
GENERATING AREA SITE PLAN
GENERAL ARRANGEMENT
HI01-SP-100
A
CONFIDENTIAL
REFERENCE DRAWINGS
REVISION
45-07
35-07
46-07
45-27
EVAPORATION POND (P-4)
140,000 GAL CAPACITY, 2:1 SIDE SLOPES
BLOWDOWN POND, 564,000 GAL
CAPACITY, 2:1 SIDE SLOPES
FUTURE COOLING TOWER AREA
FUTURE BOOSTER PUMP AREA
PROPERTY LINE
EXISTING ROAD
EXISTING GRADE AT
N20,800
N20,600
N20,400
N20,200
N20,000
100'-0"
160'-0"
217'-0"



no.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER

CONFIDENTIAL

Intermountain Consumer Professional Engineers, Inc.
CONSULTING ENGINEERS
1141 E. SOUTH UNION AVE
MIDVALE, UTAH 84047
PH: (801)255-1111 FAX: (801)566-5581

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO

443-006

HI01-M-001 A

Chavez, Carl J, EMNRD

From: Jim Rosser [Jim.Rosser@rasertech.com]
Sent: Monday, June 30, 2008 11:50 PM
To: Chavez, Carl J, EMNRD
Cc: Jay Hamilton
Subject: 30 Day Notice Affadavits
Attachments: CCF00712008_00000.pdf; CCF00712008_00001.pdf; CCF00712008_00002.pdf; CCF00712008_00003.pdf

Carl,

Attached are scan copies of the Affidavits for the 30 day notice publications in the Hidalgo Herald. I am still waiting on the Deming Headlight affidavits to show up at the Provo office.

Do I need to send the originals to you?

Jim

This inbound email has been scanned by the MessageLabs Email Security System.

LEGAL NOTICE

NOTICE OF PUBLICATION
Los Lobos Geothermal, LLC
Lightning Dock Geothermal No. 1
Animas, New Mexico

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.3106 NMAC), the following discharge permit application(s) has been submitted to the Director of the New Mexico Oil Conservation Division ("NMOCD"), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 476-3440.

(GT-001) Lightning Dock Geothermal No. 1 (HI-01) LLC. Mr. Steve Brown, 5152, North Edgewood Drive Suite 375, Provo, Utah 84604 has submitted an application for a new discharge permit for the Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe Geothermal Power Plant (5 Production/Development Wells & 3 Class V Geothermal Injection Wells) located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant is located approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). The development wells are located within the SW/4, NW/4; and NE/4 of Section 7. The Class V Wells are located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of 3400 feet below ground level. Geothermal water will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 1500 gpm of shallow ground water with a TDS concentration of approximately 300 mg/L will be cycled through the cooling tower unit. Of this, approximately 425 gpm of cooling tower blowdown effluent along with the remainder of produced water (~225 °F) will be routed into a lined evaporation pond(s). The produced water will then be injected via 3 Class V Wells into the geothermal reservoir at a maximum injection rate and pressure of between 4,000 to 5,000 gpm, and 75 psig per well. Lined evaporation ponds at the surface will temporarily store produced water for reinjection into the geothermal reservoir. Geothermal energy is considered a clean and renewable energy by the NMOCD and geothermal power industry. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The NMOCD has determined that the application is administratively complete and has prepared a draft permit. The NMOCD and Los Lobos Geothermal will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact the Environmental Bureau Chief of the Oil Conservation Division at the address given above or Los Lobos Geothermal, LLC at the following address:

Los Lobos Geothermal, LLC
5152 N. Edgewood Dr Suite 375
Provo, Utah 84604
Attention: Steve Brown
Lightning Dock Geothermal Public Notice

The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of at least thirty (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines that there is significant public interest. If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

Para obtener más información sobre esta solicitud en espan?ol, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México (Contacto: Dorothy Phillips, 505-476-3461)

J20c

AFFIDAVIT OF PUBLICATION

State of New Mexico,
County of Hidalgo,
City of Lordsburg

I, Brenda Hood, Publisher of the Hidalgo County Herald, a newspaper of record in the aforesaid city, county and state, hereby attest that the following legal notice for
Los Lobos Geothermal, LLC:

Notice of Publication: Los Lobos Geothermal, LLC, Lightning Dock Geothermal No. 1, Animas, NM: SPANISH

was published for 1 consecutive week(s), from: June 20, 2008 through: June 20, 2008

Amount for this legal notice is: _____

Brenda J. Hood

Brenda Hood - Publisher

State of New Mexico
County of Hidalgo

Subscribed and sworn to before me on June 27, 2008

Deborah A Greene

Notary Public: Deborah A Greene
My commission expires: October 29, 2008

LEGAL NOTICE

NOTICE OF PUBLICATION
Los Lobos Geothermal, LLC
Lightning Dock Geothermal No 1
Animas, New Mexico

Esta advierta se presenta segun las regulaciones de la Comisión de Control de calidad de Agua de Nuevo México(NMAC 20.6.2.3106); la siguiente aplicación para el permiso de la descarga ha sido sometido al Director de la Conservación del Petróleo de Nuevo México División ("NMOCD"), 1220 S. Saint Francis Drive , Santa Fe, New Mexico 87505; Teléfono (505) 476-3440:

001 (GT-) Dársena de Relámpago Geotérmica No. 1 01 (HI-) LLC. El Sr. Steve Brown, 5152, North Edgewood Drive Suite 375, Provo, Utah 84604 ha sometido una aplicación para un nuevo permiso de descarga para la Dársena de Relámpago Geotérmica No. 1 (HI-01) el "Ciclo Binario" 15 MWe Central Eléctrica Geotérmica (5 posos de Producción/ Desarrollo & 3 Clase V posos de Inyección Geotérmica) situado en el NO/4, el SW/4 de la Sección 7, Municipio 25 al sur, la Gama 19 al oeste, NMPM, Hidalgo County, New Mexico. La planta esta situada aproximadamente 10 millas al sur de I-10 en CR 338 (el lado este del Camino Geotérmico). Los pozos estan situados dentro del SW/4; NO/4; y NE/4 de la Sección 7. Los pozos de Clase V estan situados dentro del NE/4 y NO/4 de la Sección 18. Los pozos producirán aproximadamente 15.000 gpm de 250-300 °F agua geotérmica con una concentración de sólidos disolvidos de aproximadamente 1.300 mg/L de la Formación de Horquilla (depósito geotérmico de carbonato) a una profundidad de 3400 pies debajo del nivel del suelo. El agua geotérmica será dirigida en la paralela en 50 unidades portátiles y independientes (con intercambiador de calor, el evaporador & condensador) de la generación del poder del ciclo. Aproximadamente 1500 gpm de agua superficial de suelo con una concentración de aproximadamente 300 mg/L será pasado por la unidad de torre de refrigeración. De esto, aproximadamente 425 gpm del efluente de la torre de refrigeración junto con el resto de agua producida (~ 225 °F) será dirigido en una charca de evaporación. El agua producida entonces será inyectada vía 3 pozos de Clase V en el depósito geotérmico en una tasa máxima de inyección y presión de entre 4.000 a 5.000 gpm, y 75 psig cada poso. Charcas de evaporación en la superficie almacenarán temporalmente agua producida para el reinjection en el depósito geotérmico. La energía geotérmica se considera una energía limpia y renovable por el NMOCD y la industria geotérmica del poder. La agua subterránea más probable a ser afectada por un rocia, la filtración, o la descarga accidental a la superficie esta a una profundidad de aproximadamente 50 pies con un PD de aproximadamente 300 mg/L. El plan de la descarga de la construcción de los pozos, la operación, vigilar, probar de los pozos, las facilidades de superficie asociada, y proporciona un plan de emergencia en caso de rocia accidental, las filtraciones y otras descargas accidentales para proteger agua dulce.

El NMOCD ha determinado que la aplicación es administrativamente completa y ha preparado un permiso de giro. El NMOCD y Los Lobos Geothermal aceptará comentarios y declaraciones del interés con respecto a esta aplicación y creará una lista de envoi de facilidad-específico para personas que desea recibir futuras notas. Personas interesadas a obtener información adicional, someterse los comentarios o solicitar para ser parte de una lista de envoi de facilidad-específico para futuras notas pueden contactar al Jefe Ambiental de la Oficina de la Conservación del Petróleo División en la dirección specificada arriba o Los Lobos Geothermal, LLC

Los Lobos Geothermal, LLC
5152 N Edgewood Dr. Suite 375
Provo, Utah 84604
Atencion: Steve Brown
Lightning Dock Geothermal Public Notice

El permiso administrativo de la determinación y el giro de lo completo se puede ver en el encima de la dirección entre 8:00 de la mañana y 4:00 de la tarde, el lunes por el viernes, o también se puede ver en el sitio de web de NMOCD http://www.emnrd.state.nm.us/ocd/. Personas interesadas a obtener una copia del permiso de la aplicación y el giro puede contactar el NMOCD en la dirección specificada arriba. Antes de una resolución sobre un permiso propuesto o una modificación mayor, el Director permitirá un período de por lo menos treinta (30) días después de la fecha de la publicación de esta nota, durante lo cual personas interesadas pueden someter los comentarios o peticiónes que NMOCD tenga una reunion pública. Peticiones para una reunion pública expondrán las razones por las cuales una reunion es necesaria. Habra una reunion si el Director determina que hay suficiente interes público.

Si no hay una reunion publica, el Director aprobará o rechazará el permiso propuesto basado en la información disponible, incluyendo todos comentarios recibidos. Si hay una reunion pública, el director aprobará o rechazará el permiso propuesto basado en la información en la aplicación del permiso y la información sometida en la reunion. Para obtener más información sobre esta solicitud en espan?ol, sirvase comunicarse por favor. New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México (Contacto: Dorothy Phillips, 505-476-3461)

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 22nd Day of May 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

j20c

AFFIDAVIT OF PUBLICATION

State of New Mexico,
County of Hidalgo,
City of Lordsburg

I, Brenda Hood, Publisher of the Hidalgo County Herald, a newspaper of record in the aforesaid city, county and state, hereby attest that the following legal notice for
Los Lobos Geothermal, LLC:

Notice of Publication: Los Lobos Geothermal, LLC, Lightning Dock Geothermal No. 1, Animas, NM

was published for 1 consecutive week(s), from: June 20, 2008 through: June 20, 2008

Amount for this legal notice is:_____

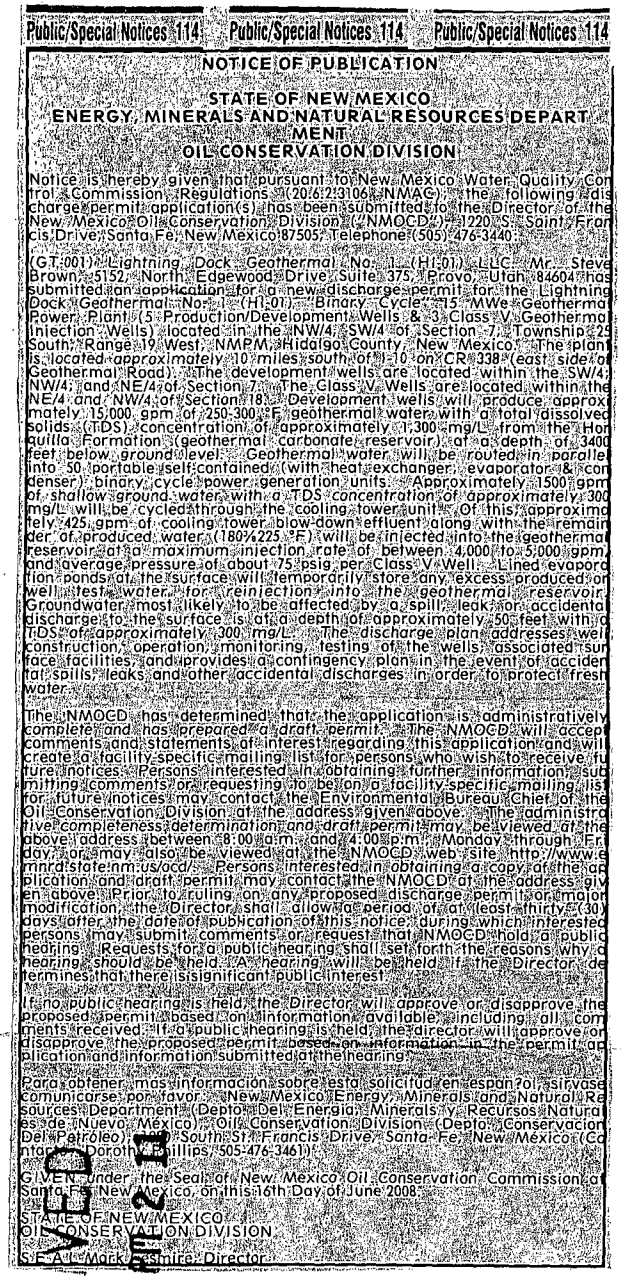
Brenda Hood - Publisher

State of New Mexico
County of Hidalgo

Subscribed and sworn to before me on June 27, 2008

Notary Public: Deborah A Greene
My commission expires: October 29, 2008

NOTICE OF PUBLICATION



Public/Special Notices 114 Public/Special Notices 114 Public/Special Notices 114

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.3106 NMAC), the following discharge permit application(s) has been submitted to the Director of the New Mexico Oil Conservation Division ("NMOCD") 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 476-3440:

(GT-001) - Lightning Dock Geothermal No. 1 (HI-01) LLC, Mr. Steve Brown, 5152 North Edgewood Drive, Suite 375, Provo, Utah, 84604 has submitted an application for a new discharge permit for the Lightning Dock Geothermal No. 1 (HI-01) Binary Cycle 15 MWe Geothermal Power Plant (5 Production/Development Wells & 3 Class V Geothermal Injection Wells) located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant is located approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). The development wells are located within the SW/4, NW/4, and NE/4 of Section 7. The Class V Wells are located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Hon quilla Formation (geothermal carbonate reservoir) at a depth of 3400 feet below ground level. Geothermal water will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 1500 gpm of shallow ground water with a TDS concentration of approximately 300 mg/L will be cycled through the cooling tower unit. Of this approximately 425 gpm of cooling tower blow-down effluent along with the remainder of produced water (180-225 °F) will be injected into the geothermal reservoir at a maximum injection rate of between 4,000 to 5,000 gpm, and average pressure of about 75 psig per Class V Well. Lined evaporation ponds at the surface will temporarily store any excess produced or well test water for reinjection into the geothermal reservoir. Groundwater most likely to be affected by a spill, leak or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The NMOCD has determined that the application is administratively complete and has prepared a draft permit. The NMOCD will accept comments and statements of interest regarding this application and will create a facility specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility specific mailing list for future notices may contact the Environmental Bureau Chief of the Oil Conservation Division at the address given above. The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m. Monday through Friday, or may also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of at least thirty (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines that there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

Para obtener mas informacion sobre esta solicitud en espanol, sirvase comunicarse por favor New Mexico Energy, Minerals and Natural Resources Department (Depto. De Energia, Minerals y Recursos Naturales de Nuevo Mexico) Oil Conservation Division (Depto. Conservacion Del Petroleo) 1220 South St. Francis Drive, Santa Fe, New Mexico (Contact Dorothy Phillips, 505-476-3461).

GIVEN Under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 16th Day of June 2008.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

SEAL Mark Fesmire, Director

RECEIVED
2008 JUN 30 PM 2 13

PROOF OF PUBLICATION

STATE OF NEW MEXICO
GRANT COUNTY

I Sharleene Vega do solemnly swear that I am the Classifieds Clerk of the Silver City Sun News and that the article, a copy of which is hereto attached, has been published in said Silver City Sun News for 2 times consecutively.

First publication being on the 22nd day of June, 2008

Second publication being on the 22nd day of June, 2008

Dependent further states this newspaper is duly qualified to publish legal notice or advertisements within the meaning of Sec. Chapter 167, Laws of 1937

Silver City Sun News

By Vega
Classifieds Clerk

STATE OF NEW MEXICO
ss.
Grant County

Sworn to and subscribed before me on the 24th day of June 2008

April Palacio
My commission expires Oct. 5, 2010

OFFICIAL SEAL
APRIL PALACIO
NOTARY PUBLIC-STATE OF NEW MEXICO
My commission expires Oct. 5, 2010

Chavez, Carl J, EMNRD

From: Jim Rosser [Jim.Rosser@rasertech.com]
Sent: Saturday, June 21, 2008 7:16 PM
To: Chavez, Carl J, EMNRD
Cc: Jay Hamilton; Michael Hayter
Subject: Lightning Dock Sign Posting
Attachments: 100_3078.jpg; 100_3080.jpg; 100_3081.jpg; 100_3082.jpg; 100_3084.jpg

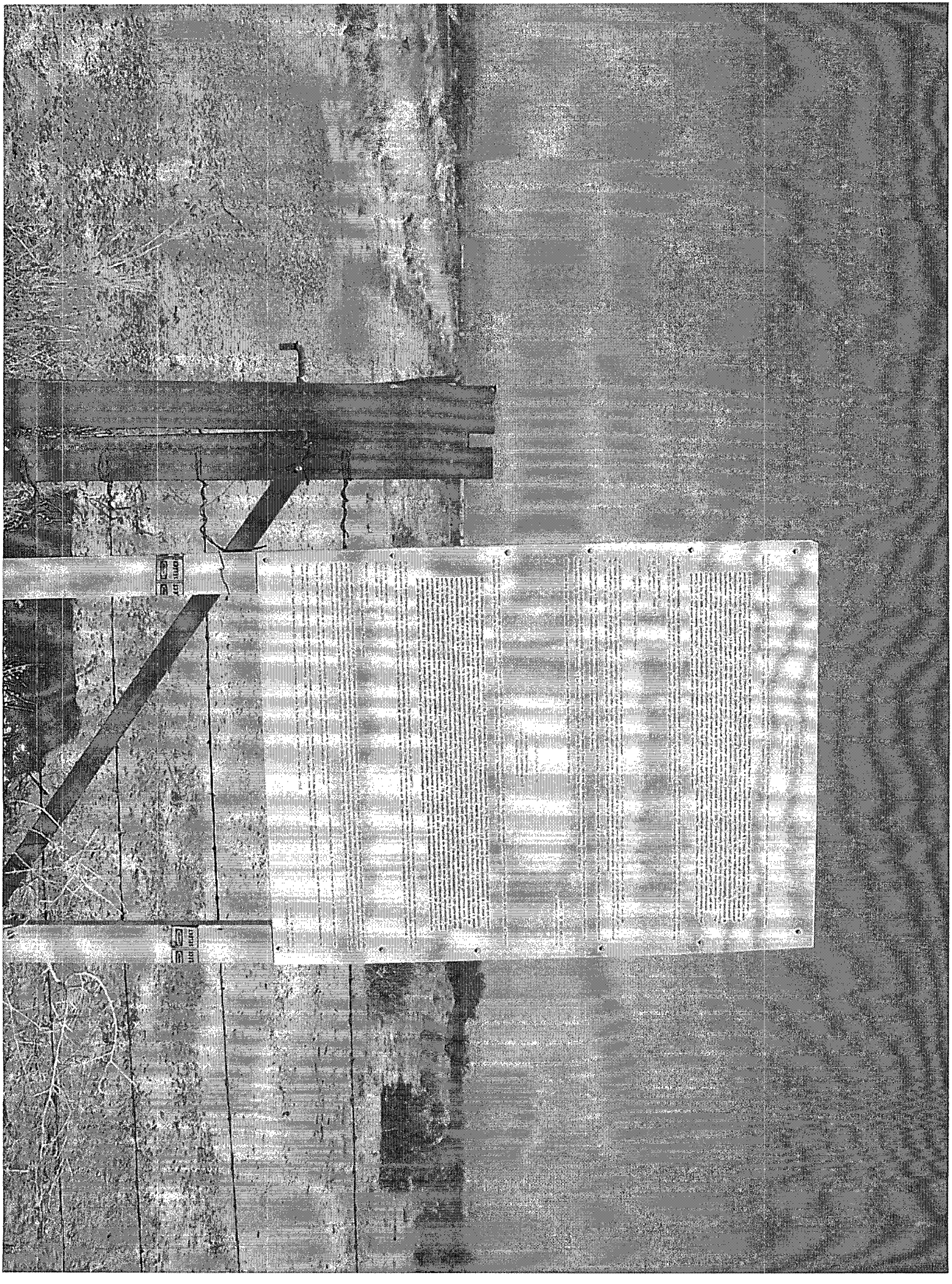
Carl,

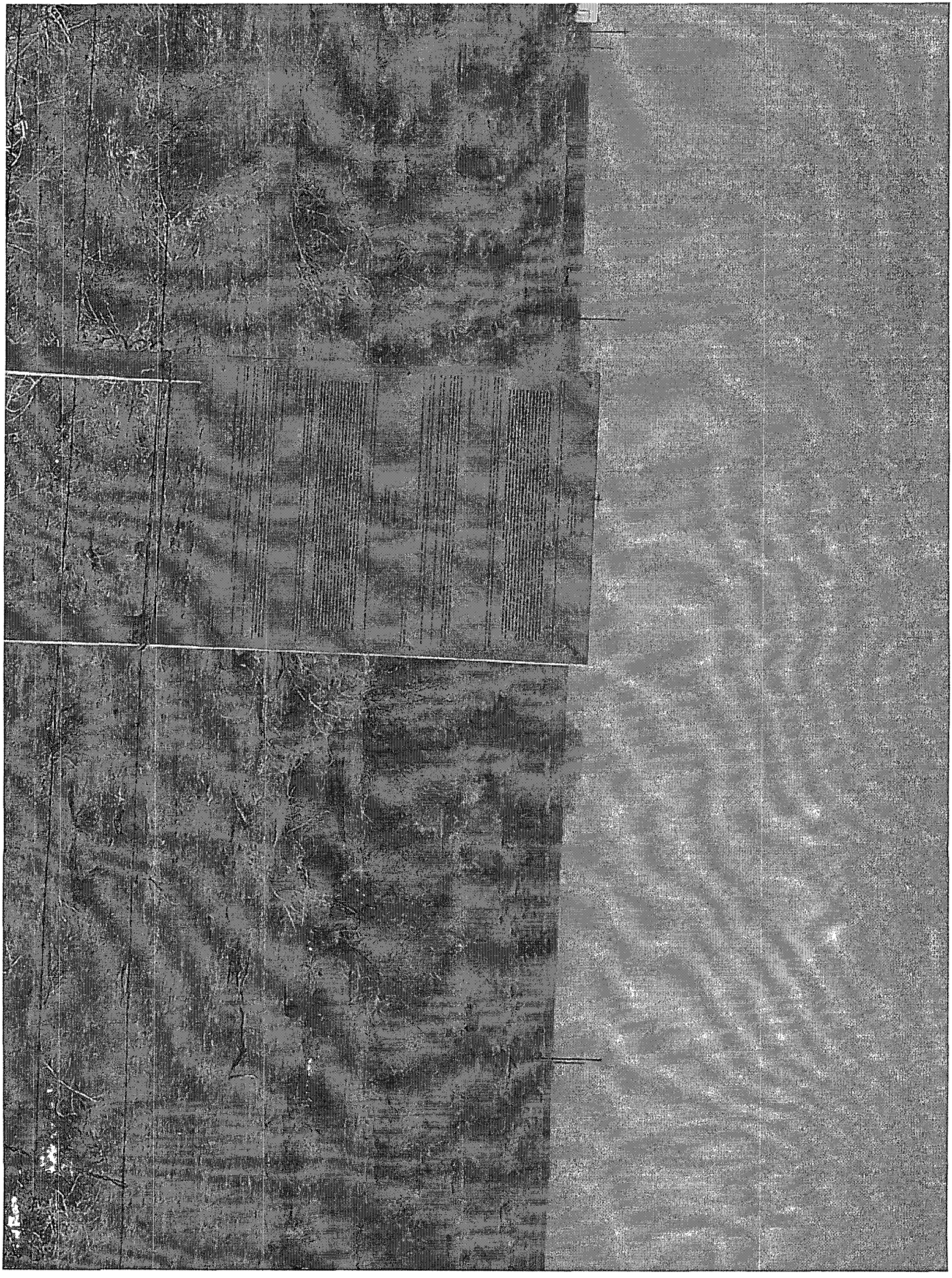
Attached are pictures of the 30 day Notice Signs for Lightning Dock. I placed them at the intersection of Hwy 338 and Geothermal Road and at the entrance on Geothermal Road to the Plant Site.

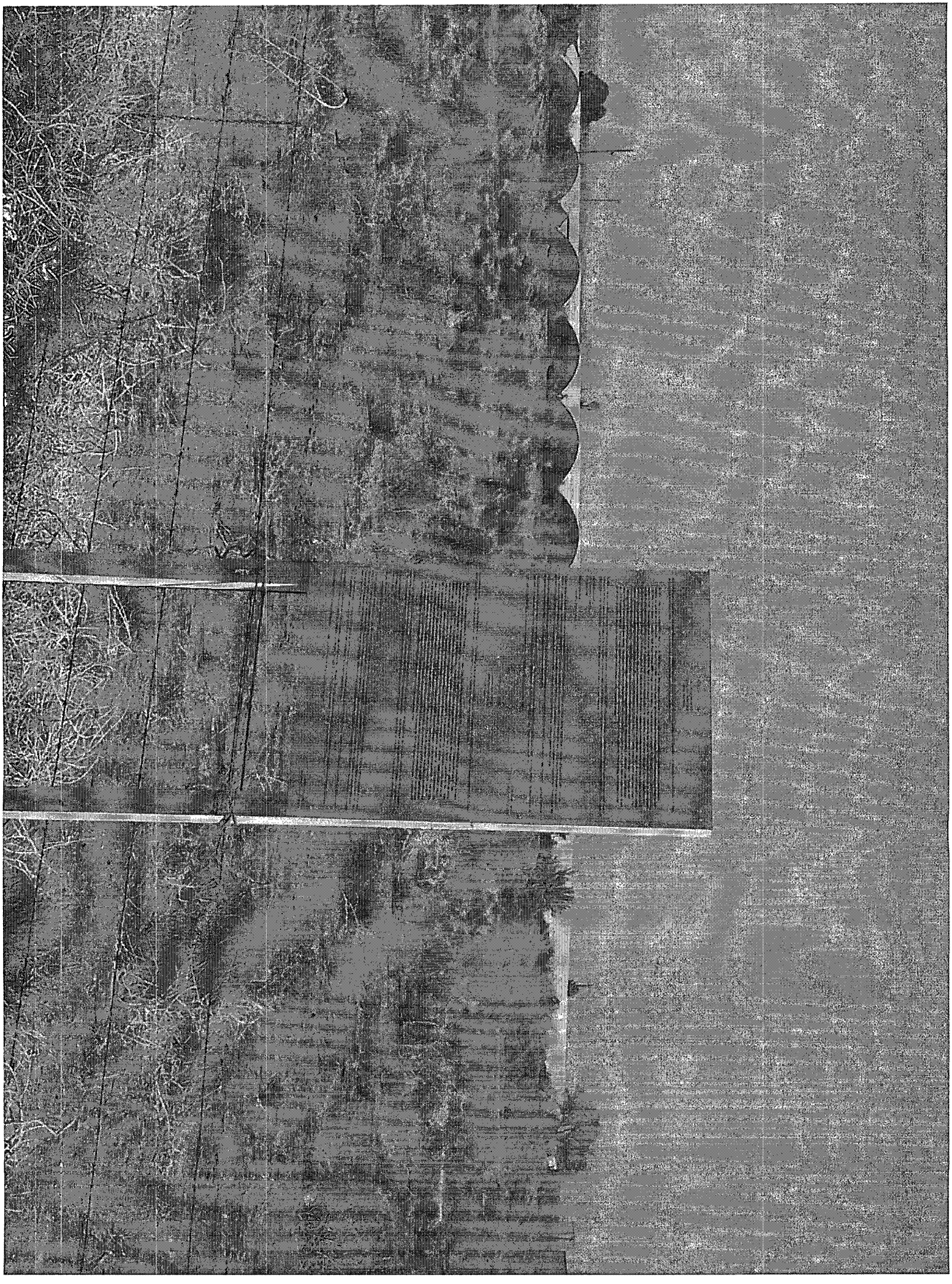
The date was June 20, at approx 4:00 pm.

Jim Rosser

This inbound email has been scanned by the MessageLabs Email Security System.







NOTICE OF PUBLICATION

Los Lobos Geothermal, LLC
Lightning Dock Geothermal No.1
Artesia, New Mexico

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.3108 NMAC) the following discharge permit application(s) has been submitted to the Director of the New Mexico Oil Conservation Division (NMOCD), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 476-3440.

(GT-001) Lightning Dock Geothermal No. 1 (HI-01) LLC, Mr. Steve Brown, 5152, North Edgewood Drive Suite 375, Provo, Utah 84604 has submitted an application for a new discharge permit for the Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe Geothermal Power Plant (5 Production/Development Wells, 4 Class V Geothermal Injection Wells) located in the SW/4 SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant is located approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). The development wells are located within the SW/4, NW/4, and NE/4 of Section 7. The Class V Wells are located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Honquita Formation (geothermal carbonate reservoir) at a depth of 3400 feet below ground level. Geothermal water will be routed in parallel into 50 portable self-contained twin heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 1500 gpm of shallow ground water with a TDS concentration of approximately 300 mg/L will be cycled through the cooling tower unit. Of this, approximately 425 gpm of cooling tower blow-down effluent along with the remainder of produced water (~225 °F) will be routed into a lined evaporation pond(s). The produced water will then be injected via 3 Class V Wells into the geothermal reservoir at a maximum injection rate and pressure of between 4,000 to 6,000 gpm, and 75 psig per well. Lined evaporation ponds at the surface will temporarily store produced water for reinjection into the geothermal reservoir. Geothermal energy is considered a clean and renewable energy by the NMOCD and geothermal power industry. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect fresh water.

The NMOCD has determined that the application is administratively complete and has prepared a draft permit. The NMOCD will accept comments and statements of interest regarding the application and will create a facility specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact the Environmental Bureau Chief of the Oil Conservation Division at the address given above or Los Lobos Geothermal, LLC.

Los Lobos Geothermal, LLC
5152 N Edgewood Dr. Suite 375
Provo, Utah 84604

Attention: Steve Brown
Lightning Dock Geothermal Public Notice

The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may also be viewed at the NMOCD web site (www.emnrd.state.nm.us/ocd). Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of at least thirty (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines that there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

Para obtener mas información sobre esta solicitud en español, sírvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energía, Minerals y Recursos Naturales de Nuevo Mexico) Oil Conservation Division (Depto. Conservación Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New Mexico (Contacto: Dorothy Phillips, 505-476-3461)

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 22nd Day of May 2008

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

NOTICE OF PUBLICATION

Los Lobos Geothermal, LLC
Lightning Dock Geothermal No.1
Artesia, New Mexico

Esta advierte se presenta según las regulaciones de la Comisión de Control de calidad de Agua de Nuevo México(NMAC 20.6.2.3108), la siguiente aplicación para el permiso de la descarga ha sido sometido al Director de la Conservación del Petróleo de Nuevo México División ("NMOCD"), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Teléfono (505) 476-3440.

(GT-) Dársena de Relámpago Geotérmica No. 1 (HI-) LLC, El Sr. Steve Brown, 5152, North Edgewood Drive Suite 375, Provo, Utah 84604 ha sometido una aplicación para un nuevo permiso de descarga para la Dársena de Relámpago Geotérmica No. 1 (HI-01) el "Ciclo Binario" 16 MWe Central Eléctrica Geotérmica (5 pozos de Producción/Desarrollo & 3 Clase V pozos de Inyección Geotérmica) situado en el NO/4, el SW/4 de la Sección 7, Municipio 25 al sur, la Gama 19 al oeste, NMPM, Hidalgo County, New Mexico. La planta esta situada aproximadamente 10 millas al sur de I-10 en CR 338 (el lado este del Camino Geotérmico). Los pozos están situados dentro del SW/4; NO/4; y NE/4 de la Sección 7. Los pozos de Clase V están situados dentro del NE/4 y NO/4 de la Sección 18. Los pozos producirán aproximadamente 15,000 gpm de 250-300 °F agua geotérmica con una concentración de sólidos disolvidos de aproximadamente 1,300 mg/L de la Formación de Honquita (depósito geotérmico de carbonato) a una profundidad de 3400 pies debajo del nivel del suelo. El agua geotérmica será dirigida en la paralela en 50 unidades portátiles y independientes (con intercambiador de calor, el evaporador & condensador) de la generación del poder del ciclo. Aproximadamente 1500 gpm de agua superficial de suelo con una concentración de aproximadamente 300 mg/L será pasado por la unidad de torre de refrigeración. De esto, aproximadamente 425 gpm del efluente de la torre de refrigeración junto con el resto de agua producida (~ 225 °F) será dirigido en una charca de evaporación. El agua producida entonces será inyectada vía 3 pozos de Clase V en el depósito geotérmico en una tasa máxima de inyección y presión de entre 4,000 a 6,000 gpm, y 75 psig cada pozo. Charcas de evaporación en la superficie almacenarán temporalmente agua producida para el reinjection en el depósito geotérmico. La energía geotérmica se considera una energía limpia y renovable por el NMOCD y la industria geotérmica del poder. La agua subterránea más probable a ser afectada por un roto, la filtración, o la descarga accidental a la superficie está a una profundidad de aproximadamente 50 pies con un PD de aproximadamente 300 mg/L. El plan de la descarga de la construcción de los pozos, la operación, vigilar, probar de los pozos, las facilidades de superficie asociadas, y proporciona un plan de emergencia en caso de rotos accidental, las filtraciones y otras descargas accidentales para proteger agua dulce.

El NMOCD ha determinado que la aplicación es administrativamente completa y ha preparado un permiso de giro. El NMOCD y Los Lobos Geothermal aceptará comentarios y declaraciones del interés con respecto a esta aplicación y creará una lista de correo de facilidad específico para personas que deseen recibir futuras notas. Personas interesadas a obtener información adicional, someterán los comentarios o pedirán ser en la lista de envío de facilidad específico para futuras notas pueden contactar el Jefe Ambiental de la Oficina de la Conservación del Petróleo Dirección en la dirección mencionada arriba o Los Lobos Geothermal, LLC.

Los Lobos Geothermal, LLC
5152 N Edgewood Dr. Suite 375
Provo, Utah 84604

Atención: Steve Brown
Lightning Dock Geothermal Public Notice

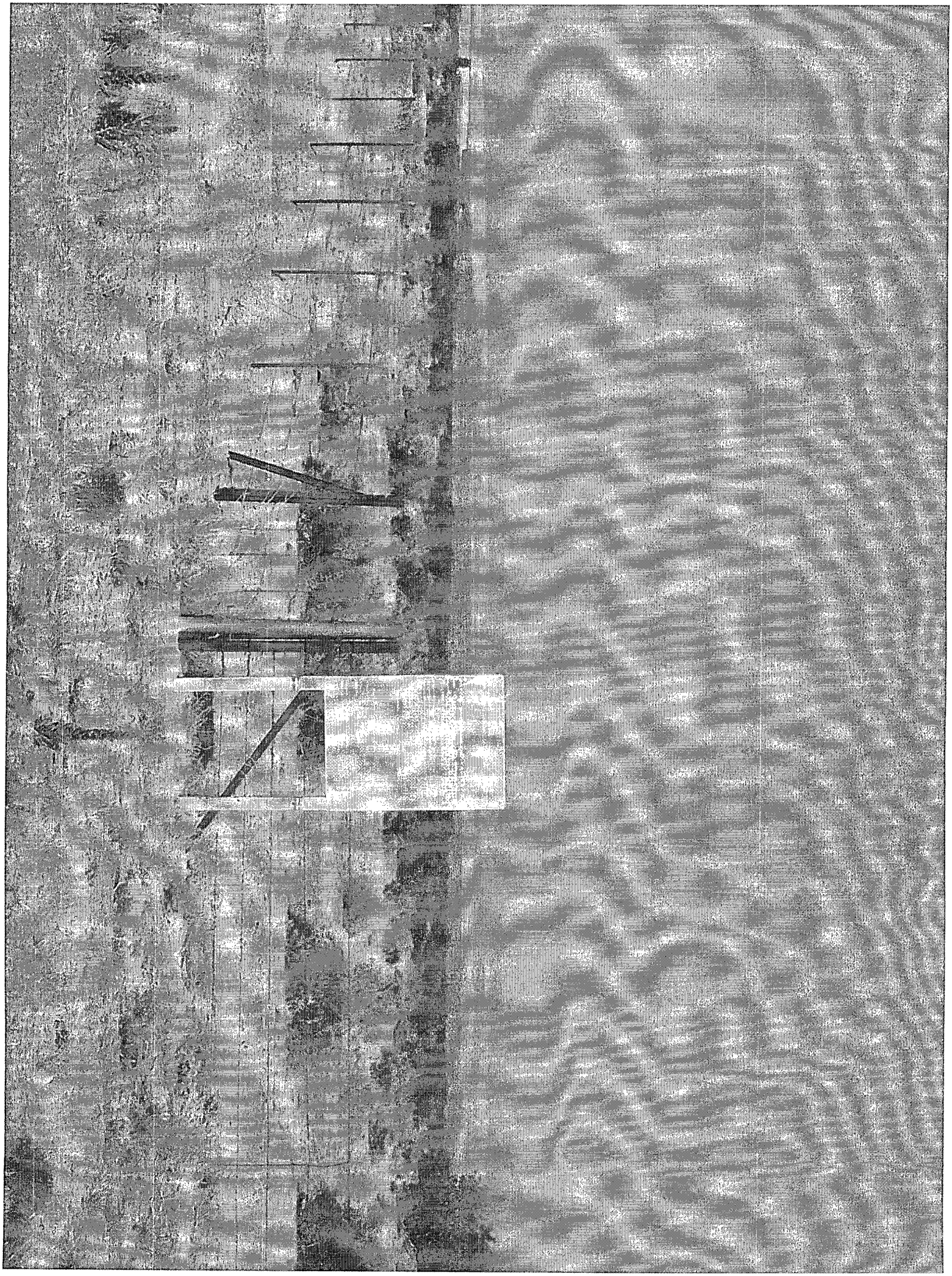
El permiso administrativo de la determinación y el giro de la compañía se puede ver en la dirección especificada arriba entre 8:00 de la mañana y 4:00 de la tarde, de lunes por el viernes, o también se puede ver en el sitio de web de NMOCD http://www.emnrd.state.nm.us/ocd/. Personas interesadas a obtener una copia del permiso de la aplicación y el giro puede contactar el NMOCD en la dirección especificada arriba. Antes de una resolución sobre un permiso propuesto o una modificación mayor, el Director permitirá un período no por lo menos treinta (30) días después de la fecha de la publicación de esta nota, durante lo cual personas interesadas pueden someter los comentarios o proponer que NMOCD tenga una reunión pública. Peticiones para una reunión pública expondrán las razones por las cuales una reunión es necesaria. Habrá una reunión si el Director determina que hay suficiente interés público.

Si no hay una reunión pública, el Director aprobará o rechazará el permiso propuesto basado en la información disponible, incluyendo todos comentarios recibidos. Si hay una reunión pública, el director aprobará o rechazará el permiso propuesto basado en la información en la aplicación del permiso y la información sometida en la reunión.

Para obtener más información acerca esta solicitud en español, sírvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energía, Minerals y Recursos Naturales de Nuevo México) Oil Conservation Division (Depto. Conservación Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New Mexico (Contacto: Dorothy Phillips, 505-476-3461)

GIVEN Under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 22nd Day of May 2008

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION



THE SANTA FE
NEW MEXICAN
Founded 1849

RECEIVED
2008 JUN 9 PM 2 01

NM EMNRD OIL CONSERV
1220 S ST FRANCIS DR
SANTA FE NM 87505

ALTERNATE ACCOUNT: 56689
AD NUMBER: 00257265 ACCOUNT: 00002212
LEGAL NO: 82966 P.O. #: 56689
252 LINES 1 TIME(S) 219.52
AFFIDAVIT: 7.00
TAX: 17.98
TOTAL: 244.50

Mc to pay
OJ
6/10/08

AFFIDAVIT OF PUBLICATION

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.2.3106 NMAC); the following discharge permit application(s) has been submitted to the Director of the New Mexico Oil Conservation Division ("NMOCD"), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 476-3440:

(GT-001) Lightning Dock Geothermal No. 1 (HI-01) LLC, Mr. Steve Brown, 5152

STATE OF NEW MEXICO
COUNTY OF SANTA FE

I, L. Paquin, being first duly sworn declare and say that I am Legal Advertising Representative of THE SANTA FE NEW MEXICAN, a daily newspaper published in the English language, and having a general circulation in the Counties of Santa Fe and Los Alamos, State of New Mexico and being a newspaper duly qualified to publish legal notices and advertisements under the provisions of Chapter 167 on Session Laws of 1937; that the publication # 82966 a copy of which is hereto attached was published in said newspaper 1 day(s) between 06/04/2008 and 06/04/2008 and that the notice was published in the newspaper proper and not in any supplement; the first date of publication being on the 4th day of June, 2008 and that the undersigned has personal knowledge of the matter and things set forth in this affidavit.

/S/ L. Paquin
LEGAL ADVERTISEMENT REPRESENTATIVE

Subscribed and sworn to before me on this 4th day of June, 2008

Notary Pamela Anne Beach

Commission Expires: May 31, 2011

OFFICIAL SEAL
Pamela Anne Beach
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 5-31-11

North Edgewood Drive Suite 375, Provo, Utah 84604 has submitted an application for a new discharge permit for the Lightning Dock Geothermal No. 1 (HI-01) "Binary Cycle" 15 MWe Geothermal Power Plant (5 Production/Development Wells & 3 Class V Geothermal Injection Wells) located in the NW/4, SW/4 of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The plant is located approximately 10 miles south of I-10 on CR 338 (east side of Geothermal Road). The development wells are located within the SW/4; NW/4; and NE/4 of Section 7. The Class V Wells are located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of 3400 feet below ground level. Geothermal water will be

and has prepared a draft permit. The NMOCD will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact the Environmental Bureau Chief of the Oil Conservation Division at the address given above. The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

SEAL
Mark Fesmire,
Director
Legal No. 82966
Pub. June 4, 2008

wells are located within the SW/4; NW/4; and NE/4 of Section 7. The Class V Wells are located within the NE/4 and NW/4 of Section 18. Development wells will produce approximately 15,000 gpm of 250-300 °F geothermal water with a total dissolved solids (TDS) concentration of approximately 1,300 mg/L from the Horquilla Formation (geothermal carbonate reservoir) at a depth of 3400 feet below ground level. Geothermal water will be routed in parallel into 50 portable self-contained (with heat exchanger, evaporator & condenser) binary cycle power generation units. Approximately 1500 gpm of shallow ground water with a TDS concentration of approximately 300 mg/L will be cycled through the cooling tower unit. Of this, approximately 425 gpm of cooling tower blow-down effluent along with the remainder of produced water (180-225 °F) will be injected into the geothermal reservoir at a maximum injection rate of between 4,000 to 5,000 gpm, and average pressure of about 75 psig per Class V Well. Lined evaporation ponds at the surface will temporarily store any excess produced or well test water for reinjection into the geothermal reservoir. Groundwater most likely to be affected by a spill, leak, or accidental discharge to the surface is at a depth of approximately 50 feet with a TDS of approximately 300 mg/L. The discharge plan addresses well construction, operation, monitoring, testing of the wells, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks and other accidental discharges in order to protect

draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the NMOCD at the address given above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of at least thirty (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines that there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

Para obtener más información sobre esta solicitud en espan_ol, sirvase comunicarse por favor: New Mexico Energy, Minerals and Natural Resources Department (Depto. Del Energia, Minerals y Recursos Naturales de Nuevo México), Oil Conservation Division (Depto. Conservacio´n Del Petróleo), 1220 South St. Francis Drive, Santa Fe, New México (Contacto: Dorothy Phillips, 505-476-3461)

Title 19: Natural Resources & Wildlife
Chapter 14: Geothermal Power

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Chapter 71, Article 5
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Carl Chavez
505-476-3491
(carlj.chavez@state.nm.us)
Oil Conservation Division
Environmental Bureau
Energy, Minerals & Natural
Resources Department

Photos Courtesy of Geothermal Education Office

OCD GEOTHERMAL REGULATIONS

Water Temp > 250 F OCD

Water Temp < 250 F NMED

OCD Geothermal Regulations

Chapter 71: Energy & Minerals
Article 5: Geothermal Resources Conservation Act

"Chapter 71, Article 5 NMSA 1978"

Title 19: Natural Resources & Wildlife
Chapter 14: Geothermal Power

"Title19, Chapter 14 NMAC 1983"
Recompiled 12/31/01

OCD was delegated authority by the EPA over its UIC Program for Class II UIC Wells on February 5, 1982 under §1425 47FR5412.

The OCD was later delegated authority by the EPA over its UIC Program for Class I, III, IV and V (Geosequestration & Geothermal) UIC Wells on July 11, 1983 under §1422 48FR31640.

The OCD was delegated authority by the Water Quality Control Commission (WQCC) over its State UIC Program (20.6.2.5000-5299 NMAC) on July 21, 1989.

1. General Provisions. As a gen. rule, OCD will admin. & enforce applic. Com. regulations pertain. to surface & GW dischgs. at oil & natl. gas prod. sites, oil refineries, natl. gas proces. plants, geothermal installations, carbon dioxide facilities, natl. gas transmis. lines, & dischgs. assoc. w/ the activities of the oil field service industry.

Title 20 Environmental Protection
Chapter 6 Water Quality
Part 4 Standards for Interstate & Intrastate Surface Waters
20.6.4 NMAC
Effective: 7/17/05

Title 20 Environmental Protection
Chapter 6 Water Quality
Part 2 Ground & Surface Water Protection
20.6.2 NMAC
Effective: 7/16/06

OCD Regulations

- 20.6.2.1201 Notice of Intent to Discharge to OCD (Discharge Permit Application)
- 20.6.2.3108 Public Notice
- 20.6.2.3114 Fees ($100 filing fee + $1700/5 yrs.)
- 20.6.2.5002 (B5b) UIC Well Classification (EPA: UIC Class V)
  - Class V (geothermal energy for heating, aquaculture & production of electrical power)

OCD Regulations

- 20.6.2.5003 Notification & General Operating Requirements for all UIC Wells
- 20.6.2.5101(D) states 3105 (Exemptions From Discharge Permits) apply to Geothermal Wells
- 20.6.2.5102(B1b) Geothermal Well Plans, Specs, documents shall be filed w/ OCD.

Status of Geothermal Projects in New Mexico

- Historical Geothermal Well Drilling conducted throughout New Mexico
  - NM Bureau of Mines (Socorro)
    - Geothermal Resources of New Mexico – A Survey of Work to Date (Open-File Report 73) March, 1977
    - Studies throughout NM & in progress today
  - NMSU (Direct Heat for University)
  - Los Alamos National Laboratory
- Geothermal Companies: Lightening Dock Geothermal Binary Cycle Power Plant in NM (Application 4/08)

490 mW/m² near Socorro

60 F / 100 ft?

$22.81/ft² home

- 63¢/therm 6.30/MM BTU
- 1.13/therm 11.30/MM BTU

Gas / Elec. HVAC.

— Borehole test determines # of wells to produce energy.

- Grout —

Thermal Conduct = Thermal Conduct ground

0.4 Thermal Conduct

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Revised June 10, 2003

Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to Appropriate
District Office

DISCHARGE PLAN APPLICATION FOR SERVICE COMPANIES,GAS PLANTS, REFINERIES, COMPRESSOR, GEOTHERMAL FACILITES AND CRUDE OIL PUMP STATIONS

(Refer to the OCD Guidelines for assistance in completing the application)

☐ New ☐ Renewal ☐ Modification

1. Type: _____

2. Operator: _____

   Address: _____

   Contact Person: _____ Phone: _____

3. Location: _____/4 _____/4 Section _____ Township _____ Range _____
   Submit large scale topographic map showing exact location.

4. Attach the name, telephone number and address of the landowner of the facility site.

5. Attach the description of the facility with a diagram indicating location of fences, pits, dikes and tanks on the facility.

6. Attach a description of all materials stored or used at the facility.

7. Attach a description of present sources of effluent and waste solids. Average quality and daily volume of waste water must be included.

8. Attach a description of current liquid and solid waste collection/treatment/disposal procedures.

9. Attach a description of proposed modifications to existing collection/treatment/disposal systems.

10. Attach a routine inspection and maintenance plan to ensure permit compliance.

11. Attach a contingency plan for reporting and clean-up of spills or releases.

12. Attach geological/hydrological information for the facility. Depth to and quality of ground water must be included.

13. Attach a facility closure plan, and other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.

14. CERTIFICATIONI hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: _____ Title: _____

Signature: _____ Date: _____

E-mail Address: _____

Chavez, Carl J, EMNRD

From: Jay Hamilton [hamiltonenviro@yahoo.com]
Sent: Tuesday, May 20, 2008 8:55 AM
To: Chavez, Carl J, EMNRD; Price, Wayne, EMNRD
Subject: Fw: Underground Piping Systems for Thermal & Lightning Dock Sites

Carl/Wayne,

This the status of the underground piping details.

I will call so we can discuss this.

Thanks,

Jay
----- Forwarded Message ----
From: "Shilander, Robert" <Robert.Shilander@hdrinc.com>
To: Jay Hamilton <hamiltonenviro@yahoo.com>
Cc: Steven Brown <steve.brown@rasertech.com>; Bob Nash <Bob.Nash@icpeinc.com>; Ross Hansen <Ross.Hansen@icpeinc.com>; jim.rosser@rasertech.com; FRANCOMR@comcast.net
Sent: Monday, May 19, 2008 12:13:26 PM
Subject: Underground Piping Systems for Thermal & Lightning Dock Sites

Jay,

The following are a summaries of the **Underground Piping Systems** at the Thermo, Utah and Lightning Dock/Lordsburg, New Mexico Sites:

- **Fire Protection System** ---- a combination of 6" through 10" diameter Ductile Cast Iron Piping, Fittings, & Fixtures ---- interconnected with PVC Piping.
- **Instrument Air System** ---- 2" diameter Welded Stainless Steel Piping
- **Cooling Water System** ---- 24" and 36" diameter Welded Carbon Steel Piping --- Wrapped and Coated for corrosion protection --- and as additionally Catholically Protected to prevent corrosion due to soil conditions
- **Equipment Drain System** ----- a combination of 3" and 4" diameter Cast Iron Piping
- **Geothermal Water System** ---- ***although not yet designed***, the Geothermal Water Piping consisting of 14" to 22" diameter Welded Carbon Steel Piping will necessarily be required to pass under Site and County Roads. Those Road Crossings will be below grade; however, passing through Sleeves/Structures rather than any type of direct burial.

Design (Drawings BE01-UP-1060 through 1069) and related Specifications for the Thermo, Utah Site systems ***(except for the Geothermal Pipe/Road Crossings)*** will be completed and issued and available at ICPE and/or Raser's Provo Office on **May 20, 2008**.

Design (Drawings HI01-Up-1060 through 1069) for the Lightning Dock/Lordsburg, new Mexico Site systems ***(except for the Geothermal Pipe/Road Crossings)*** will be completed and issued and available at ICPE and/or Raser's Provo Office on **June 13, 2008**.

Bob & Ross,

Please provide a separate PDF File of the above (i.e., drawings & specifications) to Jay when it is Issued.

THANKX,

Robert Shilander

Program Manager - Raser Rower Systems - Geothermal Projects

HDR|C&B ONE COMPANY | ***Many Solutions***
5405 Data Court | Ann Arbor, MI | 48108
Phone: 734.332.6486 | Fax: 734.761.9881 | Cell: 734.476.2551
Email: Robert.Shilander@hdrinc.com
www.hdrinc.com | www.cummins-barnard.com

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FEDERAL REGISTER
VOL. 58, No. 53

Rules and Regulations

ENVIRONMENTAL PROTECTION AGENCY (EPA)

40 CFR Part 261

[FRL-4606-6]

Clarification of the Regulatory Determination for Wastes From the Exploration, Development and Production of Crude Oil, Natural Gas and Geothermal Energy

58 FR 15284

DATE: Monday, March 22, 1993

ACTION: Clarification.

SUMMARY: This document provides additional clarification of the Resource Conservation and Recovery Act (RCRA) Regulatory Determination for Oil and Gas and Geothermal Exploration, Development and Production Wastes dated June 29, 1988 (53 FR 25446; July 6, 1988). This document clarifies the regulatory status of wastes generated by the crude oil reclamation industry, service companies, gas plants and feeder pipelines, and crude oil pipelines. Since this document only further clarifies the status of these wastes under the RCRA Subtitle C hazardous waste exemption discussed in EPA's 1988 Regulatory Determination, and does not alter the scope of the current exemption in any way, comments are not being solicited by the Agency on this notice.

FOR FURTHER INFORMATION CONTACT: For general information on the scope of the RCRA Subtitle C exemption for wastes from the exploration, development and production of crude oil, natural gas and geothermal energy, contact the RCRA/Superfund hotline at (800) 424-9346 (toll free) or (703) 412-9810. For technical information, contact Mike Fitzpatrick, U.S. Environmental Protection Agency OS-323W, 401 M Street, SW., Washington, DC 20460; phone (703) 308-8411.
SUPPLEMENTARY INFORMATION:

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B. Service Companies

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III. Administrative Procedures Act Requirements

IV. EPA RCRA Docket

I. Introduction

In the Solid Waste Disposal Act Amendments of 1980 (Pub. L. 94-580), Congress amended the Resource Conservation and Recovery Act (RCRA) to add sections 3001 (b)(2)(A), and 8002(m). Section 3001(b)(2)(A) exempted drilling fluids, produced waters, and other wastes associated with exploration, development, and production of crude oil, natural gas and geothermal energy from regulation as hazardous wastes. Section 8002(m) required the Administrator to complete a Report to Congress on these wastes and provide an opportunity for public comment. The Administrator was also required by section 3001 (b)(2)(A) to make a determination no later than six months after completing the Report to Congress as to whether hazardous waste regulations under RCRA Subtitle C were warranted for these wastes.

EPA's Report to Congress was transmitted to Congress on December 28, 1987. In the process of preparing the Report to Congress, the Agency found it necessary to define the scope of the exemption for the purpose of determining which wastes were considered "wastes from the exploration, development or production of crude oil, natural gas or geothermal energy." Based upon statutory language and legislative history, the Report to Congress identified several criteria used in making such a determination. In particular, for a waste to be exempt from regulation as hazardous waste under RCRA Subtitle C, it must be associated with operations to locate or remove oil or gas from the ground or to remove impurities from such substances and it must be intrinsic to and uniquely associated with oil and gas exploration, development or production operations (commonly referred to simply as exploration and production or E&P); the waste must not be generated by transportation or manufacturing operations.

Transportation of oil and gas can be for short or long distances. For crude oil, "transportation" is defined in the Report to Congress and the subsequent Regulatory Determination as beginning after transfer of legal custody of the oil from the producer to a carrier (i.e., pipeline or trucking concern) for transport to a refinery or, in the absence of custody transfer, after the initial separation of the oil and water at the primary field site. For natural gas, "transportation" is defined as

beginning after dehydration and purification at a gas plant, but prior to transport to market. To accurately determine the scope of the exemption, the reader is referred to the December 28, 1987, Report to Congress, Management of Wastes from the Exploration, Development, and Production of Crude Oil, Natural Gas, and Geothermal Energy (NTIS # PB88-146212) for the specific application of the criteria.

The Agency's Regulatory Determination was published in the Federal Register on July 6, 1988 (53 FR **[Page 15285]** 25446). The Regulatory Determination included a list of example wastes that generally are exempt and a list of example wastes that generally are not exempt. Neither of these lists was intended to be a complete itemization of all possible exempt or non-exempt wastes. Also, because definitions of the terms used in these lists vary, the criteria identified in the Report to Congress remain the authoritative source for determining the scope of the exemption. The reader is referred to the July 6, 1988, notice for detailed background on all aspects of the Regulatory Determination.

Since 1987, the terms uniquely associated and intrinsic have been used as interchangeable synonyms in various documents in reference to oil and gas wastes qualifying for the exemption from Subtitle C regulation. (For simplicity's sake, when referring to exempt wastes, this notice combines the use of these two terms into the single term uniquely associated.) A simple rule of thumb for determining the scope of the exemption is whether the waste in question has come from down-hole (i.e., brought to the surface during oil and gas E&P operations) or has otherwise been generated by contact with the oil and gas production stream during the removal of produced water or other contaminants from the product (e.g., waste demulsifiers, spent iron sponge). If the answer to either question is yes, the waste is most likely considered exempt.

Since the Agency's Regulatory Determination, numerous requests have been received for determination, on a site-specific basis, of the regulatory status of wastes not itemized in the Regulatory Determination's list of examples. Many of these requests have dealt with broad categories of similar wastes (e.g., crude oil reclaimer wastes, service company wastes, pipeline wastes). Today's notice responds to the many requests for clarification of the scope of the exemption.

II. Clarification of the Scope of the Oil and Gas Exemption

A. Crude Oil Reclamation Industry

The crude oil reclamation industry recovers marketable crude oil and other hydrocarbons from produced water, crude oil tank bottoms and

other oily wastes that are generated by the production of crude oil

and natural gas. In general, the marketable crude oil is recovered from the waste materials by simple thermal and/or physical processes (e.g., heat and gravity separation). Occasionally, demulsifiers may be added to produced waters from which crude oil cannot be separated with heat and settling time alone. The typical residual materials left after removal of the crude oil by the reclaimers are also produced water and tank bottom solids. These residuals will often exhibit the same characteristics as the parent waste, although the concentrations of some constituents may vary from those in the parent.

In September 1990, the crude oil reclamation industry requested that the Agency provide an interpretation of the language in the 1988 Regulatory Determination pertaining to RCRA Subtitle C coverage of wastes from crude oil and tank bottom reclaimers. (The list of "non-exempt" wastes in the Regulatory Determination included "liquid and solid wastes generated by crude oil and tank bottom reclaimers.") In particular, they requested that EPA clarify whether any wastes generated by crude oil reclaimers are included within the oil and gas exemption, particularly those originating from the crude oil itself, such as produced water and the other extraneous materials in crude oil, otherwise known as basic sediment and water (BS&W).

In April 1991, the Agency responded to the request with a letter that included broad guidance on the status of wastes from the crude oil reclamation industry. (A copy of the letter is included in the docket to this notice.) EPA explained that the inclusion of "liquid and solid wastes" from crude oil reclamation on the list of non-exempt wastes contained in the Regulatory Determination was intended to refer only to those non-E&P wastes generated by reclaimers (e.g., waste solvents from cleaning reclaimers' equipment) and was not intended to refer to wastes remaining from the treatment of exempt wastes originally generated by the exploration, development or production of crude oil or natural gas.

EPA's basis for this position is several-fold. First, the Agency has consistently taken the position that wastes derived from the treatment of an exempt waste, including any recovery of product from an exempt waste, generally remain exempt from the requirements of RCRA Subtitle C. Treatment of, or product recovery from, E&P exempt wastes prior to disposal does not negate the exemption. [The same principle applies to exempt mining and mineral processing wastes. See, 54 FR at 36621 (Sept. 1, 1989).] For example, waste residuals (e.g., BS&W) from the on-site or off-site process of recovering crude oil from tank bottoms obtained from crude oil storage facilities at primary field operations (i.e., operations at or near the wellhead) are exempt from RCRA Subtitle C because the crude oil storage tank bottoms at primary field operations are exempt. In effect,

reclaimers are conducting a specialized form of waste treatment in which valuable product is recovered and removed from waste uniquely

associated with E&P operations. In addition, in many cases, product recovery or treatment reduces the volume and overall toxicity of the waste and thereby contributes to the Agency's policy and goals for waste minimization and treatment of waste prior to disposal.

EPA further notes that the off-site transport of exempt waste from a primary field site for treatment, reclamation, or disposal does not negate the exemption. The change of custody criterion (which is discussed in the Report to Congress) for the purpose of defining transportation refers to the transport of product (crude oil, natural gas) and does not apply to exempt wastes moving off-site for treatment or disposal since these wastes were generated by the exploration, development or production operations and not by the transportation process. Thus, the off-site transport and/or sale of exempt oil-field wastes to crude oil reclaimers for treatment does not terminate the exempt status either of the wastes or the residuals from a reclamation process applied to these wastes.

However, there are solid and liquid wastes from reclamation operations that are not exempt from RCRA Subtitle C. These are wastes which the Agency intended to refer to in its example within the 1988 Regulatory Determination. Generally, these reclaimer wastes are derived from non-exempt oilfield wastes or otherwise contain materials that are not uniquely associated with exploration, development or production operations. An example would be waste solvents generated from the solvent cleaning of tank trucks that are used to transport oilfield tank bottoms. Such wastes would not be exempt from Subtitle C because the use of cleaning solvents is not uniquely associated with the production of crude oil.

Generally, crude oil reclaimer wastes that are derived from exempt oilfield wastes (e.g., produced water, BS&W) are not subject to the Subtitle C waste management requirements of RCRA. Such wastes, however, remain subject to any applicable state solid waste management requirements. Moreover, this exemption from RCRA Subtitle C requirements may not apply if the crude oil reclaimer wastes are combined with other wastes that are subject to RCRA Subtitle C requirements. **[Page 15286]**

B. Service Companies

Oil and gas service companies are those companies hired by the principal operating company to, among other things, supply materials for use at a drilling or production site or provide a service to be performed. Some of the activities of service companies take place on-site while others may take place off-site. Examples of the types of activities that may take place

off-site are product formulation, transport of materials, laboratory analysis, and waste handling and disposal.

The 1988 Regulatory Determination stated that "oil and gas service company wastes, such as empty drums, drum rinsate, vacuum truck

rinsate, sandblast media, painting wastes, spent solvents, spilled chemicals, and waste acids" are not covered by the oil and gas E&P exemption. The Agency intended this statement to identify those wastes, including unused and discarded product materials, generated by service companies that are not uniquely associated with primary field operations. (Primary field operations occur at or near the wellhead or gas plant and include only those operations necessary to locate and recover oil and gas from the ground and to remove impurities.) Similar to the reference to crude oil reclamation wastes, the Agency did not intend to imply that under no circumstances will a service company ever generate a RCRA Subtitle C-exempt waste. For example, if a service company generates spent acid returns from a well work-over, the waste is exempt since the waste acid in this case came from down-hole and was part of primary field operations.

EPA is aware that some confusion exists in various segments of the industry with regard to the scope of the exemption from RCRA Subtitle C for solid wastes not uniquely associated with oil and gas exploration and production. One common belief is that any wastes generated by, in support of, or intended for use by the oil and gas E&P industry (including most service company wastes) are exempt. This is not the case; in fact, only wastes generated by activities uniquely associated with the exploration, development or production of crude oil or natural gas at primary field operations (i.e., wastes from down-hole or wastes that have otherwise been generated by contact with the production stream during the removal of produced water or other contaminants from the product) are exempt from regulation under RCRA Subtitle C regardless of whether they are generated on-site by a service company or by the principal operator. In other words, wastes generated by a service company (e.g., unused frac or stimulation fluids and waste products) that do not meet the basic criteria listed in the Report to Congress (i.e., are not uniquely associated with oil and gas E&P operations) are not exempt from Subtitle C under the oil and gas exemption, just as wastes generated by a principal operator that do not meet these criteria are not exempt from coverage by RCRA Subtitle C.

The 1988 Regulatory Determination also stated that "vacuum truck and drum rinsate from trucks and drums transporting or containing non-exempt waste" is not included within the exemption (emphasis added). The unstated corollary to this is that vacuum truck and drum rinsate from trucks and drums transporting or containing exempt wastes is exempt, provided that the trucks or drums only contain E&P-related exempt wastes and that the water

or fluid used in the rinsing is not subject to RCRA Subtitle C (i.e., is itself non-hazardous). This is consistent with the general policy principle that certain wastes derived exclusively from RCRA Subtitle C-exempt wastes remain exempt from RCRA Subtitle C.

C. Crude Oil Pipelines

Crude oil is produced from the ground through a system of one or more wells in an oilfield. The oil and any related produced water typically is directed to a series of tanks known as a tank battery where the water and oil separate naturally due to gravity; sometimes, separation is enhanced by the use of heat. Most water is separated from the oil at the tank battery. The volume of oil produced is then metered prior to a change in custody or ownership of the oil and/or its transportation off-site.

In the case of crude oil, all production-related activities occur as part of primary field operations at or near the wellhead. Wastes generated as part of the process of transporting products away from primary field operations are not exempt. Generally, for crude oil production, a custody transfer of the oil (i.e., the product) or, in the absence of custody transfer, the end point of initial product separation of the oil and water, will define the end point of primary field operations and the beginning of transportation. Only wastes generated before the end point of primary field operations are exempt. In this context, the term end point of initial product separation means the point at which crude oil leaves the last vessel, including the stock tank, in the tank battery associated with the well or wells. The purpose of the tank battery is to separate the crude oil from the produced water and/or gas. The movement of crude oil by pipeline or other means after the point of custody transfer or initial product separation is not part of primary field operations.

Therefore, any waste generated by the transportation or handling of the crude oil (product) after custody transfer or, in the absence of custody transfer, after the end point of initial product separation of the oil and water, is not within the scope of the exemption. Examples of non-exempt wastes resulting from transportation include transportation pipeline pigging wastes, contaminated water and snow resulting from spills from transportation pipelines or other forms of transport of the product, and soils contaminated from such spills. It should be noted that the hydrocarbon-bearing soils identified in the 1987 Report to Congress and listed in the 1988 Regulatory Determination as being exempt are limited to those hydrocarbon-bearing soils that occur at oil or gas E&P sites or result from spills of exempt waste. As discussed above, the exempt status of wastes generated by primary field operations and transported off-site for treatment or disposal is not affected by

custody transfer.

D. Gas Plants and Feeder Pipelines

Natural gas is produced from the ground through a system of one or more wells in a gas field. Some water may be separated from the gas at the wellhead, but due to economy of scale, the gas from several wells is generally commingled and sent to a central gas plant where additional water and other impurities are removed. The ownership, or custody, of the natural gas commonly changes hands between the

wellhead and the gas plant, yet the removal of impurities from the gas at a gas plant is still a necessary part of the production process for natural gas.

For natural gas, primary field operations (as defined in the 1987 Report to Congress) include those production-related activities at or near the wellhead and at the gas plant (regardless of whether or not the gas plant is at or near the wellhead) but prior to transport of the natural gas from the gas plant to market. Because the movement of the natural gas between the wellhead and the gas plant is considered a necessary part of the production operation, uniquely associated wastes derived from the production stream along the gas plant feeder pipelines (e.g., produced water, gas condensate) are considered exempt wastes, even if a change of custody of the natural gas has occurred between **[Page 15287]** the wellhead and the gas plant. Some wastes generated at this production stage may not be uniquely associated with the natural gas production stream and are, therefore, not exempt (e.g., pump lube oil, waste mercury from meters and gauges). Similarly, soils contaminated by spills of wastes that are not uniquely associated with production operations, such as soils contaminated by mercury from gauges, are not exempt wastes.

Wastes generated at compressor stations and facilities located along the transportation and distribution network downstream from the gas plant or at the market end of the transportation system are not covered by the E&P exemption. These wastes are not uniquely associated with oil or gas exploration and production and are not exempt.

In addition, wastes generated by non-production related activities (i.e., manufacturing) that may occur at a gas plant are not exempt. These non-exempt manufacturing activities include operations that go beyond the removal of impurities from the raw gas and the physical separation of the gas into its component fractions. Manufacturing activities would be those that are similar to petrochemical plant operations, such as the cracking and reforming of the molecular structures of the various gas fractions and the addition of odorants or other substances. The end point of the scope of the exemption for natural gas is in the gas plant once manufacturing begins or, if no manufacturing

occurs, at the point at which the natural gas leaves the gas plant for transportation to market.

It should be noted that the production of elemental sulfur from hydrogen sulfide gas at a gas plant is considered treatment of an exempt waste (i.e., the hydrogen sulfide gas is a uniquely associated waste). This waste treatment process reduces the volume and/or toxicity of the exempt waste and produces a saleable product. As such, this process is similar to crude oil reclamation and any residual waste derived from the hydrogen sulfide remains exempt.

Finally, wastes uniquely associated with operations to recover natural gas from underground gas storage fields are covered by the exemption just as if the gas were being produced for the first time. This is because operations to store and retrieve natural gas from natural underground formations, as well as the types of wastes generated, are virtually identical to those involved with the production of natural gas for the first time, although the volume of wastes generated by natural gas storage and retrieval is typically smaller than the volume generated by the initial production. In effect, in the context of the E&P exemption, the storage of natural gas in natural underground formations returns the gas to the beginning point of the production process.

III. Administrative Procedure Act Requirements

Today's notice is issued without request for public comment since it does not revise, amend, repeal, change, or otherwise alter any EPA regulation, nor constitute a change to EPA's 1988 Regulatory Determination regarding oil and gas exploration and production wastes. This notice merely provides further clarification of EPA's statements regarding the scope of the exemption for oil and gas wastes. Thus, EPA does not believe that today's notice constitutes an action for which notice and comment is required under the Administrative Procedure Act (APA).

To the extent today's notice is covered by APA requirements, EPA believes that it is merely interpreting the scope of the existing RCRA statutory exclusion for oil and gas wastes, for which notice and comment is not ordinarily required. Alternatively, EPA believes it has good cause under Section 553(b) of the APA to publish this notice without opportunity for comment. EPA has already received substantial comment regarding the scope of the oil and gas exemption in response to its 1987 Report to Congress, and further comment on the issue is unnecessary, particularly since EPA is not altering its position from that which the Agency announced in the 1988 Regulatory Determination.

IV. EPA RCRA Docket

The EPA RCRA docket is located at: United States Environmental Protection Agency, RCRA Information Center, room M2427, 401 M Street, SW., Washington, DC 20460.

The RCRA Information Center is open from 9:00 to 4:00 Monday through Friday, except for federal holidays. The public must make an appointment to review docket materials. Call the docket at (202) 260-9327 for appointments. Copies cost $.15 per page.

The following documents related to the July 6, 1988 regulatory determination are available for inspection in docket number F-88-OGRA-FFFFF.

-- Report to Congress on Management of Wastes from the

Exploration, Development, and Production of Crude Oil, Natural Gas, and Geothermal Energy;

-- All supporting documentation for the regulatory determination, including public comments on the Report to Congress and EPA response to comments, and

-- Transcripts from the public hearings on the Report to Congress.

All supporting documentation for this Federal Register Notice are available for inspection in docket number F-93-OGRC-FFFFF.

Dated: March 11, 1993.

Richard J. Guimond,

Assistant Surgeon General, USPHS. Acting Assistant Administrator.
[FR Doc. 93-6153 Filed 3-19-93; 8:45 am]

BILLING CODE 6560-50-P

Table 16. Annual Production of Major Well Fields
Page 1 of 2

Year	Annual Production (acre-feet per year)					
	Santa Fe	Buckman	Los Alamos	Española	Eldorado	Total
1947	0	---	451	---	---	451
1948	0	---	810	---	---	810
1949	0	---	930	---	---	930
1950	121	---	1,688	---	---	1,809
1951	2,010	---	2,366	---	---	4,376
1952	699	---	2,449	---	---	3,148
1953	594	---	2,504	---	---	3,098
1954	1,618	---	2,314	---	---	3,932
1955	1,649	---	2,397	---	---	4,046
1956	2,594	---	2,891	---	---	5,485
1957	993	---	2,228	---	---	3,221
1958	0	---	2,354	---	---	2,354
1959	1,255	---	2,673	---	---	3,928
1960	550	---	3,262	---	---	3,812
1961	488	---	3,588	---	---	4,076
1962	601	---	3,603	---	---	4,204
1963	734	---	3,661	---	---	4,395
1964	3,154	---	3,962	---	---	7,116
1965	199	---	3,428	---	---	3,627
1966	185	---	3,655	---	---	3,840
1967	3,257	---	4,048	335	---	7,640
1968	1,213	---	4,297	374	---	5,884
1969	1,338	---	4,100	339	---	5,777
1970	4,315	---	4,229	328	---	8,872
1971	4,055	---	4,760	225	---	9,040
1972	3,739	849	4,628	393	15	9,625
1973	962	2,325	4,803	522	11	8,623
1974	2,202	3,288	4,984	664	11	11,149
1975	450	2,372	4,711	621	13	8,167
1976	1,801	2,700	5,193	758	14	10,465
1977	2,009	3,100	4,517	510	23	10,160
1978	810	1,609	4,413	627	26	7,485
1979	1,196	511	4,318	657	53	6,735
1980	1,565	507	4,803	733	46	7,654
1981	2,607	2,486	4,616	760	41	10,510

Source: Duke, 2001 (Table 5-1)

--- = No data available

MONTHLY GEOTHERMAL PURCHASER'S REPORT
FORM G-109

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
2040 Pacheco St.
Santa Fe, NM 87505

Form G-109
Adopted 10-1-74
Revised 10-1-78

MONTHLY GEOTHERMAL PURCHASER'S REPORT

Month of

Purchaser's Name	Address	
Place of Utilization	Purpose	Producer's Name
Lease	Field	County

WELL NO.	LOCATION UL	S	T	R	Product* Purchased	Total Mass, Lbs. x 10^6	Total Vol., Acre Feet	Total Vol., Gallons †	Temp. °F	Pres. psi
Totals										

Residual Water	Acre Feet	Gallons †	Disposition
Type and Weight of Minerals Extracted			Disposition of Minerals

*State type of product: Dry Steam, Geothermal Water, Low-Temp. Thermal Water, etc.
†Total Volume in Gallons for Low-Temp. Thermal Wells Only

I hereby certify that the above information is true and complete to the best of my knowledge and belief.

Remarks: _____ Name _____

_____ Title _____ Date _____

RULE G-209. MONTHLY GEOTHERMAL PURCHASER'S REPORT (FORM G-109)

The purchaser of production from any geothermal resource well shall file in DUPLICATE a monthly purchaser's report, Form G-109, which report shall be due in the Santa Fe Office of the Division by the 15th day of each month and shall show the purchases made from all leases and wells connected to the purchaser's facilities during the preceding calendar month.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

Adopted 10-1-74
Revised 10-1-78

ANNUAL GEOTHERMAL TEMPERATURE AND PRESSURE TESTS

Operator	Address	Field	County

LEASE	WELL NO.	LOCATION UL	S	T	R	Date & Hour Shut In	Production Last 24 Hrs.	Flowing Pres. psi	Flowing Temp. °F	Date & Hour of Tests	Time Shut-in Hrs., Mins.	SI Pres psig Dead-weight

hereby certify that the above information is true and complete to the best of my knowledge and belief.

gnature _____ Title _____ Date _____

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

Form C-132
Adopted 10-1-74
Revised 10-1-78

APPLICATION TO PLACE WELL ON INJECTION-GEOTHERMAL RESOURCES AREA

Operator		Address	
Lease Name	Well No.	Field	County

Location

Unit Letter _____ ; Well Is Located _____ Feet From The _____ Line And _____ Feet From The _____ Line, Section _____ Township _____ Range _____ NMPM.

CASING AND TUBING DATA

NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEMENT	TOP OF CEMENT	TOP DETERMINED BY
Conductor Pipe					
Surface Casing					
Long String					
Tubing			Name, Model and Depth of Tubing Packer		

Name of Proposed Injection Formation	Top of Formation	Bottom of Formation

Is Injection Through Tubing, Casing, or Annulus?	Perforations or Open Hole?	Proposed Interval(s) of Injection

Is This a New Well Drilled For Injection ?	If Answer is No, For What Purpose was Well Originally Drilled?	Has Well Ever Been Perforated in Any Zone Other Than the Proposed Injection Zone?

List All Such Perforated Intervals and Sacks of Cement used to Seal Off or Squeeze Each

Depth of Bottom of Deepest Fresh Water Zone in This Area	Is This Injection for Purpose of Pressure Maintenance or Water Disposal? (See Rules 501 and 502)

Anticipated Daily Injection Volume	Minimum	Maximum	Open or Closed Type System	Is Injection to be by Gravity or Pressure?	Approx. Pressure (psi)

Answer Yes or No Whether the Following Waters are Mineralized to such a Degree as to be Unfit for Domestic, Stock, Irrigation, or Other General Use—	Water to be Injected	Natural Water in Injection Zone	Are Water Analyses Attached?

Name and Address of Surface Owner (or Lessee, if State or Federal Land)

List Names and Addresses of all Operators Within One-Half (½) Mile of This Injection Well

Have Copies of this Application Been Sent to Each Operator Within One-Half Mile of this Well?	Yes ☐ No ☐		
Are the Following Items Attached to this Application (see Rule 503)	Plat of Area Yes ☐ No ☐	Electrical Log Yes ☐ No ☐	Diagrammatic Sketch of Well Yes ☐ No ☐

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

(Signature)	*(Title)*	*(Date)*

NOTE: Should waivers from all operators within one-half mile of the proposed injection well not accompany this application, the New Mexico Oil Conservation Division will hold the application for a period of 20 days from the date of receipt by the Division's Santa Fe office. If at the end of the 20-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing, if the applicant so requests. SEE RULE 503.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

Form G-110
Adopted 10-1-74
Revised 10-1-78

MONTHLY GEOTHERMAL INJECTION REPORT

Month of

Operator | Address

Lease Name | Field | County

Well No.	Location				P.M. or D.	Acre Feet Water Inj.	Ave. Surf. Inj. Pres.	Ave. Temp. Inj. Wtr.	Cumulative Water Inj.	Name of Inj. Zone	Source of Water
	UL	S	T	R							
TOTALS											

P.M. is injection into a producing zone for the purpose of building up or maintaining pressure.

D. is injection into a zone other than a producing zone for disposal purposes.

I hereby certify that the above is true and complete to the best of my knowledge and belief.

Remarks: _____ Name _____

_____ Company _____

_____ Title _____ Date _____

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

Form C-108
Adopted 10-1-74
Revised 10-1-78

MONTHLY GEOTHERMAL PRODUCTION REPORT

SUBMIT IN DUPLICATE

Month of

Operator | Address

Lease Name | Reservoir | County

NOTE: Report actual production (NOT SALES). Use Form G-109 for water injection wells.

Well No.	Unit Ltr.	Sec.	Twp.	Rge	Total mass produced (Lbs x 10^6)	Dry steam produced (Lbs x 10^6)	Flow temp. (°F)	Flow pres. (psig)	Water produced (acre-feet)	Minerals produced (type and tons)	Method of Prod (F. or P.)	No. days well prod	If well not on production, state reason
TOTALS													

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

(Signature) | (Title) | (Date)

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

May 21, 2008

Mr. Steve Brown
Lightning Dock Geothermal No. HI-01
5152 North Edgewood Drive Suite 375
Provo, Utah 84604

Re: Lightning Dock Geothermal No. HI-01 Discharge Permit (GT-001)
Near Animas, NM
Hidalgo County, New Mexico

Dear Mr. Brown:

The New Mexico Oil Conservation Division (NMOCD) has received Los Lobos Renewable Power, LLC's (owner/operator) application, filing and permit fees, on the behalf of Lightning Dock Geothermal No. HI-01, dated May 12, 2008, for authorization to install 3 Class V Geothermal Injection Wells, 5 Production or Development Wells, and a binary cycle power plant. The proposed discharge site is located in the NE ¼ of the SW ¼ of Section 7, Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. The submittal provided the required information in order to deem the new application "administratively" complete.

Therefore, the July 2006 New Mexico Water Quality Control Commission regulations (WQCC) notice requirements of 20.6.2.3108 NMAC must be satisfied and demonstrated to the NMOCD. Geothermal discharge water shall not be produced, discharged or reinjected until the NMOCD notice period passes, and NMOCD sends and receives a signed discharge permit.

If there are any questions regarding this matter, please do not hesitate to contact me at (505) 476-3491 or carlj.chavez@state.nm.us. On behalf of the staff of the NMOCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Carl Chavez
Environmental Engineer

CC/cc

xc: OCD District Office

DESCRIPTION OF GEOTHERMAL WELL DRILL LOCATIONS IN
LIGHTNING DOCK NO. 1, HI-01 LLC
ANIMAS, HIDALGO COUNTY, NEW MEXICO

WELL # 23-07

Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3781.0' feet along the west section line;
Thence, East, a distance of 530.1 feet to the location of said well.

SW/NW UL: E

WELL # 43-07

Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3721.2 feet along the west section line;
Thence, East, a distance of 1789.4 feet to the location of said well.

SE/NW UL: F

WELL # 63-07

Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3775.3 feet along the west section line;
Thence, East, a distance of 3052.1 feet to the location of said well.

SW/NE UL: G

WELL # 45-07

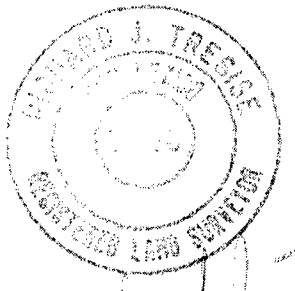
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 2360.0 feet along the west section line;
Thence, East, a distance of 2278.2 feet to the location of said well.

NE/SW UL: K

WELL # 47-07

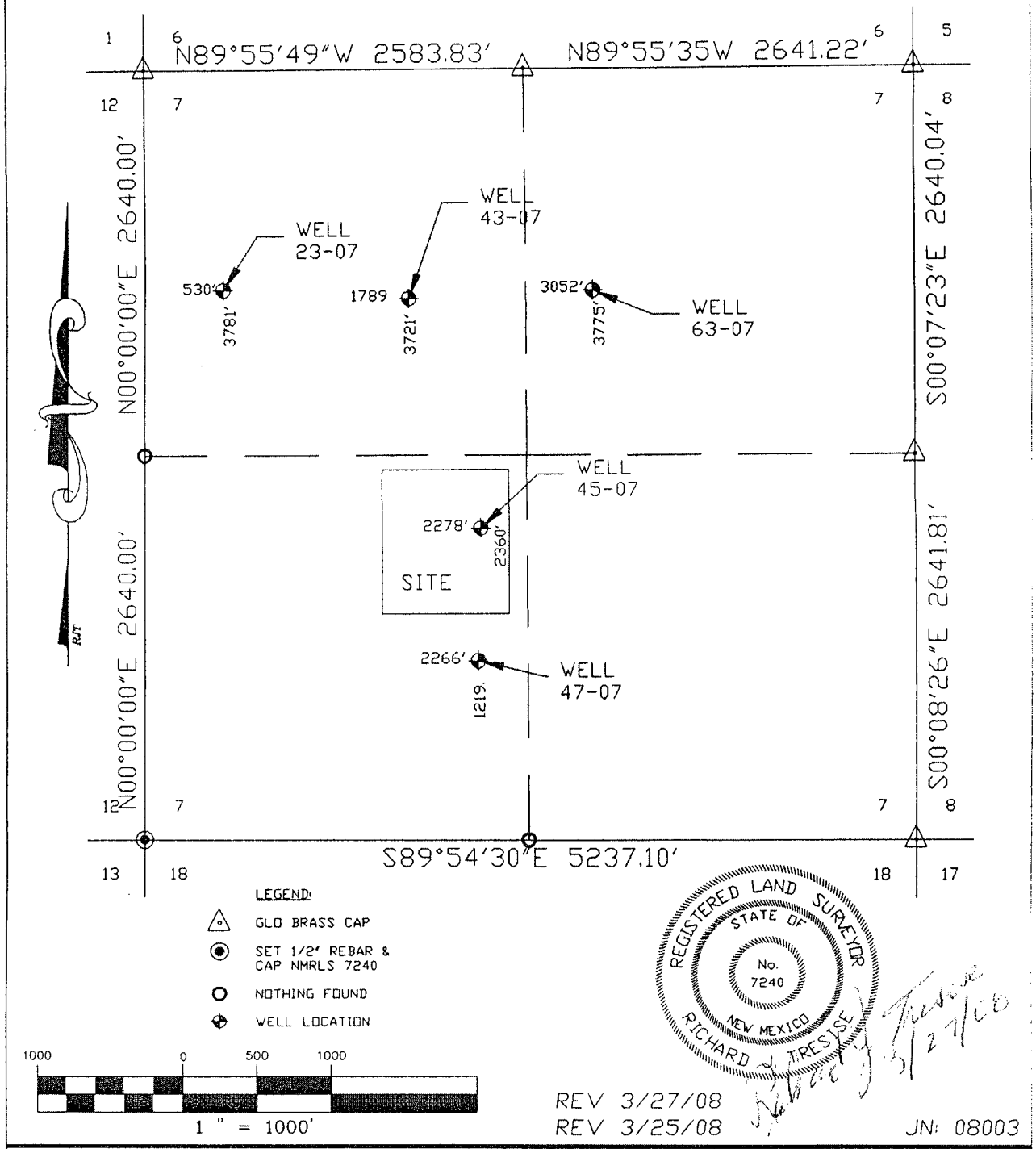
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 1219.1 feet along the west section line;
Thence, East, a distance of 2266.3 feet to the location of said well.

SE/SW UL: N



Tresise
3/27/08

Prepared by:
Richard J. Tresise
555 Ringer Ave.
Bosque Farms, NM 87068



REV 3/27/08
REV 3/25/08

JN: 08003

DATE OF SURVEY: MARCH 12, 2008

EXHIBIT B1
LIGHTNING DOCK NO. 1, HI-01 LLC
WELL LOCATIONS
HIDALGO COUNTY, NEW MEXICO

Sec. 7, Township 25S, Range 19W

SURVEYING – PLANNING – MAPPING
NEW MEXICO – COLORADO – ARIZONA
GPS SURVEYS * A.L.T.A. Surveys

MIDDLE EARTH DESIGNS, LLC

555 Ringer Ave. – Bosque Farms, N.M. 87068
Phone/Fax: (505) 869-3264
Mobile:(505) 980-9175 Email:Rtresise@AOL.com

DESCRIPTION OF GEOTHERMAL WELL DRILL LOCATIONS IN
LIGHTNING DOCK NO. 1, HI-01 LLC
ANIMAS, HIDALGO COUNTY, NEW MEXICO

WELL # 48-07

Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1307.0' feet along the west section line;
Thence, East, a distance of 2123.1 feet to the location of said well. NE/NW UL: C

WELL # 68-07

Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1297.2 feet along the west section line; NW/NE UL: B
Thence, East, a distance of 3350.4 feet to the location of said well.

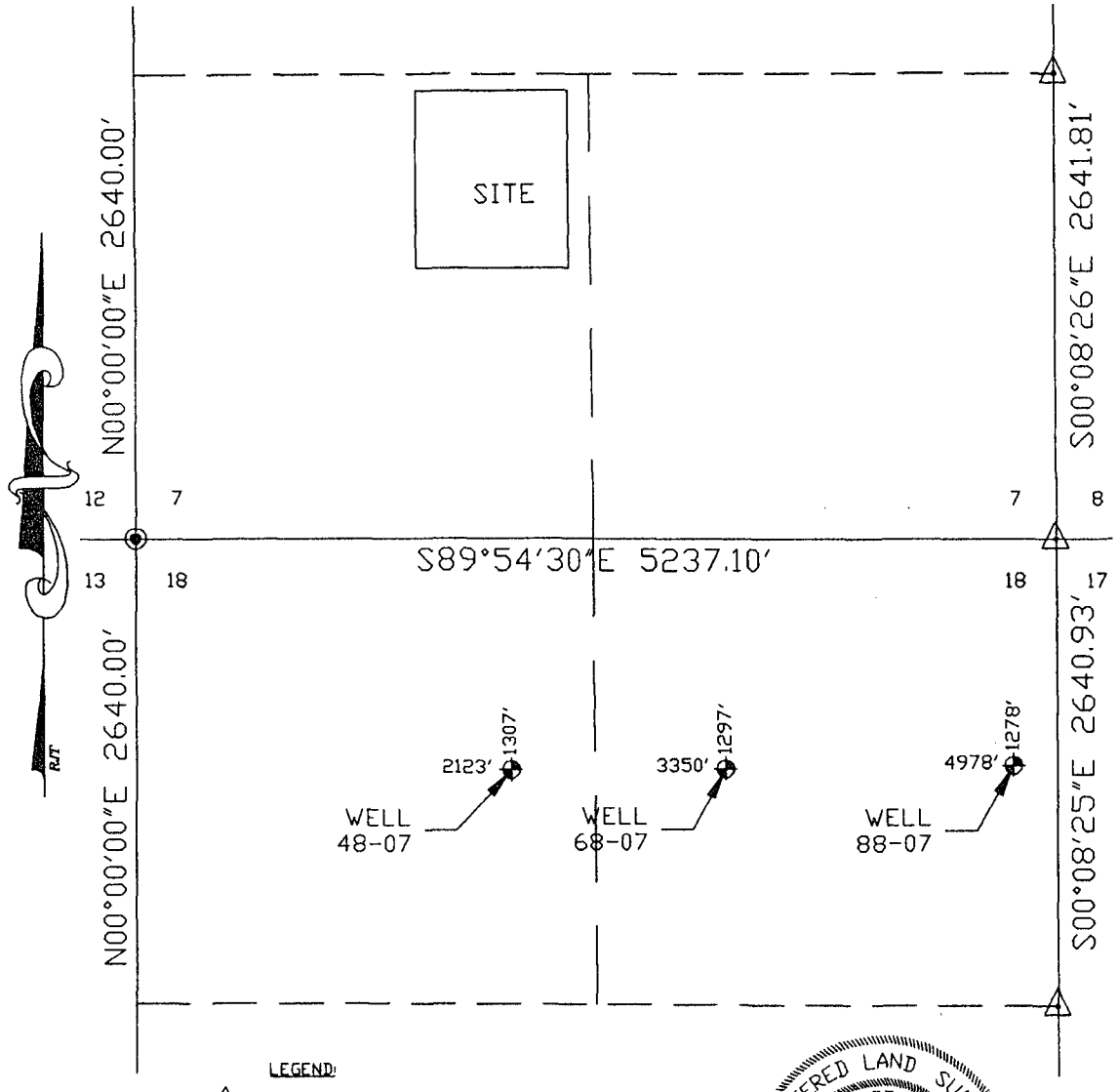
WELL # 88-07

Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1278.3 feet along the west section line;
Thence, East, a distance of 4978.1 feet to the location of said well. NE/NE UL: A

Richard J. Tresise 3/25/08

RICHARD J. TRESISE
NEW MEXICO
7859
REGISTERED LAND SURVEYOR

Prepared by:
Richard J. Tresise
555 Ringer Ave.
Bosque Farms, NM 87068



LEGEND:

- GLO BRASS CAP
- SET 1/2" REBAR & CAP NMRLS 7240
- NOTHING FOUND
- WELL LOCATION

1000 0 500 1000

1 " = 1000'

REGISTERED LAND SURVEYOR
STATE OF
No. 7240
NEW MEXICO
RICHARD J. TRESISE

Richard J. Tresise 3/25/08

JN: 08003

DATE OF SURVEY: MARCH 12, 2008

EXHIBIT B2
LIGHTNING DOCK NO. 1, HI-01 LLC
WELL LOCATIONS
HIDALGO COUNTY, NEW MEXICO

Sec. 18 , Township 25S , Range 19W

SURVEYING - PLANNING - MAPPING
NEW MEXICO - COLORADO - ARIZONA
GPS SURVEYS * A.L.T.A. Surveys

MIDDLE EARTH DESIGNS, LLC

555 Ringer Ave. - Bosque Farms, N.M. 87068
Phone/Fax: (505) 869-3264
Mobile:(505) 980-9175 Email:Rtresise@AOL.com

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

RECEIVED
2008 MAY 13 PM 2 23

Revised June 10, 2003

Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to Appropriate
District Office

DISCHARGE PLAN APPLICATION FOR SERVICE COMPANIES,GAS PLANTS, REFINERIES, COMPRESSOR, GEOTHERMAL FACILITES AND CRUDE OIL PUMP STATIONS

(Refer to the OCD Guidelines for assistance in completing the application)

☒ New ☐ Renewal ☐ Modification

1. Type: Lightning Dock No. 1

2. Operator: Los Lobos Renewable Power, L.L.C.

   Address: 5152 North Edgewood Drive Suite 375

   Contact Person: Steve Brown Phone: (801) 765-1200

3. Location: NE /4 SW /4 Section 7 Township 25S Range 19W
   Submit large scale topographic map showing exact location.

4. Attach the name, telephone number and address of the landowner of the facility site.
   See Discharge Plan Application for Brine Extraction Facilities (Section IV)
5. Attach the description of the facility with a diagram indicating location of fences, pits, dikes and tanks on the facility.
   See Discharge Plan Application for Brine Extraction Facilities (Site Map)
6. Attach a description of all materials stored or used at the facility.
   See Discharge Plan Application for Brine Extraction Facilities (Section V)
7. Attach a description of present sources of effluent and waste solids. Average quality and daily volume of waste water must be included.
   See Discharge Plan Application for Brine Extraction Facilities (Section VII)
8. Attach a description of current liquid and solid waste collection/treatment/disposal procedures.
   See Discharge Plan Application for Brine Extraction Facilities (Section IV)
9. Attach a description of proposed modifications to existing collection/treatment/disposal systems.
   See Discharge Plan Application for Brine Extraction Facilities (Section VI-D)
10. Attach a routine inspection and maintenance plan to ensure permit compliance.
    See Discharge Plan Application for Brine Extraction Facilities (Section VI-F)
11. Attach a contingency plan for reporting and clean-up of spills or releases.
    See Discharge Plan Application for Brine Extraction Facilities (Sections IV-F and VIII)
12. Attach geological/hydrological information for the facility. Depth to and quality of ground water must be included.
    See Discharge Plan Application for Brine Extraction Facilities (Section IX)
13. Attach a facility closure plan, and other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.
    See Discharge Plan Application for Brine Extraction Facilities (Section VI-F.5)
14. CERTIFICATION: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Steve Brown Title: Member

Signature: Date: May 12, 2008

E-mail Address: steve.brown@rasertech.com

ZIONS FIRST NATIONAL BANK
Orem/Wasatch Office 1220 South 800 East
Orem, Utah 84097

RASER TECHNOLOGIES, INC.
5152 EDGEWOOD DR. STE 375
PROVO, UT 84604
801-765-1200

DATE
4/30/2008

11929
31-5/1240
41

PAY TO THE ORDER OF State of New Mexico Energy

**********100.00
$

One hundred and xx / 100

DOLLARS

State of New Mexico Energy
Minerals and Natural Resources Dept.
1220 South St. Francis Dr.
FOR Santa Fe, NM 87505
USA

Richard E Hall

"011929" 1:1240000541: 041 03916 5"

RASER TECHNOLOGIES, INC.

VENDOR: M&N-NM
REMIT TO: State of New Mexico Energy
CHECK: 0000011929
COMMENT:
DATE: 4/30/2008 11929

INVOICE	DATE	VOUCHER	COMMENT	AMOUNT	DISCOUNT	NET AMOUNT
4252008	4/30/2008	0000001772		100.00	0.00	100.00
			TOTALS:	100.00	0.00	100.00

RASER TECHNOLOGIES, INC.
5152 EDGEWOOD DR. STE 375
PROVO, UT 84604
801-765-1200

ZIONS FIRST NATIONAL BANK
Orem/Wasatch Office 1220 South 800 East
Orem, Utah 84097

DATE 4/30/2008

11930
31-5/1240
41

PAY TO THE ORDER OF

State of New Mexico Energy

**********1,700.00
$

One thousand seven hundred and xx / 100

DOLLARS

State of New Mexico Energy
Minerals and Natural Resources Dept.
1220 South St. Francis Dr.
FOR Santa Fe, NM 87505
USA

Richard E Holt

"011930" 1:1240000541: 041 03916 5"

RASER TECHNOLOGIES, INC.

VENDOR: M&N-NM
REMIT TO: State of New Mexico Energy
CHECK: 0000011930
COMMENT:
DATE: 4/30/2008 11930

INVOICE	DATE	VOUCHER	COMMENT	AMOUNT	DISCOUNT	NET AMOUNT
04252008	4/25/2008	0000001773	HI01-040 State of New Mexico Energy	1,700.00	0.00	1,700.00
			TOTALS:	1,700.00	0.00	1,700.00

ACKNOWLEDGEMENT OF RECEIPT
OF CHECK/CASH

I hereby acknowledge receipt of check No. _____ dated 4/30/08

or cash received on _____ in the amount of $ 100.00

from Los Lobos Renewable Power LLC

for GT-1

Submitted by: Lawrence Romero Date: 5/16/08

Submitted to ASD by: Lawrence Romero Date: _____

Received in ASD by: _____ Date: _____

Filing Fee ✓ New Facility _____ Renewal _____

Modification _____ Other _____

Organization Code 521.07 Applicable FY 2004

To be deposited in the Water Quality Management Fund.

Full Payment _____ or Annual Increment _____

ACKNOWLEDGEMENT OF RECEIPT OF CHECK/CASH

I hereby acknowledge receipt of check No. _____ dated 4/30/08

or cash received on _____ in the amount of $ 1700 00

from Los Lobos Renewable Power LLC

for GT-1

Submitted by: Lawrence Romero Date: 5/16/08

Submitted to ASD by: Sowma Romero Date: 5/16/08

Received in ASD by: _____ Date: _____

Filing Fee _____ New Facility _____ Renewal _____

Modification _____ Other _____

Organization Code 521.07 Applicable FY 2004

To be deposited in the Water Quality Management Fund.

Full Payment ✓ or Annual Increment _____

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

RECEIVED
2008 MAY 13 PM 2 23

Revised June 10, 2003

Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to Appropriate
District Office

DISCHARGE PLAN APPLICATION FOR SERVICE COMPANIES,GAS PLANTS, REFINERIES, COMPRESSOR, GEOTHERMAL FACILITES AND CRUDE OIL PUMP STATIONS

(Refer to the OCD Guidelines for assistance in completing the application)

☒ New ☐ Renewal ☐ Modification

1. Type: Lightning Dock No. 1
2. Operator: Los Lobos Renewable Power, L.L.C.

   Address: 5152 North Edgewood Drive Suite 375

   Contact Person: Steve Brown Phone: (801) 765-1200

3. Location: NE /4 SW /4 Section 7 Township 25S Range 19W
   Submit large scale topographic map showing exact location.

4. Attach the name, telephone number and address of the landowner of the facility site.
   See Discharge Plan Application for Brine Extraction Facilities (Section IV)
5. Attach the description of the facility with a diagram indicating location of fences, pits, dikes and tanks on the facility.
   See Discharge Plan Application for Brine Extraction Facilities (Site Map)
6. Attach a description of all materials stored or used at the facility.
   See Discharge Plan Application for Brine Extraction Facilities (Section V)
7. Attach a description of present sources of effluent and waste solids. Average quality and daily volume of waste water must be included.
   See Discharge Plan Application for Brine Extraction Facilities (Section VII)
8. Attach a description of current liquid and solid waste collection/treatment/disposal procedures.
   See Discharge Plan Application for Brine Extraction Facilities (Section IV)
9. Attach a description of proposed modifications to existing collection/treatment/disposal systems.
   See Discharge Plan Application for Brine Extraction Facilities (Section VI-D)
10. Attach a routine inspection and maintenance plan to ensure permit compliance.
    See Discharge Plan Application for Brine Extraction Facilities (Section VI-F)
11. Attach a contingency plan for reporting and clean-up of spills or releases.
    See Discharge Plan Application for Brine Extraction Facilities (Sections IV-F and VIII)
12. Attach geological/hydrological information for the facility. Depth to and quality of ground water must be included.
    See Discharge Plan Application for Brine Extraction Facilities (Section IX)
13. Attach a facility closure plan, and other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.
    See Discharge Plan Application for Brine Extraction Facilities (Section VI-F.5)
14. CERTIFICATION: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Steve Brown Title: Member

Signature: Date: May 12, 2008

E-mail Address: steve.brown@rasertech.com

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources Department

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Revised June 10, 2003

Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to Appropriate
District Office

DISCHARGE PLAN APPLICATION FOR BRINE EXTRACTION FACILITES

(Refer to the OCD Guidelines for assistance in completing the application)

x☐ New ☐ Renewal

I. Facility Name: Lightning Dock No.1

II. Operator: Los Lobos Renewable Power, L.L.C.

Address: 5152 North Edgewood Drive Suite 375

Contact Person: Steve Brown Phone: (801) 765-1200

III. Location: NE 1/4 SW 1/4 Section 7 Township 25S Range 19W
Submit large scale topographic map showing exact location.

IV. Attach the name and address of the landowner of the facility site.
See Attached Sheet

V. Attach a description of the types and quantities of fluids at the facility.
See Attached Sheet

VI. Attach a description of all fluid transfer and storage and fluid and solid disposal facilities.
See Attached Sheet

VII. Attach a description of underground facilities (i.e. brine extraction well).
See Attached Sheet

VIII. Attach a contingency plan for reporting and clean-up of spills or releases.
See Attached Sheet

IX. Attach geological/hydrological evidence demonstrating that brine extraction operations will not adversely impact fresh water.
See Attached Sheet

X. Attach such other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.
See Attached Sheet

XI. CERTIFICATION:

I hereby certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

Name: Steve Brown Title: Manager

Signature: Date: April 21,2008

E-mail
Address: steve.brown@rasertech.com

DISCHARGE PLAN APPLICATION FOR BRINE EXTRACTION FACILITIES

I. Name of Facility:

See Application Form

II. Name of Operator or Legally Responsible Party and Local Representative:

See Application Form

Local Representative:

Name: Jim Rosier (575) 202-8604

III. Location of Facility:

See Application Form

See enclosed Proposed Action Map

IV. Landowners:

Rosette Inc.
26 Rose Land
Animas, New Mexico 88020

Phone: (575) 548-2353

V. General Proposed Action Description

The Lightning Dock Geothermal (LDG) facility will include a 10 megawatt geothermal power plant and associated facilities using binary technology. The facility consists of 50 UTC Power PureCycle 280 Power systems, each producing 280 gross kW. The PureCycle equipment converts heat provided by geothermal fluids into electricity utilizing the organic Rankin Cycle through the utilization of a closed circulation water system, a heat rejection cooling tower, and minor support systems. Each PureCycle unit consists of an evaporator, condenser, turbine, induction generator, cycle-pump, system controls, control valves and piping which is shop assembled/test, and shipped to the site as a complete unit. The facility is designed for un-manned operation and is capable of producing clean energy on a continuous basis.

The Facility will be supplied with geothermal fluids from a well field which was developed by LDG. The geothermal fluids are produced and transported from the geothermal production wells to the power plant. The fluids flow under pressure directly into the PureCycle evaporators. The geothermal fluid heats and vaporizes the R-245fa working fluid, which is a hydro fluoro carbon refrigerant (HFC). The working fluid expands through the turbine which is coupled to the generator. The expanding working fluids are condensed in a water-cooled condenser and pumped back to the heat exchanger in a closed loop. The facility will utilize a cooling tower system to provide cooling water for the condensers. The spent geothermal fluids are returned via pipelines from the power plant facilities to the injection wells. Electric power required to operate power plant auxiliary equipment and produce, transport and re-inject the geothermal fluids is provided by the gross output of the Facility.

Type and Quantities of Fluids Stored or Used at the Facility:

Lubricants, hydraulic fluids and drilling chemicals (drilling mud, caustic soda, barite, etc.), would be transported to, stored on and used by the Project at the proposed drill and power plant sites (see Table 1). The project must conform to both federal and state requirements for handling these hazardous materials. Typical of most construction projects, the storage and use of these materials may result in minor, incidental spills of diesel fuel or oil on to the ground during fueling of equipment, filling of fuel storage tanks and handling of lubricants. Other incidental spills could be associated with equipment failures such as ruptured hoses. The Proposed Project includes a Storm Water Pollution Prevention Plan (Contingency Plan) which describes the methods for cleanup and abatement of any petroleum hydrocarbon or other hazardous material spill.

Table 1: Materials and Chemicals Commonly Used During Well Drilling

Product	Quantity Used	Quantity Stored
Drilling Mud Gel (Bentonite Clay)	200,000 lbs	100 lb sacks on pallets
Salt (NaCl)	80,000 lbs	2250 lb sacks on pallets
Barite (BaSO4)	12,000 lbs	50 lb sacks on pallets
Tannathin (Lignite)	2,500 lbs	50 lb sacks on pallets
Lime (Calcium Hydroxide)	2,000 lbs	50 lb sacks on pallets
Caustic Soda (Sodium Hydroxide)	1,000 lbs	50 lb sacks on pallets
Diesel Fuel	30,000 gals	6,000 gal tank

Lubricants (Motor Oil, Compressor Oil)	1,000 gals	55 gal drums
Hydraulic fluid	200 gals	55 gal drums
Anti-Freeze (Ethylene Glycol)	100 gals	55 gal drums
Liquid Polymer Emulsion (partially hydrolyzed polyacrylamide / polyacrylate (PHPA) copolymer)	100 gals	5 gal buckets

Table 2:Materials and Chemicals Commonly Used During Power Plant Operations

Substance	Size	Function
R-245fa	4-50 Gallon containers	Working Fluid
SAE 5W-30 Synthetic Motor Oil	49 Gallons	General lubricant and oil for emergency generator
Propane Tank	2-500 Gallon Tanks	Emergency Generator
SAE 5W-10 Synthetic Turbine Oil	5 Gallons	High Grade Oil For Refrigeration Pumps
Multi-Purpose Grease	5 Gallons	Lubricating Machinery
Teflon synthetic Grease	5 Gallons	Lubricating Machinery
pH - Chemicals - Depending on production water	Totes	Control pH in Cooling Towers

Well workover operations may involve placing a dilute mixture of hydrochloric (muriatic) and hydrofluoric acids down the well. The amount of dilute acid placed in the well bore (which can vary from 10,000 gallons to 50,000 gallons or more) is determined by calculating the amount of each type of mineral to be dissolved. Concentrated (35%) hydrochloric acid and 40% ammonium fluoride solution (to make the hydrofluoric acid) are trucked to the site and mixed on site with water by experienced contractors. The dilute acid mixture is placed in the cased well bore, followed by water to push the mixture into the geothermal reservoir. After dissolving the minerals in the geothermal reservoir, the water and spent acids are flowed back through the well to the surface where they are tested, neutralized if necessary (using sodium hydroxide or crushed limestone or marble) and discharged to the reserve pit.

VI. Transfer, Storage and Disposal of Fluids and Solids

A. The Lightning Dock Geothermal drilling procedures and plant operation will not be using toxic or hazardous substances. The geothermal fluids will be extracted and the heat removed and re-injected back into the ground in a closed loop system. The working fluid is a non-hazardous substance (R-245fa, see enclosed Material Safety Data Sheet) and is also a closed loop system. Water used in the cooling towers is groundwater supplemented with non-hazardous compounds to control corrosion (see Plant Schematics).

1. Tankage and Chemical Storage Areas

Storage tanks for fluids other than fresh water will be bermed to contain a volume one-third more than the largest tank. If the tanks are interconnected, the berm will be designed to contain a volume one-third more than the total volume of the interconnected tanks. Chemical and drum storage areas will be paved, curbed and drained such that spills or leaks from drums are contained on the pads.

2. Surface Impoundments

The proposed date of the construction of the ponds is August 17, 2008 (see Construction Schedule).

The ponds will be earth-constructed with a 4:1 slope with a 45 mil liner. Each pond will be monitored with a level control alarm system.

Drilling Activities:

Reserve Pits would be constructed in accordance with the applicable Best Engineer Management Practices. The reserve pit(s) would be fenced with an enclosure fence on three sides, and then fenced on the fourth side once drilling has been completed to prevent access by persons, wildlife or livestock. The fence would remain in place until pit(s) reclamation begins.

Reserve pits would be constructed on each pad for the containment and temporary storage of geothermal fluid, drill cuttings and waste drilling mud during drilling operations. Each reserve pit would be approximately 200 feet long by 100 feet wide by 15 feet deep. The pit will be constructed with a 4:1 slope. They would each hold roughly 277,000 gallons, with a three foot freeboard. Reserve pits will be lined with a 45 (mil) material. The following liners have been selected to be used on the site because of their thermal properties: Chlorosulfonated Polyethylene-reubfirced (CSPE-R), Ethylene Propylene Diene Monomer (EPDM) and Flexible Polypropylene (FPP). No

other liners will be selected unless approved by the Division.

Where possible the liners will be seamless. Where seaming is performed, the seams will be hot-wedge w/double track weld with a 4-6 in overlap. The seaming will be preformed by a qualified individual.

Power Plant Operations:

During operation of the power plant, up to approximately 2,200 acre-feet of water would be consumed per year for the facility cooling tower operation. Water would be pumped from one or more groundwater wells proposed on private land. Water from the wells would be delivered to the power plant via a buried pipeline adjacent to the access road.

For the operation of the power plant the following two ponds will be constructed:

STRUCTURE	SIZE	FUNCTION
Blowdown Pond (Lined)	250' x 100' x 4' (750,000 gallons)	Retention of Excess Geothermal Water
Evaporation Pond (Lined)	100' x 50' x 4' (150,000 gallons)	Retention of Excess Water

Design and construction of the ponds will be overseen by a Professional Engineer.

3. Leach Fields

There will be no leach fields on the property.

4. Solids Disposal

Drilling mud stored in the reserve pit during the drilling operations will be dried and analytically tested before being buried or hauled to an approved off-site disposal facility. It is not anticipated that drilling mud will have toxic or contaminated constituents. All other solids including sands, sludges, filter, containers, cans and drums will be stored in an on site dumpster and disposed as needed to the local approved solid waste facility. If the geothermal fluid produces a buildup of solids they will be analytically tested and disposed of according to local, state and federal regulations.

B.

1. No toxic pollutants are expected to be on the property. All ponds will be lined with a 45 mil liner. All chemicals, lubricants and greases, will be stored in the "Containment Curbed" area of the 20' 30' storage building.

2. During drilling activities there will be a Pason monitoring system installed at the well to monitor the drilling at real time. Sampling ports and gauges will be installed on the well head to monitor the temperature, pressure and water volume. A sampling port will be available to collect water samples. Water samples may be collected during various times throughout the drilling period to provide data to assist the geologist in evaluating the well. Water samples will be collected upon completion of the well and during short and long term pumping tests.

   During plant operations samples of geothermal fluids will be collected to determine the chemistry of the reservoir. Temperature, pressure and volume in the wells will be monitored by automated instruments. Well properties will be measured and transmitted with a 4-20ma interface to the Programmable Logic Controller (PCL). Instrumentation will be provided to produce historical temperature, pressures and flow data from the individual geothermal production wells.

3. No monitoring wells are proposed to monitor leakage or failure of any discharge system. See Section F-4 for automated operation and monitoring systems. Employee inspections of retention and storage ponds will be monitored on a weekly basis. (See Storm Water Pollution Prevention Plan for Construction Activities - Erosion and Sediment Control Inspection Form).

C. Off-site Disposal

No hazardous wastewater sludges, solids etc. are expected to be pumped or shipped off-site.

All lubricants, maintenance oil and grease will be brought on-site in relatively small amounts as described in Section V of this document. All lubricants, maintenance oils, etc will be stored in a 20 x 30 curbed cemented "Containment Cube".

The operator will take extensive measures to prevent leaks or spills as outlined in the Operation Plan, Storm Water Pollution Prevention Plan and Section F-4 of this document.

The operator will follow all state and federal regulations in the delivery, storage, usage, spills/leaks and will abate or remediate and dispose of any and all hazardous,

regulated or substances of concern.

See Enclosure - Storm Water Pollution Prevention Plan

The operator will notify the division of fire, breaks, leaks, spills and blowouts as outlined in 19.14.36.8 NMAC.

If it becomes necessary to transport waste waters, sludges, solids, etc from off site, the operator will use an approved OCD disposal contractor. The operator may use Butterfield Trail Regional Land Disposal as their disposal contractor.

Disposal contractor: Butterfield Trail Regional Land Disposal

Contact : Tom Bates

Address: Deming, New Mexico

Phone Number: (575-546-8848

D. Proposed Modifications

1. Proposed Modifications

   The applicant feels that in Section B.1 they have demonstrated the ability to protect possible ground water by meeting the requirements of the Regulations.

2. The applicant feels they have demonstrated that by the use of liners in the pond and by following state and federal regulations ground water will be protected.

E. During the drilling activities the well casing and piping will follow the specifications as presented in the drilling plan. During the power plant operations the piping systems primarily include the geothermal water and condenser water systems . The basic design specifications common to both systems includes the following:

1. Geothermal piping designed, fabricated, installed and tested to ASME/ANSI B31.3.

2. Condenser Water piping, instrument air piping designed, fabricated, installed and tested to ASME/ANSI B31.9

3. Pipe material shall conform to ANSI A 106 or A53 Grade B.

4. All piping material shall be domestic in origin or certified as fabricated to US standards.

5. Flanges shall be slip-on ANSI 150# rated.

6. All pipes shall be of welded construction.

7. Insulation for piping shall be calcium silicate material.

8. Insulation jacketing shall be .016 PAINTED embossed aluminum or other Engineer Approved Lagging such as Colored Polycarbonate.

9. The pipe shall be sized to maintain a minimum velocity of 4.75 fps and a maximum velocity of 11.18 fps (with 50 units).

10. To the extent possible piping shall be fabricated off site and shipped to the site for installation.

11. After installation all piping and equipment shall be flushed and cleaned.

12. In accordance with ASME/ANSI B31.3 requirements, well field piping shall receive a 5% random x-ray weld inspection.

Mechanical Integrity Testing

1. MIT Tests:

   a. Internal test - No leaks from casing or other casing components.

   b. External Test - No movement of fluids/water behind the casing.

   MIT Test to demonstrate the internal and external test will be "Casing Integrity Tool" and "Cement Bond" respectively.

   Pressure testing will be conducted before the casing shoe is drilled out.

   The Division will be notified a minimum of 48 hours before conducting MIT testing, so a representative may be on site to witness the test.

   Drilling manager will be responsible for maintaining a pressure monitoring system.

System will record the test in real time and the Division will be sent annotated graphics of the test.

2. MIT Procedure:

Casing Test Pressure - Test to 500 psi or maximum authorized injection pressure; 4 hours test.

A successful test is one in which the pressures stabilize within 10% of the required test pressure and remain stabilized for a minimum of 30 minutes.

3. MIT Report

Within 30 days after completion of testing, a Summary Report will be compiled and submitted to the Division with the following information:

a. Condition of geothermal well(s) prior to test (e.g. static, injection at ###gpm, etc.)

b. Condition of well(s) during test(s) , such as, but not limited to operating conditions of the well, water level, changes in status/conditions of the well during test, anomalies witnessed prior to or during test, gauges calibration and conditions for any gauges used, etc.

c. A static temperature, pressure and spinner log will be submitted.

d. Interpretation and conclusions of all test results stating whether each well meets the internal and external regulatory requirements in the regulations will be provided. This will be done in conjunction with the Service Company.

F. Inspection, Maintenance and Reporting

The drilling reserve pits will be monitored by the drilling crew and drill master on a 24/7 basis during drilling operations.

1. During the plant operations two surface impoundment will be constructed to retain the excess geothermal water and water used for the cooling towers.

The cooling tower water will be pumped from a local well by permission of the owner.

The applicant has enclosed the water chemistry from the well and the geothermal source, and no toxic or hazardous chemical have been detected in the water analysis (see Analytical Summary Report). The ponds at no time will treat, store, etc. hazardous chemicals.

The surface impoundments will be designed and inspected upon completion for structural integrity by a professional engineer. The impoundments will have a freeboard equal to or greater than three feet to avoid overtopping from wave action or precipitation. Each impoundment will be installed with a level detection alarm system.

While the surface impoundments are in operation, they will be inspected by the owner/operator weekly and after storms to detect evidence of any of the following;

a. Deterioration, malfunction, or improper operation of control systems

b. Sudden drops in the level of the impoundment's contents

c. Severe erosion, seepage, or other sign of deterioration in dikes or other containment device

Prior to placing a surface impoundment into operation, or prior to renewed operation after six months or more during which the impoundment was not in service, a professional engineer must certify that the impoundment's dike and liner have structural integrity.

Emergency Repairs and Contingency Plans

If a malfunction occurs in the containment system which can cause a release to land or water, a surface impoundment will be removed from service and the operator will take the following actions:

a. Immediately shut down the flow of additional water into the impoundment.

b. Immediately stop leak and contain water which has been released.

c. Take steps to prevent catastrophic failure.

d. If leak cannot be stopped, empty the impoundment.

e. Clean up all release wastes and any contaminated materials if present.

f. Notify the division of the problem within twenty-four hours after detecting the problem.

No Surface impoundment that has been removed from service will be restored to service unless the portion of the impoundment which was failing is repaired and the following steps are taken:

a. If the impoundment was removed from service as the result of actual or imminent failure, the operator will certify the dike's structural integrity.

If the impoundment was removed from service as the result of a sudden drop in the liquid level, the following actions must be taken:

a. For any existing portion of the impoundment without a liner, a liner will be installed.

b. For any portion of the impoundment that is lined, the liner will be repaired and operator will certify that repaired liner meets design specification approved in the permit.

As presented in 19.14.36.8 the notification of a break or leak in the two surface impoundments would be reported as outlined.

Major breaks, spills or leaks: Notification of breaks, spills or leaks of wellheads, pipelines, tanks, drilling pits, storage pits or ponds, the result of which 50 barrels or more of liquids containing hydrocarbons or hydrocarbon wastes, salt water, strong caustics, strong acids or other deleterious substances reach a water course or enter a stream or lake, or in which noxious substances escape or any quantity of fluids are lost which may with reasonable probability endanger human health or result in substantial damage to property, will be classified as 'immediate notification'. Under this notification the operator or owner would in person or by telephone notify the incident to the nearest district office of the Division. A complete report would be required within 10 days after discovery of the incident to the Santa Fe office.

Minor breaks, spills or leaks: Notification of breaks, spills or leaks of well heads, pipelines, tanks, drilling pits, slush pits, storage pits or ponds, the result of which 25 barrels or more but less than 50 barrels of liquids containing hydrocarbons or hydrocarbon wastes, salt water, strong caustics or strong acids or other deleterious substances are lost or in which noxious gases escape, but in which there is no danger to human health nor of substantial

damage to property will be subsequent notice. This notice requires a completed written report to the Santa Fe office with in 10 days.

The report will identify the location of the incident by quarter-quarter, section, township and range, and by distance and direction from the nearest town or prominent landmark so the exact site of the incident can be readily located on the ground. The report will specify the nature and quantity of the loss and also the general condition prevailing in the area, including precipitation, temperature and site conditions. The report will also detail the measures that have been and are being taken to remedy the situation reported.

2. Ground water monitoring will not be used to detect leakage or failure of surface impoundments (see F-1).

3. Surface impoundments are not considered a process area and will be used only for retaining excess geothermal fluid and for water used in the cooling towers. The power plant site will be graded so that precipitation and runoff water will be diverted to the retention pond. A level detection alarm system will be installed in the pond to insure the operator is aware of the additional water. If it becomes necessary to remove water from the pond, the water will be tested for hazardous constituents as directed by the Division.

4. During the operation of the power plant there will be no above or below ground tanks. There will be drums and containers as detailed in Section V. These containers will be stored in a "Containment Curbed" cement area of 20'x30'. This area will be inspected on a weekly basis. There will be underground geothermal piping transporting geothermal fluids from the production wells to the power plant, and the spent fluid being returned to the injection wells. This is a closed loop system and will be closely monitored by the plant instrumentation. In the plant there will be additional piping above ground and below ground to transport working fluid to the plant and the cooling towers. The plant will have a central system to monitor and control water flow, temperatures, pressures, etc.

   The control system is based on a Programmable Logic Controller (PLC).

   PLC System

   a. PLC Processor, Input and Output (IO) modules
   b. Operator Interface (HMI)
   c. Remote IO Panels with network interface
   d. Switch Gear Interface, to the 2500 amp breaker (SWGR-1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B and 5A)

The PLC Processor and IO modules will interface to the automated instruments and control devices typically located near the PLC control panel. In addition, the PLC will have a hardwired interface to the UTC generators. This will allow the generators to be shut down in case of a utility 'trip" or if some other process condition dictates. One PLC output will interface to a set of five generators, allowing for a partial shutdown (in groups of five), or more commonly a complete shutdown.

The HMI will be located near the PLC and provide operating parameters of the generation Plant. This information includes status of the circuit breaker at the Utility Interface CB-M, status from the 2500 amp breakers, and process pressure and temperatures.

Remote IO is used to reduce the length of the instrument and control runs from the PLC to the IO points. Remote IO is located in the Motor control Center (MCCs) which have automated start and stop functions from the PLC. Typically, the instruments located near the Remote Panels will be routed to them. The Remote IO Panels will be networked to the PLC.

The Generator Switch Gear 2500 amp main breaker has a network interface. This interface will allow the PLC to monitor the operating parameters such as voltage level, currents and breaker status. This interface will allow the PLC to open the breaker as needed. Typically the breaker will be opened if CB-M is opened. If the breaker is opened, or trips, the PLC will indicate an open and tripped status on the HMI. The PLC will not close the breaker, forcing the breaker to be manually closed when conditions allow. When the breaker has been manually closed, the HMI will indicate the breaker is closed and tripped status will be removed.

The condenser water system is divided into four operating zones. The operation of zones is controlled by the operator using HMI display. The condenser water pumps are controlled by the PLC and are based on the number of operating zones.

Geothermal pressure control valves automatically adjust to increased supply and demand for the geothermal water. As geothermal well pumps and generators start and stop, the geothermal supply and demand increases or decreases. The pressure control valve adjusts to compensate for fluctuations in the supply and demand.

Cooling fans are automatically controlled. When one or more cooling pumps are running the cooling fan control begins. Cooling fans are turned on and

off to adjust the condenser water temperature supplied to the generators. As the temperature increases, more fans are started. To conserve energy, as the temperature decreases, running fans are stopped accordingly.

Instrumentation will be provided to produce historical temperature and flow data from individual geothermal production wells.

Manuals valves (on/off) will have field verifiable valve position indicators, either by handle position or open and closed position indicators.

Pressure measurements will typically have a field mounted transmitter with a 4-20ma interface to the PLC. The pressure measuring element typically uses a manual isolation valve to allow maintenance without process disruption.

Temperature measurements will typically be in the process flow, and will be incased in temperature wells allowing for maintenance without process disruption. Temperature measurements will typically be done with RTD temperature elements. The RTD will connect to a field mounted transmitter. This transmitter will typically have local or field temperature readout and a 4-20ma PCL interface.

Automated valves will typically have an air actuated controller. For valves requiring on/off control, the valve actuator will be operated by a solenoid valve. Automated control valves are typically I/P type actuator using a 4-20ma signal from the PLC. Automated valves will have a 'fail safe' valve position either normally open or normally closed. The fail safe state is determined by the process conditions to maintain safe operating conditions for personnel and equipment.

The power plant will install a hydrogen sulfide monitoring system with an alarm system. The operator will also install a wind sock to the appropriate height to detect wind direction.

5.

The estimated life of the Project is 30 years or its useful life, whichever is longer. The power plant and field facilities will be decommissioned after having served their use. At this point all useful equipment and material will be salvaged and unsalvageable equipment and materials will be removed from the project site. Since the plant will be designed to be compatible with the existing vegetation and topography, the project site will be easily reclaimed so that it can be used for agriculture purposes or for other uses.

Production and injection wells will be abandoned in compliance with the New Mexico Administrative Code as administered by the New Mexico Department of Minerals and Natural Resources, New Mexico Department of Environmental Protection and the New Mexico State Engineers. The well abandonment will be in compliance with all federal requirements as administered by the BLM.

The geothermal brine gathering and injection pipeline system will be completely disassembled and the disturbed areas will be returned to their original condition.

Within the power plant area all equipment and vessels, such as storage tanks, heat exchangers, turbine/generator sets, condensers, piping, pumps and electrical components, will be removed from the site. Since only minor changes to the plant site will take place during operation and construction, reclamation efforts will be minimal.

All unusable or unsafe structures will be dismantled and removed from the site. Drilling pads and ponds will be restored to the original land surface conditions. Ponds will be reclaimed by removing any contaminated clay and grading the area similar to the original topography. All land will be graded to conform to the existing topography and any paving materials not used for future purposes will be removed. Areas not to be used immediately for cultivation will be planted with an appropriate native grass or shrub mix. The transmission line will most likely be in an operable condition after power plant decommissioning and, therefore, can be used for electrical transmission. The segment of the transmission line located on the owner's property may become the property of the owner. Columbus Cooperative Power Company will most likely use the remaining portion of the line not located on the owner's property for local electricity distribution after making minor modifications to the line. Any segments of the transmission line which are not sold or given to another party will be removed. Poles sites will be returned to their original conditions.

All above-ground equipment, including the power plant, ancillary facilities, the pipelines and their supports would be removed. LDG would prepare a site reclamation plan for review by all relevant state and federal agencies. The plan would address restoring the surface grades, surface drainage and revegetation of cleared areas.

VII. Brine Extraction Well(s)

Each well would be drilled and completed to a nominal measured depth of 3,400 feet. The geothermal well drilling program involves a sequence of drilling holes to a selected depth, cementing a steel casing of smaller diameter into the drilled holes, and then repeating the process with progressively smaller holes and cemented casings to progressively greater depths until the design depth is reached. The steel casing is designed to prevent mechanical failure of the drilled hole, prevent contamination of ground water by geothermal fluid, and prevent loss of the geothermal resource into other aquifers. After cementing of the initial (surface) casing in the well, blowout

prevention equipment (BOPE), which is typically inspected and approved by the division would be installed, tested and ready for use while drilling to ensure that any geothermal fluid encountered does not flow uncontrolled to the surface.

Each well will be drilled to a depth of approximately 3,000 feet using non-toxic, temperature-stable drilling mud composed of a bentonite clay-water or polymer-water mix to lubricate and cool the drill bit, bring rock cuttings to the surface for discharge into the reserve pit, and prevent loss of drilling fluids into the rock. Additional non-hazardous and not-toxic additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight and prevent mud loss. Additional drilling mud would be mixed and added to the drilling rig's mud system as needed to maintain the required quantities.

Below approximately 3,000 feet, each well may be drilled using water with a soap/foam additive and compressed air to reduce the weight of the drilling fluids in the hole, maintain the reservoir permeability and carry the cuttings to the surface. The air, water, rock cuttings, and any reservoir fluids brought to the surface would be diverted through a separator/muffler to separate and discharge the air and water vapor to the atmosphere, and the drilling mud and cuttings to the reserve pit. Upon reaching a desired measured depth, with the drill rig still over the well bore, the residual drilling and cuttings would be flowed from the well bore and discharged to the reserve pit. The well would be evaluated using wireline pressure, temperature and spinner logs. Short term and long-term flow tests could then be conducted on the well.

Individual injection wells are expected to receive between 3,750 and 4,750 GPM (6,000 to 7,600 acre-feet per year) of <220 degree geothermal fluid with well head injection pressures of about <100 psig.

A. Drilling, Deepening, or Plug Back Operations

1. Operator has enclosed the C-101 form to drill wells 13-07, 33-07,53-07, 45-07, 47-07, 42-07, 62-0 and 82-07.
2. Operator has enclosed the "Notice of Intent to Discharge" in accordance with WQCC regulation 1-201.
3. See Enclosed map. (Exibit B)
4. For complete site details see - Well Log For 55-7 and Geologic Study and History
5. See Enclosure - Sundry Notice To Abandon Existing Wells.
6. See Enclosure - Typical Geological Cross Section (Plan of Operations).
7. See Enclosure - Geologic Study and Well 55-7 Drilling Log and Evaluation.
8. See Enclosure - Typical Well Pad Layout and Geothermal Well Completion Profile.

9. See Enclosure - Logging, Procedures, Coring Program and Deviation Checks (Plan of Operations).
10. See Enclosure - Operation Procedures (Plan of Operations).
11. See Enclosure - Abandonment and Plugging (Plan of Operations).

B. Workover Operations

Well work over operations consist of a wide range of potential measures such as air or gas lift operations, formation stimulation (using a dilute mixture of hydrochloric (muriatic) and hydrofluoric acids or rock fracturing techniques), multiple well completions, and well deepening or re-drilling. Subsequent to any well work over, the well would likely be flow tested again.

Before performing remedial work, altering or pulling casing, plugging or abandonment or any other workover, approval of OCD will be obtained. Approval will be requested on an approved OCD Form.

C. Additional Information Required with Discharge Plan

1-2. Upon the request to drill, deepen, workover or plug back operations the operator will use the OCD's "Sundry Notices and Report on Well" form to provide the following information: evaluation, completion and well workover details; including all logs, test results, completion reports, workover descriptions, proposed maximum and average injection pressures and injection volumes, description of injection and extraction procedures, reverse flow if used, mechanical integrity testing procedures and any other information the Division may require.

3. Mechanical Integrity Testing

The mechanical integrity testing of the casing will be conducted prior to use of production or injection wells (see Section E).

MIT Tests:

a. Internal test - No leaks from casing or other casing components.

b. External Test - No movement of fluids/water behind the casing.

MIT Test to demonstrate the internal and external test will be "Casing Integrity Tool" and "Cement Bond" respectively.

Pressure testing will be conducted before the casing shoe is drilled out.

The Division will be notified a minimum of 48 hours before conducting MIT testing, so a representative may be on site to witness the test.

Drilling manager will be responsible for maintaining a pressure monitoring system. The system will record the test in real time and the Division will be sent annotated graphics of the test.

MIT Procedure:

Casing Test Pressure - Test to 500 psi or maximum authorized injection pressure; 4 hours minimum test.

A successful test is one in which the pressures stabilize within 10% of the required test pressure and remain stabilized for a minimum of 30 minutes.

MIT Report:

Within 30 days after completion of testing, a Summary Report will be compiled and submitted to the Division with the following information:

a. Condition of geothermal well(s) prior to test (e.g. static, injection at ###gpm, etc.)

b. Condition of well(s) during test(s) such as, but not limited to operating conditions of the well, water level, changes in status/ conditions of the well during test, anomalies witnessed prior to/during test, gauges calibrations and conditions for any gauges used, etc.

c. A static temperature, pressure, spinner log will be submitted.

d. Interpretation and conclusions of the test results stating whether each well meets the internal and external regulatory requirements will be provided. This will be done in conjunction with the Service Company.

The operator will conduct a casing pressure test isolating the casing from the formation using either a bridge plug or packer prior to start-up, and repeat at least once every five years or during well workover. The operator will conduct an open hole pressure test to 500 psi for 4 hours on an annual basis.

4. Please note that the geothermal fluid and injection fluid are one and the same. This is a closed loop system. The operator has proposed to install the

following 5 production wells and 3 injection wells at the Lightning Dock site:

Production Wells:

13-07
33-07
53-07
45-07
47-07

Injection Wells:

42-18
62-18
82-18

Upon completion and before injection, each well will be sampled from the sampling port on the well head. A sufficient volume of water will be drawn off before the production well is sampled to ensure a representative sample is collected from the geothermal reservoir. Sample will be collected and submitted to the laboratory for analysis for concentrations of Total Dissolved Solids, Sodium, Calcium, Potassium, Magnesium, Bromide, Carbonate/Bicarbonate, Chloride and Sulfate. Sampling containers will be obtained from the laboratory to ensure cleanliness of the containers. All standard industrial environmental sampling standards will be observed in collection, storing, and delivery to the laboratory. The operator will use only a New Mexico approved laboratory.

Samples will be documented and tracked using a standard Chain-of-Custody form. Sample custody begins at the time of sample collection and will be maintained by the sampling individual until samples are relinquished for shipment to the laboratory, or until samples are hand-delivered to the designated laboratory sample custodian.

5. Upon well completion the operator will provide an analysis of the injection fluid and brine. The report will also compare volumes of fresh water injected to volume of brine to detect underground losses and specify methods by which volumes are determined. After approval, submittal of a quarterly report listing by month the volume of fluids injected and produced will be delivered to the Division.

6. The operator will submit a renewal application for the facility Operation every 15 years to provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued

brine extraction will not cause surface disturbance or catastrophic collapse.

VIII. Spill/Leak Prevention and Reporting Procedures (Contingency Plans)

A. The Lightning Dock geothermal drilling procedures and plant operation will not be using toxic or hazardous substances. The geothermal fluids will be extracted and heat removed and reinjected back into the ground. If geothermal fluids are spilled or released they will be abated in a timely manner and reported as explained in Section VI-F of this document.

The working fluid is a non-hazardous substance which is also a closed loop system. If the working fluid spills or leaks it will be abated in a timely manner and reported as explained in Section VI-F of this document.

Water used in the cooling towers will be groundwater. Some non-hazardous compounds will be used to control corrosion. If water leaks or spills it will be abated in a timely manner and reported as explained in Section VI-F of this document.

All lubricants, maintenance oil and grease will brought on site in relatively small amounts as described in Section V of this document. All lubricants, maintenance oils, etc. will be stored in a 20 x 30 cubed cemented "Containment Cube".

B. The operator will take extensive measures in preventing leaks or spills as outlined in the Operation Plan, Storm Water Pollution Prevention Plan and Section VI-F of this document. The operator will follow all state and federal regulations in delivery, storage, usage, spill abatement or remediation and disposal of any and all hazardous, regulated or substances of concern.

See Enclosure - Storm Water Pollution Prevention Plan

C. The operator will notify the division of fire, breaks, leaks, spills and blowouts as outlined in 19.14.36.8 NMAC.

IX. Site Characteristics

A. The subject property resides to the south of the Gila River in the Animas Valley. The Animas Valley Watershed is a closed basin system with no outlet. The valley drains the surrounding highland through ephemeral streams and creeks and occupies an area that is from 7 to 13 miles in width and about 90 mil long. The northern portion of the valley contains alkali lakes that are the remnants of collected surface water. The valley ends just to the north and northwest of the city of Lordsburg and is separated by the Gila river from the Lordsburg Mesa.

The subject property is situated within the Rio Grande aquifer system. This aquifer system is the principal aquifer in the New Mexico, Texas, and Colorado Area. These aquifers consist of interconnected intermountain sediment-filled valleys. This basin fill material is the principal water-bearing unit. These sediments generally consist of the Santa Fe Group of the Gila conglomerate in southwestern New Mexico. These Tertiary and Quaternary deposits are discontinuous units and generally range in thickness of several hundred feet. The aquifer is recharged through mountain-valley boundaries, river and stream loss and irrigation discharge. In Hidalgo County in the Animas Valley, a geothermal region lies on the eastern side of the valley at the foot of the Pyramid Mountain about ten miles south of Interstate 10, and about 20 miles distant from Lordsburg. In the site vicinity, depth to ground water is reported about 40 to 60 feet below ground surface (bgs) but is variable with pumping rates and water usage in the area. The groundwater gradient in the overall valley is to the west and north-northwest following topography.

"The Effects of Shallow Geothermal Fluid Utilization on Fresh Water..." by Richard Austin has been enclosed for the Division's review.

1. See Enclosed Proposed Project Action Map

2. See Enclosed Analytical Reports.

3. See Enclosed Well Study and Well Log for 55-07.

4. Provide Information On:

    a. In a review of the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA) for Hidalgo County in the general area of the subject property, and communications with personnel from FEMA it appears the subject property and surrounding area has not been mapped with regard to flood zones. Numerous ephemeral streams are present and adjacent to the subject property; it appears that the site would have minimal flood potential associated with these ephemeral streams and mountain drainage on and about the site.

    b. No additional flood protection measures will be provided.

B. Additional Information

The operator has provided in this document information necessary to demonstrate that approval of the discharge plan will not result in concentrations in excess of the standards of WQ Section 3-103, or the presence of any toxic pollutant (Section

10101.UU.) at any place of withdrawal of water for present or reasonable foreseeable future use.

The operator will provide additional information upon request from OCD.

X. Other Compliance Information

The operator will provide additional information upon request from OCD.

MATERIAL SAFETY DATA SHEET INDEX

PRODUCT NAME/FUNCTION	CHEMICAL INGREDIENTS
Amersite 2 Corrosion Inhibitor	Sodium Bisulfite
Wrico Oxy 11 Corrosion Inhibitor	Sodium Sulfite Ethylanediamine Tetraacetic Acid Cyclohexylamine
Midland 203 Oxygen Scavenger	Sodium Metabisulfite Cobalt Compounds
Millsperse Anti-scalant	Poly (Maleic Acid)
Sodium Hydroxide pH Adjustor and H2S Abator	Sodium Hydroxide
Drew 11-480 Corrosion Inhibitor	Soya Amine Poly
Royal Purple Barrier Fluid	Synthetic Lubricant
Catalyzed Sulfite Anti-Scalant	Sodium Chloride Phosphoric Acid Derivative
Biosperse 250 Microbiocide	Magnesium Nitrate Cupric Nitrate Magnesium Chloride 2-Methyl-4-Isothiazolin-3-One
Sulfuric Acid Anti-Scalant	Sulfuric Acid

AMERSITE 2

Corrosion Inhibitor

Chemical Ingredient:
Sodium Sulfite

ASHLAND CHEMICAL INC -- AMERSITE 2 CORROSION INHIBITOR -- 6850-00N072809

========== Product Identification ==========

Product ID:AMERSITE 2 CORROSION INHIBITOR
MSDS Date:05/31/1989
FSC:6850
NIIN:00N072809
MSDS Number: CBYYY
=== Responsible Party ===
Company Name:ASHLAND CHEMICAL INC
Address:ONE DREW PLAZA
City:BOONTON
State:NJ
ZIP:07005
Country:US
Info Phone Num:201-263-7600
Emergency Phone Num:606-324-1133: 800-274-5263
CAGE:DO048
=== Contractor Identification ===
Company Name:ASHLAND CHEMICAL CO., ASHLAND OIL DIV.
Address:P.O. BOX 2219
Box:2219
City:COLUMBUS
State:OH
ZIP:43216
Phone:606-324-1133
CAGE:DO048
Company Name:DREW CHEMICAL CORP,DIV OF ASHLAND CHEMICAL CO
Address:ONE DREW CHEMICAL PLAZA
Box:City:BOONTON
State:NJ
ZIP:07005
Country:US
Phone:606-324-1133
CAGE:52454

========== Composition/Information on Ingredients ==========

Ingred Name:PYROSULFUROUS ACID, DISODIUM SALT; (SODIUM BISULFITE)
CAS:7681-57-4
RTECS #:UX8225000
Fraction by Wt: 25-40%
OSHA PEL:5 MG/M3
ACGIH TLV:5 MG/M3; 9495

Ingred Name:PERFORMANCE ADDITIVES
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:SUPDAT:IF RUN-OFF OCCURS, NOTIFY PROPER AUTHORITIES AS
REQUIRED, THAT A SPILL HAS OCCURED.
RTECS #:9999999ZZ

Ingred Name:RESP PROT:SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT
SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS (ING 5)
RTECS #:9999999ZZ

Ingred Name:ING 4:SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.
RTECS #:9999999ZZ

Ingred Name:OTHER PROT EQUIP:NORMAL WORK CLOTHING COVERING ARMS AND
LEGS.
RTECS #:9999999ZZ

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE: EYES: CAUSES IRRITATION, BURNS IF NOT REMOVED. SKIN: CAN CAUSE IRRITATION. INGESTION: CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING, AND DIARRHEA. INHALATION: EXCESSIVE INHALATION OF VAPORS CAN CAUSE NASAL AND RESPIRATORY IRRITATION. CHRONIC: NONE SPECIFIED BY MANUFACTURER.
Explanation of Carcinogenicity:NOT RELEVANT.
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:SKIN:THORO WASH EXPOSED AREA W/SOAP & H*2O. REMOVE CONTAMD CLTHG. LAUNDER CONTAMD CLTHG BEFORE RE-USE. EYES:FLUSH W/LRG AMTS OF H*2O FOR AT LEAST 15 MIN, LIFTING UPPER & LOWER LIDS OCCAS, GET MED ATTN . INGEST:IMMED DRINK TWO GLASSES OF H*2O & INDUCE VOMIT BY EITHER GIVING IPECAC SYRUP/BY PLACING FINGER AT BACK OF THROAT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCON PERSON. GET MED ATTN IMMED. (SUPDAT)

========== Fire Fighting Measures ==========

Extinguishing Media:WATER FOG OR CARBON DIOXIDE.
Fire Fighting Procedures:USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT .
Unusual Fire/Explosion Hazard:NOT APPLICABLE.

========== Accidental Release Measures ==========

Spill Release Procedures:SMALL SPILL:ABSORB LIQ ON PAPER, VERMICULITE, FLOOR ABSORB/OTHER ABSORB MATL. LRG SPILL:PERSONS NOT WEARING PROT EQUIP SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP IS COMPLETED. STOP SPILL AT SOURCE. DIKE TO PREVENT SPREADING. PUMP(SUPDAT)
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID).
Other Precautions:ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:IF WORKPLACE EXPOS LIMIT(S) OF PROD/ANY COMPONENT IS EXCEEDED (SEE SECTION II), A NIOSH APPRVD AIR SUPPLIED RESP IS ADVISED IN ABSENCE OF PROPER ENVIRON CTL. OSHA REGS ALSO PERMIT OTHER NIOSH RESPS (N EGATIVE PRESSURE TYPE) UNDER (ING 4)
Ventilation:PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).
Protective Gloves:NEOPRENE, POLYVINYL CHLORIDE.
Eye Protection:ANSI APPROVED CHEM WORKERS GOGGS .
Other Protective Equipment:ANSI APPRVD EMER EYE WASH & DELUGE SHOWER . TO PVNT RPTD/PRLNG SKIN CNTCT, WEAR IMPERVIOUS CLTHG & BOOTS. (ING 6)
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
FIRST AID PROC:INHAL:IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED GIVE ARTIFICAL RESPIRATION. KEEP PERSON WARM, QUIET & GET MEDIC AL ATTENTION. SPILL PROC:TO SELVAGE TANK. PREVENT RUN-OFF TO SEWERS, STREAMS/OTHER BODIES OF H*2O. (ING 3)

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:212F,100C
Vapor Pres:17.5 @ 20C
Vapor Density:LTR/AIR
Spec Gravity:1.300 @ 77.00F
pH:4.1
Evaporation Rate & Reference:SLOWER THAN ETHER
Appearance and Odor:CLEAR PINK COLOR LIQUID.
Percent Volatiles by Volume:55-70

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG MINERAL ACIDS, STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:MAY FORM TOXIC MATERIALS: SULFUR DIOXIDE.

========== Disposal Considerations ==========

Waste Disposal Methods:SMALL AND LARGE SPILLS: DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever, expressly or implied, warrants this information to be accurate and disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.

WRICO OXY 11

Corrosion Inhibitor

Chemical Ingredients:

Sodium Sulfite

Ethylanediamine Tetraacetic Acid

Cyclohexylamine

MSDS Number: **S5066** * * * * * *Effective Date:* ***02/15/08*** * * * * * *Supercedes:* ***06/16/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582 2537) for assistance.

SODIUM SULFITE

1. Product Identification

Synonyms: Sodium sulfite anhydrous; disodium sulfite; sulfurous acid, disodium salt; exsiccated sodium sulfite
CAS No.: 7757-83-7
Molecular Weight: 126.04
Chemical Formula: Na2SO3
Product Codes:
J.T. Baker: 3888, 3922
Mallinckrodt: 8056, 8064

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Sulfite	7757-83-7	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED. MAY CAUSE ALLERGIC REACTION AND BREATHING DIFFICULTIES. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

Although only moderately toxic in large amounts, sulfites can pose risk to some asthmatics producing central nervous system depression, bronchoconstriction and anaphylaxis.

Inhalation:
Inhalation of dust may cause irritation to the mucous membranes of the upper respiratory tract. Use of bronchodilators preserved with sulfites can cause allergic reactions.
Ingestion:
May cause gastric irritation by the liberation of sulfurous acid. Large doses may result in circulatory disturbances, diarrhea, and central nervous system depression. Estimated fatal dose is 0.5 to > 5g/kg.
Skin Contact:
May cause irritation.
Eye Contact:
May cause irritation, redness and pain.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
Some individuals are said to be dangerously sensitive to minute amounts of sulfites in foods and some bronchodilator medicines preserved with sulfites. Symptoms may include broncho constriction, shock, gastrointestinal disturbances, angio edema, flushing, and tingling sensations.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. If involved in a fire, can emit toxic fumes and irritating and corrosive gases.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-ACGIH Threshold Limit Value (TLV):
5mg/m3 (TWA) for sodium bisulfite & for sodium metabisulfite, A4 Not classifiable as a human carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
White crystals.
Odor:
Odorless.
Solubility:
Soluble in ca. 3.2 parts water.
Specific Gravity:
2.6 @ 15.4C (60F)
pH:
ca. 9
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
Not applicable.
Melting Point:
No information found.
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):

No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat and moisture contribute to instability. May air-oxidize.

Hazardous Decomposition Products:
Burning may produce sulfur oxides.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Acids, strong oxidizers, high temperatures.
Conditions to Avoid:
Heat and moisture.

11. Toxicological Information

Oral mouse LD50: 820 mg/kg. Investigated as a tumorigen and mutagen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Sulfite (7757-83-7)	No	No	3

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Sodium Sulfite (7757-83-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Sulfite (7757-83-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Sulfite (7757-83-7)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium Sulfite (7757-83-7)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED. MAY CAUSE ALLERGIC REACTION AND BREATHING DIFFICULTIES. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.
Label Precautions:
Avoid breathing dust.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Keep container closed.
Use with adequate ventilation.
For Reagent and Technical Grades: Not For Food Use.For TAC Grades: Do not use in meats or in foods recognized as a source of Vitamin B-1, nor in fruits or vegetables to be served or sold raw to consumers or to be presented to consumers as fresh.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

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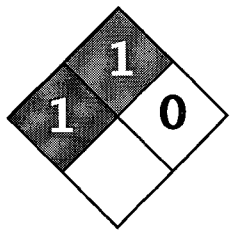

Health	1
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Ethylenediamine tetraacetic acid MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylenediamine tetraacetic acid

Catalog Codes: SLE1045

CAS#: 60-00-4

RTECS: AH4025000

TSCA: TSCA 8(b) inventory: Ethylenediamine tetraacetic acid

CI#: Not available.

Synonym: EDTA; Edetic acid

Chemical Name: Ethylenediamine tetraacetic acid

Chemical Formula: C10H16N2O8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

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For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylenediamine tetraacetic acid	60-00-4	100

Toxicological Data on Ingredients: Ethylenediamine tetraacetic acid: ORAL (LD50): Acute: 30 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
TERATOGENIC EFFECTS: Classified POSSIBLE for human.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to kidneys.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2), nitrogen oxides (NO, NO2...).

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Poisonous solid.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (crystalline powder.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 292.28 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: Not available.

Melting Point: Decomposition temperature: 220-240°C (464°F)

Critical Temperature: Not available.

Specific Gravity: 0.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Very slightly soluble in cold water.
Insoluble in common organic solvents.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Neutralized by alkali metal hydroxides to form a series of water-soluble salts containing from one to four alkali metal cations. No other information at this time.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 30 mg/kg [Mouse].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
TERATOGENIC EFFECTS: Classified POSSIBLE for human.
May cause damage to the following organs: kidneys.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (fertility and fetotoxicity) and birth defects based on animal data.
May affect genetic material based on animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Can cause skin irritation.
Eyes: Can cause eye irritation.
Inhalation: Can irritate the nose, throat/respiratory tract, and mucous membranes.
Ingestion: May cause gastrointestinal tract irritation. May affect behavior.
Chronic Potential Health Effects:
Long term exposure via inhalation or ingestion may damage the kidneys.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: : Not available. UNNA: NA9117 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut carcinogen reporting list.: Ethylenediamine tetraacetic acid
Illinois toxic substances disclosure to employee act: Ethylenediamine tetraacetic acid
Illinois chemical safety act: Ethylenediamine tetraacetic acid
New York release reporting list: Ethylenediamine tetraacetic acid
Pennsylvania RTK: Ethylenediamine tetraacetic acid
Massachusetts RTK: Ethylenediamine tetraacetic acid
Massachusetts spill list: Ethylenediamine tetraacetic acid
New Jersey: Ethylenediamine tetraacetic acid
New Jersey spill list: Ethylenediamine tetraacetic acid
California Director's List of Hazardous Substances: Ethylenediamine tetraacetic acid
TSCA 8(b) inventory: Ethylenediamine tetraacetic acid
CERCLA: Hazardous substances.: Ethylenediamine tetraacetic acid: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R40- Possible risks of irreversible effects.
R63- Possible risk of harm to the unborn child.
S2- Keep out of the reach of children.

S36/37- Wear suitable protective clothing and gloves.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:18 PM

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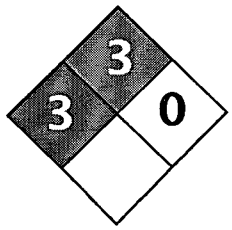

Health	3
Fire	3
Reactivity	0
Personal Protection	

Material Safety Data Sheet
Cyclohexylamine MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cyclohexylamine

Catalog Codes: SLC3241

CAS#: 108-91-8

RTECS: GX0700000

TSCA: TSCA 8(b) inventory: Cyclohexylamine

CI#: Not available.

Synonym:

Chemical Formula: C6H13N

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cyclohexylamine	108-91-8	100

Toxicological Data on Ingredients: Cyclohexylamine: ORAL (LD50): Acute: 156 mg/kg [Rat]. 224 mg/kg [Mouse]. DERMAL (LD50): Acute: 276 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Corrosive to skin and eyes on contact. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to the nervous system, upper respiratory tract.

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 293°C (559.4°F)

Flash Points: CLOSED CUP: 31°C (87.8°F). OPEN CUP: 32°C (89.6°F) (Cleveland).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:
Flammable liquid. Corrosive liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep container dry. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 10 (ppm)
TWA: 40 (mg/m3)Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Fish. Amine like.

Taste: Not available.

Molecular Weight: 99.17 g/mole

Color: Colorless to light yellow.

pH (1% soln/water): 11 [Basic.]

Boiling Point: 134.5°C (274.1°F)

Melting Point: -17.7°C (0.1°F)

Critical Temperature: Not available.

Specific Gravity: 0.8647 (Water = 1)

Vapor Pressure: 10.7 mm of Hg (@ 20°C)

Vapor Density: 3.42 (Air = 1)

Volatility: Not available.

Odor Threshold: 26 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 1.5

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 156 mg/kg [Rat].
Acute dermal toxicity (LD50): 276 mg/kg [Rabbit].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.
The substance is toxic to the nervous system, upper respiratory tract.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 8: Corrosive liquid.

Identification: : Corrosive liquids n.o.s. : UN2357 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Cyclohexylamine
Florida: Cyclohexylamine
Minnesota: Cyclohexylamine
Massachusetts RTK: Cyclohexylamine
New Jersey: Cyclohexylamine
TSCA 8(b) inventory: Cyclohexylamine
SARA 302/304/311/312 extremely hazardous substances: Cyclohexylamine
CERCLA: Hazardous substances.: Cyclohexylamine

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS E: Corrosive liquid.

DSCL (EEC):
R10- Flammable.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 3

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Full suit.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:03 PM

Last Updated: 10/09/2005 05:03 PM

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MIDLAND 203

Oxygen Scavenger

Chemical Ingredients:

Sodium Metabisulfite

Cobalt Compounds

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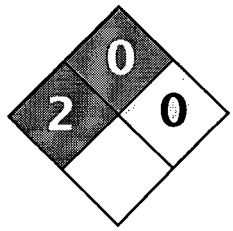

Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Sodium metabisulfite MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium metabisulfite

Catalog Codes: SLS3025

CAS#: 7681-57-4

RTECS: VZ2000000

TSCA: TSCA 8(b) inventory: Sodium metabisulfite

CI#: Not available.

Synonym: Disodium disulfite; Disodium pyrosulfite; Sodium Pyrosulfite; Sodium Metabisulphite

Chemical Name: Pyrosulfurous acid, disodium salt

Chemical Formula: Na2S2O5

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

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International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium metabisulfite	7681-57-4	100

Toxicological Data on Ingredients: Sodium metabisulfite: ORAL (LD50): Acute: 1131 mg/kg [Rat]. DERMAL (LD50): Acute: >2000 mg/kg [Rat]. >1000 mg/kg [Guinea pig].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung irritant).
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to upper respiratory tract, skin, eyes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
When heated to decomposition it emits toxic fumes of SOx, Na2O.
Decomposes on heating to form sodium sulfate

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not ingest. Do not breathe dust. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Moisture sensitive. Air Sensitive

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 5 (mg/m3) [United Kingdom (UK)]
TWA: 5 (mg/m3) from ACGIH (TLV) [United States]
TWA: 5 (mg/m3) from NIOSH [United States]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystals solid or Powdered solid.)

Odor: odor of sulfur dioxide

Taste: Not available.

Molecular Weight: 190.13 g/mole

Color: White to yellowish.

pH (1% soln/water): 4.3 [Acidic.]

Boiling Point: Not available.

Melting Point: Decomposition temperature: 150°C (302°F)

Critical Temperature: Not available.

Specific Gravity: 1.4 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:
Easily soluble in cold water, hot water.
Freely soluble in glycerol.
Slightly soluble in alcohol.
Moderately soluble in ethanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, heat, moisture, air, dust generation.

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Moisture sensitive Air sensitive.
It slowly oxidizes to sodium sulfate upon exposure to air and moisture.
Incompatible with sodium nitrite

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 1131 mg/kg [Rat].
Acute dermal toxicity (LD50): >1000 mg/kg [Guinea pig].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.
May cause damage to the following organs: upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material (mutagenic) based on animal test data.
May cause adverse reproductive effects based on animal test data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: May cause skin irritation.
Eyes: May cause eye irritaiton.
Inhalation: May cause respiratory tract irritation with coughing and wheezing.
Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation irritation with abdominal pain, nausea, vomiting, diarrhea, violent colic, and possible gastri hemorrhaging. May affect behavior/central nervous system and cause central nervous system depression/seizures. It may also affect the cardiovasular system (hypotension, tachycardia, cardiovascular collapse), Ingestion of sulfite compounds may cause a severe allergic reaction (anaphylactoid symptoms) in sensitive individuals and some asthmatics.
Chronic Potential Health Effects:
Skin: Prolonged or repeated skin contact may cause allergic dermatitis.
Ingestion: Prolonged or repeated ingestion may affect the liver, urinary system, and metabolism (weight loss).
Future exposures may also cause asthma like allergy with coughing, shortness of breath, wheezing and/or chest tightness.
Inhalation: Prolonged or repeated inhalation may irritate the lungs, may cause bronchitis to develop with cough, phlegm and/or shortness of breath.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Sodium metabisulfite
Illinois toxic substances disclosure to employee act: Sodium metabisulfite
Rhode Island RTK hazardous substances: Sodium metabisulfite
Pennsylvania RTK: Sodium metabisulfite
Minnesota: Sodium metabisulfite

Massachusetts RTK: Sodium metabisulfite
New Jersey: Sodium metabisulfite
California Director's List of Hazardous Substances: Sodium metabisulfite
TSCA 8(b) inventory: Sodium metabisulfite
TSCA 4(a) ITC priority list: Sodium metabisulfite
TSCA 8(a) PAIR: Sodium metabisulfite
TSCA 8(d) H and S data reporting: Sodium metabisulfite: effective: 1/26/94; sunset: 6/30/98

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 10/11/2005 12:35 PM

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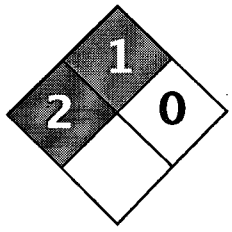

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Cobalt MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cobalt

Catalog Codes: SLC1684, SLC3475

CAS#: 7440-48-4

RTECS: GF8750000

TSCA: TSCA 8(b) inventory: Cobalt

CI#: Not available.

Synonym:

Chemical Formula: Co

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cobalt	7440-48-4	100

Toxicological Data on Ingredients: Cobalt: ORAL (LD50): Acute: 6170 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
Hazardous in case of inhalation.
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to lungs.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid.
Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance

on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.05 (mg/m3) from OSHA
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 58.93 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 3100°C (5612°F)

Melting Point: 1493°C (2719.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.92 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 6170 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH.
The substance is toxic to lungs.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may

arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Metal powder, Flammable, n.o.s. (Cobalt metal, powder) : UN3089 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cobalt
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cobalt
Pennsylvania RTK: Cobalt
Massachusetts RTK: Cobalt
TSCA 8(b) inventory: Cobalt

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R36/38- Irritating to eyes and skin.
R40- Possible risks of irreversible effects.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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MILLSPERSE

Anti-Scalant

Chemical Ingredient:
Poly (Maleic Acid)

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS Name: Poly(maleic acid)

Synonyms: Hydrolyed Polymaleic Anhydride; Polymaleic Acid Homopolymer; Poly(maleic acid); HPMA;

Catalog Numbers: HC-327

Company Identification :

Changzhou Wujing Hongguang chemical Co.,Ltd
Hengshanqiao Town, Changzhou, Jiangsu,
P.R China
Zip: 213119
Tel: 86-519-860-1388
Fax: 86-519-860-3588
Website: http://www.hgchem.com

2. COMPOSITION, INFORMATION ON INGREDIENTS

CAS#	Chemical Name	%	EINECS#
26099-09-2	Poly(maleic acid)	48-52	N/A

Hazard Symbols: C

Risk Phrases: 34

3. HAZARDS IDENTIFICATION

Emergency Overview

Harmful in contact with skin and if swallowed or splashed into the eyes. Causes burns.

Potential Health Effects

Eye: Moderately irritating to eyes.

Skin: *Moderately irritating to skin. No more than slightly toxic if absorbed.*

Ingestion: No more than slightly toxic if swallowed.Significant adverse health effects are not expected to develop if only small amounts (less than a mouthful) are swallowed.

Inhalation: Not available.

Chronic: Not available.

4. FIRST AID MEASURES

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally

lifting the upper and lower eyelids. Get medical aid immediately.

Skin: Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion: Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

Inhalation: Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

5. FIRE FIGHTING MEASURES

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

Flash point: Non flammable aqueous solution

Hazardous products of combustion: carbon monoxide (CO); carbon dioxide;

Extinguishing media: *Water spray, foam, dry chemical, or carbon dioxide*

Unusual fire and explosion hazards: Decomposes in a fire giving off irritant fumes.

6. ACCIDENTAL RELEASE MEASURES

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Contain large spills with dikes and transfer the material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container. Neutralize washings with soda ash or lime. Flush spill area with water.

7. HANDLING and STORAGE

Handling: Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Use only in a chemical fume hood.

Storage: *Keep in a cool, dry, well ventilated place. Stable under normal conditions of* handling and storage.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.

Personal Protective Equipment

Eyes: Wear chemical goggles.

Skin: Wear appropriate protective gloves and clothing to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	liquid
Appearance:	amber
Odor:	mild
pH:	2.0 – 3.0, max (1% aq.sol)
Vapor Pressure:	Not available.
Viscosity dl/g 30 deg.C:	38
Boiling Point:	Not available.
Freezing/Melting Point:	Not available.
Autoignition Temperature:	Not available.
Flash Point:	Not available.
Explosion Limits, lower:	Not available.
Explosion Limits, upper:	Not available.
Decomposition Temperature:	Not available.
Solubility in water:	Soluble.
Specific Gravity/Density:	1.18 – 1.24 g/ml, 20 deg C

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials.
Incompatibilities with Other Materials: Strong oxidizing agents, strong alkalai, nitrites, sulfites.
Hazardous Decomposition Products: carbon monoxide (CO); carbon dioxide;
Hazardous Polymerization: Has not been reported.

11. TOXICOLOGICAL INFORMATION

LD50/LC50:

Skin,rabbie, moderately irritating to skin.

Oral, rat: LD50 = 15000 mg/kg.

Carcinogenicity:

Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA. See actual entry in RTECS for complete information.

12. ECOLOGICAL INFORMATION

Environmental Toxicity:

Invertebrates: 48 h, EC50 Water flea (Daphnia magna) > 1,000 mg/l;

Fish: 96 h, LC50 Rainbow trout (Oncorhynchus mykiss) > 100 mg/l

Biodegradation:

Zahn-Wellens (OECD 302B) 18 % 35 d.

13. DISPOSAL CONSIDERATIONS

Dispose of in a manner consistent with federal, state, and local regulations.

14. TRANSPORT INFORMATION

IATA

Shipping Name: CORROSIVE LIQUID, N.O.S.*

Hazard Class: 8

UN Number: 1760

Packing Group: III

IMO

Shipping Name: CORROSIVE LIQUID, N.O.S.

Hazard Class: 8

UN Number: 1760

Packing Group: III

RID/ADR

Shipping Name: CORROSIVE LIQUID, N.O.S.

Hazard Class: 8

UN Number: 1730

Packing Group: III

15. REGULATORY INFORMATION

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: C Corrosive

Risk Phrases:

R34 Causes burns.

Safety Phrases:

S25 Avoid contact with eyes.

S36/37/39 Wear suitable protective clothing, gloves and eye/ face protection.

S45 In case of accident of if you feel unwell, seek medical advice immediately (show the label where possible).

US FEDERAL

TSCA: CAS# 26099-09-2 is listed on the TSCA inventory.

16. ADDITIONAL INFORMATION

Date Issued: 05/20/2003

Revision No: 1

Date Revised: 05/20/2003

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SODIUM HYROXIDE

pH Adjustor and H2S Abator

Chemical Ingredient:
Sodium Hydroxide

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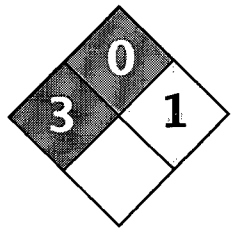
Chemicals & Laboratory Equipment



Health	3
Fire	0
Reactivity	2
Personal Protection	J

Material Safety Data Sheet
Sodium hydroxide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium hydroxide

Catalog Codes: SLS3298, SLS1081, SLS2503, SLS3925, SLS1705

CAS#: 1310-73-2

RTECS: WB4900000

TSCA: TSCA 8(b) inventory: Sodium hydroxide

CI#: Not available.

Synonym: Caustic Soda

Chemical Name: Sodium Hydroxide

Chemical Formula: NaOH

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	100

Toxicological Data on Ingredients: Sodium hydroxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to mucous membranes, upper respiratory tract, skin, eyes.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: metals

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
Slightly explosive in presence of heat.

Fire Fighting Media and Instructions: Not available

Special Remarks on Fire Hazards:
sodium hydroxide + zinc metal dust causes ignition of the latter.

Under proper conditions of temperature, pressure and state of division, it can ignite or react violently with acetaldehyde, ally alcohol, allyl chloride, benzene-1,4-diol, chlorine trifluoride, 1,2 dichlorethylene, nitroethane, nitromethane, nitroparaffins, nitropropane, cinnamaldehyde, 2,2-dichloro-3,3-dimethylbutane.
Sodium hydroxide in contact with water may generate enough heat to ignite adjacent combustible materials.
Phosphorous boiled with NaOH yields mixed phosphines which may ignite spontanously in air.
sodium hydroxide and cinnamaldehyde + heat may cause ignition.
Reaction with certain metals releases flammable and explosive hydrogen gas.

Special Remarks on Explosion Hazards:
Sodium hydroxide reacts to form explosive products with ammonia + silver nitrate.
Benzene extract of allyl benzenesulfonate prepared from allyl alcohol, and benzene sulfonyl chloride in presence of aquesous sodium hydroxide, under vacuum distillation, residue darkened and exploded.
Sodium Hydroxde + impure tetrahydrofuran, which can contain peroxides, can cause serious explosions.
Dry mixtures of sodium hydroxide and sodium tetrahydroborate liberate hydrogen explosively at 230-270 deg. C.
Sodium Hydroxide reacts with sodium salt of trichlorophenol + methyl alcohol + trichlorobenzene + heat to cause an explosion.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:
Corrosive solid.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep container dry. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, alkalis, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Hygroscopic. Deliquescent.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
STEL: 2 (mg/m3) from ACGIH (TLV) [United States]

TWA: 2 CEIL: 2 (mg/m3) from OSHA (PEL) [United States]
CEIL: 2 (mg/m3) from NIOSHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Deliquescent solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 40 g/mole

Color: White.

pH (1% soln/water): 13.5 [Basic.]

Boiling Point: 1388°C (2530.4°F)

Melting Point: 323°C (613.4°F)

Critical Temperature: Not available.

Specific Gravity: 2.13 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, moisture, moist air

Incompatibility with various substances:
Highly reactive with metals.
Reactive with oxidizing agents, reducing agents, acids, alkalis, moisture.

Corrosivity: Not available.

Special Remarks on Reactivity:
Hygroscopic. Much heat is evolved when solid material is dissolved in water. Therefore cold water and caution must be used for this process.
Sodium hydroxide solution and octanol + diborane during a work-up of a reaction mixture of oxime and diborane in tetrahyrofuran is very exothermic, a mild explosion being noted on one occassion.

Reactive with water, acids (mineral, non-oxidizing, e.g. hydrochloric, hydrofluoric acid, muriatic acid, phosphoric), acids (mineral, oxidizing e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), acids (organic e.g. acetic acid, benzoic acid, formic acid, methanoic acid, oxalic acid), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, foraldehyde), carbamates (e.g. carbanolate, carbofuran), esters (e.g. butyl acetate, ethyl acetate, propyl formate), halogenated organics (dibromoethane, hexachlorobenzene, methyl chloride, trichloroethylene), isocyanates (e.g. methyl isocyanate), ketones (acetone, acetophenone, MEK, MIBK), acid chlorides, strong bases, strong oxidizing agents, strong reducing agents, flammable liquids, powdered metals and metals (i.e aluminum, tin, zinc, hafnium, raney nickel), metals (alkali and alkaline e.g. cesium, potassium, sodium), metal compounds (toxic e.g. berylium, lead acetate, nickel carbonyl, tetraethyl lead), mitrides (e.g. potassium nitride, sodium nitride), nitriles (e.g. acetonitrile, methyl cyanide), nitro compounds (organic e.g. nitrobenzene, nitromethane), acetic anhydride, chlorohydrin, chlorosulfonic acid, ethylene cyanohydrin, glyoxal, hydrosulfuric acid, oleum, propiolactone, acylonitrile, phorosous pentoxide, chloroethanol, chloroform-methanol, tetrahydroborate, cyanogen azide, 1,2,4,5 tetrachlorobenzene, cinnamaldehyde.
Reacts with formaldehyde hydroxide to yield formic acid, and hydrogen.

Special Remarks on Corrosivity: Very caustic to aluminum and other metals in presence of moisture.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
May cause damage to the following organs: mucous membranes, upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:
Extremely hazardous in case of inhalation (lung corrosive).
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose:
LDL [Rabbit] - Route: Oral; Dose: 500 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material. Investigation as a mutagen (cytogenetic analysis)

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sodium hydroxide, solid UNNA: 1823 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Illinois toxic substances disclosure to employee act: Sodium hydroxide
Illinois chemical safety act: Sodium hydroxide
New York release reporting list: Sodium hydroxide
Rhode Island RTK hazardous substances: Sodium hydroxide
Pennsylvania RTK: Sodium hydroxide
Minnesota: Sodium hydroxide
Massachusetts RTK: Sodium hydroxide
New Jersey: Sodium hydroxide
Louisiana spill reporting: Sodium hydroxide
California Director's List of Hazardous Substances: Sodium hydroxide
TSCA 8(b) inventory: Sodium hydroxide
CERCLA: Hazardous substances.: Sodium hydroxide: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive solid.

DSCL (EEC):
R35- Causes severe burns.
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37/39- Wear suitable gloves and eye/face protection.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves.
Synthetic apron.
Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 06:32 PM

Last Updated: 10/09/2005 06:32 PM

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DREW 11-480

Corrosion Inhibitor

Chemical Ingredient:
Soya Amine Poly

ROYAL PURPLE

Barrier Fluid

Chemical Ingredient:
Synthetic Lubricant

Royal Purple, Ltd.

Material Safety Data Sheet

I. Product Name: **Royal Purple® Motor Oil** Date Issued/Revised: June 14, 2002
Chemical Family: Synthetic based lubricating oil
Use: Lubricant and corrosion inhibitor
Manufacturer: Royal Purple, Ltd.
Address: 1 Royal Purple Lane, Porter, Texas 77365 USA
Phone: 281-354-8600 Emergency Phone: 281-354-8600 Fax: 281-354-7600

II. Components:
- Base Oil (synthetic) — Synthetic additives with iso-paraffinic diluents.
- The precise composition of this oil is proprietary. A more complete disclosure will be provided to a physician or nurse in the event of a medical emergency.
- All components of this product are listed on the U.S. TSCA inventory.
- This product contains no hazardous substances within the definition of OSHA Regulation 29 CFR 1910.1200.
- Royal Purple certifies that this product has been evaluated for RCRA characteristics and does not meet the criteria of a hazardous waste if discarded in its purchased form.

III. Main Hazards / Health Effects:
Eyes: May cause irritation.
Inhalation: Oil mist may line breathing passages with oil making breathing difficult.
Ingestion: May cause diarrhea.
Skin: May irritate the skin after prolonged periods of contact.

IV. First Aid:
Eyes: Flush with water until all residual material is gone. If irritation persists, seek medical help.
Inhalation: Clear air passage. If respiratory difficulty continues, seek medical help.
Ingestion: Wash out mouth immediately. Do not induce vomiting. Consult physician.
Skin: Wash thoroughly with hand cleanser, followed by soap and water. Contaminated clothing should be dry cleaned before reuse.

V. Extinguishing Media:
Suitable: Foam, dry powder, Halon®, carbon dioxide, sand, earth and water mist.
Unsuitable: Water jet.
Protective Equipment for Fire Fighting: Self-contained breathing apparatus.

VI. Accidental Release Measures:
Personal Precautions: Wear gloves and protective overalls.
Environmental Precautions: Do not allow it to enter drains.
Spillage: Contain spill and keep from entering waterways. Absorb on porous material. Large quantities can be pumped.

VII. Handling and Storage:
Handling: No special handling precautions necessary.
Storage: Do not store at elevated temperatures.

VIII. Exposure Control / Personal Protection:
Respiratory Protection: Hydrocarbon absorbing respirator if misting.
Hand Protection: Oil-proof gloves for hypersensitive persons.
Eye Protection: Glasses, if applied to parts in motion.
Body Protection: Overalls.

IX. Physical and Chemical Properties:
Physical State: Liquid
Color: Purple
Odor: Lube Oil
pH: Neutral
Boiling Range / Point °F (°C): >420 (>218)
Pour Point °F (°C): <40 (<4.4)
Flash Point (COC) °F (°C): >400 (>204)
Autoignition Temperature °F (°C): >600 (>315)
Evaporation Rate (Butyl Acetate): Negligible
Vapor Pressure (kPa): <0.1
Percent Volatiles: None
Density (g/cm^3): >0.87
Flammability: Not flammable at ambient temp.
OAR Value: UN
Oxidizing Properties: None
Water Soluability: Emulsifiable
Vapor Density: Greater than air

X. Stability and Reactivity:

Stability: Chemically stable under normal conditions. No photoreactive agents.
Conditions to Avoid: Powerful sources of ignition and extreme temperatures.
Materials to Avoid: Strong inorganic and organic acids, oxidizing agents.
Hazardous Decomposition Products: Burning generates smoke, airborne soot, hydrocarbons and oxides of carbon, sulfur and nitrogen. Residue mainly comprised of soot and mineral oxides.

XI. Toxicological Information:

Acute Toxicity: Not known
Irritancy-Skin: Very mild
Skin Sensitization: Not known
Subacute / Sub-chronic Toxicity: Not known
Genotoxicity: None known
Chronic Toxicity: None known

California Prop 65: N/A
Carcinogen: NTP: No
IARC: No
OSHA: No
EC Classification (67 / 548 / EEC): No
LC-50: >200mg/l - extrapolated from component data
LD-50: Not applicable

XII. Ecological Information:

Possible Effects: In extreme cases, may germinate oil fractions that could act as a marine pollutant. Occurrences of this nature are highly unlikely.
Behavior: Relatively well behaved. Bioaccumulation potential nil.
Environmental Fate: Due to its fluid nature and specific gravity, this product will float or spread across water making it a nuisance contaminant. It is not thought to be toxic to marine or land organisms.

XIII. Waste and Container Disposal:

Waste Disposal: Consider recycling. This product, as sold, does not meet the RCRA characteristics of a hazardous waste. Under RCRA, it is the responsibility of the user, at the time of disposal, to determine whether the product meets the RCRA criteria for hazardous waste. Contact a waste disposal company or local authority for advice.
Container Disposal: See waste disposal section listed above.

XIV. Transport Information:

DOT: Nonhazardous
UN No.: N/A
DOT: Nonhazardous

Air Transport (ICAO, IATA): Bulk Nonhazardous
Sea Transport (IMO, IMDG): Bulk Nonhazardous
Road and Rail Transport (ADR / RID): Bulk Nonhazardous

XV. Regulatory Information:

Labeling Information: None needed
EC Annex 1 Class.: N/A
R Phrases: N/A
SARA 311 / 312: None
S Phrases: S-3 keep cool, S-16 keep away from ignition sources
Ozone Depleting Chemicals: N/A

CERCLA: Nonhazardous
TSCA: All components are listed
WHMIS (Canada): Not regulated
Canadian DSL: All components are listed
40 CFR Part 372 (SARA Section 313): N/A
RCRA Hazard Class: Nonhazardous
TSCA 12B Components: None

XVI. Other Information:

Signature: A. J. Gustavsen

Prepared By: A. J. Gustavsen, Ph.D.

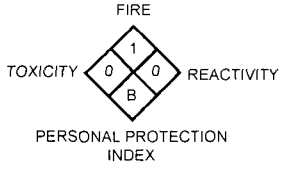
Date Issued/Revised: June 14, 2002

As of issue date, the information contained herein is accurate and reliable to the best of Royal Purple's knowledge. Royal Purple does not warrant or guarantee its accuracy or reliability and shall not be liable for any loss or damage arising out of the use thereof. It is the user's responsibility to satisfy itself that the information offered for its consideration is suitable for its particular use.

LEGEND

I. Identification of the Substance / Preparation and Company
II. Composition Information on Ingredients
III. Hazards Identification
IV. First Aid Measures
V. Fire Fighting Measures
VI. Accidental Release Measures
VII. Handling and Storage
VIII. Exposure Control / Personal Protection
IX. Physical and Chemical Properties
X. Stability and Reactivity
XI. Toxicological Information
XII. Ecological Information
XIII. Waste Disposal
XIV. Transport Information
XV. Regulatory Information
XVI. Other Information

NFPA SYMBOL



HMIS SYMBOL

HEALTH	0
FLAMMABILITY	1
REACTIVITY	0
PPI	B

CATALYZED SULFITE

Anti-Scalant

Chemical Ingredients:

Sodium Chloride

Phosphoric Acid Derivative

MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY: **Diversity Technologies Corp.**
8750 – 53rd Ave.
Edmonton, AB T6E 5G2
DATE: Apr. 27, 2005
PHONE: 780-468-4064
FAX: 780-469-1899

PRODUCT NAME: **SODIUM SULFITE, CATALYZED**

PRODUCT USE: Oxygen scavenger
CHEMICAL FAMILY: Sodium sulfite; inorganic salt
CAS #: 7757-83-7

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION: D2A
WORKPLACE HAZARD: Very Toxic

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME: Not regulated under TDG
TDG CLASSIFICATION: Not applicable
UN NUMBER (PIN): Not applicable
PACKING GROUP: Not applicable

SECTION II: HAZARDOUS INGREDIENTS

INGREDIENT	% (w/w)	CAS NUMBER	LD_{50} Oral-Rat	LC_{50} Inhal-Rat	ACGIH-TLV
Sodium sulfite	60-100	7757-83-7	820 mg/kg (mouse)	>5.5 mg/L/4 hr (dust)	Not established
Sodium metabisulfite	1-5	7681-57-4	115 mg/kg	Not available	Not established
Sodium sulfate	0.5-1.5	7757-43-3	5989 mg/kg (mouse)	Not available	Not established
Cobalt sulfate	0.5-1.5	10124-43-3	424 mg/kg	Not available	0.02 mg/m^3

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY: [XX] EYE CONTACT [XX] SKIN [XX] INHALATION [XX] INGESTION
EYE CONTACT: Dust or mist may irritate or burn eyes. Solutions will irritate or burn.
SKIN CONTACT: Dust or mist may cause irritation from prolonged contact. Solutions will irritate.

INGESTION:	Ingestion may irritate gastrointestinal tract. May cause severe allergic reaction in some asthmatics and sulfite sensitive individuals. Large doses may cause violent colic and diarrhea, circulatory disturbances, central nervous system depression, and even death.
INHALATION:	Inhalation of dust may irritate respiratory tract.
CARCINOGENICTY:	Cobalt and its compounds have been shown to cause cancer in laboratory animals (IARC Group 2B).
TERATOGENICITY:	No information available.
REPRODUCTIVE TOXICITY:	No information available.
MUTAGENICTY:	Sodium sulfite has been demonstrated to have mutagenic effects in humans and mammals.
SYNERGISTIC PRODUCTS:	No information available.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT:	Immediately flush with water for 15 minutes. Remove contaminated clothing and footwear. Obtain medical attention. Launder clothing before reuse.
EYE CONTACT:	Immediately flush with gently flowing warm water for at least 15 minutes, or until irritation ceases. Remove contact lenses (if present) and hold eyelids open to ensure thorough flushing. Obtain medical attention.
INGESTION:	Do not induce vomiting. If victim is fully conscious, give a little water or milk. Obtain immediate medical attention. Never give anything by mouth to an unconscious or convulsing victim.
INHALATION:	Move to fresh air. Apply oxygen or artificial respiration if required. Obtain medical attention.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR:	White crystals; slight sulfur dioxide-like odour	
SPECIFIC GRAVITY:	2.6	
BOILING POINT (°C):	Not available	
MELTING POINT (°C):	Not available	
SOLUBILITY IN WATER:	17% by wt @ 10°C	pH: 8 – 8.4 (1% solution)
PERCENT VOLATILE BY VOLUME:	Not applicable	
EVAPORATION RATE:	Not applicable	
VAPOUR PRESSURE (mmHg):	Not applicable	
VAPOUR DENSITY (air = 1):	Not applicable	
BULK DENSITY:	Not available	

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:	Not applicable
FLAMMABLE LIMITS:	Not applicable
EXTINGUISHING MEDIA:	Use dry chemicals, CO_2 or foam. Do not use water.
SPECIAL FIRE FIGHTING PRODCEDURES:	Self-contained breathing apparatus required for fire fighting personnel. Remove containers from fire area, or cool with water spray, if possible.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	Decomposes to produce toxic/corrosive sulfur oxides.

SECTION VII: REACTIVITY DATA

STABILITY:	STABLE [XX] UNSTABLE [ ]
INCOMPATIBILITY (CONDITIONS TO AVOID):	Strong oxidizers cause vigorous exothermic reactions. Acids release sulfur dioxide gas.
CONDITIONS OF REACTIVITY:	Contact with incompatible materials.
HAZARDOUS DECOMPOSITION PRODUCTS:	Sulfur dioxide gas-toxic and corrosive. Sodium sulphide residue-flammable, dangerous fire risk, strong irritant to skin and tissue, incompatible with acids.
HAZARDOUS POLYMERIZATION:	WILL NOT OCCUR [XX] MAY OCCUR [ ]

SECTION VIII: PREVENTATIVE MEASURES

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	NIOSH approved dust mask or respirator.
VENTILATION:	Use local exhaust ventilation, process enclosure or other engineering controls to control dust.
PROTECTIVE GLOVES:	Impervious gloves recommended.
EYE PROTECTION:	Suggest chemical safety goggles (do not wear contact lenses).
OTHER PROTECTIVE EQUIPMENT (Specify):	Suggest rubber apron. Long-sleeved shirt & trousers. Ensure eye was station and emergency shower are available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid contact with eyes, skin, and clothing. Avoid breathing dust or mist. When dissolving, add to water cautiously while stirring. Use adequate ventilation if dust cloud is created or if there is a release of sulfur dioxide gas. Use good personal hygiene and housekeeping practices. Wash thoroughly after handling. Store in a cool, dry area away from acids or oxidizers. Keep container closed. Protect from physical damage. Handle empty containers as if full.

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Wear suitable personal protective equipment. Evacuate area of nonessential personnel. Sweep up spilled material. Collect uncontaminated material for repackaging. Collect contaminated material for disposal. Wash spill area thoroughly with water after cleanup.

WASTE DISPOSAL METHOD

Dispose in accordance with federal, provincial and local regulations. It is the responsibility of the end-user to determine if material meets the criteria of hazardous waste at the time of disposal. Empty containers, which have not been cleaned and purged, contain residual hazardous material and must be disposed of, or recycled, according to local regulations.

SECTION IX: PREPARATION

THE INFORMATION CONTAINED HEREIN IS GIVEN IN GOOD FAITH,
BUT NO WARRANTY, EXPRESSED OR IMPLIED, IS MADE.

DATE ISSUED:	April 27, 2005	BY:	Product safety committee
SUPERSEDES:	August 18, 2002	PHONE:	780-440-4923

Diversity Technologies Corp. is the parent company of Canamara-United Supply, Hollimex Products and The Drilling Depot.

BIOSPERSE 250

Microbiocide

Chemical Ingredients:

Magnesium Nitrate

Cupric Nitrate

Magnesium Chloride

2-Methyl-4-Isothiazolin-3-One

DREW CHEMICAL CORP DIV OF ASHLAND CHEMICAL CO -- 1551 BIOSPERSE 250 MICROBIOCIDE -- 6810-00F037952

========== Product Identification ==========

Product ID:1551 BIOSPERSE 250 MICROBIOCIDE
MSDS Date:01/12/1994
FSC:6810
NIIN:00F037952
MSDS Number: BWKGF
=== Responsible Party ===
Company Name:DREW CHEMICAL CORP DIV OF ASHLAND CHEMICAL CO
Address:1 DREW CHEMICAL PLAZA
City:BOONTON
State:NJ
ZIP:07005-5000
Country:US
Info Phone Num:201-263-7600/800-274-5263
Emergency Phone Num:201-263-7600/800-274-5263
CAGE:52454
=== Contractor Identification ===
Company Name:DREW CHEMICAL CORP,DIV OF ASHLAND CHEMICAL CO
Address:ONE DREW CHEMICAL PLAZA
Box:City:BOONTON
State:NJ
ZIP:07005
Country:US
Phone:606-324-1133
CAGE:52454

========== Composition/Information on Ingredients ==========

Ingred Name:MAGNESIUM NITRATE
CAS:10377-60-3
RTECS #:OM3750000
Fraction by Wt: <5%

Ingred Name:5-CHLORO-2-METHYL-4-ISOTHIOAZOLIN-3-ONE
CAS:26172-55-4
RTECS #:NX8156850
Fraction by Wt: 1.15%

Ingred Name:MAGNESIUM CHLORIDE
CAS:7786-30-3
Fraction by Wt: <1%

Ingred Name:2-METHYL-4-ISOTHIAZOLIN-3-1
CAS:2682-20-4
RTECS #:NX8157000

Fraction by Wt: 0.35%

Ingred Name:COPPER NITRATE, CUPRIC NITRATE
CAS:3251-23-8
RTECS #:QR7400000
Fraction by Wt: <1%
OSHA PEL:100 UG/CUM
EPA Rpt Qty:100 LBS
DOT Rpt Qty:100 LBS

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:EYES: SEVERE IRRITATION & CORNEAL INJURY. SKIN: SEVERE IRRITATION. REPEATED CONTACT MAY CAUSE SENSITIZATION. PROLONGED/REPEATED EXPOSURE CAN BE ABSORBED IN TOXI AMOUNTS. INHALATION: MIST CAN CAUSE IR RITATION OF NASAL & RESPIRATORY PASSAGES. INGESTION: CAN CAUSE DEATH.
Explanation of Carcinogenicity:NONE
Effects of Overexposure:IRRITATION.

========== First Aid Measures ==========

First Aid:SKIN: IMMEDIATELY FLUSH EXPOSED AREA W/WATER FOR 15 MINS. EYES: IMMEDIATELY FLUSH W/LARGE AMOUNTS OF WATER FOR 15 MINS. INGESTION: DON'T INDUCE VOMITING. DRINK PROMPTLY A LARGE QUANTITY OF MILK, EGG W HITES, GELATIN SOLUTIONS/DRINK LARGE QUANTITIES OF WATER. AVOID ALCOHOL. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN/CPR IF NEEDED. KEEP WARM & QUIET. OBTAIN MEDICAL ATTENTION IN ALL CASES. (SEE SUP)

========== Fire Fighting Measures ==========

Fire Fighting Procedures:WEAR SCBA W/A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND MODE & FULL BODY PROTECTION WHEN FIGHTING FIRES. WATER MAY BE USED TO KEEP CONTAINERS COOL

========== Accidental Release Measures ==========

Spill Release Procedures:SMALL: ABSORB LIQUID ON VERMICULITE, FLOOR ABSORBENT MATERIAL. STOP AT SOURCE. DIKE TO PREVENT SPREADING. ABSORB W/INERT MATERIAL. THEN SHOVEL INTO PAIL/DRUM & TREAT W/DECONTAMINATED SOLUTION. LET CON TAINERS STAND OPEN 48 HRS TO AVOID BUILDUP. (SUPP)

========== Handling and Storage ==========

Other Precautions:CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED, SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES; VAPOR,

LIQUID, SOLID.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR I ADVISED.
Ventilation:PROVIDE MECHANICAL: GENERAL/LOCAL EXHAUST TO MAINTAIN EXPOSURE < LEVEL OF OVEREXPOSURE.
Protective Gloves:RESISTANT/NEOPRENE/NITRILE RUBBER
Eye Protection:CHEMICAL SPLASH GOGGLES/SAFETY GLASSES
Other Protective Equipment:FACE SHIELD (8 MIN.). IMPERVIOUS CLOTHING & BOOTS. EYEWASH STATION, EMERGENCY SHOWER.
Work Hygienic Practices:REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. WASH SKIN W/SOAP & WATER.
Supplemental Safety and Health
NOTE TO PHYSICIAN: PROBABLE MUCOSAL DAMAGE MAY CONTRAINDICATE THE USE OF GASTRIC LAVAGE. MEASURES AGAINST CIRCULATORY SHOCK, RESPIRATORY DEPRESSION & CONVULSIONS MAY BE NEEDED. SPILLS: WASH AREA SOLUT IO THEN FLUSH INTO A CHEMICAL/MUNICIPAL SEWER. DON'T DISHARGE & CLEAN RUNOFFS INTO BODIES OF WATER.

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:212F
Vapor Pres:17.5
Vapor Density:>1
pH:2-5
Evaporation Rate & Reference:SLOWER THAN ETHER
Appearance and Odor:CLEAR LIGHT GREEN YELLOW LIQUID
Percent Volatiles by Volume:85-100

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS, REDUCING AGENTS, AMINES.
Hazardous Decomposition Products:OXIDES OF SULFUR, HYDROGEN CHLORIDE, OXIDES OF NITROGEN.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF IN A LANDFILL IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Disclaimer (provided with this information by the compiling agencies) This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever, expressly or implied, warrants this information to be accurate and disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to thei

particular situation.

SULFURIC ACID

Anti-Scalant

Chemical Ingredient:
Sulfuric Acid

Material Data Safety Sheet (MSDS): SULFURIC ACID

1. Product Identification	7. Handling and Storage
2. Composition	8. Exposure Controls/Personal Protection
3. Hazards Identification	9. Physical and Chemical Properties
4. First Aid Measures	10. Stability and Reactivity
5. Fire Fighting Measures	11. Toxicological Information
6. Accidental Release Measures	12. Ecological Information
	13. Disposal Considerations
	16. Other Information

Note: This information sheet has been re-formatted for better clarity by the Department of Earth Sciences.
Some of the data such as information on shipping and weapons treaties were intentionally left out. If you
want to look at the complete MSDS, you can either check one of the hardcopy versions in the Department,
contact the manufacturer, or check one of the various Web-based databases such as those compiled
by BU's Office of Environmental Health & Safety (www.bu.edu/ehs/msds/index.htm).
Return to MSDS Index

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1. Product Identification

MSDS Name: **Sulfuric acid**, reagent acs

Synonyms: Hydrogen Sulfate, Oil of Vitriol, Vitriol Brown Oil, Matting Acid, Battery Acid
Company Identification: Acros Organics N.V.
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

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2. Composition/Information on Ingredients

CAS#	Chemical Name	%	EINECS#
7664-93-9	Sulfuric acid	95-98.0%	231-639-5
7732-18-5	Water	Balance	231-791-2

Hazard Symbols: XI C
Risk Phrases: 35 36/38

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MSDS Index

3. Hazards Identification

EMERGENCY OVERVIEW
Appearance: colorless to brown.
Danger! Harmful if inhaled. Corrosive. Hygroscopic. Causes digestive and respiratory tract burns. Causes digestive and respiratory tract irritation. Causes severe eye and skin irritation and burns. Target Organs: None known.

Potential Health Effects
Eye:
May cause irreversible eye injury. Causes eye irritation and burns.
Skin:
Causes severe skin irritation and burns.
Ingestion:
Causes gastrointestinal tract burns.
Inhalation:
Harmful if inhaled. May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract.
Chronic:
Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis.

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4. First Aid Measures

Eyes:
Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation is required (at least 30 minutes).
Skin:
Get medical aid immediately. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. SPEEDY ACTION IS CRITICAL!
Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen.
Notes to Physician:
Treat symptomatically and supportively.

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MSDS Index

5. Fire Fighting Measures

General Information:
Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Contact with water can cause violent liberation of heat and splattering of the material.
Extinguishing Media:
Do NOT use water directly on fire. Use water spray to cool fire-exposed containers. Use carbon dioxide or dry chemical.
Autoignition Temperature: Not available.
Flash Point: 340 deg C (644.00 deg F)
NFPA Rating: Not published.

Explosion Limits, Lower: Not available.
Upper: Not available.

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6. Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Cover with sand, dry lime or soda ash and place in a closed container for disposal.

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7. Handling and Storage

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well ventilated area. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Do not allow contact with water. Discard contaminated shoes.

Storage:
Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area.

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8. Exposure Controls/Personal Protection

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne

concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sulfuric acid	1 mg/m3; 3 mg/m3 STEL	1 mg/m3 TWA; 15 mg/m3 IDLH	1 mg/m3 TWA

OSHA Vacated PELs:
Sulfuric acid:1 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

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MSDS Index

9. Physical and Chemical Properties ()

Appearance:	colorless to brown liquid
Odor:	Odorless
Solubility:	
Density:	1.8400 g/cm3
pH:	Not available
% Volatiles by volume @	

21C (70F):	
Boiling Point:	280 deg C @ 760.00mm Hg
Melting Point:	3 deg C
Vapor Density (Air=1):	1.2 kg/m3
Vapor Pressure (mm Hg):	< 0.00120 mm Hg
Evaporation Rate:	Slower than ether
Viscosity:	Not available

Molecular Formula: H2O4S
Molecular Weight: 98.08

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10. Stability and Reactivity

Chemical Stability:
Stable under normal temperatures and pressures.

Conditions to Avoid:
Contact with water, metals, excess heat, combustible materials, organic materials.

Incompatibilities with Other Materials:
Acids (mineral, oxidizing, e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), alcohols and glycols (e.g. butyl alcohol, ethanol, methanol, ethylene glycol), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, formaldehyde), amines (aliphatic and aromatic, e.g. dimethyl amine, propylamine, pyridine, triethylamine), azo, diazo, and hydrazines (e.g. dimethyl hydrazine, hydrazine, methyl hydrazine), caustics (e.g. ammonia, ammonium hydrozide, calcium hydroxide, potassium hydroxide, sodium hydroxide), cyanides (e.g. potassium cyanide, sodium cyanide), dithiocarbamates (e.g. ferbam, maneb, metham, thiram), fluorides (inorganic, e.g. ammonium fluoride, calcium fluoride, cesium fluoride), isocyanates (e.g. methyl isocyanate), metals (alkali and alkaline, e.g. cesium, potassium, sodium), metals as powders (e.g. hafnium, raney nickel), metals and metal compounds (toxic, e.g. beryllium, lead acetate, nickel carbonyl, tetraethyl lead), nitrides (e.g. potassium nitride, sodium n.

Hazardous Decomposition Products:
Oxides of sulfur.

Hazardous Polymerization: Has not been reported.

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11. Toxicological Information

RTECS#:
CAS# 7664-93-9: WS5600000

LD50/LC50:
CAS# 7664-93-9: Inhalation, mouse: LC50 =320 mg/m3/2H; Inhalation, rat: LC50 =510 mg/m3/2H; Oral, rat: LD50 = 2140 mg/kg.

Carcinogenicity:
Sulfuric acid -
ACGIH: A2 - Suspected Human Carcinogen
OSHA: Select carcinogen
IARC: Group 1 carcinogen
Epidemiology:
Workers exposed to industrial sulfuric acid mist showed a statistical increase in laryngeal cancer. This data suggests a possible relationship between carcinogenisis and inhalation of sulfuric acid mist.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

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12. Ecological Information

Ecotoxicity:
Sulfuric acid is harmful to aquatic life in very low concentrations. It may be dangerous if it enters water intakes. The aquatic toxicity for bluegill in fresh water was 24.5 ppm/24 hr, which was lethal.
Environmental Fate:
Not available.
Physical/Chemical:
Not available.
Other:
Not available.

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13. Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: None listed.
RCRA D-Series Chronic Toxicity Reference Levels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

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16. Other Information

MSDS Creation Date: 2/01/1996 Revision #3 Date: 10/01/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable

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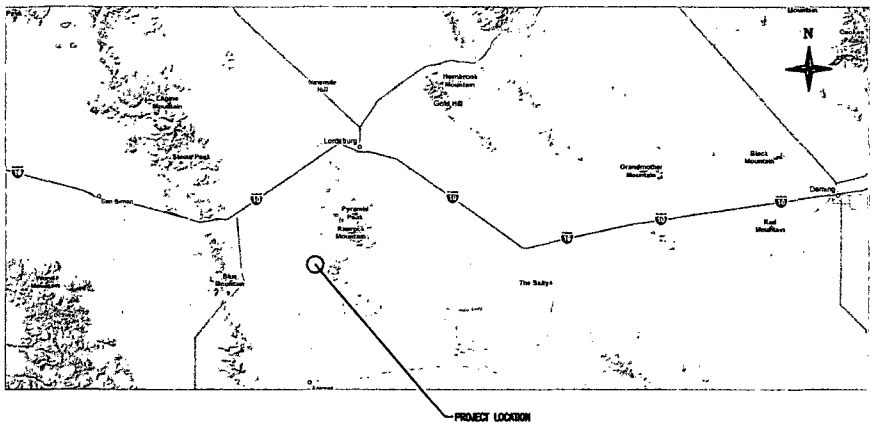
MSDS Index

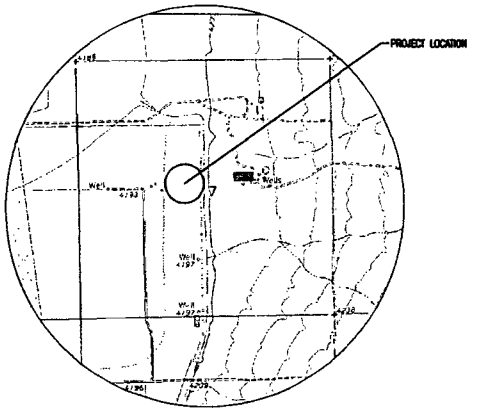
RECEIVED
2008 MAY 12 PM 1 57

LIGHTNING DOCK, NEW MEXICO

GEOTHERMAL GENERATION PLANT



PROJECT LOCATION MAP



PROJECT LOCATION TOPOGRAPHICAL MAP

DESIGN CRITERIA

PROJECT LOCATION: APPROXIMATE 20 ACRE PARCEL OF LAND (10 ACRES IN THE NORTH WEST 1/4 AND 10 ACRES IN THE SOUTH WEST 1/4) WITHIN SECTION 7 OF TOWNSHIP 25S AND RANGE 19W IN THE STATE OF NEW MEXICO.

PROJECT DESCRIPTION: 10 MW ADVANCED BINARY GEOTHERMAL POWER PLANT.

GOVERNING CODES: IBC 2006; UFC 2006; UMC 2006; UPC 2006

BUILDING DEPARTMENT: HIDALGO COUNTY

SEISMIC: Sds = 0.278; Sd1 = 0.125

WIND LOADS: 90 MPH

SNOW LOADS: 5 PSF GROUND

FROST DEPTH: 18"

PROJECT DATA

PROJECT NAME: LIGHTNING DOCK, NEW MEXICO (H01)

ENGINEERS:

PRINCIPAL: ROBERT L NASH

CIVIL: SCOTT McNEIL – NM 15678

MECHANICAL: ROBERT L NASH – NM 12747

ELECTRICAL: STEVE NASH – NM 13020

ELEVATION = 4100' MSL

OPERATION = 8322 HOURS/YR

CAPACITY = 10 MW

PRELIMINARY- FOR REVIEW & COMMENT 12/11/2007

No.	DATE	BY	APP	REVISION	REFERENCE DRAWING	NUMBER
A	12/21/07	DCP	BN	PRELIMINARY - ISSUED FOR INFORMATION ONLY		

CONFIDENTIAL

Intermountain Consumer Professional Engineers, Inc.
CONSULTING ENGINEERS
1345 E SOUTH UNION AVE
MIDVALE, UTAH 84047
BUS. (801) 255-1111 FAX (801) 566-0388

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Des. by:	Date
Drawn By: DCP	Date
Chk'd. by:	Date
ENGR.	Date
APP'D	Date
APP'D	Date

LIGHTNING DOCK GEOTHERMAL PLANT #1
HIDALGO COUNTY, NEW MEXICO
PROJECT COVER SHEET

SCALE: NTS
PROJECT No. 443-006
DRAWING No. H01-A-001
REVISION A

Lightning Dock
Proposed Action
and
National Hydrologic Dataset
Water Inventory
Animas Valley, NM

WELL # 13-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3781.0 feet along the west section line;
Thence, East, a distance of 5304 feet to the location of said well.

WELL # 33-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3721.2 feet along the west section line;
Thence, East, a distance of 1789.4 feet to the location of said well.

WELL # 53-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 3775.3 feet along the west section line;
Thence, East, a distance of 3052.1 feet to the location of said well.

WELL # 45-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 2360.0 feet along the west section line;
Thence, East, a distance of 2278.2 feet to the location of said well.

WELL # 47-07
Beginning at the southwest corner of Section 7, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, North, a distance of 1219.1 feet along the west section line;
Thence, East, a distance of 2266.3 feet to the location of said well.

WELL # 42-18
Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1307.0 feet along the west section line;
Thence, East, a distance of 2123.1 feet to the location of said well.

WELL # 62-18
Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1297.2 feet along the west section line;
Thence, East, a distance of 3350.4 feet to the location of said well.

WELL # 82-18
Beginning at the northwest corner of Section 18, Township 25 South, Range 19 West, New Mexico Principle Meridian, Hidalgo County, New Mexico;
Thence, South, a distance of 1278.3 feet along the west section line;
Thence, East, a distance of 4978.1 feet to the location of said well.

Project Area 1 Mile Buffer (Geothermal Lease)

Proposed Wells

Injection

Production

Geothermal Lease

Proposed Power Plant

Raser Surface Agreement

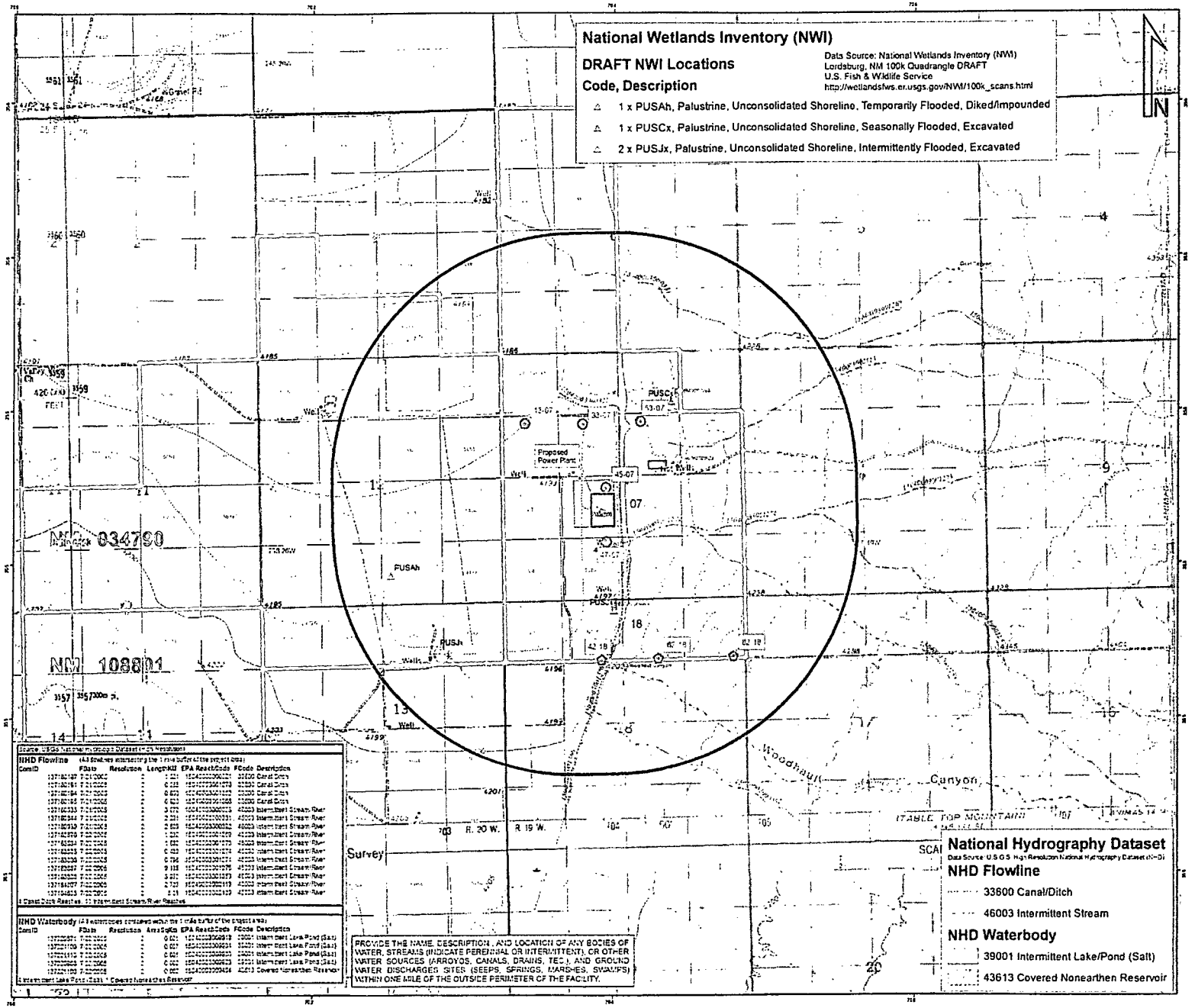
ROSETTE, INC.

Raser Federal Geothermal Lease

Imagery:
USGS Digital Raster Graphics
1:24,000 scale Quadrangles
Coordinate System: UTM Zone 12 NAD83
Contour elevations reported in feet
National Geodetic Vertical Datum 1929

0 0.5 1 Miles

0 0.5 1 1.5 Km



OIL CONSERVATION DIVISION

Application for Permit to Drill, Re-Enter, Deepen,
Plugback, or Add a Zone

Form C-101

PRODUCTION WELLS

13-07
33-07
53-07
45-07
47-07

INJECTION WELLS

42-18
62-18
82-18

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	13-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3781.0	South	530.1	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4230
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .2 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@rasrtech.com

Date: 4/24/08 Phone: 801 765 1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPC

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	33-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3721.2	South	1789.4	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4230
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zc
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

[23] I hereby certify that the information given above is true and complete to the best of my knowledge and belief. **I further certify that the drilling pit will be constructed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@nmetech.com

Date: 4/21/08 Phone: 801.765.1201

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	53-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3775.3	South	3052.1	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4230
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

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Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@rasatech.com

Date: 4/21/08 Phone: 801 765 1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPC

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	45-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		2360.0	South	2278.3	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4230
[16] Multiple	[17] Proposed Depth	[18] Formation	[19] Contractor	[20] Spud Date
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
	7" Liner (If)	23.0 lb/ft			

[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

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Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@rmstech.com

Date: 4/21/08 Phone: 801 765 1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
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1301 W. Grand Avenue, Artesia, NM 88210
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State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPC

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	47-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		1219.1	South	2266.3	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(P) Production Well	R	P – Land BLM – Geothermal	4230
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
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	7" Liner (If)	23.0 lb/ft			

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SEE PLAN OF OPERATION

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Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@rabsteel.com

Date: 4/21/08 Phone: 801 765 1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
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State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPC

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	42-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		1307.0	North	2123.1	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(I) Injection Well	R	P – Land BLM – Geothermal	4230

[16] Multiple	[17] Proposed Depth	[18] Formation	[19] Contractor	[20] Spud Date
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
26"	20"	3/8" Wall	63'	150 Sacks	
17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
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SEE PLAN OF OPERATION

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Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: Steve.Brown@rasetech.com

Date: 4/21/08 Phone: 801 765 1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27, 2

Submit to appropriate District Of

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	62-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		1207	North	3350.4	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(I) Injection Well	R	P – Land BLM – Geothermal	4230
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
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17.7"	13.375"	54.5 lb/ft	1,500'	750 Sacks	
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	7" Liner (If)	23.0 lb/ft			

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Signature:

Printed name: Steven Brown

Title: Manager

E-mail Address: steve.braun@rasertech.com

Date: 4/21/08 Phone: 801 765 1200

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date: Expiration Date:

Conditions of Approval Attached ☐

District I
1625 N. French Dr., Hobbs, NM 88240
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1301 W. Grand Avenue, Artesia, NM 88210.
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-
May 27.

Submit to appropriate District O

☐ AMENDED REPO

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

[1] Operator Name and Address	[2] OGRID Number
Los Lobos Renewable Power, LLC 5125 North Edgewood Drive Suite 375 Provo, Utah 84604	[3] API Number 30 -

[3] Property Code	[5] Property Name	[6] Well No.
	Lightning Dock No 1, HI-01 LLC	82-07

[9] Proposed Pool 1	[10] Proposed Pool 2

[7] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		1278.3	North	4978.1	West	Hidalgo

[8] Proposed Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

Additional Well Information

[11] Work Type Code	[12] Well Type Code	[13] Cable/Rotary	[14] Lease Type Code	[15] Ground Level Elevation
N	(I) Injection Well	R	P – Land BLM – Geothermal	4230
[16] Multiple	**[17] Proposed Depth**	**[18] Formation**	**[19] Contractor**	**[20] Spud Date**
See Plan of Operation	3,400 feet		Layne Christensen Company	May 2008

Depth to Groundwater 40 feet	Distance from nearest fresh water well .4 miles	Distance from nearest surface water - None

Pit: Liner: Synthetic ☒ 45 mils thick Clay ☐ Pit Volume: 45,000bbls
Closed-Loop System ☒

Drilling Method:
Fresh Water ☐ Brine ☒ Diesel/Oil-based ☐ Gas/Air ☐

[21] Proposed Casing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
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12.25"	9.625"	36.0 lb/ft	3,400'	980 Sacks	
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[22] Describe the proposed program. If this application is to DEEPEN or PLUG BACK, give the data on the present productive zone and proposed new productive zo
Describe the blowout prevention program, if any. Use additional sheets if necessary.

SEE PLAN OF OPERATION

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Signature:

Printed name: Steven Brown	Title:
Title: Manager	Approval Date: / Expiration Date:
E-mail Address: steve-brown@yahoo.com	
Date: 4/21/08 / Phone: 801.765.1200	Conditions of Approval Attached ☐

OIL CONSERVATION DIVISION

Approved by:

OIL CONSERVATION DIVISION

Well Location and Acreage Dedication PLAT

Form C-102

PRODUCTION WELLS

13-07
33-07
53-07
45-07
47-07

INJECTION WELLS

42-18
62-18
82-18

District I
1625 N. French Dr., Hobbs, NM 88240
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State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1. HI-01 LLC	13-07
[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4100

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3781'	South	530'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

[16]

• 13-07

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/21/08

Steven Braun
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor.

Richard J. Tosaw Jr. 4/16/08

NMPLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
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State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
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☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	33-07

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4100

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3721'	South	1789'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
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20			

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[16]

33-07 •

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

4/21/08
Signature Date

Shawn Bran
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor

Richard J. Nelson 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
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OIL CONSERVATION DIVISION
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WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number	2 Pool Code	3 Pool Name

4 Property Code	5 Property Name	6 Well Number
	Lightning Dock No 1, HI-01 LLC	53-07

7 OGRID No.	8 Operator Name	9 Elevation
	Los Lobos Renewable Power, LLC	4106

10 Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		3775'	South	3052'	West	Hidalgo

11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

12 Dedicated Acres	13 Joint or Infill	14 Consolidation Code	15 Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

16

53-07 •

17 OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/18/08

Steven Brown
Printed Name

18 SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Tavarez 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	45-07

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4100

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		2360'	South	2278'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

16

45-07 •

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature 4/2/08 Date

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 31, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Treasure 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

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Revised October 12, 2005
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☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	47-07

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4100

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	07	25S	19W		1219'	South	2266'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

[16]

47-07 •

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature 4/21/08 Date

Steven Braun
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 31, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Tavaszi 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

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Revised October 12, 2005
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State Lease - 4 Copies
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☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	42-18

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4106

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	18	25S	19W		1307'	North	2123'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

16

42-18 •

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/24/08

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Robert J. Thomas 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
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☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	62-18

[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4125

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	18	25S	19W		1207'	North	3350'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

16

62-18 •

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/21/08

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor:

Richard J. Tosaw 4/16/08

NMRLS 7240
Certificate Number

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised October 12, 2005
Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	Lightning Dock No 1, HI-01 LLC	82-18
[7] OGRID No.	[8] Operator Name	[9] Elevation
	Los Lobos Renewable Power, LLC	4151

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
	18	25S	19W		1278'	North	4978'	West	Hidalgo

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Same									

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
20			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

[16]

82-18 •

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature — Date: 4/21/08

Steven Brown
Printed Name

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

March 12, 2008
Date of Survey

Signature and Seal of Professional Surveyor

Richard J. Tavarez 4/16/08

NMRLS 7240
Certificate Number

BUREAU OF LAND MANAGEMENT

Geothermal Drilling Permit (GDP)

OMB No. 1004-0132

PRODUCTION WELLS

13-07
33-07
53-07
45-07
47-07

INJECTION WELLS

42-18
62-18
82-18

Form 3260-2
(September 2001)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0132
Expires: January 31, 2004

GEOTHERMAL DRILLING PERMIT

The Bureau of Land Management (BLM) requires this form or other BLM approved forms to be prepared and filed in **triplicate** with requisite attachments with the authorized officer. The authorized officer must approve this permit prior to any lease operation.

7. Lease Serial No.

8. Surface Manager: ☐ BLM ☐ FS ☐ Other

1a. Type of Work: ☑ Drill New Well ☐ Redrill ☐ Deepen ☐ Plug Back ☐ Directionally Drill ☐ Other

9. Unit Agreement Name

1b. Well Type: ☑ Production ☐ Injection ☐ Heat Exchange ☐ Observation ☐ Water Supply ☐ Other

10. Well No. **13-07**

11. Permit No.

1c. Well Status: **NEW WELL**

12. Field or Area

2. Name of Lessee/Operator **LIGHTNING DOCK NO. HI-01 LLC**

13. Sec., T., R., B. & M. **SEC 7 T25S R19W**

3. Address of Lessee/Operator **5152 NORTH EDGEWOOD DRIVE, SUITE 375, PROVO, UTAH**

4. Location of Well
At surface **SEE ATTACHMENT**
At proposed prod. zone **SAME AS ABOVE**

14. County **HIDALGO**

15. State **NM**

5. Distance from Proposed Location to Nearest Property or Lease Line **530 ft**

16. Approx. Starting Date **05/30/2008**

6. Distance from Proposed Location to Nearest Well, or Previously Applied for Well Location on this Lease. **N/A**

17. Acres Assigned (Well Spacing)

18. Drilling Media and Characteristics: ☐ Air ☐ Water ☑ Mud ☐ Foam ☐ Other

19. Proposed Depth
Measured:
True Vertical: **2,500 feet**

20. Elevations: ☑ Estimated ☐ Final
Reference Datum: ☑ GR ☐ MAT ☐ DF ☐ KB ☐ RT ☐ Casinghead Flange ☐ Other

21. Existing and/or Proposed Casing and Cementing Program *(List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)*

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	COUPLING *(Collars & Threads)*	GRADE	SETTING DEPTH Top	SETTING DEPTH Bottom	QUANTITY OF CEMENT
26"	**20"**	**3.8" Well**		**PEBFM**	**GL**	**63'**	**150 ssacks**
17.5'	**13.375"**	**54.5 lb/ft**		**J55BT&C**		**1500'**	**750 sacks**
12.25"	**9.625"**	**36.0 lb/ft**		**J55BT&C**		**3400'**	**980 sacks**

22. Proposed Work Summary

Drill a geothermal production well from drill site on private land to exctract geothermal fluids from federal lease number NM-108801 & NM-034790.
See attached location map.
See attached Drilling Program for details.

23.

Signed _____ Title _____ Date _____

(This space for Federal use)

Approved by _____ Title _____ Date _____

Conditions of Approval, If Any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(See instructions on page 2)

Form 3260-2
(September 2001)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0132
Expires: January 31, 2004

GEOTHERMAL DRILLING PERMIT

The Bureau of Land Management (BLM) requires this form or other BLM approved forms to be prepared and filed in **triplicate** with requisite attachments with the authorized officer. The authorized officer must approve this permit prior to any lease operation.

7. Lease Serial No.

8. Surface Manager: ☐ BLM ☐ FS ☐ Other

1a. Type of Work: ☑ Drill New Well ☐ Redrill ☐ Deepen ☐ Plug Back ☐ Directionally Drill ☐ Other

9. Unit Agreement Name

1b. Well Type: ☑ Production ☐ Injection ☐ Heat Exchange ☐ Observation ☐ Water Supply ☐ Other

10. Well No. **33-07**

11. Permit No.

1c. Well Status: **NEW WELL**

12. Field or Area

2. Name of Lessee/Operator **LIGHTNING DOCK NO. HI-01 LLC**

13. Sec., T., R., B. & M. **SEC 7 T25S R19W**

3. Address of Lessee/Operator **5152 NORTH EDGEWOOD DRIVE, SUITE 375, PROVO, UTAH**

4. Location of Well
At surface **SEE ATTACHMENT**
At proposed prod. zone **SAME AS ABOVE**

14. County ***HIDALGO***

15. State **NM**

5. Distance from Proposed Location to Nearest Property or Lease Line **2389.4 ft**

16. Approx. Starting Date **05/30/2008**

6. Distance from Proposed Location to Nearest Well, or Previously Applied for Well Location on this Lease. **N/A**

17. Acres Assigned (Well Spacing)

18. Drilling Media and Characteristics: ☐ Air ☐ Water ☑ Mud ☐ Foam ☐ Other

19. Proposed Depth
Measured:
True Vertical: **2,500 feet**

20. Elevations: ☑ Estimated ☐ Final
Reference Datum: ☑ GR ☐ MAT ☐ DF ☐ KB ☐ RT ☐ Casinghead Flange ☐ Other

21. Existing and/or Proposed Casing and Cementing Program *(List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)*

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	COUPLING *(Collars & Threads)*	GRADE	SETTING DEPTH Top	SETTING DEPTH Bottom	QUANTITY OF CEMENT
26"	**20"**	**3.8" Well**		**PEBFM**	**GL**	**63'**	**150 ssacks**
17.5'	**13.375"**	**54.5 lb/ft**		**J55BT&C**		**1500'**	**750 sacks**
12.25"	**9.625"**	**36.0 lb/ft**		**J55BT&C**		**3400'**	**980 sacks**

22. Proposed Work Summary

Drill a geothermal production well from drill site on private land to exctract geothermal fluids from federal lease number NM-108801 & NM-034790.
See attached location map.
See attached Drilling Program for details.

23.

Signed _____ Title _____ Date _____

(This space for Federal use)

Approved by _____ Title _____ Date _____

Conditions of Approval, If Any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(See instructions on page 2)

Form 3260-2
(September 2001)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0132
Expires: January 31, 2004

GEOTHERMAL DRILLING PERMIT

The Bureau of Land Management (BLM) requires this form or other BLM approved forms to be prepared and filed in **triplicate** with requisite attachments with the authorized officer. The authorized officer must approve this permit prior to any lease operation.

7. Lease Serial No.

8. Surface Manager: ☐ BLM ☐ FS ☐ Other

1a. Type of Work: ☑ Drill New Well ☐ Redrill ☐ Deepen ☐ Plug Back ☐ Directionally Drill ☐ Other

9. Unit Agreement Name

1b. Well Type: ☑ Production ☐ Injection ☐ Heat Exchange ☐ Observation ☐ Water Supply ☐ Other

10. Well No. **53-07**

11. Permit No.

1c. Well Status: **NEW WELL**

12. Field or Area

2. Name of Lessee/Operator **LIGHTNING DOCK NO. HI-01 LLC**

13. Sec., T., R., B. & M. **SEC 7 T25S R19W**

3. Address of Lessee/Operator **5152 NORTH EDGEWOOD DRIVE, SUITE 375, PROVO, UTAH**

4. Location of Well
At surface **SEE ATTACHMENT**
At proposed prod. zone **SAME AS ABOVE**

14. County **HIDALGO**

15. State **NM**

5. Distance from Proposed Location to Nearest Property or Lease Line **3052 ft**

16. Approx. Starting Date **05/30/2008**

6. Distance from Proposed Location to Nearest Well, or Previously Applied for Well Location on this Lease. **N/A**

17. Acres Assigned (Well Spacing)

18. Drilling Media and Characteristics: ☐ Air ☐ Water ☑ Mud ☐ Foam ☐ Other

19. Proposed Depth
Measured:
True Vertical: **2,500 feet**

20. Elevations: ☑ Estimated ☐ Final
Reference Datum: ☑ GR ☐ MAT ☐ DF ☐ KB ☐ RT ☐ Casinghead Flange ☐ Other

21. Existing and/or Proposed Casing and Cementing Program *(List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)*

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	COUPLING *(Collars & Threads)*	GRADE	SETTING DEPTH Top	SETTING DEPTH Bottom	QUANTITY OF CEMENT
26"	**20"**	**3.8" Well**		**PEBFM**	**GL**	**63'**	**150 ssacks**
17.5'	**13.375"**	**54.5 lb/ft**		**J55BT&C**		**1500'**	**750 sacks**
12.25"	**9.625"**	**36.0 lb/ft**		**J55BT&C**		**3400'**	**980 sacks**

22. Proposed Work Summary

Drill a geothermal production well from drill site on private land to exctract geothermal fluids from federal lease number NM-108801 & NM-034790.
See attached location map.
See attached Drilling Program for details.

23.

Signed _____ Title _____ Date _____

(This space for Federal use)

Approved by _____ Title _____ Date _____

Conditions of Approval, If Any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(See instructions on page 2)

Form 3260-2
(September 2001)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0132
Expires: January 31, 2004

GEOTHERMAL DRILLING PERMIT

The Bureau of Land Management (BLM) requires this form or other BLM approved forms to be prepared and filed in **triplicate** with requisite attachments with the authorized officer. The authorized officer must approve this permit prior to any lease operation.

7. Lease Serial No.

8. Surface Manager: ☐ BLM ☐ FS ☐ Other

1a. Type of Work: ☑ Drill New Well ☐ Redrill ☐ Deepen ☐ Plug Back ☐ Directionally Drill ☐ Other

9. Unit Agreement Name

1b. Well Type: ☑ Production ☐ Injection ☐ Heat Exchange ☐ Observation ☐ Water Supply ☐ Other

10. Well No. **45-07**

11. Permit No.

1c. Well Status: **NEW WELL**

12. Field or Area

2. Name of Lessee/Operator **LIGHTNING DOCK NO. HI-01 LLC**

13. Sec., T., R., B. & M. **SEC 7 T25S R19W**

3. Address of Lessee/Operator **5152 NORTH EDGEWOOD DRIVE, SUITE 375, PROVO, UTAH**

4. Location of Well
At surface **SEE ATTACHMENT**
At proposed prod. zone **SAME AS ABOVE**

14. County **HIDALGO**

15. State **NM**

5. Distance from Proposed Location to Nearest Property or Lease Line **2428 ft**

16. Approx. Starting Date **05/30/2008**

6. Distance from Proposed Location to Nearest Well, or Previously Applied for Well Location on this Lease. **N/A**

17. Acres Assigned (Well Spacing)

18. Drilling Media and Characteristics: ☐ Air ☐ Water ☑ Mud ☐ Foam ☐ Other

19. Proposed Depth
Measured:
True Vertical: **2,500 feet**

20. Elevations: ☑ Estimated ☐ Final
Reference Datum: ☑ GR ☐ MAT ☐ DF ☐ KB ☐ RT ☐ Casinghead Flange ☐ Other

21. Existing and/or Proposed Casing and Cementing Program *(List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)*

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	COUPLING *(Collars & Threads)*	GRADE	SETTING DEPTH Top	SETTING DEPTH Bottom	QUANTITY OF CEMENT
26"	**20"**	**3.8" Well**		**PEBFM**	**GL**	**63'**	**150 ssacks**
17.5'	**13.375"**	**54.5 lb/ft**		**J55BT&C**		**1500'**	**750 sacks**
12.25"	**9.625"**	**36.0 lb/ft**		**J55BT&C**		**3400'**	**980 sacks**

22. Proposed Work Summary

Drill a geothermal production well from drill site on private land to exctract geothermal fluids from federal lease number NM-108801 & NM-034790.
See attached location map.
See attached Drilling Program for details.

23.

Signed _____ Title _____ Date _____

(This space for Federal use)

Approved by _____ Title _____ Date _____

Conditions of Approval, If Any:

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(See instructions on page 2)

Form 3260-2
(September 2001)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0132
Expires: January 31, 2004

GEOTHERMAL DRILLING PERMIT

The Bureau of Land Management (BLM) requires this form or other BLM approved forms to be prepared and filed in **triplicate** with requisite attachments with the authorized officer. The authorized officer must approve this permit prior to any lease operation.

7. Lease Serial No.

8. Surface Manager: ☐ BLM ☐ FS ☐ Other

1a. Type of Work: ☑ Drill New Well ☐ Redrill ☐ Deepen ☐ Plug Back ☐ Directionally Drill ☐ Other

9. Unit Agreement Name

1b. Well Type: ☑ Production ☐ Injection ☐ Heat Exchange ☐ Observation ☐ Water Supply ☐ Other

10. Well No. **47-07**

11. Permit No.

1c. Well Status: **NEW WELL**

12. Field or Area

2. Name of Lessee/Operator **LIGHTNING DOCK NO. HI-01 LLC**

13. Sec., T., R., B. & M. **SEC 7 T25S R19W**

3. Address of Lessee/Operator **5152 NORTH EDGEWOOD DRIVE, SUITE 375, PROVO, UTAH**

4. Location of Well
At surface **SEE ATTACHMENT**
At proposed prod. zone **SAME AS ABOVE**

14. County **HIDALGO**

15. State **NM**

5. Distance from Proposed Location to Nearest Property or Lease Line **1219 ft**

16. Approx. Starting Date **05/30/2008**

6. Distance from Proposed Location to Nearest Well, or Previously Applied for Well Location on this Lease. **N/A**

17. Acres Assigned (Well Spacing)

18. Drilling Media and Characteristics: ☐ Air ☐ Water ☑ Mud ☐ Foam ☐ Other

19. Proposed Depth
Measured:
True Vertical: **2,500 feet**

20. Elevations: ☑ Estimated ☐ Final
Reference Datum: ☑ GR ☐ MAT ☐ DF ☐ KB ☐ RT ☐ Casinghead Flange ☐ Other

21. Existing and/or Proposed Casing and Cementing Program *(List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)*

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	COUPLING *(Collars & Threads)*	GRADE	SETTING DEPTH Top	SETTING DEPTH Bottom	QUANTITY OF CEMENT
26"	**20"**	**3.8" Well**		**PEBFM**	**GL**	**63'**	**150 ssacks**
17.5'	**13.375"**	**54.5 lb/ft**		**J55BT&C**		**1500'**	**750 sacks**
12.25"	**9.625"**	**36.0 lb/ft**		**J55BT&C**		**3400'**	**980 sacks**

22. Proposed Work Summary

Drill a geothermal production well from drill site on private land to exctract geothermal fluids from federal lease number NM-108801 & NM-034790.
See attached location map.
See attached Drilling Program for details.

23.

Signed _____ Title _____ Date _____

(This space for Federal use)

Approved by _____ Title _____ Date _____

Conditions of Approval, If Any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(See instructions on page 2)

Form 3260-2
(September 2001)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0132
Expires: January 31, 2004

GEOTHERMAL DRILLING PERMIT

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7. Lease Serial No.

8. Surface Manager: ☐ BLM ☐ FS ☐ Other

1a. Type of Work: ☑ Drill New Well ☐ Redrill ☐ Deepen ☐ Plug Back ☐ Directionally Drill ☐ Other

9. Unit Agreement Name

1b. Well Type: ☐ Production ☑ Injection ☐ Heat Exchange ☐ Observation ☐ Water Supply ☐ Other

10. Well No. **42-18** | 11. Permit No.

1c. Well Status: **NEW WELL**

12. Field or Area

2. Name of Lessee/Operator **LIGHTNING DOCK NO. HI-01 LLC**

13. Sec., T., R., B. & M. **SEC 7 T25S R19W**

3. Address of Lessee/Operator **5152 NORTH EDGEWOOD DRIVE, SUITE 375, PROVO, UTAH**

4. Location of Well
At surface **SEE ATTACHMENT**
At proposed prod. zone **SAME AS ABOVE**

14. County **HIDALGO**

15. State **NM**

5. Distance from Proposed Location to Nearest Property or Lease Line **1307 ft**

16. Approx. Starting Date **05/30/2008**

6. Distance from Proposed Location to Nearest Well, or Previously Applied for Well Location on this Lease. **N/A**

17. Acres Assigned (Well Spacing)

18. Drilling Media and Characteristics: ☐ Air ☐ Water ☑ Mud ☐ Foam ☐ Other

19. Proposed Depth
Measured:
True Vertical: **2,500 feet**

20. Elevations: ☑ Estimated ☐ Final
Reference Datum: ☑ GR ☐ MAT ☐ DF ☐ KB ☐ RT ☐ Casinghead Flange ☐ Other

21. Existing and/or Proposed Casing and Cementing Program *(List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)*

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	COUPLING *(Collars & Threads)*	GRADE	SETTING DEPTH Top	SETTING DEPTH Bottom	QUANTITY OF CEMENT
26"	**20"**	**3.8" Well**		**PEBFM**	**GL**	**63'**	**150 ssacks**
17.5'	**13.375"**	**54.5 lb/ft**		**J55BT&C**		**1500'**	**750 sacks**
12.25"	**9.625"**	**36.0 lb/ft**		**J55BT&C**		**3400'**	**980 sacks**

22. Proposed Work Summary

Drill a geothermal injection well from drill site on private land to exctract geothermal fluids from federal lease number NM-108801 & NM-034790.
See attached location map.
See attached Drilling Program for details.

23.

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1a. Type of Work: ☑ Drill New Well ☐ Redrill ☐ Deepen ☐ Plug Back ☐ Directionally Drill ☐ Other

9. Unit Agreement Name

1b. Well Type: ☐ Production ☑ Injection ☐ Heat Exchange ☐ Observation ☐ Water Supply ☐ Other

10. Well No. **62-18**

11. Permit No.

1c. Well Status: **NEW WELL**

12. Field or Area

2. Name of Lessee/Operator **LIGHTNING DOCK NO. HI-01 LLC**

13. Sec., T., R., B. & M. **SEC 7 T25S R19W**

3. Address of Lessee/Operator **5152 NORTH EDGEWOOD DRIVE, SUITE 375, PROVO, UTAH**

4. Location of Well
At surface **SEE ATTACHMENT**
At proposed prod. zone **SAME AS ABOVE**

14. County **HIDALGO**

15. State **NM**

5. Distance from Proposed Location to Nearest Property or Lease Line **1297.2 ft**

16. Approx. Starting Date **05/30/2008**

6. Distance from Proposed Location to Nearest Well, or Previously Applied for Well Location on this Lease. **N/A**

17. Acres Assigned (Well Spacing)

18. Drilling Media and Characteristics: ☐ Air ☐ Water ☑ Mud ☐ Foam ☐ Other

19. Proposed Depth
Measured:
True Vertical: **2,500 feet**

20. Elevations: ☑ Estimated ☐ Final
Reference Datum: ☑ GR ☐ MAT ☐ DF ☐ KB ☐ RT ☐ Casinghead Flange ☐ Other

21. Existing and/or Proposed Casing and Cementing Program *(List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)*

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17.5'	**13.375"**	**54.5 lb/ft**		**J55BT&C**		**1500'**	**750 sacks**
12.25"	**9.625"**	**36.0 lb/ft**		**J55BT&C**		**3400'**	**980 sacks**

22. Proposed Work Summary

Drill a geothermal injection well from drill site on private land to exctract geothermal fluids from federal lease number NM-108801 & NM-034790.
See attached location map.
See attached Drilling Program for details.

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1a. Type of Work: ☑ Drill New Well ☐ Redrill ☐ Deepen ☐ Plug Back ☐ Directionally Drill ☐ Other

9. Unit Agreement Name

1b. Well Type: ☐ Production ☑ Injection ☐ Heat Exchange ☐ Observation ☐ Water Supply ☐ Other

10. Well No. **82-18**

11. Permit No.

1c. Well Status: **NEW WELL**

12. Field or Area

2. Name of Lessee/Operator **LIGHTNING DOCK NO. HI-01 LLC**

13. Sec., T., R., B. & M. **SEC 7 T25S R19W**

3. Address of Lessee/Operator **5152 NORTH EDGEWOOD DRIVE, SUITE 375, PROVO, UTAH**

4. Location of Well
At surface **SEE ATTACHMENT**
At proposed prod. zone **SAME AS ABOVE**

14. County **HIDALGO**

15. State **NM**

5. Distance from Proposed Location to Nearest Property or Lease Line **1278.3 ft**

16. Approx. Starting Date **05/30/2008**

6. Distance from Proposed Location to Nearest Well, or Previously Applied for Well Location on this Lease. **N/A**

17. Acres Assigned (Well Spacing)

18. Drilling Media and Characteristics: ☐ Air ☐ Water ☑ Mud ☐ Foam ☐ Other

19. Proposed Depth
Measured:
True Vertical: **2,500 feet**

20. Elevations: ☑ Estimated ☐ Final
Reference Datum: ☑ GR ☐ MAT ☐ DF ☐ KB ☐ RT ☐ Casinghead Flange ☐ Other

21. Existing and/or Proposed Casing and Cementing Program *(List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)*

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(See instructions on page 2)

Legal Description of Wells

Genetron 245fa

Material Safety Data Sheet

Honeywell

Material Safety Data Sheet

Genetron® 245fa

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Genetron 245fa
OTHER/GENERIC NAMES: HFC-245fa. R-245fa
PRODUCT USE: Insulating Gas for foams and as a refrigerant. See Section 15 for Regulatory Information
MANUFACTURER: Honeywell
101 Columbia Road
Box 1053
Morristown, New Jersey 07962-1053

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-707-4555

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
1-800-707-4555 or 602-365-4980
Chemtrec: 1-800-424-9800

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
1,1,1,3,3-Pentafluoropropane	460-73-1	100

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: **Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At high temperatures (>250°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.**

POTENTIAL HEALTH HAZARDS

SKIN: Non-irritating

EYES: Contact with liquid or mist may cause irritation.

INHALATION: Genetron 245fa is of low order of toxicity in animals. At high levels of exposure, cardiac arrhythmia may occur. When oxygen levels are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination , increased pulse rate and deeper respiration will occur.

INGESTION: Ingestion is an unlikely route of exposure because Genetron 245fa is a low boiling liquid, usually stored in a pressurized container. For that reason, ingestion hazards have not been evaluated. Discomfort due to volatility would be expected. Some of the inhalation effects could be expected.

DELAYED EFFECTS: None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section			

4. FIRST AID MEASURES

SKIN: Promptly flush skin with water until all chemical is removed. Remove clothing contaminated with liquid and wash before reuse.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes, lifting eyelids occasionally to facilitate irrigation. Get medical attention.

INHALATION: Immediately remove patient to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. DO NOT give epinephrine (adrenaline). Get medical attention immediately.

INGESTION: Ingestion is an unlikely route of exposure because Genetron 245fa is a low boiling liquid, usually stored in a pressurized container. For that reason, ingestion hazards have not been evaluated. DO NOT induce vomiting unless instructed to do so by a physician. DO NOT give stimulants. Get medical attention immediately.

ADVICE TO PHYSICIAN: Because of possible disturbances of cardiac rhythm, catecholamine drugs such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: None
FLASH POINT METHOD: ASTM D-3828-87 and ASTM D-1310-86
AUTOIGNITION TEMPERATURE: 774°F (412°C) Tested in a 500ml flask
UPPER FLAME LIMIT (volume % in air): None
LOWER FLAME LIMIT (volume % in air): None

FLAME PROPAGATION RATE (solids): Not applicable
OSHA FLAMMABILITY CLASS: Not applicable

EXTINGUISHING MEDIA:

Use any standard agent - choose the one most appropriate for type of surrounding fire (material itself in not flammable)

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Genetron 245fa is not flammable at ambient temperatures and atmospheric pressure. However, based on other HFC response, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources. Contact with certain finely divided reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against suffocation and possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool and to knock down vapors which may result from product decomposition.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Immediately evacuate the area and provide maximum ventilation. Try to eliminate all ignition sources. Unprotected personnel should move upwind from spill. Only personnel equipped with proper respiratory and eye/skin protection should be permitted in the area until air has been tested and determined safe, including low lying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Avoid breathing vapors or liquid contact with eyes, skin or clothing. Do not puncture or drop containers, expose them to open flame, excessive heat, or direct sunlight. Use approved containers only. Tank cleaning personnel should use only formal tank entry procedure based on recognized safety principles.

Genetron 245fa should not be mixed with air above atmospheric pressure for leak testing or any other purpose. Use dry nitrogen to leak test equipment pressurized with Genetron 245fa.

STORAGE RECOMMENDATIONS:

Due to low boiling of 59°F (15°C), store in a cool, well-ventilated area of low fire risk. Protect container and its fittings from physical damage. Storage in subsurface locations should be avoided. Do not heat the container or store at a temperature above 125°F (51.7°C). Close valve tightly and after use and when empty. If container temperature exceeds boiling point, cool the container before opening.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Use local exhaust at filling zones and where leakage is probable. Use mechanical (general) ventilation for storage areas. All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94).

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:
Use protective, impervious gloves and clothing made of neoprene, nitrile or butyl rubber if prolonged or repeated contact with liquid is anticipated. Wash clothing promptly, if wet. Remove any non-impervious clothing and wash before re-use.

EYE PROTECTION:
For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear splash-proof goggles. Contact lenses should not be worn under such conditions.

RESPIRATORY PROTECTION:
None required for normal work situations where adequate ventilation is provided. Use NIOSH approved self-contained, positive pressure respirators for emergencies and in situations where air may be displaced by vapors.

ADDITIONAL RECOMMENDATIONS:
High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
1,1,1,3,3-Pentafluoropropane	None	None	**300 ppm TWA- 8hrs.

* = Provisional limit established by Honeywell
** = Workplace Environmental Exposure Level (AIHA).
*** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
Hydrogen Fluoride: 3 ppm ACGIH TLV

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless liquid
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: 134
CHEMICAL FORMULA: $CHF_2CH_2CF_3$
ODOR: Faint ethereal and sweetish odor
SPECIFIC GRAVITY (water = 1.0): 1.32 @ 68°F (20°C)
SOLUBILITY IN WATER (weight %): 7.18g/l @ ambient room temperature
pH: Neutral
BOILING POINT: 59°F (15°C)

MELTING POINT:	Not determined	
FREEZING POINT:	<-112°F (< -80°C)	
VAPOR PRESSURE:	17.8 psia @ 68°F (20°C)	
	56.3 psia @ 130°F (54.4°C)	
VAPOR DENSITY (air = 1.0):	4.6	
EVAPORATION RATE:	>1	COMPARED TO: Ether = 1
% VOLATILES:	100	
FLASH POINT:	None	

(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

Product is stable under normal conditions.

Avoid sources of ignition such as sparks, hot spots, welding flames and lighted cigarettes which may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:

Strong acids and alkalis, reactive metals e.g., powdered or freshly abraded aluminum (may cause strong exothermic reaction), sodium, potassium, calcium, magnesium, zinc, molten aluminum, barium and lithium shavings. Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS:

Halogens and halogen acids; and possibly carbonyl halides.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Acute Dermal (rabbit) - LD_{50} > 2,000 mg.kg

Cardiac Sensitization (dogs) - No effects noted at 35,000 ppm, the threshold for induction of cardiac arrhythmias in the presence of injected adrenalin was 44,000 ppm.

Acute Inhalation (rat): 4-hr. LC_{50} > 200,000 ppm. No lethality at 200,000 ppm. Evidence of transient anesthetic effect.

Acute Inhalation (mouse): 4-hr. LC_{50} > 100,000 ppm. No lethality at 100,000 ppm. Evidence of transient underactivity
during exposure.

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Embryotoxicity (rats): Not a teratogen at 50,000 ppm, the highest level tested.

NOEL (pups): 50,000 ppm

NOEL (dams): 2,000 ppm (due to decrease in bodyweight gains at 10,000 ppm and 50,000 ppm)

28-day Inhalation Study (rats): NOAEL - 50,000 ppm and NOEL - 500 ppm

90-day Inhalation Study (rats): NOAEL - 2,000 ppm
Dose levels: 0, 500, 2,000, 10,000 and 50,000 ppm

Overall, subchronic studies showed dose-related increases in urinary fluoride levels, urine volumes and water consumption. Increases were noted in hematological parameters, BUN levels and serum liver enzyme activities (GOT, GPT). These increases did not follow a dose response; however, they indicate that HFC-245fa is metabolized in the liver. Significant recovery was noted in these parameters following a 2-week, non-exposure period which followed the 28-day exposure period. No histopathological effects were noted in the 28-day study. The 90-day study noted an increase in incidence and severity (trace to moderate) of mycarditis (inflammation of the heart muscle) at 10,000 and 50,000 ppm. This was not noted at the 500 or 2,000 ppm dose levels nor was it seen the the 28-day study at 50,000 ppm.

OTHER DATA:

Genetic studies: In vitro Human Lymphocyte weak positive activation without S9 at 30% v/v; not active with S9 up to 70% v/v.
In Vivo Mouse Micronucleaus - Not active up to 100,000 ppm.
Ames Test: Not active up to 100% v/v with or without S9.

12. ECOLOGICAL INFORMATION

Partition Coefficient: Log P_{OW} = 1.35 @ 21.5°C
Acute toxicity to Daphnia magna (Limit Test): NOEC > 97.9 mg/L; 48 hr. EC_{50} > 97.9 mg/L
Acute toxicity to Rainbow Trout (Limit Test): NOEC > 10 mg/L; 96 hr. EC_{50} > 81.8 mg/L

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? The product is not a RCRA waste
If yes, the RCRA ID number is: Not applicable

OTHER DISPOSAL CONSIDERATIONS:
All spent material must be disposed of in accordance with all applicable Federal and State RCRA Regulations. Consult with appropriate regulatory agencies before disposing of waste material.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: Not regulated

US DOT ID NUMBER: Not applicable

MATERIAL SAFETY DATA SHEET

Genetron® 245fa

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed

OTHER TSCA ISSUES: EPA intends to promulgate a SNUR restricting the use of Genetron 245fa to foam blowing and refrigerant for commercial chillers. Pertinent regulations are found at 40 CFR Part 721. Restrictions are stated in 40 CFR 721.80(j) and (p).

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE
PRESSURE

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
No ingredients listed in this section	

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:
Contains HFC-245fa, a greenhouse gas, a substance which may contribute to global warming.
Regulated under Section 612 (SNAP) of the Clean Air Act and 40 CFR Part 82, subpart G.

MATERIAL SAFETY DATA SHEET

Genetron® 245fa

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

Not determined.

16. OTHER INFORMATION

CURRENT ISSUE DATE: September, 2000
PREVIOUS ISSUE DATE: January, 1999

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

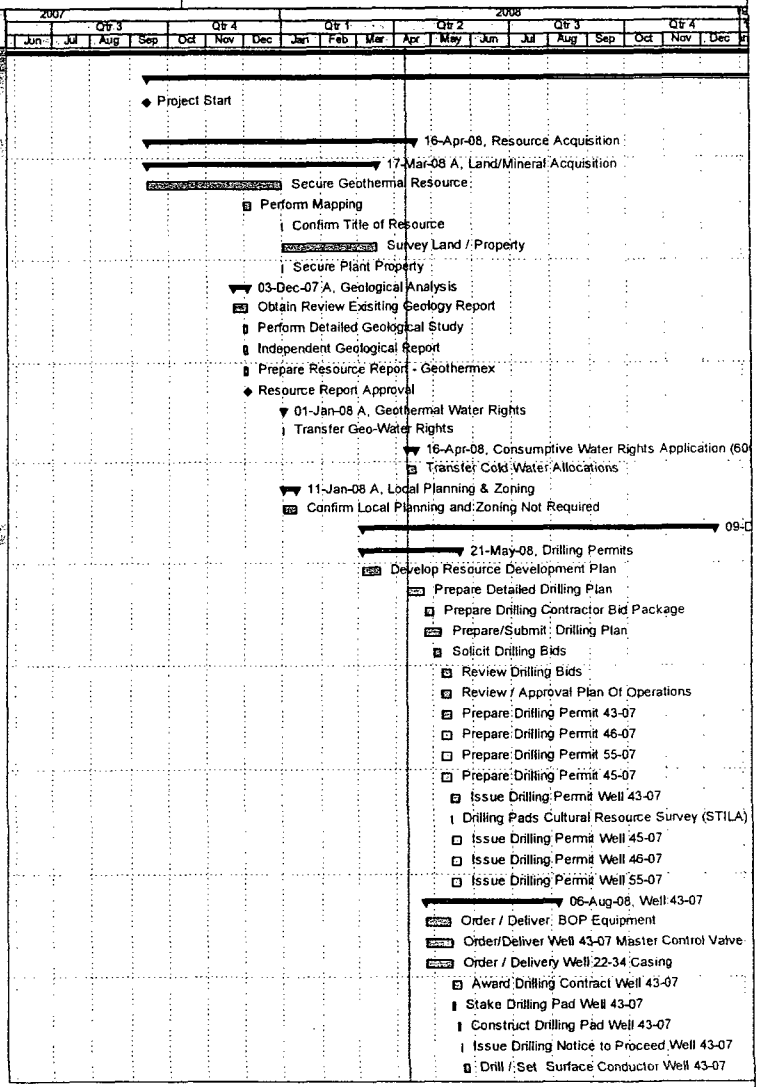
Section 1: New Company Name and addition of Trade Name
Section 8: Addition of AIHA permissible exposure limit
Section 15: TSCA status
Section 16: SNAP regulations

OTHER INFORMATION: HMIS Classification: Health - 2, Flammability - 0, Reactivity - 1
NFPA Classification: Health - 2, Flammability - 0, Reactivity - 1

Construction Schedule

Lightning Dock Geo Thermal No.1 HI-01, LLC (NM)	LTNG DOCK REV-1.06	10-Apr-08 10:47

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
Lightning Dock Geo Thermal No.1 HI-01, LLC (NM) 10MWe					
Project Milestones		387	14-Sep-07 A	09-Mar-09	
A1000	Project Start	0	14-Sep-07 A		
A1010	Project Finish	0		09-Mar-09	CO2120, CO2060
Resource Acquisition		215	14-Sep-07 A	16-Apr-08	
Land/Mineral Acquisition		157	14-Sep-07 A	17-Mar-08 A	
RA1000	Secure Geothermal Resource	30	14-Sep-07 A	01-Jan-08 A	RA1050
RA1010	Perform Mapping	5	01-Dec-07 A	07-Dec-07 A	RA1000
RA1030	Confirm Title of Resource	1	01-Jan-08 A	01-Jan-08 A	RA1020, RA1000
RA1020	Survey Land / Property	10	01-Jan-08 A	17-Mar-08 A	RA1000
RA1040	Secure Plant Property	0	01-Jan-08 A	01-Jan-08 A	RA1030
Geological Analysis		83	22-Nov-07 A	03-Dec-07 A	
RA1050	Obtain Review Exisiting Geology Report	15	22-Nov-07 A	03-Dec-07 A	A1000
RA1060	Perform Detailed Geological Study	36	30-Nov-07 A	03-Dec-07 A	RA1000
RA1070	Independent Geological Report	20	30-Nov-07 A	03-Dec-07 A	RA1060
RA1080	Prepare Resource Report - Geothermex	10	30-Nov-07 A	03-Dec-07 A	RA1070
RA1090	Resource Report Approval	0		03-Dec-07 A	RA1080
Geothermal Water Rights		1	01-Jan-08 A	01-Jan-08 A	
RA1100	Transfer Geo-Water Rights	1	01-Jan-08 A	01-Jan-08 A	RA1060
Consumptive Water Rights Application (600 Acre Feet)		5	10-Apr-08	16-Apr-08	
RA1110	Transfer Cold Water Allocations	5	10-Apr-08	16-Apr-08*	RA1060
Local Planning & Zoning		1	01-Jan-08 A	11-Jan-08 A	
RA1120	Confirm Local Planning and Zoning Not Required	1	01-Jan-08 A	11-Jan-08 A	ENG1040
Resource Development		191	04-Mar-08 A	09-Dec-08	
Drilling Permits		47	04-Mar-08 A	21-May-08	
RD1000	Develop Resource Development Plan	15	04-Mar-08 A	18-Mar-08 A	RA1060, RA1010
RD1010	Prepare Detailed Drilling Plan	10	10-Apr-08	23-Apr-08	RD1000
RD1020	Prepare Drilling Contractor Bid Package	5	24-Apr-08	30-Apr-08	RD1010
RD1040	Prepare/Submit Drilling Plan	10	24-Apr-08	07-May-08	RD1010
RD1050	Solicit Drilling Bids	5	01-May-08	07-May-08	RD1020
RD1060	Review Drilling Bids	5	08-May-08	14-May-08	RD1050
RD1070	Review / Approval Plan Of Operations	5	08-May-08	14-May-08	RD1040
RD1080	Prepare Drilling Permit 43-07	5	08-May-08	14-May-08	RA1030, RD1040
RD1090	Prepare Drilling Permit 46-07	5	08-May-08	14-May-08	RD1040
RD1100	Prepare Drilling Permit 55-07	5	08-May-08	14-May-08	RD1040
RD1085	Prepare Drilling Permit 45-07	5	08-May-08	14-May-08	RD1040
RD1110	Issue Drilling Permit Well 43-07	5	15-May-08	21-May-08	RD1070, RD1080
RD1120	Drilling Pads Cultural Resource Survey (STILA)	0	15-May-08	15-May-08	RD1070
RD1130	Issue Drilling Permit Well 45-07	5	15-May-08	21-May-08	RD1070, RD1085, RD1010
RD1140	Issue Drilling Permit Well 46-07	5	15-May-08	21-May-08	RD1090, RD1070
RD1150	Issue Drilling Permit Well 55-07	5	15-May-08	21-May-08	RD1100, RD1070
Well 43-07		75	24-Apr-08	06-Aug-08	
RD1160	Order / Deliver BOP Equipment	14	24-Apr-08	13-May-08	RD1010
RD1170	Order/Deliver Well 43-07 Master Control Valve	15	24-Apr-08	14-May-08	RD1010
RD1180	Order / Delivery Well 22-34 Casing	15	24-Apr-08	14-May-08	RD1010
RD1190	Award Drilling Contract Well 43-07	5	15-May-08	21-May-08	RD1060
RD1210	Stake Drilling Pad Well 43-07	2	15-May-08	16-May-08	RD1120
RD1220	Construct Drilling Pad Well 43-07	2	19-May-08	20-May-08	RD1210
RD1200	Issue Drilling Notice to Proceed Well 43-07	1	22-May-08	22-May-08	RD1190, RD1110
RD1230	Drill / Set Surface Conductor Well 43-07	2	23-May-08	27-May-08	RD1220, RD1200



Remaining Work | Actual Work | Summary
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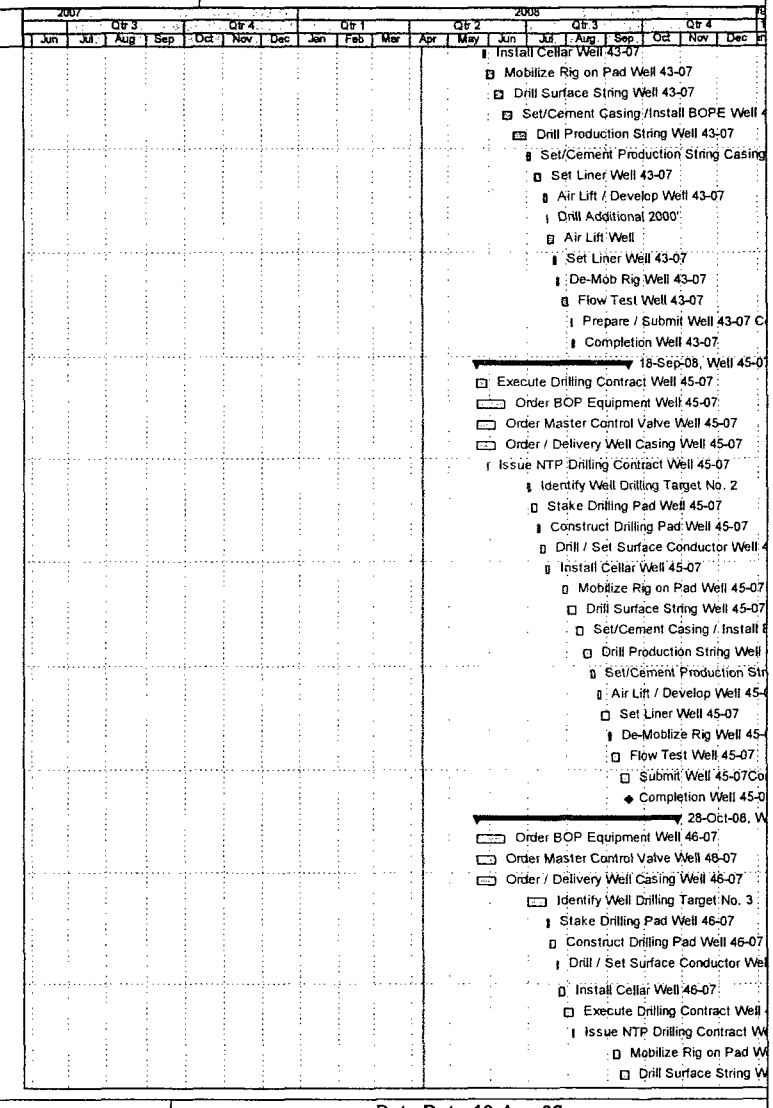
Data Date 10-Apr-08

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
RD1240	Install Cellar Well 43-07	2	28-May-08	29-May-08	RD1230
RD1250	Mobilize Rig on Pad Well 43-07	5	30-May-08	05-Jun-08	RD1240
RD1260	Drill Surface String Well 43-07	5	06-Jun-08	12-Jun-08	RD1250, RD1180
RD1270	Set/Cement Casing /Install BOPE Well 43-07	5	13-Jun-08	19-Jun-08	RD1160, RD1170, RD1260
RD1280	Drill Production String Well 43-07	7	20-Jun-08	30-Jun-08	RD1270
RD1290	Set/Cement Production String Casing Well 43-07	3	01-Jul-08	03-Jul-08	RD1280
RD1300	Set Liner Well 43-07	5	07-Jul-08	11-Jul-08	RD1290
RD1310	Air Lift / Develop Well 43-07	3	14-Jul-08	16-Jul-08	RD1300
RD1320	Drill Additional 2000'	0	17-Jul-08	17-Jul-08	RD1310
RD1330	Air Lift Well	3	17-Jul-08	21-Jul-08	RD1320
RD1340	Set Liner Well 43-07	2	22-Jul-08	23-Jul-08	RD1330
RD1350	De-Mob Rig Well 43-07	2	24-Jul-08	25-Jul-08	RD1310, RD1340
RD1360	Flow Test Well 43-07	5	28-Jul-08	01-Aug-08	RD1350
RD1370	Prepare / Submit Well 43-07 Completion Report	1	04-Aug-08	04-Aug-08	RD1360
RD1380	Completion Well 43-07	2	05-Aug-08	06-Aug-08	RD1370
Well 45-07		86	22-May-08	18-Sep-08	
RD1390	Execute Drilling Contract Well 45-07	5	22-May-08	29-May-08	RD1130
RD1400	Order BOP Equipment Well 45-07	15	22-May-08	12-Jun-08	RD1130
RD1410	Order Master Control Valve Well 45-07	10	22-May-08	05-Jun-08	RD1130
RD1420	Order / Delivery Well Casing Well 45-07	10	22-May-08	05-Jun-08	RD1130
RD1430	Issue NTP Drilling Contract Well 45-07	1	30-May-08	30-May-08	RD1390
RD1440	Identify Well Drilling Target No. 2	2	01-Jul-08	02-Jul-08	RD1280
RD1450	Stake Drilling Pad Well 45-07	2	03-Jul-08	07-Jul-08	RD1130, RD1440
RD1460	Construct Drilling Pad Well 45-07	3	08-Jul-08	10-Jul-08	RD1450
RD1470	Drill / Set Surface Conductor Well 45-07	2	11-Jul-08	14-Jul-08	RD1460
RD1480	Install Cellar Well 45-07	3	15-Jul-08	17-Jul-08	RD1470
RD1490	Mobilize Rig on Pad Well 45-07	4	28-Jul-08	31-Jul-08	RD1430, RD1350, RD1480
RD1500	Drill Surface String Well 45-07	5	01-Aug-08	07-Aug-08	RD1490, RD1420
RD1510	Set/Cement Casing / Install BOPE Well 45-07	4	08-Aug-08	13-Aug-08	RD1400, RD1410, RD1420, RD1500
RD1520	Drill Production String Well 45-07	4	14-Aug-08	19-Aug-08	RD1510
RD1530	Set/Cement Production String Casing Well 45-07	3	20-Aug-08	22-Aug-08	RD1520, RD1420
RD1540	Air Lift / Develop Well 45-07	3	25-Aug-08	27-Aug-08	RD1530
RD1550	Set Liner Well 45-07	3	28-Aug-08	02-Sep-08	RD1540
RD1560	De-Moblize Rig Well 45-07	2	03-Sep-08	04-Sep-08	RD1550
RD1570	Flow Test Well 45-07	5	05-Sep-08	11-Sep-08	RD1560
RD1580	Submit Well 45-07Completion Report	5	12-Sep-08	18-Sep-08	RD1570, RD1540
RD1590	Completion Well 45-07	0		18-Sep-08	RD1580
Well 46-07		114	22-May-08	28-Oct-08	
RD1600	Order BOP Equipment Well 46-07	15	22-May-08	12-Jun-08	RD1140
RD1610	Order Master Control Valve Well 46-07	10	22-May-08	05-Jun-08	RD1140
RD1620	Order / Delivery Well Casing Well 46-07	10	22-May-08	05-Jun-08	RD1140
RD1650	Identify Well Drilling Target No. 3	10	01-Jul-08	15-Jul-08	RD1280
RD1660	Stake Drilling Pad Well 46-07	2	16-Jul-08	17-Jul-08	RD1140, RD1650
RD1670	Construct Drilling Pad Well 46-07	3	18-Jul-08	22-Jul-08	RD1660
RD1680	Drill / Set Surface Conductor Well 46-07	2	23-Jul-08	24-Jul-08	RD1670
RD1690	Install Cellar Well 46-07	3	25-Jul-08	29-Jul-08	RD1680
RD1630	Execute Drilling Contract Well 46-07	5	29-Jul-08	04-Aug-08	RD1450
RD1640	Issue NTP Drilling Contract Well 46-07	1	05-Aug-08	05-Aug-08	RD1630
RD1700	Mobilize Rig on Pad Well 46-07	4	05-Sep-08	10-Sep-08	RD1640, RD1560, RD1690
RD1710	Drill Surface String Well 46-07	5	11-Sep-08	17-Sep-08	RD1700, RD1620



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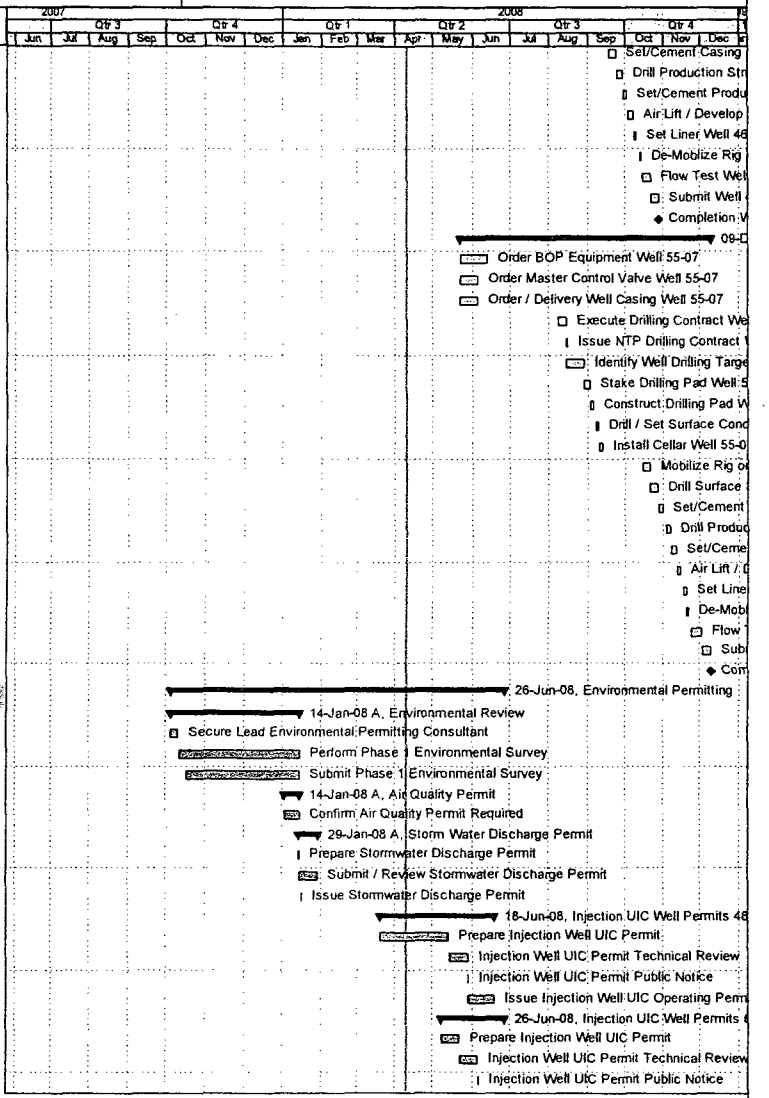
Lightning Dock Geo Thermal No.1 HI-01, LLC (NM)	LTNG DOCK REV-1.06	10-Apr-08 10:47

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
RD1720	Set/Cement Casing / Install BOPE Well 46-07	4	18-Sep-08	23-Sep-08	RD1600, RD1610, RD1620, RD1710
RD1730	Drill Production String Well 46-07	4	24-Sep-08	29-Sep-08	RD1720
RD1740	Set/Cement Production String Casing Well 46-07	3	30-Sep-08	02-Oct-08	RD1730, RD1620
RD1750	Air Lift / Develop Well 46-07	3	03-Oct-08	07-Oct-08	RD1740
RD1760	Set Liner Well 46-07	3	08-Oct-08	10-Oct-08	RD1750
RD1770	De-Moblize Rig Well 46-07	2	13-Oct-08	14-Oct-08	RD1760
RD1780	Flow Test Well 46-07	5	15-Oct-08	21-Oct-08	RD1770
RD1790	Submit Well 46-07 Completion Report	5	22-Oct-08	28-Oct-08	RD1780, RD1750
RD1800	Completion Well 46-07	0		28-Oct-08	RD1790
Well 55-07		144	22-May-08	09-Dec-08	
RD1810	Order BOP Equipment Well 55-07	15	22-May-08	12-Jun-08	RD1150
RD1820	Order Master Control Valve Well 55-07	10	22-May-08	05-Jun-08	RD1150
RD1830	Order / Delivery Well Casing Well 55-07	10	22-May-08	05-Jun-08	RD1150
RD1840	Execute Drilling Contract Well 55-07	5	08-Aug-08	14-Aug-08	RD1660
RD1850	Issue NTP Drilling Contract Well 55-07	1	15-Aug-08	15-Aug-08	RD1840
RD1860	Identify Well Drilling Target No. 4	10	15-Aug-08	28-Aug-08	RD1840
RD1870	Stake Drilling Pad Well 55-07	2	29-Aug-08	02-Sep-08	RD1860, RD1150
RD1880	Construct Drilling Pad Well 55-07	3	03-Sep-08	05-Sep-08	RD1870
RD1890	Drill / Set Surface Conductor Well 55-07	2	08-Sep-08	09-Sep-08	RD1880
RD1900	Install Cellar Well 55-07	3	10-Sep-08	12-Sep-08	RD1890
RD1910	Mobilize Rig on Pad Well 55-07	4	15-Oct-08	20-Oct-08	RD1850, RD1900, RD1770
RD1920	Drill Surface String Well 55-07	5	21-Oct-08	27-Oct-08	RD1910, RD1830
RD1930	Set/Cement Casing / Install BOPE Well 55-07	4	28-Oct-08	31-Oct-08	RD1810, RD1820, RD1830, RD1920
RD1940	Drill Production String Well 55-07	4	03-Nov-08	06-Nov-08	RD1930
RD1950	Set/Cement Production String Casing Well 55-07	3	07-Nov-08	11-Nov-08	RD1940, RD1830
RD1960	Air Lift / Develop Well 55-07	3	12-Nov-08	14-Nov-08	RD1950
RD1970	Set Liner Well 55-07	3	17-Nov-08	19-Nov-08	RD1960
RD1980	De-Moblize Rig Well 55-07	2	20-Nov-08	21-Nov-08	RD1970
RD1990	Flow Test Well 55-07	5	24-Nov-08	02-Dec-08	RD1980
RD2000	Submit Well 55-07 Completion Report	5	03-Dec-08	09-Dec-08	RD1990, RD1960
RD2010	Completion Well 55-07	0		09-Dec-08	RD2000
Environmental Permitting		199	05-Oct-07 A	26-Jun-08	
Environmental Review		199	05-Oct-07 A	14-Jan-08 A	
EP1000	Secure Lead Environmental Permitting Consultant	5	05-Oct-07 A	10-Oct-07 A	RA1010
EP1010	Perform Phase 1 Environmental Survey	10	11-Oct-07 A	14-Jan-08 A	ENG1040, EP1000
EP1020	Submit Phase 1 Environmental Survey	10	17-Oct-07 A	14-Jan-08 A	EP1010
Air Quality Permit		9	02-Jan-08 A	14-Jan-08 A	
EP1030	Confirm Air Quality Permit Required	9	02-Jan-08 A	14-Jan-08 A	ENG1040
Storm Water Discharge Permit		20	14-Jan-08 A	29-Jan-08 A	
EP1040	Prepare Stormwater Discharge Permit	10	14-Jan-08 A	14-Jan-08 A	ENG1040
EP1050	Submit / Review Stormwater Discharge Permit	10	15-Jan-08 A	29-Jan-08 A	EP1040
EP1060	Issue Stormwater Discharge Permit	7	16-Jan-08 A	16-Jan-08 A	EP1050
Injection UIC Well Permits 48-07		87	20-Mar-08 A	18-Jun-08	
EP1070	Prepare Injection Well UIC Permit	10	20-Mar-08 A	13-May-08	ENG1040
EP1080	Injection Well UIC Permit Technical Review	10	14-May-08	28-May-08	EP1070
EP1090	Injection Well UIC Permit Public Notice	0	29-May-08	29-May-08	EP1080
EP1100	Issue Injection Well UIC Operating Permit	15	29-May-08	18-Jun-08	EP1090
Injection UIC Well Permits 68-07		36	08-May-08	26-Jun-08	
EP1110	Prepare Injection Well UIC Permit	10	08-May-08	21-May-08	ENG1040
EP1120	Injection Well UIC Permit Technical Review	10	22-May-08	05-Jun-08	EP1110
EP1130	Injection Well UIC Permit Public Notice	0	06-Jun-08	06-Jun-08	EP1120



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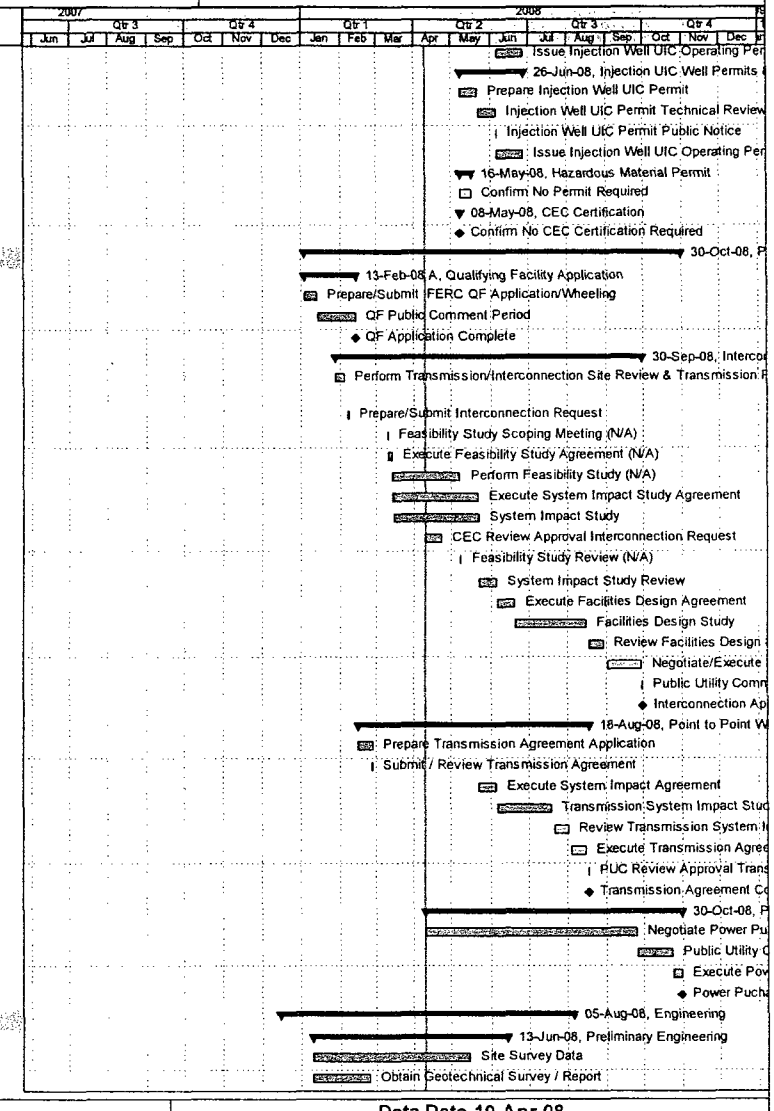
Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
EP1140	Issue Injection Well UIC Operating Permit	15	06-Jun-08	26-Jun-08	EP1130
Injection UIC Well Permits 88-07		36	08-May-08	26-Jun-08	
EP1170	Prepare Injection Well UIC Permit	10	08-May-08	21-May-08	ENG1040
EP1180	Injection Well UIC Permit Technical Review	10	22-May-08	05-Jun-08	EP1170
EP1190	Injection Well UIC Permit Public Notice	0	06-Jun-08	06-Jun-08	EP1180
EP1200	Issue Injection Well UIC Operating Permit	15	06-Jun-08	26-Jun-08	EP1190
Hazardous Material Permit		7	08-May-08	16-May-08	
EP1150	Confirm No Permit Required	7	08-May-08	16-May-08	ENG1040
CEC Certification		0	08-May-08	08-May-08	
EP1160	Confirm No CEC Certification Required	0	08-May-08		EP1150
Power Purchase/Transmission		164	03-Jan-08 A	30-Oct-08	
Qualifying Facility Application		56	03-Jan-08 A	13-Feb-08 A	
PPT1000	Prepare/Submit FERC QF Application/Wheeling	10	03-Jan-08 A	13-Jan-08 A	RA1000
PPT1010	QF Public Comment Period	30	14-Jan-08 A	13-Feb-08 A	PPT1000
PPT1020	QF Application Complete	0		13-Feb-08 A	PPT1010
Interconnection Agreement		141	28-Jan-08 A	30-Sep-08	
PPT1030	Perform Transmission/Interconnection Site Review & Transmission Plan	2	28-Jan-08 A	04-Feb-08 A	RA1010
PPT1040	Prepare/Submit Interconnection Request	5	07-Feb-08 A	07-Feb-08 A	PPT1030
PPT1060	Feasibility Study Scoping Meeting (N/A)	0	11-Mar-08 A	11-Mar-08 A	PPT1050
PPT1070	Execute Feasibility Study Agreement (N/A)	0	11-Mar-08 A	14-Mar-08 A	PPT1060
PPT1080	Perform Feasibility Study (N/A)	0	14-Mar-08 A	07-May-08	PPT1070, PPT1020
PPT1100	Execute System Impact Study Agreement	10	14-Mar-08 A	21-May-08	PPT1090
PPT1110	System Impact Study	60	15-Mar-08 A	22-May-08	PPT1100
PPT1050	CEC Review Approval Interconnection Request	10	10-Apr-08	23-Apr-08	PPT1040
PPT1090	Feasibility Study Review (N/A)	0	08-May-08	08-May-08	PPT1080
PPT1120	System Impact Study Review	10	22-May-08	05-Jun-08	PPT1110
PPT1130	Execute Facilities Design Agreement	10	06-Jun-08	19-Jun-08	PPT1120
PPT1140	Facilities Design Study	40	20-Jun-08	15-Aug-08	PPT1130
PPT1150	Review Facilities Design Study	10	18-Aug-08	29-Aug-08	PPT1140
PPT1160	Negotiate/Execute Agreement	20	02-Sep-08	29-Sep-08	PPT1150
PPT1170	Public Utility Commission Review (N/A)	0	30-Sep-08	30-Sep-08	PPT1160
PPT1180	Interconnection Application Complete	0		30-Sep-08	PPT1170
Point to Point Wheeler Agreement		79	15-Feb-08 A	18-Aug-08	
PPT1190	Prepare Transmission Agreement Application	5	15-Feb-08 A	27-Feb-08 A	PPT1110
PPT1200	Submit / Review Transmission Agreement	10	27-Feb-08 A	27-Feb-08 A	PPT1190
PPT1210	Execute System Impact Agreement	10	22-May-08	05-Jun-08	PPT1200
PPT1220	Transmission System Impact Study	30	06-Jun-08	18-Jul-08	PPT1210
PPT1230	Review Transmission System Impact Study	10	21-Jul-08	01-Aug-08	PPT1220
PPT1240	Execute Transmission Agreement	10	04-Aug-08	15-Aug-08	PPT1230
PPT1250	PUC Review Approval Transmission Agreement (N/A)	0	18-Aug-08	18-Aug-08	PPT1240
PPT1260	Transmission Agreement Complete	0		18-Aug-08	PPT1250
Power Purchase Agreements		148	10-Apr-08	30-Oct-08	
PPT1270	Negotiate Power Purchase Agreement	118	10-Apr-08	25-Sep-08	RA1000
PPT1280	Public Utility Commission PPA Review/Approval	20	26-Sep-08	23-Oct-08	PPT1270
PPT1290	Execute Power Purchase Agreement	5	24-Oct-08	30-Oct-08	PPT1280
PPT1300	Power Puchase Agreement Complete	0		30-Oct-08	PPT1290
Engineering		113	15-Dec-07 A	05-Aug-08	
Preliminary Engineering		113	10-Jan-08 A	13-Jun-08	
ENG1090	Site Survey Data	5	10-Jan-08 A	15-May-08	ENG1060
ENG1100	Obtain Geotechnical Survey / Report	33	10-Jan-08 A	25-Feb-08 A	ENG1060



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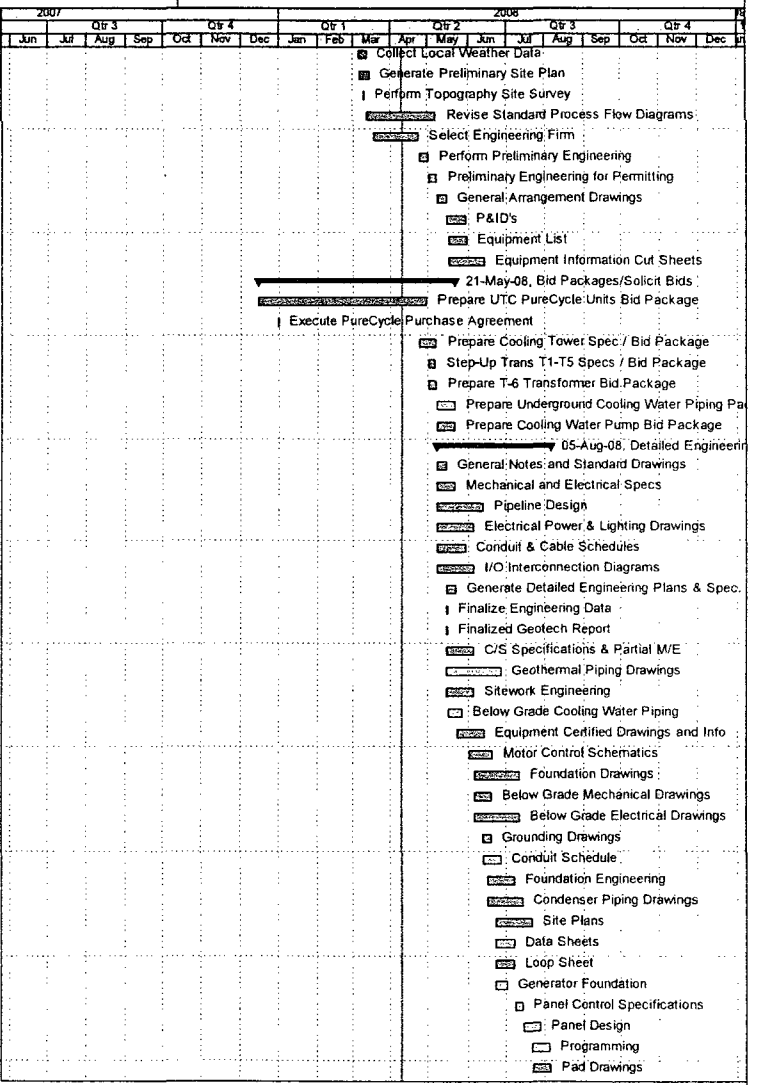
Data Date 10-Apr-08

Lightning Dock Geo Thermal No.1 HI-01, LLC (NM)	LTNG DOCK REV-1.06	10-Apr-08 10:47

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
ENG1020	Collect Local Weather Data	5	06-Mar-08 A	12-Mar-08 A	ENG1000
ENG1060	Generate Preliminary Site Plan	5	07-Mar-08 A	15-Mar-08 A	ENG1050, ENG1000
ENG1080	Perform Topography Site Survey	10	10-Mar-08 A	11-Mar-08 A	ENG1060
ENG1030	Revise Standard Process Flow Diagrams	5	13-Mar-08 A	07-May-08	ENG1010
ENG1000	Select Engineering Firm	10	18-Mar-08 A	23-Apr-08	RA1000
ENG1010	Perform Preliminary Engineering	5	24-Apr-08	30-Apr-08	ENG1000
ENG1040	Preliminary Engineering for Permitting	5	01-May-08	07-May-08	ENG1010
ENG1050	General Arrangement Drawings	5	08-May-08	14-May-08	ENG1030
ENG1070	P&ID's	10	15-May-08	29-May-08	ENG1050
ENG1110	Equipment List	10	16-May-08	30-May-08	ENG1380, ENG1060
ENG1120	Equipment Information Cut Sheets	20	16-May-08	13-Jun-08	ENG1380, ENG1060
Bid Packages/Solicit Bids		32	15-Dec-07 A	21-May-08	
ENG1150	Prepare UTC PureCycle Units Bid Package	10	15-Dec-07 A	29-Apr-08 A	ENG1010
ENG1190	Execute PureCycle Purchase Agreement	1	31-Dec-07 A	31-Dec-07 A	ENG1150
ENG1130	Prepare Cooling Tower Spec / Bid Package	10	24-Apr-08	07-May-08	ENG1020
ENG1140	Step-Up Trans T1-T5 Specs / Bid Package	4	01-May-08	06-May-08	ENG1010
ENG1160	Prepare T-6 Transformer Bid Package	5	01-May-08	07-May-08	ENG1010
ENG1170	Prepare Underground Cooling Water Piping Package	10	08-May-08	21-May-08	ENG1030
ENG1180	Prepare Cooling Water Pump Bid Package	10	08-May-08	21-May-08	ENG1030
Detailed Engineering		64	08-May-08	05-Aug-08	
ENG1200	General Notes and Standard Drawings	5	08-May-08	14-May-08	ENG1040
ENG1210	Mechanical and Electrical Specs	10	08-May-08	21-May-08	ENG1040
ENG1220	Pipeline Design	25	08-May-08	12-Jun-08	ENG1210
ENG1230	Electrical Power & Lighting Drawings	20	08-May-08	05-Jun-08	ENG1220
ENG1240	Conduit & Cable Schedules	15	08-May-08	29-May-08	ENG1220
ENG1250	I/O Interconnection Diagrams	20	08-May-08	05-Jun-08	ENG1210
ENG1340	Generate Detailed Engineering Plans & Spec.	6	15-May-08	22-May-08	PPT1030, ENG1100
ENG1380	Finalize Engineering Data	1	15-May-08	15-May-08	ENG1200
ENG1350	Finalized Geotech Report	1	15-May-08	15-May-08	ENG1100
ENG1260	C/S Specifications & Partial M/E	15	15-May-08	05-Jun-08	ENG1050
ENG1370	Geothermal Piping Drawings	30	15-May-08	26-Jun-08	ENG1220, RA1090, RA1110
ENG1270	Sitework Engineering	15	15-May-08	05-Jun-08	ENG1090
ENG1360	Below Grade Cooling Water Piping	7	16-May-08	27-May-08	ENG1350
ENG1390	Equipment Certified Drawings and Info	15	23-May-08	13-Jun-08	ENG1120
ENG1400	Motor Control Schematics	15	02-Jun-08	20-Jun-08	ENG1110
ENG1280	Foundation Drawings	25	06-Jun-08	11-Jul-08	ENG1270
ENG1290	Below Grade Mechanical Drawings	10	06-Jun-08	19-Jun-08	ENG1280
ENG1300	Below Grade Electrical Drawings	25	06-Jun-08	11-Jul-08	ENG1280
ENG1310	Grounding Drawings	5	13-Jun-08	19-Jun-08	ENG1300
ENG1320	Conduit Schedule	10	13-Jun-08	26-Jun-08	ENG1300
ENG1410	Foundation Engineering	15	16-Jun-08	07-Jul-08	ENG1260, ENG1390
ENG1420	Condenser Piping Drawings	20	16-Jun-08	14-Jul-08	ENG1220, ENG1390
ENG1430	Site Plans	20	23-Jun-08	21-Jul-08	ENG1410, ENG1080
ENG1440	Data Sheets	10	23-Jun-08	07-Jul-08	ENG1400
ENG1450	Loop Sheet	10	23-Jun-08	07-Jul-08	ENG1400
ENG1460	Generator Foundation	7	23-Jun-08	01-Jul-08	ENG1410, ENG1390
ENG1470	Panel Control Specifications	5	08-Jul-08	14-Jul-08	ENG1440
ENG1480	Panel Design	10	15-Jul-08	28-Jul-08	ENG1400, ENG1470
ENG1490	Programming	10	22-Jul-08	04-Aug-08	ENG1480, ENG1390
ENG1330	Pad Drawings	10	22-Jul-08	05-Aug-08	ENG1280, CO1120



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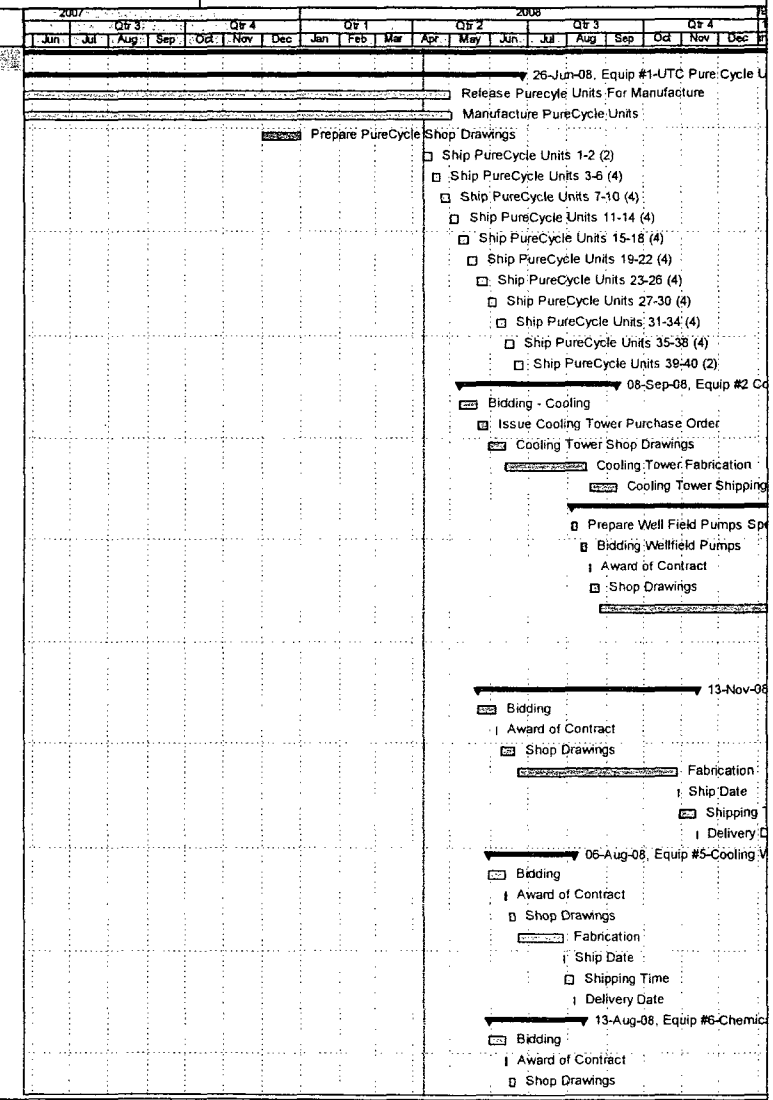
Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
Equipment Procurement		561	01-Jan-07 A	19-Jan-09	
Equip #1-UTC Pure Cycle Units (Owner Furnished) GEN-01 to GEN-50		561	01-Jan-07 A	26-Jun-08	
EQP1820	Release Purecyle Units For Manufacture	1	01-Jan-07 A	01-May-08	EQP1840
EQP1830	Manufacture PureCycle Units	176	01-Jan-07 A	02-May-08	EQP1820
EQP1840	Prepare PureCycle Shop Drawings	23	01-Dec-07 A	01-Jan-08 A	ENG1190
EQP1850	Ship PureCycle Units 1-2 (2)	5	10-Apr-08	16-Apr-08	
EQP1860	Ship PureCycle Units 3-6 (4)	5	17-Apr-08	23-Apr-08	EQP1850
EQP1870	Ship PureCycle Units 7-10 (4)	5	24-Apr-08	30-Apr-08	EQP1860
EQP1880	Ship PureCycle Units 11-14 (4)	5	01-May-08	07-May-08	EQP1870
EQP1890	Ship PureCycle Units 15-18 (4)	5	08-May-08	14-May-08	EQP1880
EQP1900	Ship PureCycle Units 19-22 (4)	5	15-May-08	21-May-08	EQP1890
EQP1910	Ship PureCycle Units 23-26 (4)	5	22-May-08	29-May-08	EQP1900
EQP1920	Ship PureCycle Units 27-30 (4)	5	30-May-08	05-Jun-08	EQP1910
EQP1930	Ship PureCycle Units 31-34 (4)	5	06-Jun-08	12-Jun-08	EQP1920
EQP1940	Ship PureCycle Units 35-38 (4)	5	13-Jun-08	19-Jun-08	EQP1930
EQP1950	Ship PureCycle Units 39-40 (2)	5	20-Jun-08	26-Jun-08	EQP1940, EQP1830
Equip #2 Cooling Towers (Owner Furnished) CT-01 Through CT-04		88	08-May-08	08-Sep-08	
EQP2660	Bidding - Cooling	10	08-May-08	21-May-08	ENG1130
EQP2670	Issue Cooling Tower Purchase Order	5	22-May-08	28-May-08	EQP2660
EQP2680	Cooling Tower Shop Drawings	10	30-May-08	12-Jun-08	EQP2670
EQP2690	Cooling Tower Fabrication	45	13-Jun-08	15-Aug-08	EQP2680
EQP2700	Cooling Tower Shipping	15	18-Aug-08	08-Sep-08	EQP2690
Equip #3-Geothermal Wellfield Pump (Owner Furnished) PP-01, PP-02, PP-03		121	04-Aug-08	19-Jan-09	
EQP2780	Prepare Well Field Pumps Spec. Bid Package	5	04-Aug-08	08-Aug-08	RD1360
EQP2790	Bidding Wellfield Pumps	5	11-Aug-08	15-Aug-08	EQP2780
EQP2800	Award of Contract	1	18-Aug-08	18-Aug-08	RD1360, EQP2790
EQP2810	Shop Drawings	5	19-Aug-08	25-Aug-08	EQP2800
EQP2820	Fabrication	93	26-Aug-08	08-Jan-09	EQP2810
EQP2830	Ship Date	1	09-Jan-09	09-Jan-09	EQP2820
EQP2840	Shipping Time	5	12-Jan-09	16-Jan-09	EQP2830
EQP2850	Delivery Date	1	19-Jan-09	19-Jan-09	EQP2840
Equip #4-Condensing Water Pumps (Owner Furnished) P-401 through P406		126	22-May-08	13-Nov-08	
EQP2860	Bidding	10	22-May-08	05-Jun-08	ENG1180
EQP2870	Award of Contract	1	06-Jun-08	06-Jun-08	EQP2860
EQP2880	Shop Drawings	10	09-Jun-08	20-Jun-08	EQP2870
EQP2890	Fabrication	90	23-Jun-08	28-Oct-08	EQP2880
EQP2900	Ship Date	1	29-Oct-08	29-Oct-08	EQP2890
EQP2910	Shipping Time	10	30-Oct-08	12-Nov-08	EQP2900
EQP2920	Delivery Date	1	13-Nov-08	13-Nov-08	EQP2910
Equip #5-Cooling Water Makeup Pump Module (Owner Furnished) FP-014 FP-0		49	30-May-08	06-Aug-08	
EQP2930	Bidding	10	30-May-08	12-Jun-08	ENG1070
EQP2940	Award of Contract	1	13-Jun-08	13-Jun-08	EQP2930
EQP2950	Shop Drawings	5	16-Jun-08	20-Jun-08	EQP2940
EQP2960	Fabrication	25	23-Jun-08	28-Jul-08	EQP2950
EQP2970	Ship Date	1	29-Jul-08	29-Jul-08	EQP2960
EQP2980	Shipping Time	5	30-Jul-08	05-Aug-08	EQP2970
EQP2990	Delivery Date	1	06-Aug-08	06-Aug-08	EQP2980
Equip #6-Chemical Injection System CIS-01 (Owner Furnished)		54	30-May-08	13-Aug-08	
EQP3000	Bidding	10	30-May-08	12-Jun-08	ENG1070
EQP3010	Award of Contract	1	13-Jun-08	13-Jun-08	EQP3000
EQP3020	Shop Drawings	5	16-Jun-08	20-Jun-08	EQP3010



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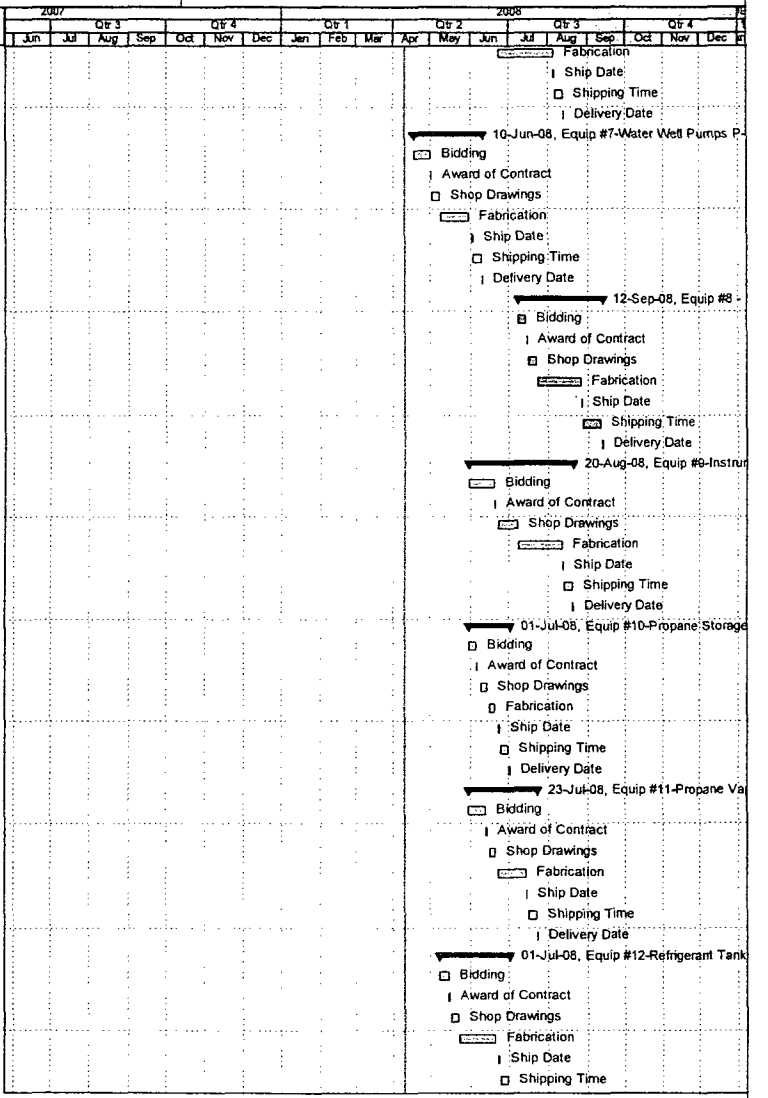
Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
EQP3030	Fabrication	30	23-Jun-08	04-Aug-08	EQP3020
EQP3040	Ship Date	1	05-Aug-08	05-Aug-08	EQP3030
EQP3050	Shipping Time	5	06-Aug-08	12-Aug-08	EQP3040
EQP3060	Delivery Date	1	13-Aug-08	13-Aug-08	EQP3050
Equip #7-Water Well Pumps P-407, P-408, P-409, & P-410 (Owner Furnished)		39	17-Apr-08	10-Jun-08	
EQP3070	Bidding	10	17-Apr-08	30-Apr-08	RA1110
EQP3080	Award of Contract	1	01-May-08	01-May-08	EQP3070
EQP3090	Shop Drawings	5	02-May-08	08-May-08	EQP3080
EQP3100	Fabrication	15	09-May-08	30-May-08	EQP3090
EQP3110	Ship Date	1	02-Jun-08	02-Jun-08	EQP3100
EQP3120	Shipping Time	5	03-Jun-08	09-Jun-08	EQP3110
EQP3130	Delivery Date	1	10-Jun-08	10-Jun-08	EQP3120
Equip #8 - Submersible Sump Pumps P-601 to P-604 (Owner Furnished)		49	08-Jul-08	12-Sep-08	
EQP3140	Bidding	5	08-Jul-08	14-Jul-08	ENG1420
EQP3150	Award of Contract	1	15-Jul-08	15-Jul-08	EQP3140
EQP3160	Shop Drawings	5	16-Jul-08	22-Jul-08	EQP3150
EQP3170	Fabrication	25	23-Jul-08	26-Aug-08	EQP3160
EQP3180	Ship Date	1	27-Aug-08	27-Aug-08	EQP3170
EQP3190	Shipping Time	10	28-Aug-08	11-Sep-08	EQP3180
EQP3200	Delivery Date	1	12-Sep-08	12-Sep-08	EQP3190
Equip #9-Instrument Air Compressor Package (Owner Furnished) AC-01 & AG		59	30-May-08	20-Aug-08	
EQP3210	Bidding	15	30-May-08	19-Jun-08	ENG1070
EQP3220	Award of Contract	1	20-Jun-08	20-Jun-08	EQP3210
EQP3230	Shop Drawings	10	23-Jun-08	07-Jul-08	EQP3220
EQP3240	Fabrication	25	08-Jul-08	11-Aug-08	EQP3230
EQP3250	Ship Date	1	12-Aug-08	12-Aug-08	EQP3240
EQP3260	Shipping Time	5	13-Aug-08	19-Aug-08	EQP3250
EQP3270	Delivery Date	1	20-Aug-08	20-Aug-08	EQP3260
Equip #10-Propane Storage Tanks TK-01 to TK-04 (Owner Furnished)		23	30-May-08	01-Jul-08	
EQP1000	Bidding	5	30-May-08	05-Jun-08	ENG1070
EQP1010	Award of Contract	1	06-Jun-08	06-Jun-08	EQP1000
EQP1020	Shop Drawings	5	09-Jun-08	13-Jun-08	EQP1010
EQP1030	Fabrication	5	16-Jun-08	20-Jun-08	EQP1020
EQP1040	Ship Date	1	23-Jun-08	23-Jun-08	EQP1030
EQP1050	Shipping Time	5	24-Jun-08	30-Jun-08	EQP1040
EQP1060	Delivery Date	1	01-Jul-08	01-Jul-08	EQP1050
Equip #11-Propane Vaporizer VAP-01 & VAP-02 (Owner Furnished)		39	30-May-08	23-Jul-08	
EQP1070	Bidding	10	30-May-08	12-Jun-08	ENG1070
EQP1080	Award of Contract	1	13-Jun-08	13-Jun-08	EQP1070
EQP1090	Shop Drawings	5	16-Jun-08	20-Jun-08	EQP1080
EQP1100	Fabrication	15	23-Jun-08	14-Jul-08	EQP1090
EQP1110	Ship Date	1	15-Jul-08	15-Jul-08	EQP1100
EQP1120	Shipping Time	5	16-Jul-08	22-Jul-08	EQP1110
EQP1130	Delivery Date	1	23-Jul-08	23-Jul-08	EQP1120
Equip #12-Refrigerant Tanks (Totes) (By UTCP) (Owner Furnished) TR-01 & 02		39	08-May-08	01-Jul-08	
EQP1140	Bidding	5	08-May-08	14-May-08	ENG1030
EQP1150	Award of Contract	1	15-May-08	15-May-08	EQP1140
EQP1160	Shop Drawings	5	16-May-08	22-May-08	EQP1150
EQP1170	Fabrication	20	23-May-08	20-Jun-08	EQP1160
EQP1180	Ship Date	1	23-Jun-08	23-Jun-08	EQP1170
EQP1190	Shipping Time	5	24-Jun-08	30-Jun-08	EQP1180



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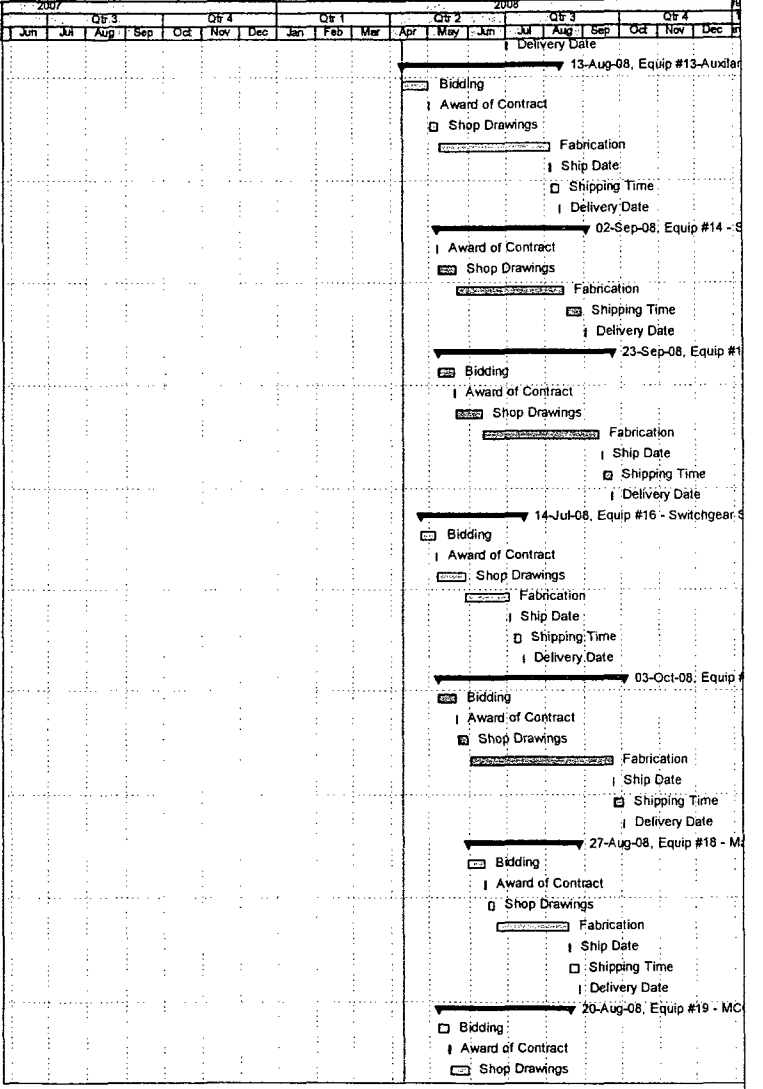
Lightning Dock Geo Thermal No.1 HI-01, LLC (NM)	LTNG DOCK REV-1.06	10-Apr-08 10:47

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
EQP1200	Delivery Date	1	01-Jul-08	01-Jul-08	EQP1190
Equip #13-Auxiliary Generator (Owner Furnished) Aux. Gen-01 & 02		90	10-Apr-08	13-Aug-08	
EQP1210	Bidding	15	10-Apr-08	30-Apr-08	RA1100
EQP1220	Award of Contract	1	01-May-08	01-May-08	EQP1210
EQP1230	Shop Drawings	5	02-May-08	08-May-08	EQP1220
EQP1240	Fabrication	60	09-May-08	04-Aug-08	EQP1230
EQP1250	Ship Date	1	05-Aug-08	05-Aug-08	EQP1240
EQP1260	Shipping Time	5	06-Aug-08	12-Aug-08	EQP1250
EQP1270	Delivery Date	1	13-Aug-08	13-Aug-08	EQP1260
Equip #14 - Step Up Transformers T1a&b to T5a&b (Owner Furnished)		85	07-May-08	02-Sep-08	
EQP1280	Award of Contract	1	07-May-08	07-May-08	ENG1140
EQP1290	Shop Drawings	10	08-May-08	21-May-08	EQP1280
EQP1300	Fabrication	60	22-May-08	15-Aug-08	EQP1290
EQP1310	Shipping Time	10	18-Aug-08	29-Aug-08	EQP1300
EQP1320	Delivery Date	1	02-Sep-08	02-Sep-08	EQP1310
Equip #15 - Step Down Transformer T-6 (Owner Furnished)		99	08-May-08	23-Sep-08	
EQP1330	Bidding	8	08-May-08	19-May-08	ENG1160
EQP1340	Award of Contract	1	20-May-08	20-May-08	EQP1330
EQP1350	Shop Drawings	15	21-May-08	11-Jun-08	EQP1340
EQP1360	Fabrication	65	12-Jun-08	12-Sep-08	EQP1350
EQP1370	Ship Date	1	15-Sep-08	15-Sep-08	EQP1360
EQP1380	Shipping Time	5	16-Sep-08	22-Sep-08	EQP1370
EQP1390	Delivery Date	1	23-Sep-08	23-Sep-08	EQP1380
Equip #16 - Switchgear S-12345 (Owner Furnished)		58	24-Apr-08	14-Jul-08	
EQP1400	Bidding	8	24-Apr-08	05-May-08	PPT1060
EQP1410	Award of Contract	1	06-May-08	06-May-08	EQP1400
EQP1420	Shop Drawings	15	07-May-08	28-May-08	EQP1410
EQP1430	Fabrication	25	29-May-08	02-Jul-08	EQP1420
EQP1440	Ship Date	1	03-Jul-08	03-Jul-08	EQP1430
EQP1450	Shipping Time	5	07-Jul-08	11-Jul-08	EQP1440
EQP1460	Delivery Date	1	14-Jul-08	14-Jul-08	EQP1450
Equip #17-Motor Control Module/Trailer(Owner Furnished)		107	08-May-08	03-Oct-08	
EQP1470	Bidding	10	08-May-08	21-May-08	ENG1030
EQP1480	Award of Contract	1	22-May-08	22-May-08	EQP1470
EQP1490	Shop Drawings	5	23-May-08	30-May-08	EQP1480
EQP1500	Fabrication	80	02-Jun-08	23-Sep-08	EQP1490
EQP1510	Ship Date	1	24-Sep-08	24-Sep-08	EQP1500
EQP1520	Shipping Time	6	25-Sep-08	02-Oct-08	EQP1510
EQP1530	Delivery Date	1	03-Oct-08	03-Oct-08	EQP1520
Equip #18 - Maintenance Storage Building (Contractor Purchased)		64	30-May-08	27-Aug-08	
EQP1680	Bidding	10	30-May-08	12-Jun-08	ENG1370, ENG1340
EQP1690	Award of Contract	1	13-Jun-08	13-Jun-08	EQP1680
EQP1700	Shop Drawings	5	16-Jun-08	20-Jun-08	EQP1690
EQP1710	Fabrication	40	23-Jun-08	18-Aug-08	EQP1700
EQP1720	Ship Date	1	19-Aug-08	19-Aug-08	EQP1710
EQP1730	Shipping Time	5	20-Aug-08	26-Aug-08	EQP1720
EQP1740	Delivery Date	1	27-Aug-08	27-Aug-08	EQP1730
Equip #19 - MCC1-MCC2-MCC3 (Contractor Purchased)		75	08-May-08	20-Aug-08	
EQP1750	Bidding	5	08-May-08	14-May-08	ENG1030
EQP1760	Award of Contract	1	15-May-08	15-May-08	EQP1750
EQP1770	Shop Drawings	10	16-May-08	30-May-08	EQP1760



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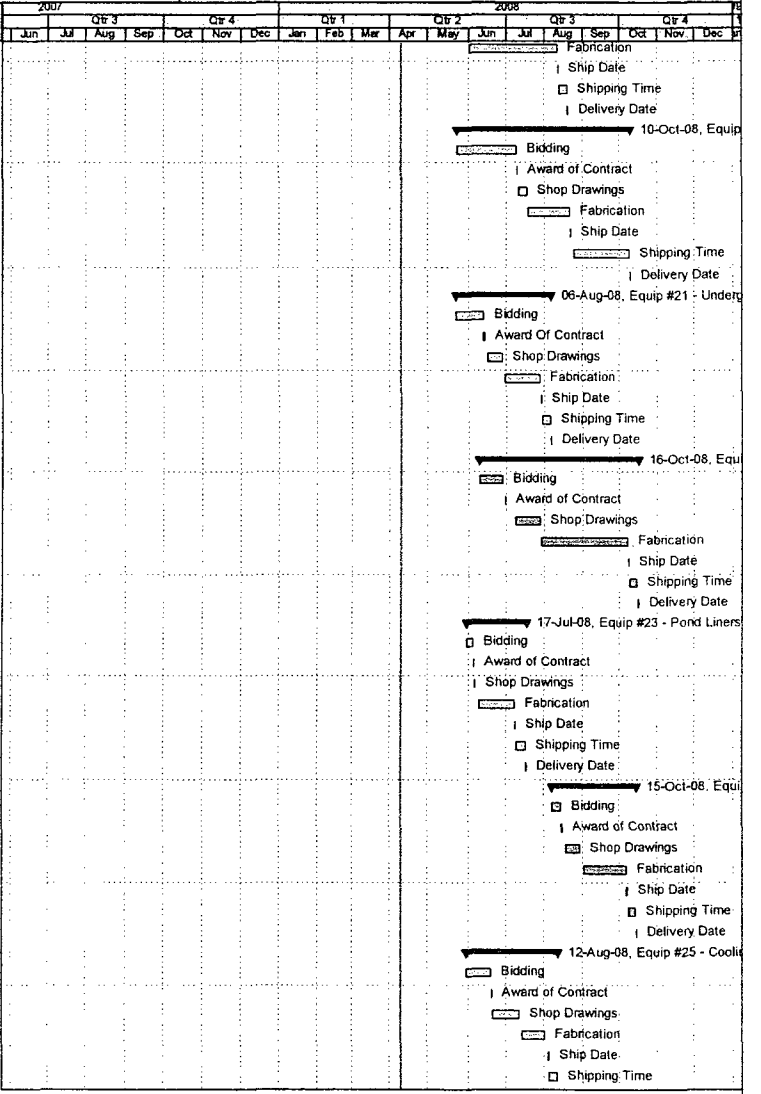
Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
EQP1780	Fabrication	50	02-Jun-08	11-Aug-08	EQP1770
EQP1790	Ship Date	1	12-Aug-08	12-Aug-08	EQP1780
EQP1800	Shipping Time	5	13-Aug-08	19-Aug-08	EQP1790
EQP1810	Delivery Date	1	20-Aug-08	20-Aug-08	EQP1800
Equip #20 - PLC / Software / Programming (Owner Purchased)		101	23-May-08	10-Oct-08	
EQP1960	Bidding	32	23-May-08	09-Jul-08	ENG1340
EQP1970	Award of Contract	1	10-Jul-08	10-Jul-08	EQP1960
EQP1980	Shop Drawings	5	11-Jul-08	17-Jul-08	EQP1970
EQP1990	Fabrication	25	18-Jul-08	21-Aug-08	EQP1980
EQP2000	Ship Date	1	22-Aug-08	22-Aug-08	EQP1990
EQP2010	Shipping Time	33	25-Aug-08	09-Oct-08	EQP2000
EQP2020	Delivery Date	1	10-Oct-08	10-Oct-08	EQP2010
Equip #21 - Underground Condensor Water Piping (Contractor Purchased)		55	22-May-08	06-Aug-08	
EQP2030	Bidding	15	22-May-08	12-Jun-08	ENG1170
EQP2040	Award Of Contract	1	13-Jun-08	13-Jun-08	EQP2030
EQP2050	Shop Drawings	10	16-Jun-08	27-Jun-08	EQP2030, EQP2040
EQP2060	Fabrication	20	30-Jun-08	28-Jul-08	EQP2050
EQP2070	Ship Date	1	29-Jul-08	29-Jul-08	EQP2060
EQP2080	Shipping Time	5	30-Jul-08	05-Aug-08	EQP2070
EQP2090	Delivery Date	1	06-Aug-08	06-Aug-08	EQP2080
Equip #22 - Piping Fabrication Package (Contractor Purchased)		94	09-Jun-08	16-Oct-08	
EQP2100	Bidding	15	09-Jun-08	27-Jun-08	ENG1390
EQP2110	Award of Contract	1	30-Jun-08	30-Jun-08	EQP2100
EQP2120	Shop Drawings	15	08-Jul-08	28-Jul-08	EQP2110, ENG1420
EQP2130	Fabrication	50	29-Jul-08	07-Oct-08	EQP2120
EQP2140	Ship Date	1	08-Oct-08	08-Oct-08	EQP2130
EQP2150	Shipping Time	5	09-Oct-08	15-Oct-08	EQP2140
EQP2160	Delivery Date	1	16-Oct-08	16-Oct-08	EQP2150
Equip #23 - Pond Liners (Contractor Purchased)PP-01, PP-02, PP-03, RP-01, R		35	30-May-08	17-Jul-08	
EQP2170	Bidding	4	30-May-08	04-Jun-08	ENG1070, ENG1340
EQP2180	Award of Contract	1	05-Jun-08	05-Jun-08	EQP2170
EQP2190	Shop Drawings	1	06-Jun-08	06-Jun-08	EQP2180
EQP2200	Fabrication	20	09-Jun-08	07-Jul-08	EQP2190
EQP2210	Ship Date	1	08-Jul-08	08-Jul-08	EQP2200
EQP2220	Shipping Time	6	09-Jul-08	16-Jul-08	EQP2210
EQP2230	Delivery Date	1	17-Jul-08	17-Jul-08	EQP2220
Equip #24 - Switchgear S-6 (Owner Furnished)		50	07-Aug-08	15-Oct-08	
EQP2240	Bidding	6	07-Aug-08	14-Aug-08	RD1380
EQP2250	Award of Contract	1	15-Aug-08	15-Aug-08	EQP2240
EQP2260	Shop Drawings	10	18-Aug-08	29-Aug-08	EQP2250
EQP2270	Fabrication	25	02-Sep-08	06-Oct-08	EQP2260
EQP2280	Ship Date	1	07-Oct-08	07-Oct-08	EQP2270
EQP2290	Shipping Time	5	08-Oct-08	14-Oct-08	EQP2280
EQP2300	Delivery Date	1	15-Oct-08	15-Oct-08	EQP2290
Equip #25 - Cooling Water Valves (Contractor Purchased)		53	30-May-08	12-Aug-08	
EQP2310	Bidding	14	30-May-08	18-Jun-08	ENG1070
EQP2320	Award of Contract	1	19-Jun-08	19-Jun-08	EQP2310
EQP2330	Shop Drawings	15	20-Jun-08	11-Jul-08	EQP2320
EQP2340	Fabrication	15	14-Jul-08	01-Aug-08	RA1000, EQP2330
EQP2350	Ship Date	1	04-Aug-08	04-Aug-08	EQP2340
EQP2360	Shipping Time	5	05-Aug-08	11-Aug-08	EQP2350



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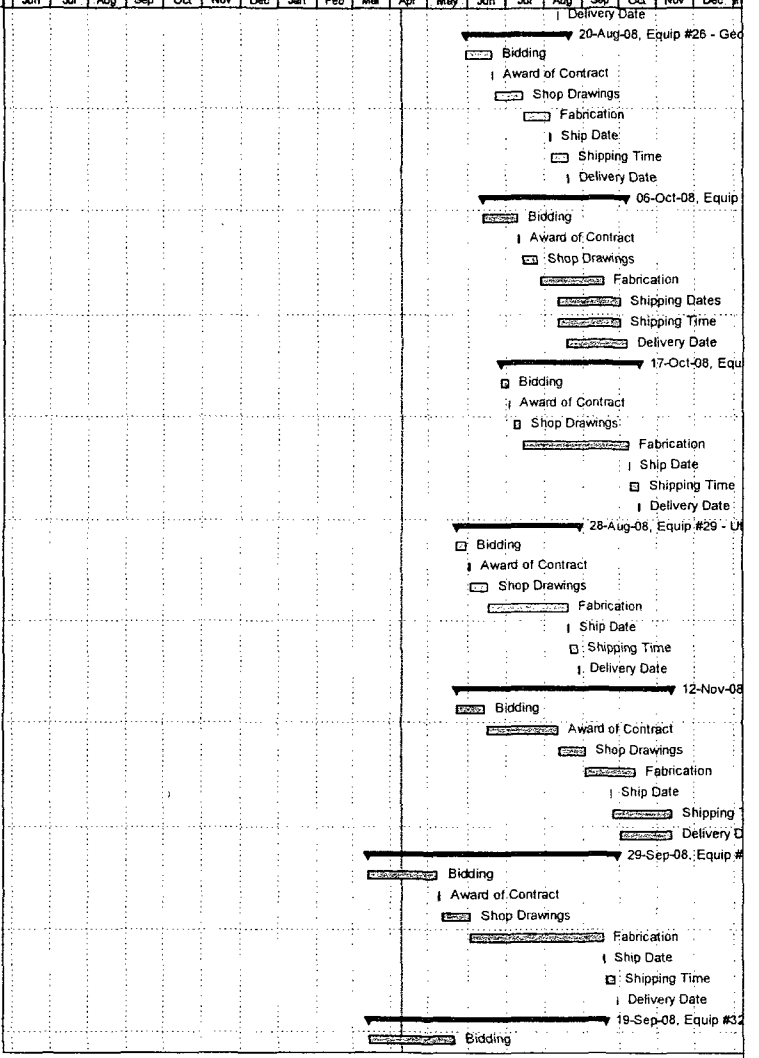
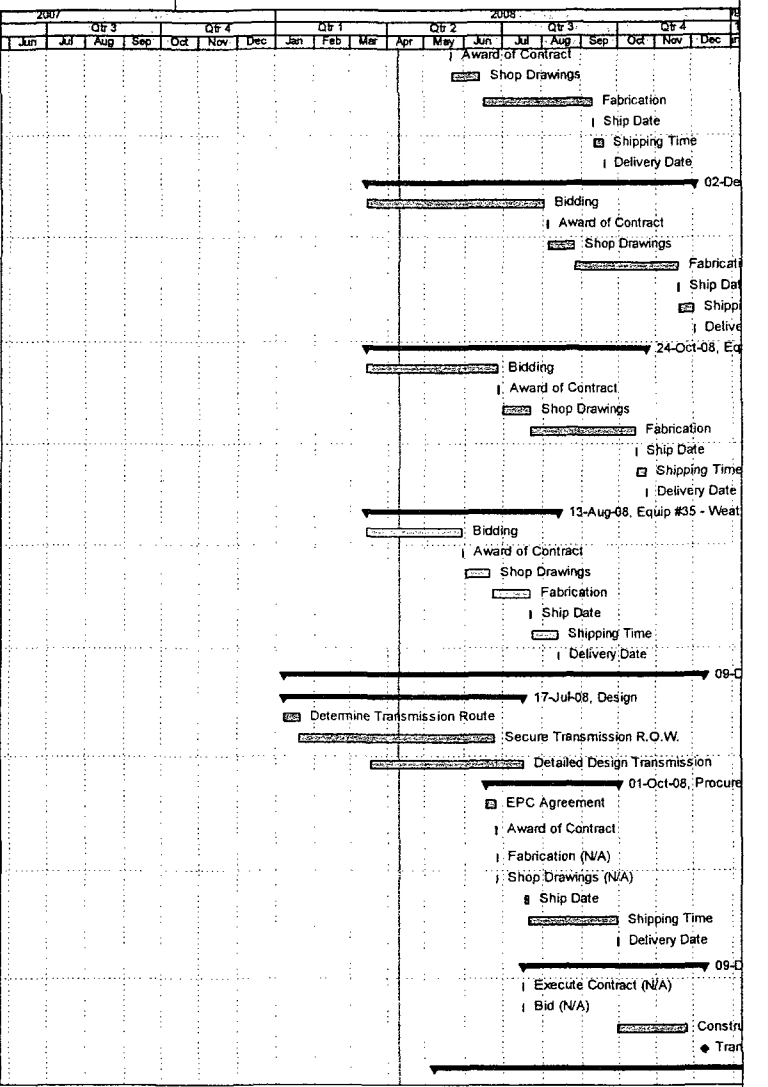
Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
EQP2370	Delivery Date	1	12-Aug-08	12-Aug-08	EQP2360
Equip #26 - Geo Water Valves (Contractor Purchased)		59	30-May-08	20-Aug-08	
EQP2380	Bidding	15	30-May-08	19-Jun-08	ENG1070
EQP2390	Award of Contract	1	20-Jun-08	20-Jun-08	EQP2380
EQP2400	Shop Drawings	15	23-Jun-08	14-Jul-08	EQP2390
EQP2410	Fabrication	15	15-Jul-08	04-Aug-08	EQP2400
EQP2420	Ship Date	1	05-Aug-08	05-Aug-08	EQP2410
EQP2430	Shipping Time	10	06-Aug-08	19-Aug-08	EQP2420
EQP2440	Delivery Date	1	20-Aug-08	20-Aug-08	EQP2430
Equip #27 - Overland Geowater Piping (Contractor Purchased)		82	13-Jun-08	06-Oct-08	
EQP2450	Bidding	19	13-Jun-08	10-Jul-08	ENG1220
EQP2460	Award of Contract	1	11-Jul-08	11-Jul-08	EQP2450
EQP2470	Shop Drawings	10	14-Jul-08	25-Jul-08	EQP2460
EQP2480	Fabrication	37	28-Jul-08	17-Sep-08	EQP2470
EQP2490	Shipping Dates	37	11-Aug-08	01-Oct-08	EQP2480
EQP2500	Shipping Time	37	11-Aug-08	01-Oct-08	EQP2490
EQP2510	Delivery Date	35	18-Aug-08	06-Oct-08	EQP2500
Equip #28 - Reinjection Wellheads (Owner Furnished) RP-01 & RP-02		81	27-Jun-08	17-Oct-08	
EQP2520	Bidding	4	27-Jun-08	02-Jul-08	EP1100, EP1140, EP1200
EQP2530	Award of Contract	1	03-Jul-08	03-Jul-08	EQP2520
EQP2540	Shop Drawings	5	07-Jul-08	11-Jul-08	EQP2530
EQP2550	Fabrication	62	14-Jul-08	08-Oct-08	EQP2540
EQP2560	Ship Date	1	09-Oct-08	09-Oct-08	EQP2550
EQP2570	Shipping Time	5	10-Oct-08	16-Oct-08	EQP2560
EQP2580	Delivery Date	1	17-Oct-08	17-Oct-08	EQP2570
Equip #29 - Utility Switching / Relay Equipment (Owner Furnished) CB-M, UM-0		70	23-May-08	28-Aug-08	
EQP2590	Bidding	5	23-May-08	30-May-08	PPT1090, ENG1340
EQP2600	Award of Contract	1	02-Jun-08	02-Jun-08	EQP2590
EQP2610	Shop Drawings	10	03-Jun-08	16-Jun-08	EQP2600
EQP2620	Fabrication	45	17-Jun-08	19-Aug-08	EQP2610
EQP2630	Ship Date	1	20-Aug-08	20-Aug-08	EQP2620
EQP2640	Shipping Time	5	21-Aug-08	27-Aug-08	EQP2630
EQP2650	Delivery Date	1	28-Aug-08	28-Aug-08	EQP2640
Equip #30 - CW & GW Control Valves (Owner Furnished)		124	23-May-08	12-Nov-08	
EQP2710	Bidding	15	23-May-08	13-Jun-08	ENG1220, ENG1340
EQP2720	Award of Contract	40	16-Jun-08	11-Aug-08	EQP2710
EQP2730	Shop Drawings	15	12-Aug-08	02-Sep-08	EQP2720
EQP2740	Fabrication	30	03-Sep-08	14-Oct-08	EQP2730
EQP2750	Ship Date	1	24-Sep-08	24-Sep-08	EQP2740
EQP2760	Shipping Time	35	25-Sep-08	12-Nov-08	EQP2750
EQP2770	Delivery Date	30	02-Oct-08	12-Nov-08	EQP2760
Equip #31- Control / Powerhouse		120	14-Mar-08 A	29-Sep-08	
EQP1540	Bidding	10	14-Mar-08 A	08-May-08	ENG1030
EQP1550	Award of Contract	1	09-May-08	09-May-08	EQP1540
EQP1560	Shop Drawings	15	12-May-08	02-Jun-08	EQP1550
EQP1570	Fabrication	75	03-Jun-08	17-Sep-08	EQP1560
EQP1580	Ship Date	1	18-Sep-08	18-Sep-08	EQP1570
EQP1590	Shipping Time	6	19-Sep-08	26-Sep-08	EQP1580
EQP1600	Delivery Date	1	29-Sep-08	29-Sep-08	EQP1590
Equip #32 - Utility Elect. Equipment		87	15-Mar-08 A	19-Sep-08	
EQP1610	Bidding	10	15-Mar-08 A	21-May-08	ENG1030



Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
EQP1620	Award of Contract	1	22-May-08	22-May-08	EQP1610
EQP1630	Shop Drawings	15	23-May-08	13-Jun-08	EQP1620
EQP1640	Fabrication	60	16-Jun-08	09-Sep-08	EQP1630
EQP1650	Ship Date	1	10-Sep-08	10-Sep-08	EQP1640
EQP1660	Shipping Time	6	11-Sep-08	18-Sep-08	EQP1650
EQP1670	Delivery Date	1	19-Sep-08	19-Sep-08	EQP1660
Equip #33 - SCADA EQUIP. Module (Owner Furnished)		139	15-Mar-08 A	02-Dec-08	
EQP3350	Bidding	10	15-Mar-08 A	01-Aug-08	PPT1220
EQP3360	Award of Contract	1	04-Aug-08	04-Aug-08	EQP3350
EQP3410	Shop Drawings	15	05-Aug-08	25-Aug-08	EQP3360
EQP3370	Fabrication	60	26-Aug-08	18-Nov-08	EQP3410
EQP3380	Ship Date	1	19-Nov-08	19-Nov-08	EQP3370
EQP3390	Shipping Time	6	20-Nov-08	01-Dec-08	EQP3380
EQP3400	Delivery Date	1	02-Dec-08	02-Dec-08	EQP3390
Equip #34 - Portable Pond Pump (Owner Furnished) P-104		112	15-Mar-08 A	24-Oct-08	
EQP3490	Bidding	10	15-Mar-08 A	26-Jun-08	ENG1070, EQP2680
EQP3500	Award of Contract	1	27-Jun-08	27-Jun-08	EQP3490
EQP3550	Shop Drawings	15	30-Jun-08	21-Jul-08	EQP3500
EQP3510	Fabrication	60	22-Jul-08	14-Oct-08	EQP3550
EQP3520	Ship Date	1	15-Oct-08	15-Oct-08	EQP3510
EQP3530	Shipping Time	6	16-Oct-08	23-Oct-08	EQP3520
EQP3540	Delivery Date	1	24-Oct-08	24-Oct-08	EQP3530
Equip #35 - Weather Station		60	15-Mar-08 A	13-Aug-08	
EQP3280	Bidding	10	15-Mar-08 A	29-May-08	ENG1080
EQP3290	Award of Contract	1	30-May-08	30-May-08	EQP3280
EQP3340	Shop Drawings	15	02-Jun-08	20-Jun-08	EQP3290
EQP3300	Fabrication	20	23-Jun-08	21-Jul-08	EQP3340
EQP3310	Ship Date	1	22-Jul-08	22-Jul-08	EQP3300
EQP3320	Shipping Time	15	23-Jul-08	12-Aug-08	EQP3310
EQP3330	Delivery Date	1	13-Aug-08	13-Aug-08	EQP3320
Transmission/Substation		214	07-Jan-08 A	09-Dec-08	
Design		147	07-Jan-08 A	17-Jul-08	
TS1000	Determine Transmission Route	5	07-Jan-08 A	20-Jan-08 A	PPT1090
TS1010	Secure Transmission R.O.W.	60	20-Jan-08 A	24-Jun-08	TS1000, PPT1120
TS1020	Detailed Design Transmission	20	18-Mar-08 A	17-Jul-08	ENG1450, PPT1150, TS1010
Procurement		75	18-Jun-08	01-Oct-08	
TS1030	EPC Agreement	5	18-Jun-08	25-Jun-08	TS1020
TS1040	Award of Contract	1	25-Jun-08	26-Jun-08	TS1030
TS1060	Fabrication (N/A)	0	26-Jun-08	26-Jun-08	TS1050
TS1050	Shop Drawings (N/A)	0	26-Jun-08	26-Jun-08	TS1040
TS1070	Ship Date	1	18-Jul-08	21-Jul-08	TS1060
TS1080	Shipping Time	50	21-Jul-08	30-Sep-08	TS1070
TS1090	Delivery Date	1	30-Sep-08	01-Oct-08	TS1080
Construction		104	17-Jul-08	09-Dec-08	
TS1110	Execute Contract (N/A)	0	17-Jul-08	17-Jul-08	TS1100
TS1100	Bid (N/A)	0	17-Jul-08	17-Jul-08	TS1020
TS1120	Construct Transmission	40	30-Sep-08	25-Nov-08	TS1110, TS1010, TS1080
TS1130	Transmission Complete	0		09-Dec-08	TS1120, CO1720
Construction		228	08-May-08	23-Mar-09	



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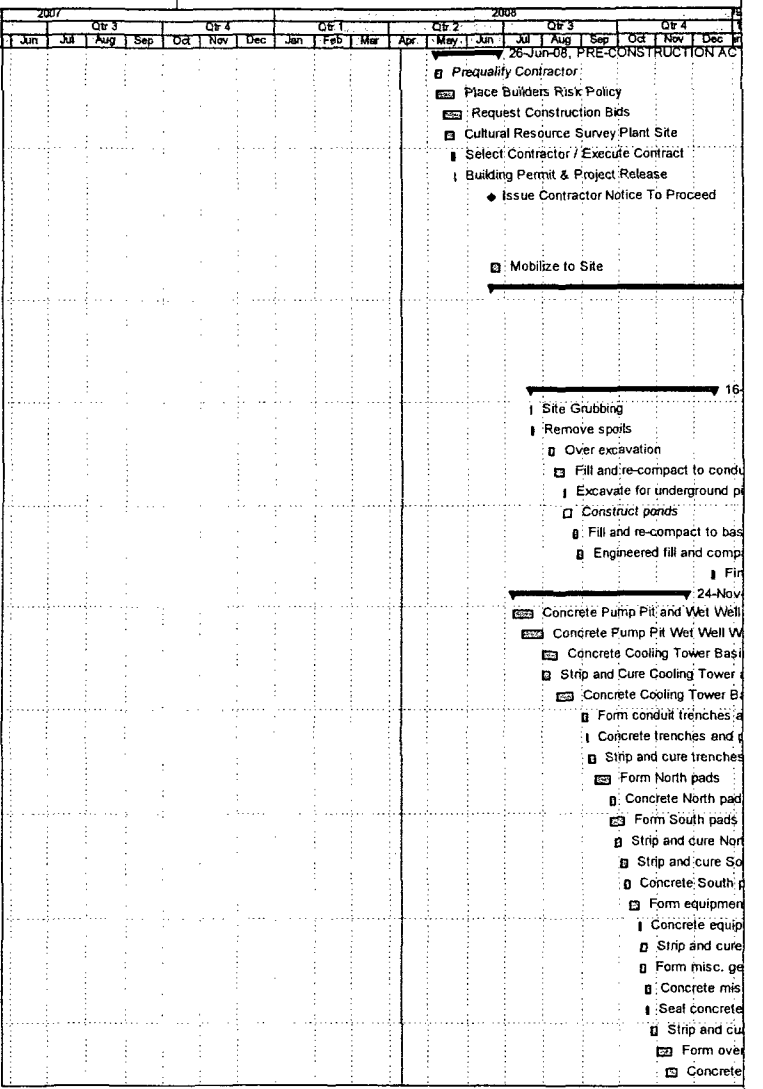
Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
PRE-CONSTRUCTION ACTIVITIES		36	08-May-08	26-Jun-08	
CO1000	Prequalify Contractor	3	08-May-08	12-May-08	ENG1040
CO1010	Place Builders Risk Policy	10	08-May-08	21-May-08	CO1000
CO1020	Request Construction Bids	10	13-May-08	27-May-08	CO1000
CO1030	Cultural Resource Survey Plant Site	5	15-May-08	21-May-08	ENG1060
CO1040	Select Contractor / Execute Contract	3	20-May-08	22-May-08	CO1020
CO1050	Building Permit & Project Release	1	22-May-08	22-May-08	CO1040
CO1060	Issue Contractor Notice To Proceed	0	20-Jun-08		CO1040, RA1040, CO1050, ENG1230, ENG1240, ENG1250, EP1060, RA1120, EP1020, EP1030, CO1030, CO1010, ENG1040
CO1070	Mobilize to Site	5	20-Jun-08	26-Jun-08	CO1060, RA1120
PROJECT MANAGMENT		187	20-Jun-08	09-Mar-09	
CO1080	Construction Management	181	20-Jun-08	09-Mar-09	CO1060
CO1090	Construction Engineering Services	181	20-Jun-08	09-Mar-09	CO1060
CO1100	Construction Surveying	181	20-Jun-08	09-Mar-09	CO1060
CO1110	Materials Testing	181	20-Jun-08	09-Mar-09	CO1060
CIVIL		106	21-Jul-08	16-Dec-08	
CO1120	Site Grubbing	1	21-Jul-08	22-Jul-08	CO1060, ENG1430, CO1070
CO1140	Remove spoils	2	22-Jul-08	24-Jul-08	CO1120
CO1130	Over excavation	5	05-Aug-08	09-Aug-08	CO1120, ENG1330, ENG1290
CO1150	Fill and re-compact to conduit level	10	09-Aug-08	17-Aug-08	CO1130, ENG1310
CO1160	Excavate for underground piping	1	17-Aug-08	18-Aug-08	CO1150
CO1170	Construct ponds	8	17-Aug-08	23-Aug-08	CO1150
CO1180	Fill and re-compact to base level	5	24-Aug-08	28-Aug-08	CO1640, EP1150
CO1190	Engineered fill and compaction	5	28-Aug-08	01-Sep-08	CO1180
CO1200	Final site grading	3	14-Dec-08	16-Dec-08	CO1860, CO1140
CONCRETE		100	07-Jul-08	24-Nov-08	
CO1270	Concrete Pump Pit and Wet Well Slab	20	07-Jul-08	23-Jul-08	ENG1410
CO1280	Concrete Pump Pit Wet Well Walls	20	15-Jul-08	31-Jul-08	CO1270
CO1250	Concrete Cooling Tower Basin Slab	15	31-Jul-08	12-Aug-08	CO1280
CO1300	Strip and Cure Cooling Tower and Pump Walls	7	31-Jul-08	06-Aug-08	CO1280
CO1260	Concrete Cooling Tower Basin Walls	15	12-Aug-08	24-Aug-08	CO1250
CO1210	Form conduit trenches and pits	5	01-Sep-08	05-Sep-08	CO1180
CO1230	Concrete trenches and pits	1	05-Sep-08	06-Sep-08	CO1210
CO1240	Strip and cure trenches and pits	6	06-Sep-08	11-Sep-08	CO1230
CO1290	Form North pads	15	11-Sep-08	23-Sep-08	CO1240
CO1310	Concrete North pads	5	23-Sep-08	27-Sep-08	CO1290
CO1320	Form South pads	15	23-Sep-08	05-Oct-08	CO1290
CO1330	Strip and cure North pads	6	27-Sep-08	02-Oct-08	CO1310
CO1340	Strip and cure South pads	6	02-Oct-08	07-Oct-08	CO1330
CO1350	Concrete South pads	5	05-Oct-08	09-Oct-08	CO1310, CO1320
CO1360	Form equipment pedestals and curbs	9	09-Oct-08	16-Oct-08	CO1330, CO1340, CO1350
CO1370	Concrete equipment pedestals and curbs	3	16-Oct-08	18-Oct-08	CO1360
CO1380	Strip and cure equipment pedestals and curbs	6	18-Oct-08	23-Oct-08	CO1370
CO1390	Form misc. generation area	5	18-Oct-08	22-Oct-08	CO1370
CO1410	Concrete misc. generation area	5	22-Oct-08	26-Oct-08	CO1390
CO1400	Seal concrete joints and penetrations	3	23-Oct-08	25-Oct-08	CO1380
CO1420	Strip and cure misc. generation area	6	26-Oct-08	31-Oct-08	CO1410, CO1400
CO1430	Form overland pipe foundations	15	31-Oct-08	12-Nov-08	CO1420
CO1440	Concrete overland pipe foundations	10	08-Nov-08	16-Nov-08	CO1430



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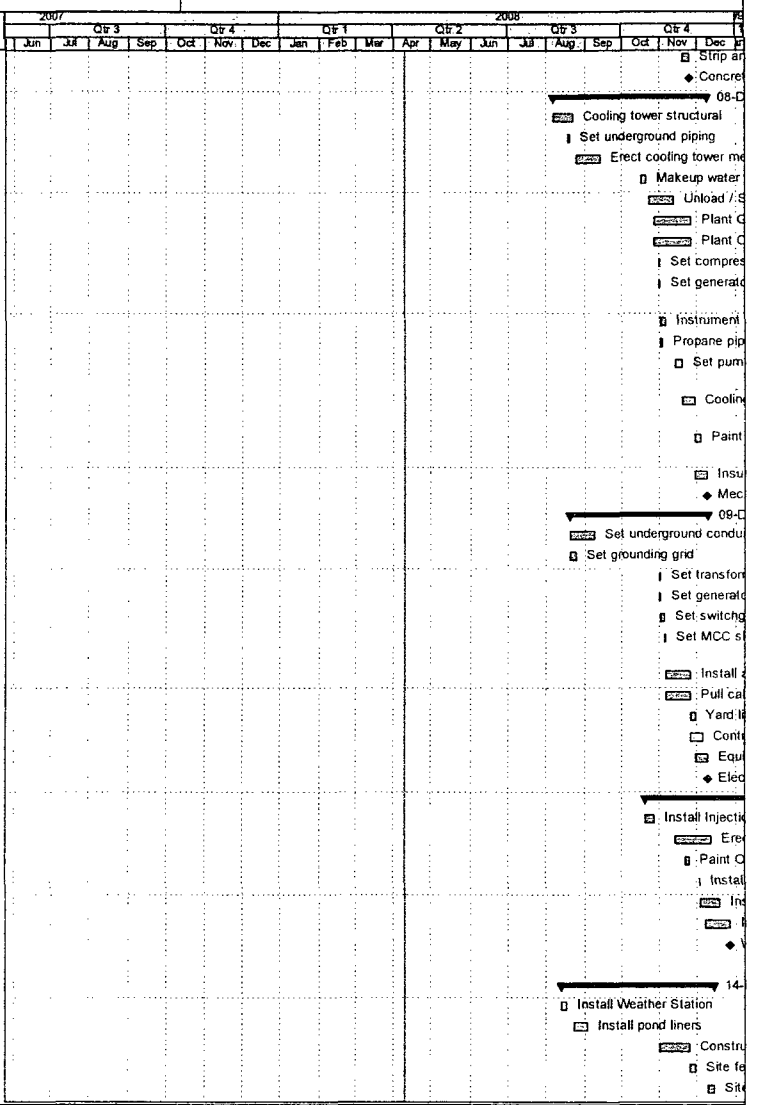
Lightning Dock Geo Thermal No.1 HI-01, LLC (NM)	LTNG DOCK REV-1.06	10-Apr-08 10:47

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
CO1450	Strip and cure overland pipe foundations	7	19-Nov-08	24-Nov-08	CO1440
CO1460	Concrete Complete	0		24-Nov-08	CO1450
MECHANICAL		89	06-Aug-08	08-Dec-08	
CO1480	Cooling tower structural	20	06-Aug-08	22-Aug-08	CO1300
CO1470	Set underground piping	1	18-Aug-08	19-Aug-08	CO1160
CO1490	Erect cooling tower mechanical and electrical	25	24-Aug-08	13-Sep-08	CO1480, CO1260
CO1550	Makeup water piping	5	16-Oct-08	20-Oct-08	CO1490, EQP2160, CO1830
CO1500	Unload / Set UTC units	25	23-Oct-08	12-Nov-08	CO1380
CO1570	Plant Geo water piping	38	27-Oct-08	26-Nov-08	CO1500, EQP2160, EQP2440
CO1580	Plant Condenser water piping	38	27-Oct-08	26-Nov-08	CO1500, EQP2370, EQP2160, EQP2090
CO1510	Set compressor	1	31-Oct-08	01-Nov-08	CO1420
CO1520	Set generator	1	31-Oct-08	01-Nov-08	CO1420, EQP1740, EQP1270, EQP1060, EQP1130, EQP1200
CO1530	Instrument air piping	5	01-Nov-08	05-Nov-08	CO1510
CO1540	Propane piping	3	01-Nov-08	03-Nov-08	CO1520
CO1560	Set pumps	6	13-Nov-08	18-Nov-08	CO1420, EQP2990, EQP3130, EQP3200, EQP2920
CO1590	Cooling water piping	13	18-Nov-08	28-Nov-08	CO1490, EQP2700, EQP2160, EQP3060, EQP3270, CO1560
CO1600	Paint piping	6	28-Nov-08	03-Dec-08	CO1570, CO1580, CO1550, CO1530, CO1540, CO1450, EQP2160, CO1590
CO1610	Insulate piping	13	28-Nov-08	08-Dec-08	CO1600
CO1620	Mechanical Work Complete	0		08-Dec-08	CO1610
ELECTRICAL		80	19-Aug-08	09-Dec-08	
CO1630	Set underground conduits	25	19-Aug-08	08-Sep-08	CO1470, CO1150
CO1640	Set grounding grid	6	19-Aug-08	24-Aug-08	CO1630
CO1650	Set transformers	1	31-Oct-08	01-Nov-08	CO1420, EQP1320, PPT1260, PPT1300
CO1660	Set generator	1	31-Oct-08	01-Nov-08	CO1420
CO1670	Set switchgear	4	01-Nov-08	04-Nov-08	CO1420, EQP1460, EQP1810, CO1650
CO1680	Set MCC skid	1	04-Nov-08	05-Nov-08	CO1420, EQP1530, CO1670, EQP1600, EQP1670
CO1690	Install above ground conduits	25	05-Nov-08	25-Nov-08	CO1660, CO1680
CO1700	Pull cables	25	05-Nov-08	25-Nov-08	CO1690
CO1710	Yard lighting	5	25-Nov-08	29-Nov-08	CO1700, CO1630
CO1730	Control connections	13	25-Nov-08	05-Dec-08	CO1690, EQP2020
CO1720	Equipment connections	13	29-Nov-08	09-Dec-08	CO1710, EQP2650, TS1090
CO1740	Electrical Complete	0		09-Dec-08	CO1720, PPT1180
WELLFIELD PIPING		71	20-Oct-08	26-Jan-09	
CO1800	Install Injection Well Head	10	20-Oct-08	27-Oct-08	EP1100, EQP2580, EP1140, EP1200
CO1750	Erect Overland Piping	37	13-Nov-08	12-Dec-08	EQP2510, EQP2770
CO1760	Paint Overland Piping	5	21-Nov-08*	24-Nov-08	CO1750
CO1770	Install Cathodic & Scale Protection	0	03-Dec-08*	03-Dec-08	CO1750, CO1600
CO1780	Insulate Production & Re-injection Wells	20	03-Dec-08	18-Dec-08	CO1770, CO1770, CO1770
CO1790	Insulate Overland Piping	25	07-Dec-08	27-Dec-08	CO1770, CO1760
CO1820	Wellfield Piping Complete	0		27-Dec-08	CO1790, CO1780
CO1810	Install Production Well Pumps	9	20-Jan-09	26-Jan-09	RD1590, EQP2650, RD1800, RD2010
MISCELLANEOUS		87	13-Aug-08	14-Dec-08	
CO1825	Install Weather Station	5	13-Aug-08	17-Aug-08	EQP3330
CO1830	Install pond liners	13	23-Aug-08	02-Sep-08	CO1170, EQP2230
CO1840	Construct misc. structures	30	31-Oct-08	24-Nov-08	CO1420
CO1850	Site fencing	6	24-Nov-08	29-Nov-08	CO1840
CO1860	Site cleanup	6	09-Dec-08	14-Dec-08	CO1850, CO1720, CO1580, CO1420



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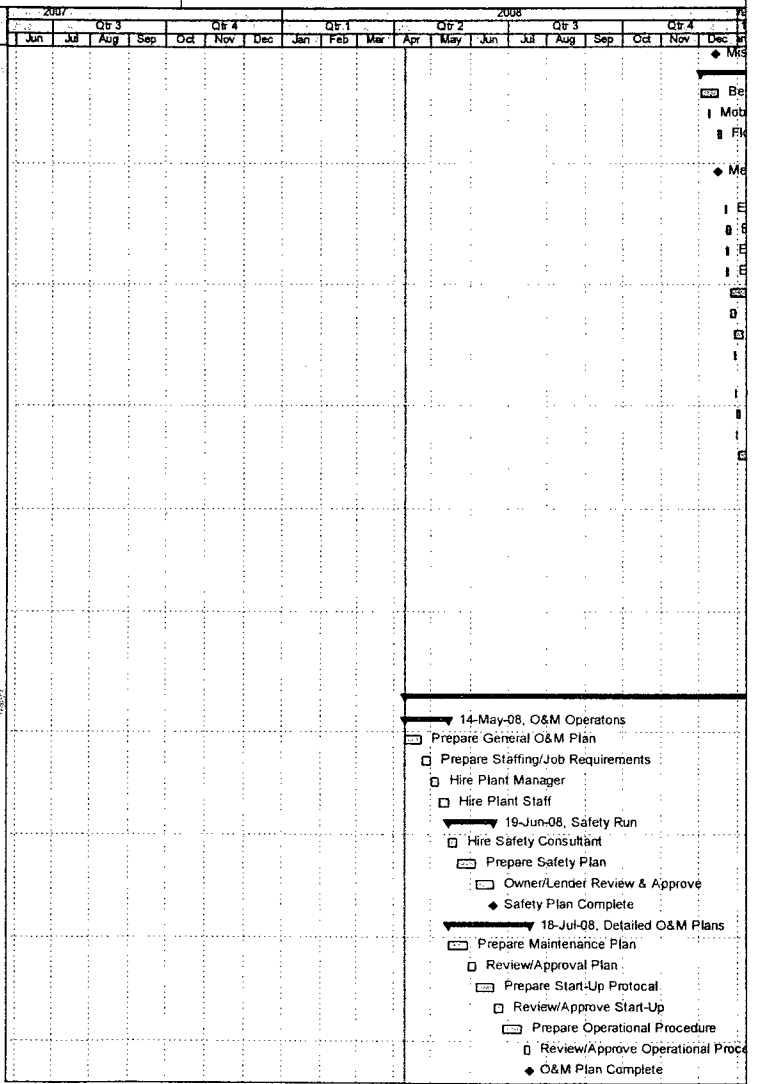
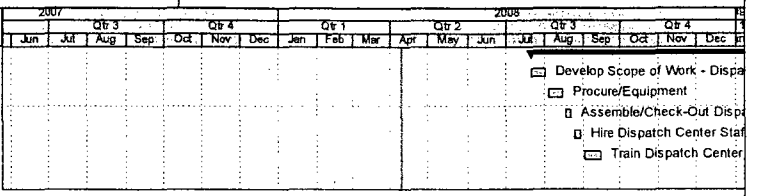
Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
CO1870	Miscellaneous Complete	0		14-Dec-08	CO1860
COMMISSIONING		79	02-Dec-08	23-Mar-09	
CO1880	Begin UTC Unit Pre-commissioning Program	10	02-Dec-08	16-Dec-08	CO1700, CO2110, EQP1950
CO1900	Mobilize Start-Up / Commissioning Team	1	09-Dec-08	09-Dec-08	CO1620, ENG1490
CO1910	Flood Pond for Cooling Water	2	16-Dec-08	18-Dec-08	CO1900, CO1620, CO2110, CO1830, CO1550
CO2110	Mechanical Completion	0		16-Dec-08	CO1620, CO1200, CO1460, CO1740, CO1870, CO1825
CO1890	Establish Site Back-Feed Power	1	22-Dec-08	22-Dec-08	TS1130, EQP1390, EQP2300, EQP3400
CO1920	Energize, Test & Checkout Cooling Water Elect.	3	23-Dec-08	26-Dec-08	CO1900, TS1120, CO1890, TS1130
CO1940	Energize UTC Station Power Circuits	2	23-Dec-08	24-Dec-08	CO1900, TS1120, CO1890
CO1950	Energize & Test BOP Electrical	2	23-Dec-08	24-Dec-08	CO1900, TS1120, CO1890
CO1960	Test & Checkout UTC Equipment	15	26-Dec-08	16-Jan-09	CO1940
CO1980	Energize & Test BOP Piping and Equipment	3	26-Dec-08	30-Dec-08	CO1950, TS1120, CO1890
CO1990	Commission Cooling Tower	5	29-Dec-08	05-Jan-09	CO1920, CO1910, CO2110
CO1930	Flood Geowater Piping Circuits	2	29-Dec-08	30-Dec-08	CO1900, CO1620, CO1820, CO2110, EQP3540
CO2000	Begin Overall BOP Commissioning Program	1	30-Dec-08	30-Dec-08	CO1980
CO1970	Energize Test & Checkout Geowell System	2	31-Dec-08	02-Jan-09	CO1930, TS1120, CO1890
CO2010	Stabilize BOP System to Auto Support for UTC	1	31-Dec-08	31-Dec-08	CO2000
CO2020	Test/Check-Out/Prove PCorp Metering/Relaying/Switch	5	02-Jan-09	08-Jan-09	CO2010, CO1880
CO2030	Plant Start-Up Protocol for Power Generation	5	09-Jan-09	15-Jan-09	CO2020, CO1990, CO1970
CO2130	Commissioning Complete	0		16-Jan-09	CO1960
CO2040	Synchronize to SPC Grid	1	19-Jan-09	19-Jan-09	CO2030, CO2130
CO2050	Raise Power Loading	3	20-Jan-09	22-Jan-09	CO2040
CO2060	Commercial Operation Date (Placed In Service)	1	23-Jan-09	23-Jan-09	CO2050
CO2070	Facility Performance Guarantee Protocol	5	26-Jan-09	30-Jan-09	CO2060
CO2080	Performance Test	22	02-Feb-09	03-Mar-09	CO2070
CO2090	Remove Construction Office Infrastructure	4	04-Mar-09	09-Mar-09	CO2080
CO2120	Substantial Completion	0		09-Mar-09	CO2130, CO2090, CO1080, CO1090, CO1100, CO1110
CO2100	Complete Punch List Items	10	10-Mar-09	23-Mar-09	CO2120
OPERATIONS		207	10-Apr-08	23-Jan-09	
O&M Operations		25	10-Apr-08	14-May-08	
OPS1000	Prepare General O&M Plan	10	10-Apr-08	23-Apr-08	
OPS1010	Prepare Staffing/Job Requirements	5	24-Apr-08	30-Apr-08	OPS1000
OPS1020	Hire Plant Manager	5	01-May-08	07-May-08	OPS1010
OPS1030	Hire Plant Staff	5	08-May-08	14-May-08	OPS1020
Safety Run		26	15-May-08	19-Jun-08	
OPS1040	Hire Safety Consultant	5	15-May-08	21-May-08	OPS1030
OPS1050	Prepare Safety Plan	10	22-May-08	05-Jun-08	OPS1040
OPS1060	Owner/Lender Review & Approve	10	06-Jun-08	19-Jun-08	OPS1050
OPS1070	Safety Plan Complete	0		19-Jun-08	OPS1060
Detailed O&M Plans		47	15-May-08	18-Jul-08	
OPS1080	Prepare Maintenance Plan	10	15-May-08	29-May-08	OPS1030
OPS1090	Review/Approval Plan	5	30-May-08	05-Jun-08	OPS1080
OPS1100	Prepare Start-Up Protocal	10	06-Jun-08	19-Jun-08	OPS1090
OPS1110	Review/Approve Start-Up	5	20-Jun-08	26-Jun-08	OPS1100
OPS1120	Prepare Operational Procedure	10	27-Jun-08	11-Jul-08	OPS1110
OPS1130	Review/Approve Operational Procedures	5	14-Jul-08	18-Jul-08	OPS1120
OPS1140	O&M Plan Complete	0		18-Jul-08	OPS1130



Activity ID	Activity Name	Original Duration	Start	Finish	Predecessors
Dispatch Center		135	21-Jul-08	23-Jan-09	
OPS1150	Develop Scope of Work - Dispatch Center	10	21-Jul-08	01-Aug-08	OPS1140
OPS1160	Procure/Equipment	10	04-Aug-08	15-Aug-08	OPS1150
OPS1170	Assemble/Check-Out Dispatch Center	5	18-Aug-08	22-Aug-08	OPS1160
OPS1180	Hire Dispatch Center Staff	5	25-Aug-08	29-Aug-08	OPS1170
OPS1190	Train Dispatch Center Staff	10	02-Sep-08	15-Sep-08	OPS1180
OPS1200	Ready for Operation	0		23-Jan-09	OPS1190, CO2060



Raser Technologies, Inc.

Introductory Presentation

New Mexico Energy, Mining & Natural Rescources

Feb 18, 2008

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Raser Technologies, Inc.

Raser Technologies is a publicly-traded, environmentally-focused technology licensing and development company, seeking to develop clean, renewable geothermal electric power plants in a fraction of the conventional time, incorporating licensed heat transfer technology

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Who is Raser Technologies?

- Formed in 2002
- Stock trades on New York Stock Exchange Arca (RZ)
- Market Capitalization, $500 million
- Geothermal development and technology licensing
- Management team with deep experience in power generation, power purchasing and plant construction
- Geothermal technologies:
  - PureCycle® advanced binary cycle (United Technologies)
  - K-Cycle advanced binary cycle (hold global license)
- Geothermal rights and options on more than 210,000 acres in six states

Raser Geothermal Leadership

Raser's Leadership has Deep, Relevant Experience

- **Brent M. Cook, CEO**
  - CPA
  - Headwaters, 6 yrs, CEO, Architect of Synfuel Plant Monetizations
  - PacifiCorp, 12 yrs, Director of Strategic Accounts
- **Patrick Schwartz, President**
  - Huntsman Chemical, 25 years, Global business segments
- **Martin F. Petersen, CFO**
  - Merrill Lynch, 7 yrs, VP of Investment Banking
  - Huntsman, 4 yrs VP of Finance and Treasurer
- **Steven R. Brown, VP Construction**
  - Headwaters, 6 yrs, VP Construction and Operations
  - 21 yrs experience in engineering and construction mgmt
- **Richard D. Clayton, General Counsel**
  - Holland and Hart, 6 yrs, Partner
  - Geneva, 10 yrs, EVP and Director

Seasoned Board of Directors

Name / Position	Prior Experience
Kraig T. Higginson Chairman	**Founder** of Raser, **American Telemedia** (CEO/President), **Lighthouse Associates** (CEO/Consultant)
Brent M. Cook CEO/Director	**Headwaters** (CEO/President), **PacifiCorp** (Director of Strategic Accounts and others)
Barry Markowitz Director	**DTE Energy Services** (President), **Bechtel Power Systems** (V.P.)
Lee Daniels Director	**AT&T Japan** (CEO), **Newbridge Capital, Japan** (President)
James Herichoff Director	**American Talc Co.** (CEO), **ARCO** (Mining executive), **Headwaters** (Board member)
Alan Perriton Director	**General Motors** (Senior executive roles, including President, GM Korea).
Reynold Roeder Director	**Deloitte & Touche** (tax focus), **PacificCorp Financial Services** (V.P. and Controller)

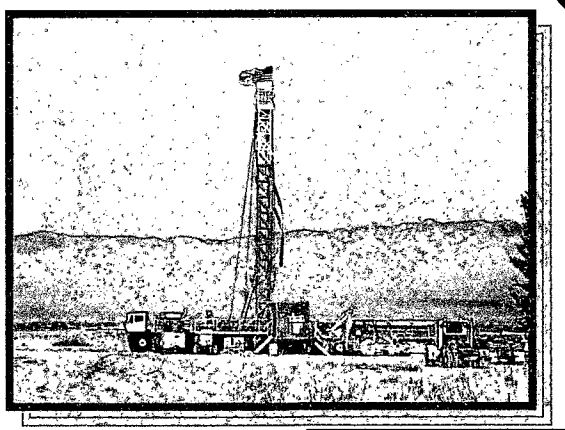
Raser Technologies

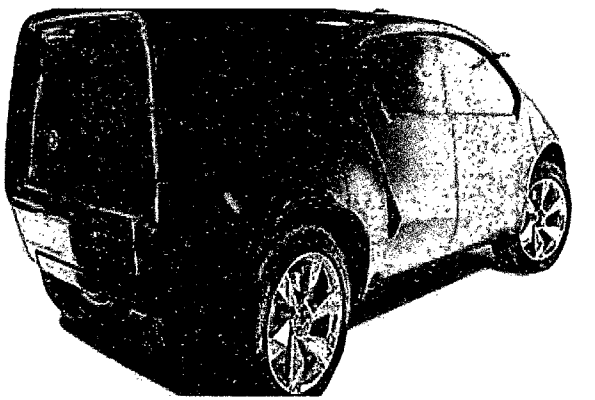
Two Business Segments

Power Systems
(Geothermal Operations)

Transportation & Industrial
(Motor & Drive Technology)

Well to Wheels





GREEN POWER STRATEGY

Why Geothermal Power?

Energy Independence – National Priority

- Renewable energy source
- Base load energy source

Environmentally Friendly

- Clean, zero emissions

Gov't Mandates and Incentives

- Significant government mandates for green power
- Attractive tax incentives

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Why is Geothermal So Attractive?

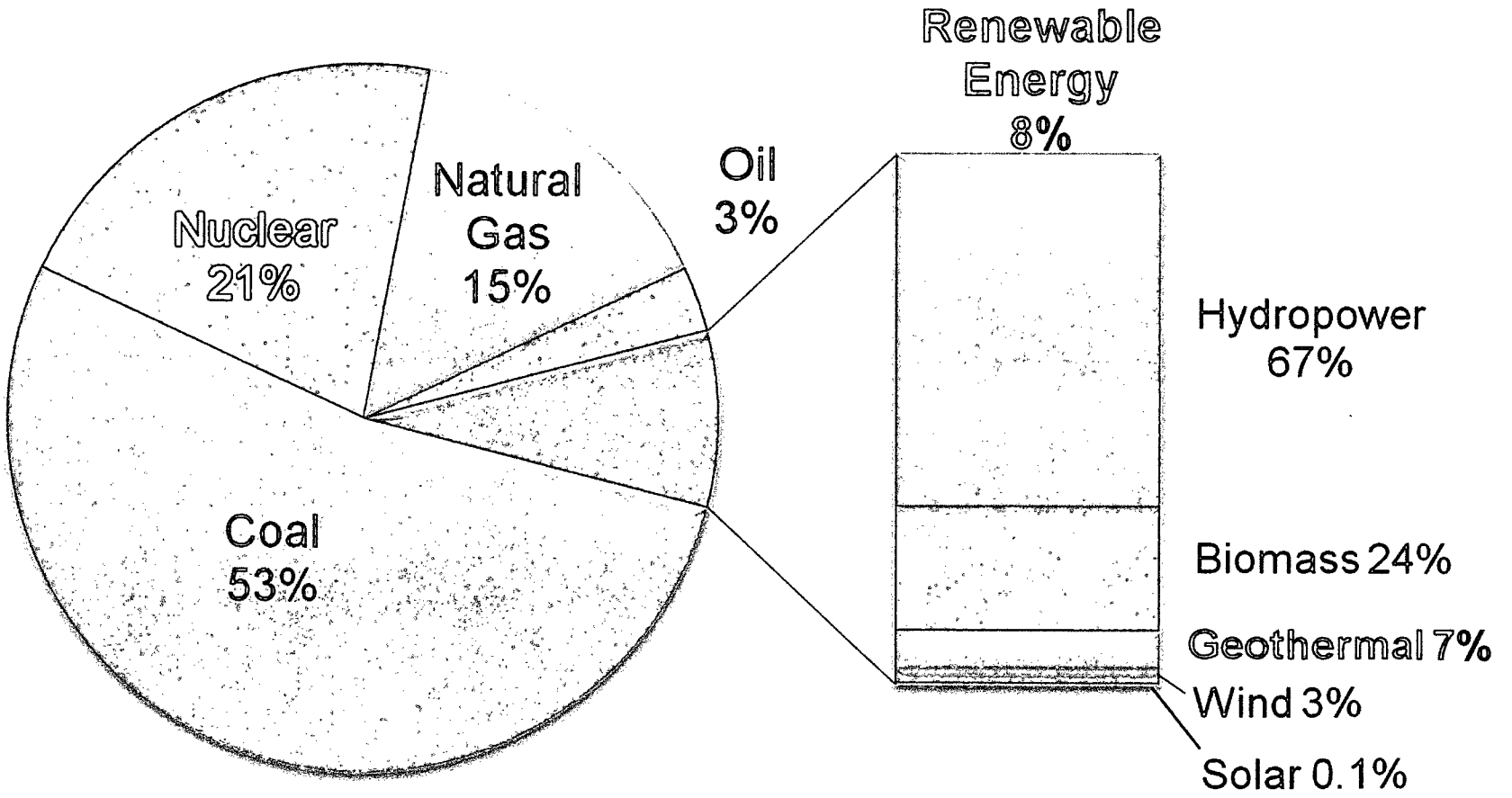
- Technology advancements permit broader application
  - Binary cycle technology can generate power from water temperatures as low as 165°F
  - Smaller plants now feasible with modular technology
  - Equipment reliability backed by manufacturer
- Renewable energy source with long life expectancy
- Once power plant is built, very low operating costs Base load power. Operates 24/7
- Environmentally friendly with zero emissions

Geothermal Power is Proliferating

- 8,217 megawatts installed capacity worldwide in 22 countries
- U.S. is largest producer with 2,800MW
- Rate of U.S. expansion is increasing dramatically
  - Advanced technology permits use of previously unusable geothermal resources
  - Tax incentives offered by federal government
  - Energy independence initiatives taking hold
  - Environmental initiatives increasing
  - States implementing renewable energy requirements

Sources of U.S. Electricity Usage

While Geothermal Currently Represents a Small Part of the U.S. Energy Supply.....



Source: Geothermal Energy Association, April 2007. 2003 Data

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US Geothermal Potential is Substantial

..... An MIT study concludes that geothermal energy could become a major part of the domestic U.S. energy supply

2006 Actual Geothermal Power Production[2] (MWe)	Potential Geothermal Power Production[1,3] (MWe)	% of Estimated Total Power Production[3]
2,800	100,000	10%

[1] Assumes a "modest, multi-year federal investment for R&D"
[2] Source: "Geothermal--The Energy Under Our Feet," National Renewable Energy Laboratory 2006
[3] Source: "The Future of Geothermal Energy," Massachusetts Institute of Technology, 2006

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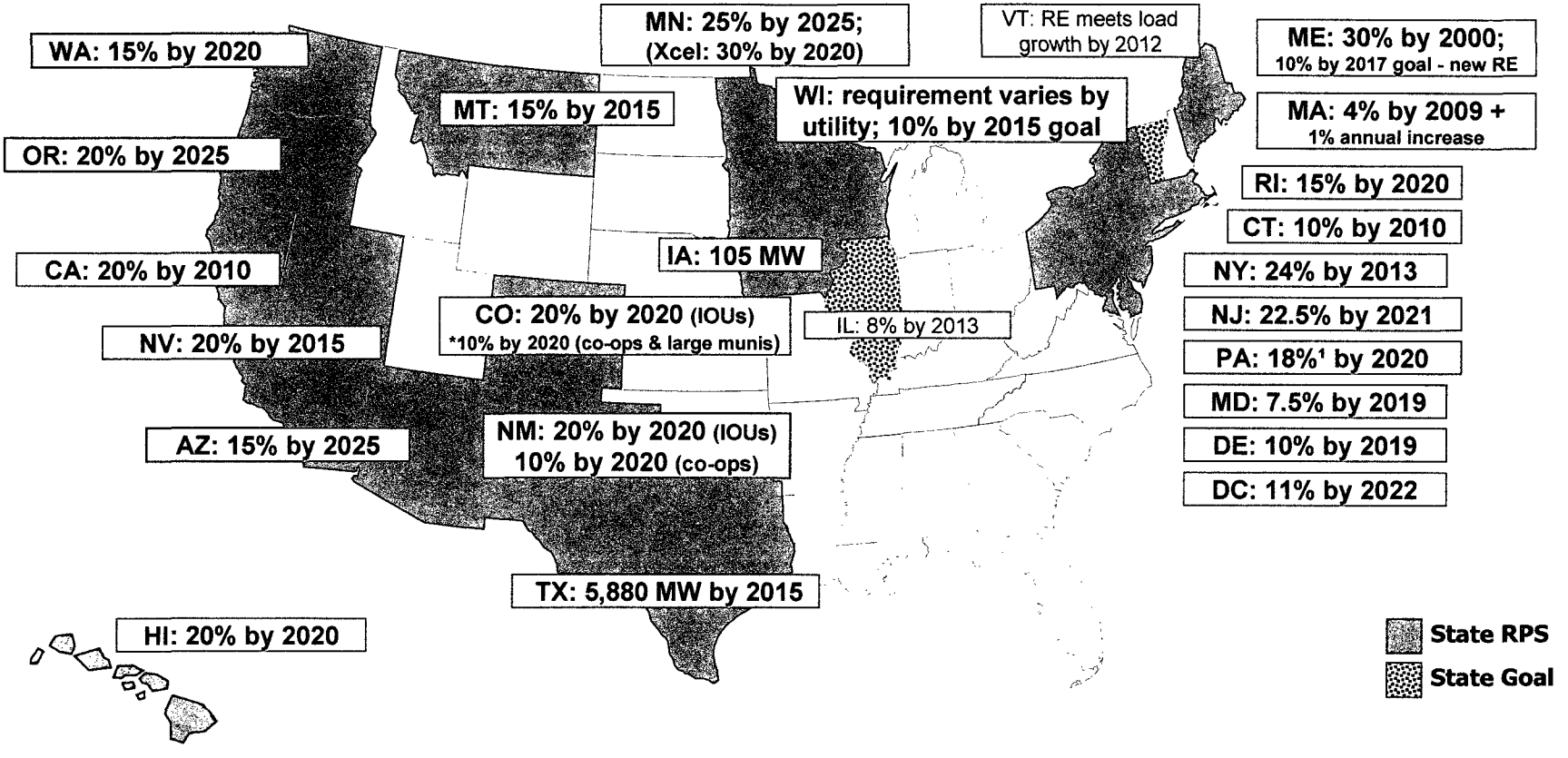
Renewable Portfolio Standards Drive Demand

24 States + District of Columbia have put RPS mandates in place



[1]PA: 8% Tier I / 10% Tier II (includes non-renewables)

Source: Interstate Renewable Energy Council

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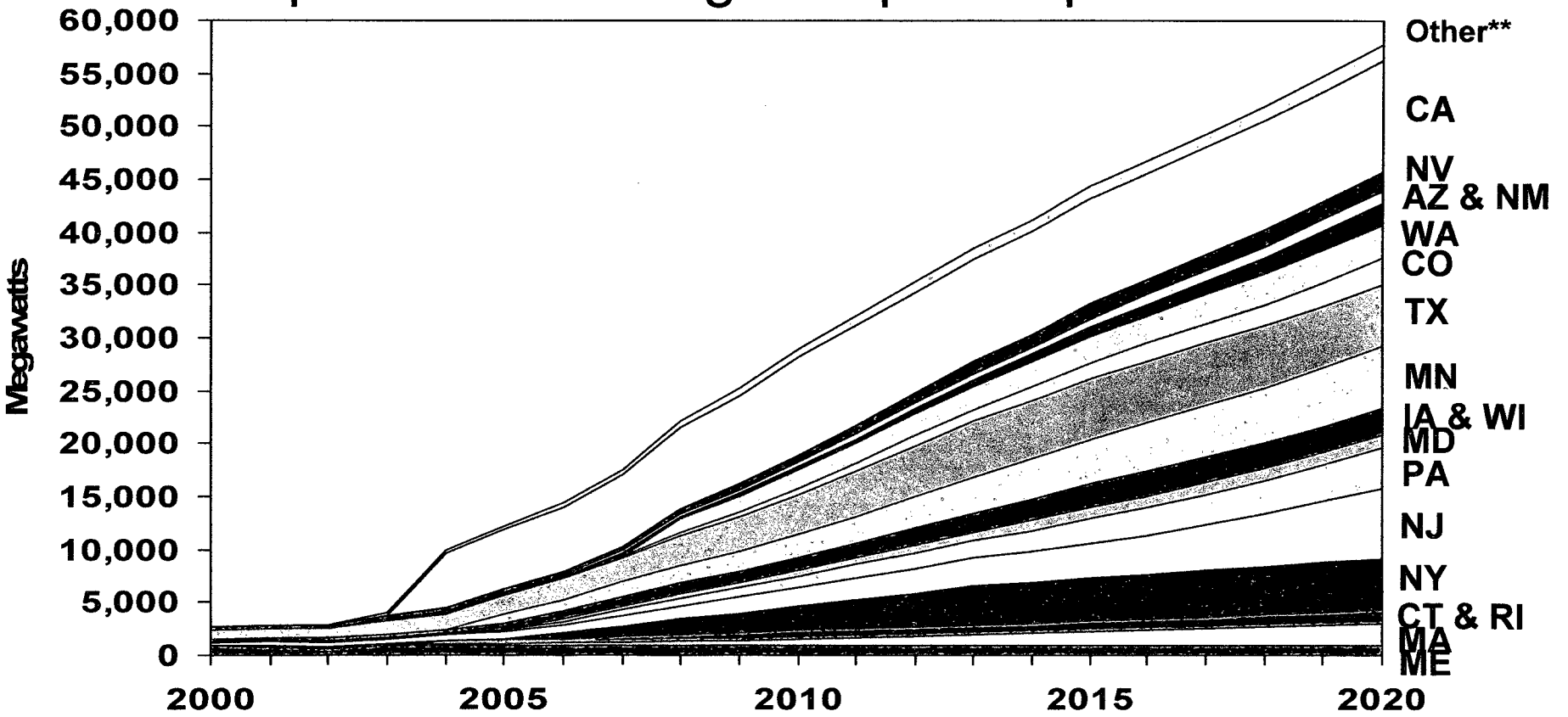
Renewable Energy Demand from RPS Mandates

Cumulative RPS mandates will require more energy to be produced from green power plants



*Projected development assuming states achieve annual renewable energy targets.
**Includes Delaware, Hawaii, Illinois, Montana, Ohio, Oregon, and Washington D.C.

Source: Union of Concerned Scientists

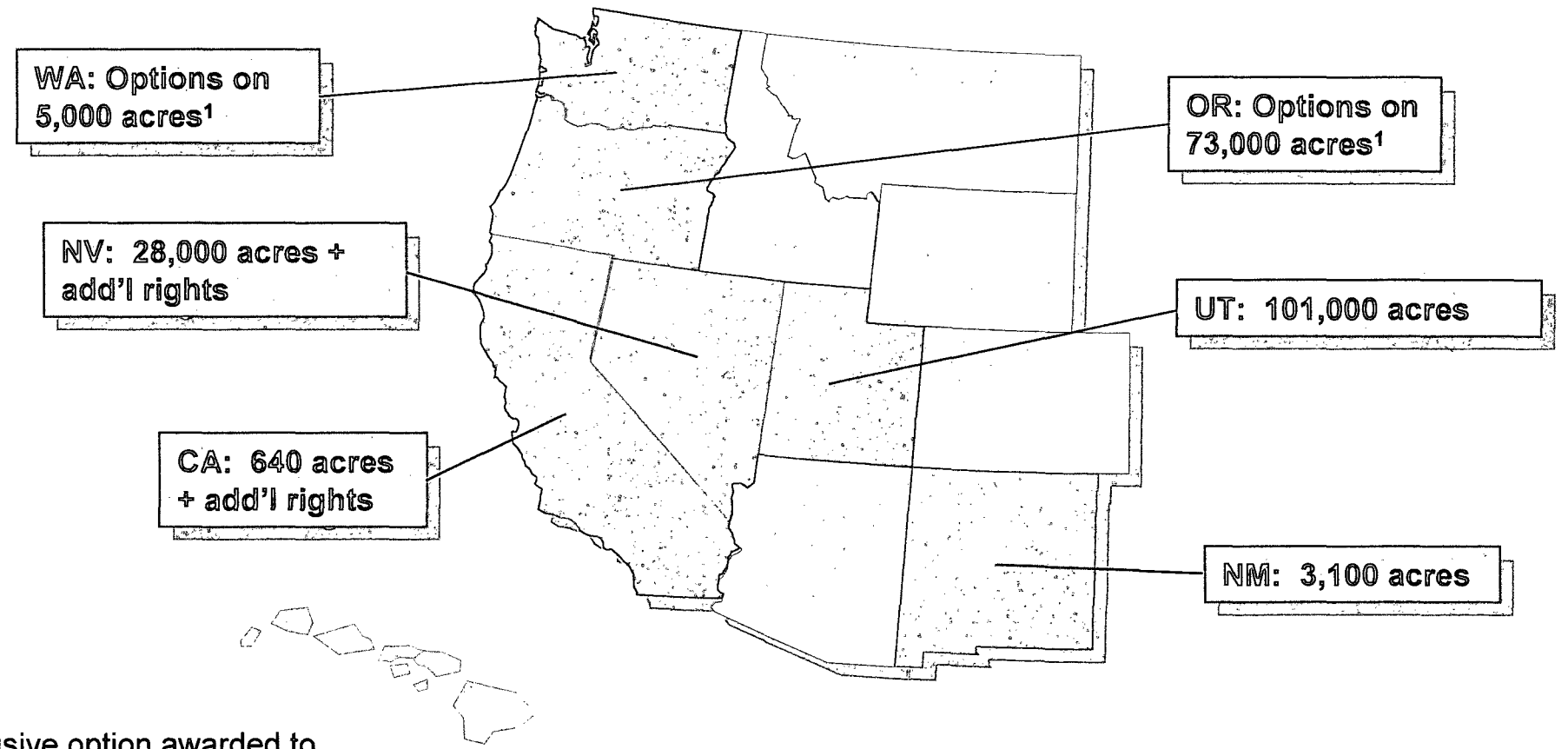
Raser's Geothermal Strategy

Raser's approach is designed to reduce risk and better ensure success "by winning the game with singles and doubles rather than trying for home runs every time"

- ◊ Exploit more prevalent, lower temperature geothermal resources, using binary cycle technology
- ◊ Employ modular, rapid deployment approach to place power plants in service and generate revenues in a fraction of the conventional time
- ◊ Monetize the tax benefits to provide the capital required to develop and construct the power plants

Raser's Geothermal Resource Portfolio

Raser has secured substantial geothermal resources in six states to date



[1]Exclusive option awarded to Raser by International Paper

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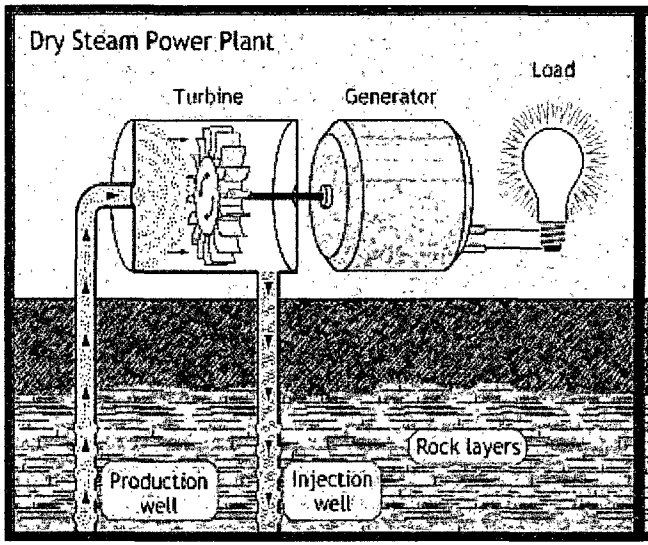
Three Geothermal Technologies

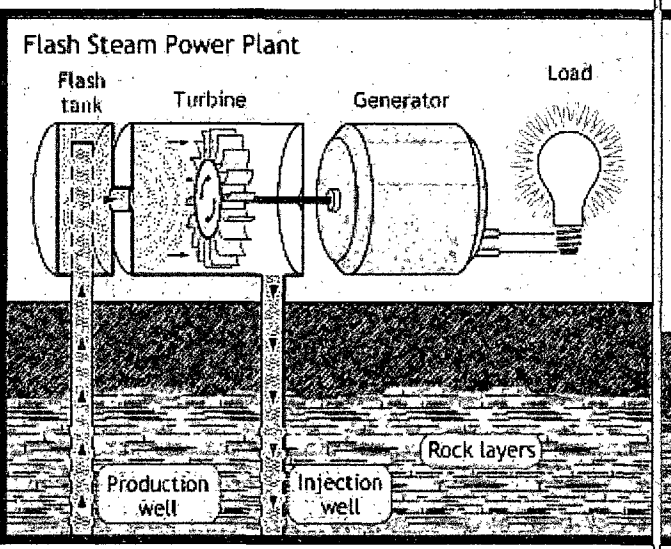
Dry Steam



Drawing Source: U.S. Department of Energy

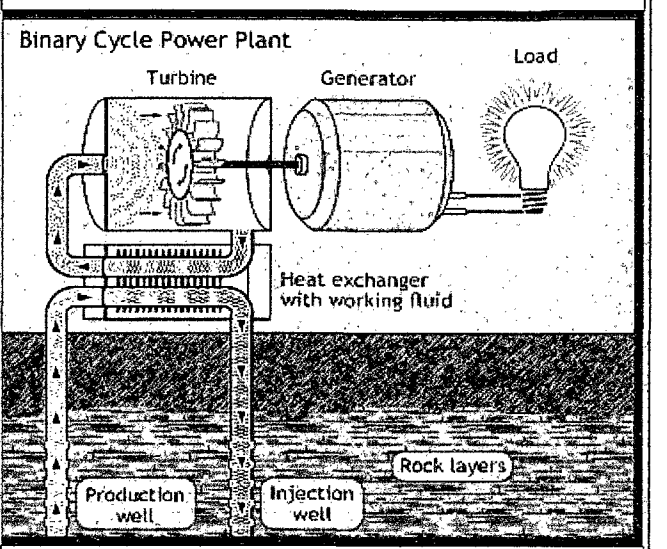
- Requires high heat
- Corrosive to turbine blades
- Some emission control required
- Some resource depletion over time

Flash Steam



- Requires very hot water
- Corrosive to turbine blades
- Some emission control required

Binary Cycle



- Newer, proven technology
- Lower heat can be used
- Closed loop, zero emissions
- Non-corrosive to turbine blades

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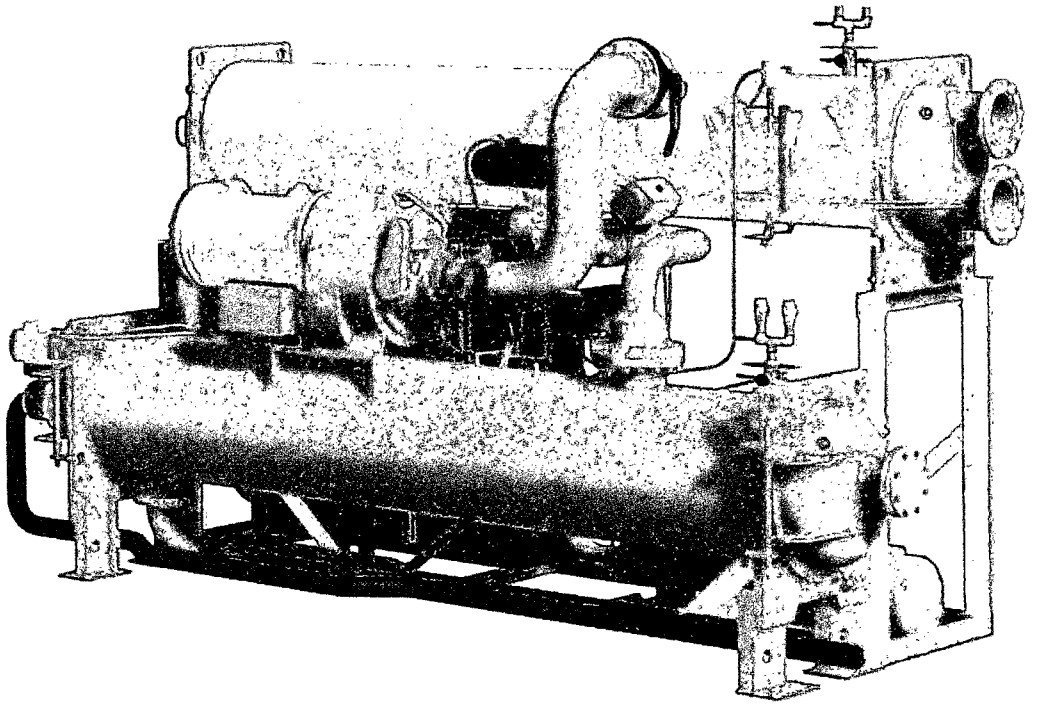
United Technologies Strategic Alliance

UTC Power and Raser formed a strategic alliance facilitating Raser's rapid deployment strategy

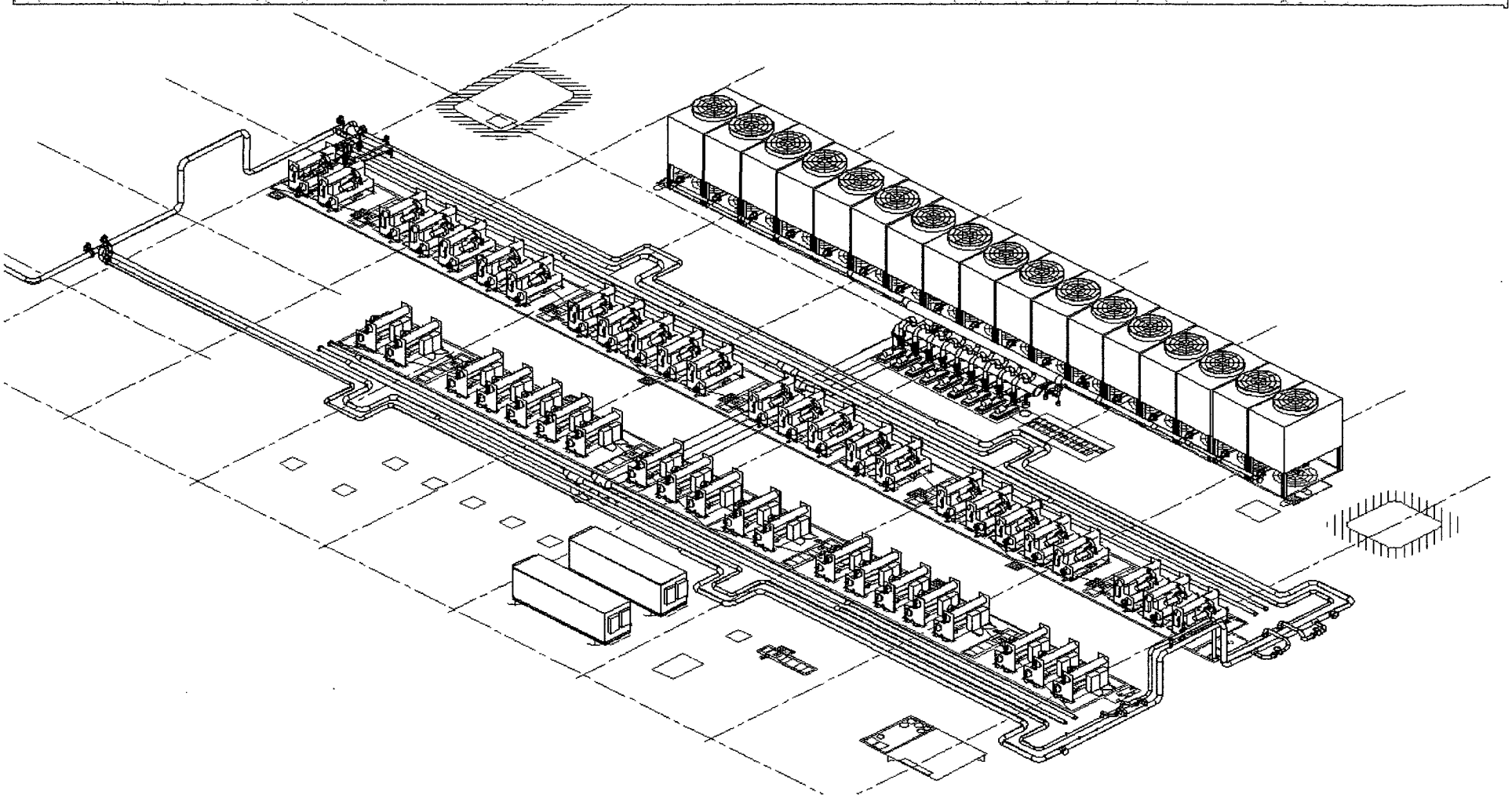
UTC Power PureCycle®
225kW Binary Cycle System



United Technologies

- Annual Revenue, $47 billion
- Established, 1934
- United Technologies companies:
  - UTC Power (geothermal tech)
  - Carrier (HVAC equipment)
  - Pratt & Whitney (aircraft engines)
  - Sikorsky (helicopters)
  - Otis (elevators)
- UTC Power guarantees performance of PureCycle binary cycle power generating units

Raser 10MW Modular Power Plant

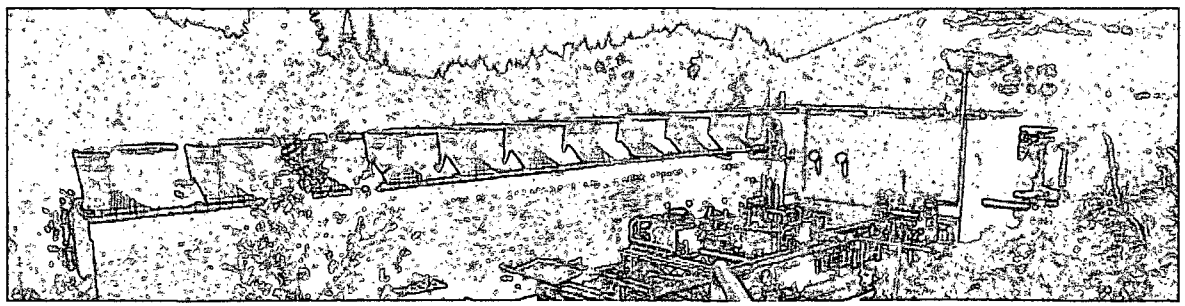


Raser's modular design allows flexibility and provides for the rapid deployment approach

Raser's Rapid Deployment Strategy

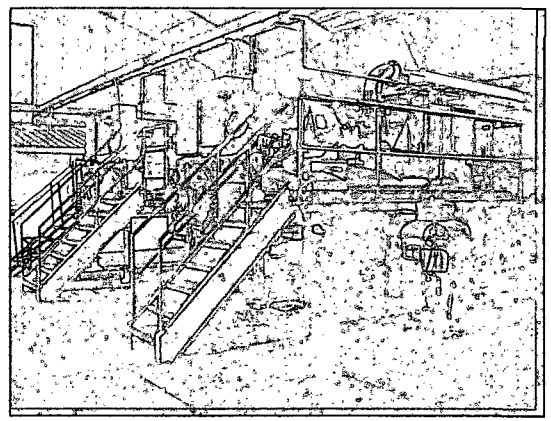
Conventional Technology, Sequential Approach

- ◊ Permit site
- ◊ Develop well field
- ◊ Design power plant
- ◊ Order equipment
- ◊ Build power plant
- ◊ Begin selling power
- ◊ Elapsed time, 3-5 years



Modular Technology, Simultaneous Approach

- ◊ Permit site
- ◊ Develop well field, build modular power generating units offsite simultaneously
- ◊ Begin selling power
- ◊ Elapsed time, 12-18 months



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Key Raser Agreements in Place

Strong Strategic Alliance and Other Partnerships Represent Meaningful Endorsements

United Technologies

- Equipment Provider
- Technology Sharing Partner

- Revenue: $47 Billion
- Est.: 1934
- HQ: Connecticut
- NYSE: UTX

CUMMINS & BARNARD, INC.
Engineering Progress Since 1932

- Program/Construction Manager
- Engineering Oversight

- Revenue: N/A
- Est.: 1932
- HQ: Michigan

Merrill Lynch

- $44 M for First 10.5 MW Plant
- 100MW + 55MW ROFR
- Construction Financing
- Tax Equity Benefits 95/5

Layne

- Drilling Services

- Revenue: $722 Million
- Est.: 1981
- HQ: Kansas
- Nasdaq: LAYN

Power Purchase Agreements

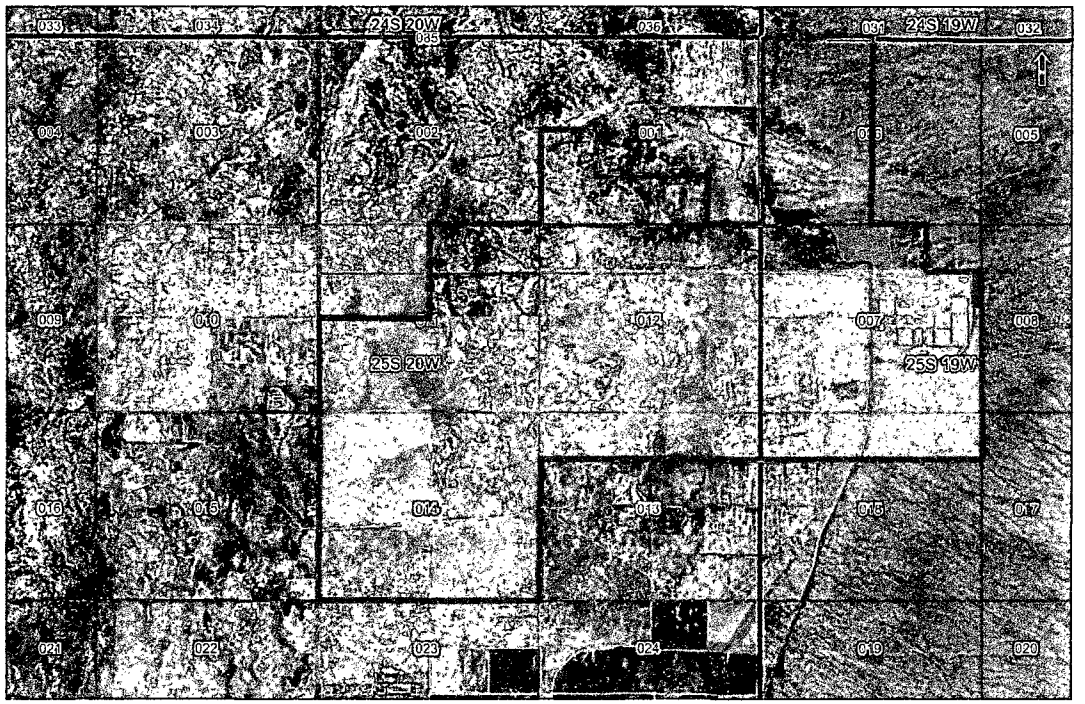
- Utility Short Listings 70 MW
- Bilateral Negotiations in Progress 60 MW

INTERNATIONAL PAPER

- Resource Partner - Oregon & Washington

- Revenues: $22 billion
- Est.: 1898
- HQ: Tennessee
- NYSE: IP

Lightning Dock Geothermal - New Mexico



Legend
Raser Federal Geothermal Lease
Burgett_Boundary

Lightning Dock Geothermal
Subject Lands
Hildago County, Nevada

Lightning Dock Geothermal HI-01, LLC
5152 North Edgewood Drive Suite 375
Provo, UT 84604

Project Details

- First Commercial Geothermal Power Plant in NM
- 20 mile southwest of Lordsburg, NM
- 15 MW - Binary Technology
- 3,100 Acres
- Total potential 20MW – 30MW

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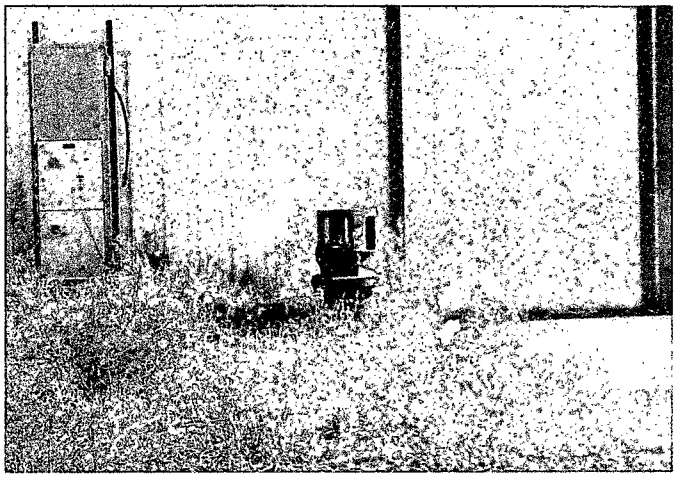
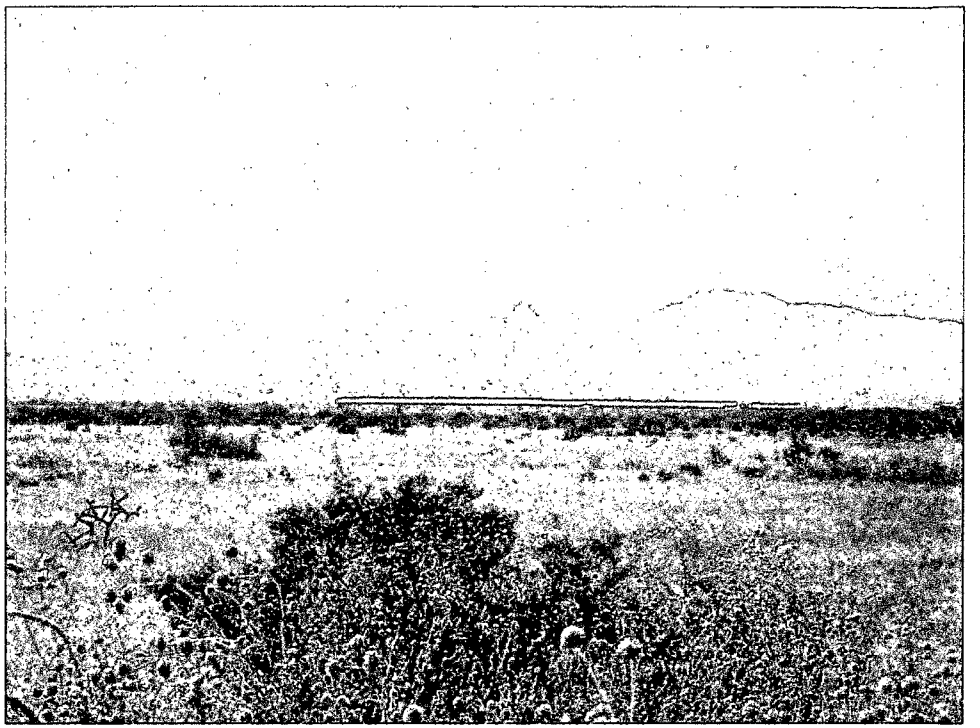
Lightning Dock Geothermal



Well 55-7

- **Production**
- **Temp 285F – 307F**
- **7000 ft**



View of LDG looking West

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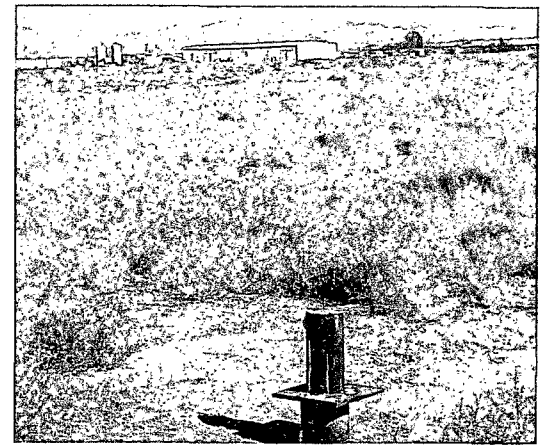
New Mexico Challenges & Opportunities

Challenges



- Geothermal development is "new"
- Permitting
- Many incentives for renewable energy do not include geothermal

Opportunities

- Strong support for clean, renewable energy
- New Mexico State Agencies willing to develop good working relationships
- Raser Technologies to make a significant investment in New Mexico
- Additional projects in New Mexico
- Partnership to make New Mexico a significant player in clean, renewable, base-load geothermal power

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Sundry Notice to Abandon Existing Wells

Well Plugging Plan of Operations

Well Plugging Report

raser

TECHNOLOGIES

Tim Sanders
Assistant District Manager
Bureau of Land Management
Las Cruces District Office
1800 Marquess Street
Las Cruces, NM 88005-3371

February 12, 2008

Re: Lease NM 34790 - Sundry Notice to Abandon Existing Wells and New Permitting.

Dear Mr. Sanders:

Lightning Dock Geothermal HI-01, LLC ("LDG") received your letter dated January 24, 2008, reference NM 34790, 3260 (03100), in which BLM agrees to withhold action related to plugging and abandoning existing wells on Lease NM 34790 for a period of six (6) months and acknowledges the receipt of the bond application for NM 34790 and a check for $45,000 (the amount agreed upon to meet the $75,000 total bond amount required, less the existing $30,000 bond already in BLM's possession).

Mr. John Besse of BLM has informed LDG, verbally, that BLM is still requiring LDG to proceed with plugging and abandoning a minimum, unspecified number of the existing wells on Lease 34790 as a prerequisite to BLM's approval of any new permit applications related to further development of Federal Lease NM 34790.

To that end, this letter serves as Sundry Notice that LDG will promptly commence plugging and abandoning ten (10) wells pertaining to Lease NM 34790. LDG proposes the following Plug and Abandon Plan for BLM approval. BLM provided LDG with the shape files and inventory of forty two (42) wells which were utilized to create the inventory and maps shown in Exhibits A and B of the Plug and Abandon Plan below. Mr. Dale Burgett, the surface land owner, has also cooperated in providing additional data on these specific wells for use in LDG's Plug and Abandon Plan.

5152 North Edgewood Drive
Phone 1-801-765-1200

Suite 375
Toll Free 1-888-81-POWER

Provo, UT 84604
Fax 1-801-374-3314

Plug and Abandon Plan for Federal Lease NM 34790

1. **Initial wells to be plugged and abandoned**. LDG will immediately plug ten (10) of the existing wells. These are BLM Well No.'s 0, 9, 14, 15, 17, 19, 23, 26, 27, and 37 (Exhibits A and B). BLM sets forth in your letter NM 34790, 3260 (03000) that "...all geothermal wells located on Federal Lease Number NM-34790 which are determined to be unnecessary to the operations of Lightning Dock LLC will be plugged and abandoned as per New Mexico State Engineers specifications." To comply with this requirement and the requirements set for in 43 CFR 3263.10 and §3263.11, all plugging shall be performed to meet all applicable New Mexico State Engineer specifications by a well driller licensed by the State of New Mexico. The ten (10) wells shall be plugged with neat cement slurry, bentonite based plugging material, or other sealing material approved by the state engineer. LDG invites BLM to witness the work, and will notify BLM prior to beginning the work and according to any notification instructions provided by BLM. .

2. **Wells not pertaining to Federal Lease NM 34790**. LDG has identified that eight (8) of the existing forty two (42) wells are located on lands outside of the boundaries of Lease NM 34790 and, therefore, are not subject to LDG's control or BLM jurisdiction. These wells are BLM Well No.'s 4, 5, 6, 7, 33, 34, 35, and 36 (See Exhibits A and B).

3. **Final report on existing wells**. During the next six (6) month period granted by BLM, LDG will review and study the remaining twenty three (23) known existing wells and will, at the end of this period, submit a final report to BLM. This report will identify any wells LDG wishes to retain for use in the proposed operation along with supporting data. The report will include the list of ten (10) wells already submitted by LDG in the letter dated Jan 17, 2008. If any of the remaining existing wells are found to be unnecessary for geothermal resource production, injection, or monitoring, or found to be mechanically unsound, as per CFR 3263.14, LDG will submit at that time, an additional Sundry Notice to plug abandon such wells promptly.

Please confirm in writing approval of this Sundry Notice and acknowledgment that once the ten (10) wells are plugged and abandoned, BLM will begin reviewing additional permits for further development of Federal Lease 34790. Also, please confirm that this action will finalize the requirements for approval and issuance of the adjacent outstanding Federal Lease NM 108801.

If you have any questions, or if you require any additional information, please contact Michael Hayter immediately at (801) 765-1200. For any questions related specifically to permitting, please contact Jay Hamilton at (801) 361-2102.

Sincerely,

Steven R. Brown
Vice President
Raser Technologies, Inc.
on behalf of
Lightning Dock Geothermal HI-01, LLC
(Record title owner of NM-34790)

Exhibit A

Inventory of Existing Wells

Well No. (BLM)	Well No. (State)	Other Description	Initial P&A	Comments
0		Heat Pump – Home Heating	Yes	Depth and circumference: 150'x 4"
1		Exploratory Well	No	Testing and monitoring
2		Exploratory Well	No	Testing and monitoring
3	A0088	Americulture Well	No	Testing and monitoring
4		Well #1 State – Burgett	No	Does not pertain to Federal Lease NM 34790
5		Well #5 State – Burgett	No	Does not pertain to Federal Lease NM 34790
6		Well #4 State – Burgett	No	Does not pertain to Federal Lease NM 34790
7		Well #3 State – Burgett	No	Does not pertain to Federal Lease NM 34790
8	A0125	Heat Pump – Home Heating	No	Domestic heating
9	A0123	Heat Pump – Home Heating	Yes	150'x4", no casing, no longer in use
10	A0122	Metered Production Well (Well #6)	No	Testing and monitoring, sealed
11	A0100	Metered Production Well (Well #3 East)	No	Testing and monitoring, sealed
12	A0097	Heat Pump – Green House Heating	No	Testing and monitoring
13	A0099	Heat Pump – Home Heating	No	Domestic heating
14	A0121	Exploratory Well – Federal	Yes	990'x4", no water, may be collapsed, locked wellhead
15	A0093	Exploratory Well – Federal	Yes	125'x4", open casing
16	A0127	Metered Production Well (#1 Discovery Well)	No	Testing and monitoring
17	NONE	Abandoned Well – Federal	Yes	100'x10"
18	A0126	Metered Production Well (Well #2) – Federal	No	Testing and monitoring, 1000' – 1200'
19	A0104	Abandoned Well - Federal	Yes	125' total, first 60'x8", next 65'x4"
20	A0103	TFD 55-7	No	Permitted for re-access and drilling
21	A0106	Heat Pump – Home Heating	No	Domestic heating
22	A0105	Abandoned Well - Federal	No	Testing and monitoring, open casing, 1000' – 1200'
23	A0132	Washing Well	Yes	85'x4"
24	A0131	Heat Pump – Home Heating	No	Domestic heating
25	A0102	Metered Production Well (#3 West) - Federal	No	Testing and monitoring, no pump
26	AO129	Abandoned Well – Federal	Yes	150'x5", 2 bull plug (flat)
27	A0130	Abandoned Well – Federal	Yes	150'x5", open casing
28	A0133	Heat Pump – Packing Plant	No	Testing and monitoring
29	A0116	Exploratory Well (GRED 36-7)	No	Testing and monitoring, 1000' – 1200', locked wellhead
30	A0119	Irrigation Well – Private	No	Testing and monitoring, status unknown
31	NONE	Exploratory Well (GRED 52-7)	No	Testing and monitoring, recent test well, sealed casing
32		Vacant	No	Testing and monitoring
33		Well #7 – State – Burgett	No	Does not pertain to Federal Lease NM 34790
34		State Well – Americulture	No	Does not pertain to Federal Lease NM 34790
35		State Well – Americulture	No	Does not pertain to Federal Lease NM 34790
36		State Well – McCants	No	Does not pertain to Federal Lease NM 34790
37		Abandoned Well – State	Yes	Dimensions and status of well unknown, no casing
38		Exploratory Well (EGS 12-7)	No	Testing and monitoring
39	A0087	McCants Well – Federal	No	Testing and monitoring
40		McCants Well – Home Heating	No	Domestic heating, open casing
41		McCants Well – Home Heating	No	Domestic heating, in use?

Exhibit B

Map of Existing Wells

(Shape files provided by BLM)

5152 North Edgewood Drive
Phone 1-801-765-1200

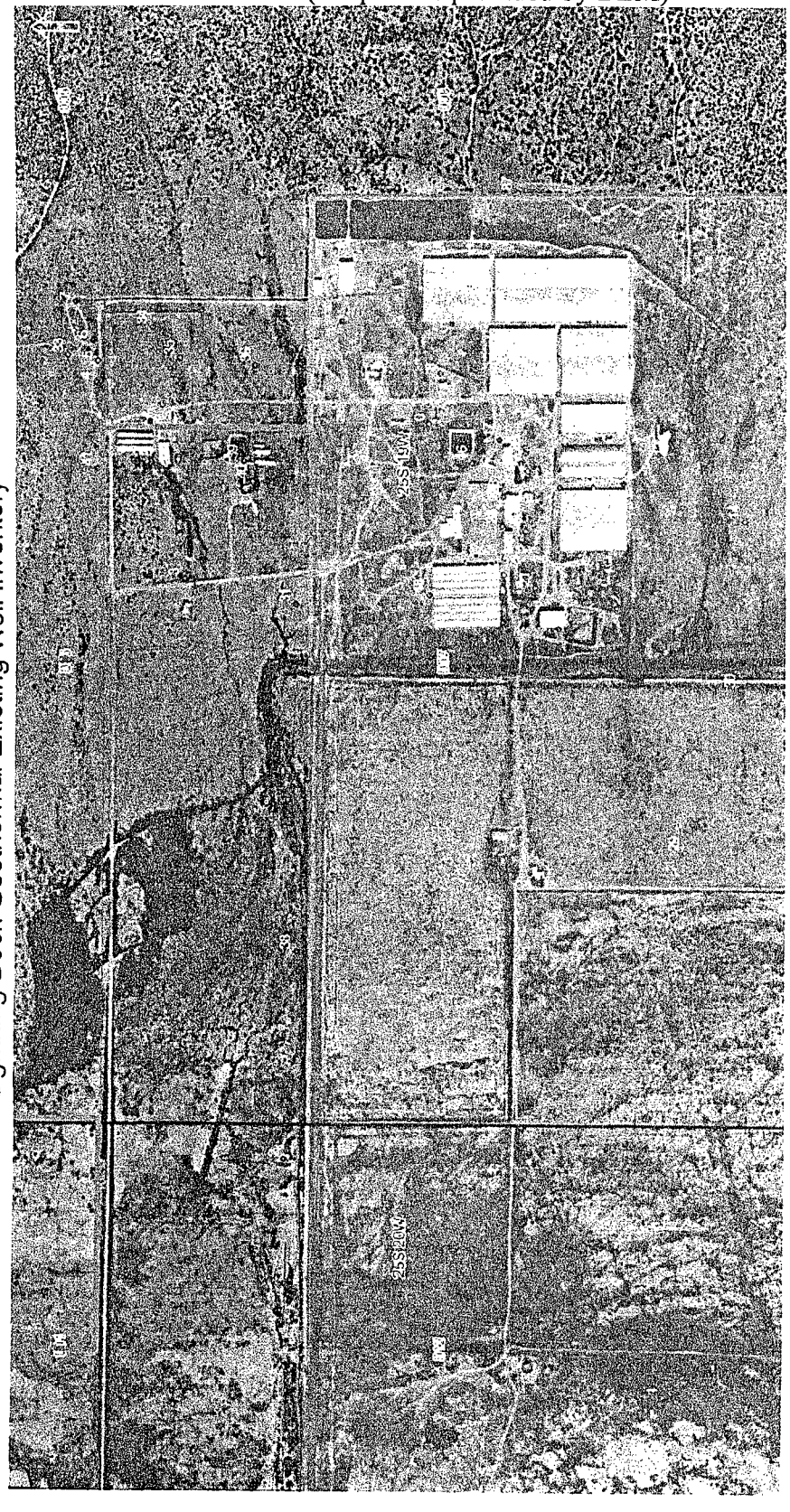
Suite 375
Toll Free 1-888-81-POWER

Provo, UT 84604
Fax 1-801-374-3314

Exhibit B

Map of Existing Wells

(Shape files provided by BLM)



5152 North Edgewood Drive
Phone 1-801-765-1200

Suite 375
Toll Free 1-888-81-POWER

Provo, UT 84604
Fax 1-801-374-3314

WELL PLUGGING
PLAN OF OPERATIONS

NOTE: **A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.**

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: 9 wells (SEE Attachment)

Name of well owner: Rosette, Inc.

Mailing address: 29 Rose Lane

City: Animas State: NM Zip code: 88020

Phone number: 505 548 2353 E-mail: burgett@vtc.net

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Everett D. Burgett

New Mexico Well Driller License No.: WD 248 Expiration Date: 7/31/09

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

1) GPS Well Location: Latitude: _____ deg, _____ min, _____ sec
Longitude: _____ deg, _____ min, _____ sec, NAD 83

2) Reason(s) for plugging well: BLM required plugging

3) Was well used for any type of monitoring program? NO If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.

4) Does the well tap brackish, saline, or otherwise poor quality water? NO If yes, provide additional detail, including analytical results and/or laboratory report(s): _____

5) Static water level: 60 feet below land surface / feet above land surface (circle one)

6) Depth of the well: _____ feet SEE Attachment

ATTACHMENT

Nine wells to be plugged in Section 7, 25 S, R 19 W, N.M.P.M

	WELL #	*DEPTH*	*CASING*	*Water Level*
1.	A0098	110	8"	No Water
2.	A0121	900	7 5/8	60
3.	A0128	110	10	60
4.	A0129	150	8	60
5.	A0104	125	8	60
6.	A0130	150	5	60
7.	A0124	150	8	60
8.	A0123	150	8	60
9.	A 36 – A – S13	260	10	Dry No Water

(Bentonite Hole Plug) to be used to plug the wells from the bottom.

5 ft. of cement at top of each well with 4" pipe hole markers

7) Inside diameter of innermost casing: _____ inches. SEE Attachment

8) Casing material: All Steel

9) The well was constructed with:

X an open-hole production interval, state the open interval: _____

_____ a well screen or perforated pipe, state the screened interval(s): _____

10) What annular interval surrounding the artesian casing of this well is cement-grouted? _____

11) Was the well built with surface casing? YES If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? _____ If yes, please describe: Pump method 60 to 70' Surface Casing

12) Has all pumping equipment and associated piping been removed from the well? YES If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well: Pumped Through Tubing if Hole Plug used

2) Will well head be cut-off below land surface after plugging? NO

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

1) For plugging intervals that employ cement grout, complete and attach Table A.

2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.

3) Theoretical volume of grout required to plug the well to land surface: Halleburton Tables

4) Type of Cement proposed: Portland

5) Proposed cement grout mix: 6 gallons of water per 94 pound sack of Portland cement.

6) Will the grout be: _____ batch-mixed and delivered to the site

X mixed on site

7) Grout additives requested, and percent by dry weight relative to cement: If cement used 6% Gel

8) Additional notes and calculations:

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

All wells will be sealed from bottom to seal water zone

VIII. SIGNATURE:

I, Dale Burgett, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Boretto Inc
Dale Burgett EO
Signature of Applicant

2/27/08
Date

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

_____ Approved subject to the attached conditions.
_____ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this _____ day of _____, _____

John R. D'Antonio, Jr., State Engineer

By: _____

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			At surface
Bottom of proposed interval of grout placement (ft bgl)			bottom of Hole
Theoretical volume of grout required per interval (gallons)			Halleburton Tables for Volume
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			6 Gal.
Mixed on-site or batch-mixed and delivered?			on site with pump
Grout additive 1 requested			none
Additive 1 percent by dry weight relative to cement			NA
Grout additive 2 requested			NA
Additive 2 percent by dry weight relative to cement			NA

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			At Surface
Bottom of proposed sealant of grout placement (ft bgl)			Bottom of Well
Theoretical volume of sealant required per interval (gallons)			As per Halleburton Tables of volume
Proposed abandonment sealant (manufacturer and trade name)			4" Hole Plug Black Hills Bentonite

STATE OF NEW MEXICO

OFFICE OF THE STATE ENGINEER

DEMING

JOHN R. D'ANTONIO, JR., P.E.
State Engineer

216 S. Silver
Post Office Box 844
Deming, New Mexico 88031
(505) 546-2851
(505) 546-7452
Fax: (505) 546-2290

March 4, 2008

File or Reference #:
A-385, A-607, A-36-A-S-4,
A-36-A-S-12, A-36-A-S-13
and 4-Heat pump wells

Rosette, Inc.
29 Rose Lane
Animas, New Mexico 88020

Greetings:

Enclosed is your copy of Well Plugging Plan of Operations, which has been approved.

A plugging report itemizing actual plugging process and materials used shall be filed with the State Engineer within 20 days after completion of plugging.

Sincerely,

Charles L. Jackson, MPA
District 3 Manager

By: H Phillips
Haddy Phillips
Assistant Manager
Animas Basin

HP:ps
Encl: Well Plugging Plan of Operations
cc: State Engineer
034

WELL PLUGGING PLAN OF OPERATIONS

NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: 9 wells (SEE Attachment)

Name of well owner: Rosette, Inc.

Mailing address: 29 Rose Lane

City: Animas State: NM Zip code: 88020

Phone number: 505 548 2353 E-mail: burgett@vtc.net

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Everett D. Burgett

New Mexico Well Driller License No.: WD 248 Expiration Date: 7/31/09

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

2008 MAR -3 AM 11:20
OFFICE OF THE STATE ENGINEER DEMING, NM

1) GPS Well Location: Latitude: _____ deg, _____ min, _____ sec
See attachment Longitude: _____ deg, _____ min, _____ sec, NAD 83

2) Reason(s) for plugging well: BLM required Plugging

3) Was well used for any type of monitoring program? NO If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.

4) Does the well tap brackish, saline, or otherwise poor quality water? NO If yes, provide additional detail, including analytical results and/or laboratory report(s): _____

5) Static water level: 60 feet below land surface / feet above land surface (circle one)

6) Depth of the well: _____ feet SEE Attachment

OFFICE OF THE
STATE ENGINEER
DEMING, NM
2008 MAR -3 AM 11:27

ATTACHMENT for Well Plugging Plan of Operations

By Dale Burgett

Nine wells to be plugged in Section 7, 25S, R19W, N.M.P.M.

		GPS Location				
OSE Well #	*Tag #*	*Latitude*	*Longitude*	*Depth*	*Casing "*	*Water Level*
A-385	A0098	32 deg 8 min 30.705 sec	108 deg 49 min 41.646 sec	110	8	No Water
A-607	A0121	32 deg 8 min 27.900 sec	108 deg 50 min 2.333 sec	900	7 5/8	60
A-36-A-S-4	A0128	32 deg 8 min 43.274 sec	108 deg 49 min 57.432 sec	110	10	60
None- Heat pump well	A0129	32 deg 8 min 41.711 sec	108 deg 49 min 59.018 sec	150	8	60
A-36-A-S-12	A0104	32 deg 8 min 43.236 sec	108 deg 50 min 9.030 sec	125	8	60
None- Heat pump well	A0130	32 deg 8 min 41.646 sec	108 deg 49 min 59.078 sec	150	5	60
None- Heat pump well	A0124	32 deg 8 min 48.356 sec	108 deg 49 min 55.627 sec	150	8	60
None- Heat pump well	A0123	32 deg 8 min 50.432 sec	108 deg 49 min 52.707 sec	150	8	60
A-36-A-S-13	none	32 deg 8 min 42.881 sec	108 deg 50 min 14.369 sec	260	10	No Water

(Bentonite Hole Plug) to be used to plug the wells from the bottom.

5 ft. of cement at top of each well with 4" pipe hole markers

7) Inside diameter of innermost casing: _____ inches. SEE Attachment

8) Casing material: All Steel

9) The well was constructed with:

X an open-hole production interval, state the open interval: _____

_____ a well screen or perforated pipe, state the screened interval(s): _____

10) What annular interval surrounding the artesian casing of this well is cement-grouted? _____

11) Was the well built with surface casing? YES If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? _____ If yes, please describe: Pump method 60' to 70' Surface Casing

12) Has all pumping equipment and associated piping been removed from the well? YES If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well: Pumped Through tubing if Hole Plug used

2) Will well head be cut-off below land surface after plugging? NO

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

1) For plugging intervals that employ cement grout, complete and attach Table A.

2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.

3) Theoretical volume of grout required to plug the well to land surface: Halleburton Tables

4) Type of Cement proposed: Portland

5) Proposed cement grout mix: 6 gallons of water per 94 pound sack of Portland cement.

6) Will the grout be: _____ batch-mixed and delivered to the site

X mixed on site

2008 MAR -3 AM 11:26

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DENVER, CO

7) Grout additives requested, and percent by dry weight relative to cement: If cement used 6% Gel

8) Additional notes and calculations:

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

All wells will be sealed from bottom to seal water zone

VIII. SIGNATURE:

I, Dale Burgett, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Rosetta Inc
By Dale Burgett CEO
Signature of Applicant

2/27/08
Date

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
___ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 3rd day of March, 2008.

John R. D'Antonio, Jr., State Engineer

By: [signature]

OFFICE OF THE STATE ENGINEER DEMING, NM
2008 MAR -3 AM 11:05

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			At surface
Bottom of proposed interval of grout placement (ft bgl)			bottom of Hole
Theoretical volume of grout required per interval (gallons)			Halleburton Tables for Volume
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			6 Gal.
Mixed on-site or batch-mixed and delivered?			on site with pump
Grout additive 1 requested			none
Additive 1 percent by dry weight relative to cement			NA
Grout additive 2 requested			NA
Additive 2 percent by dry weight relative to cement			NA

2008 MAR -3 AM 11:20
OFFICE OF THE STATE ENGINEER DEMING, NM

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			At Surface
Bottom of proposed sealant of grout placement (ft bgl)			Bottom of Well
Theoretical volume of sealant required per interval (gallons)			AS per Halleburton Tables of volume
Proposed abandonment sealant (manufacturer and trade name)			" Hole Plug" Black Hills Bentonite

2008 MAR -3 AM 11:28
STATE ENGINEER
DEMING, NM

(D)
TW
TWF

ATTACHMENT
STATE ENGINEER CONDITIONS OF APPROVAL

APPLICATION: Well Plugging Plan of Operations

APPLICANTS: Rosette Inc.

Chip bentonite shall be placed above the static water column, or a borehole that does not contain ground water, the plugging process requires 5-10 gallons of water to be added after each bucket or sack of chip bentonite to provide the chips enough hydration to swell.

Placement of the chip bentonite within the well shall be through a tremie pipe extended to near the well bottom, and kept below top of the column as the well is plugged from bottom-up.

Cement grout shall be used to top-off the upper 20' of the wells.

Type I, Type II, or Type III Portland Cement shall be used unless the mix water contains more than 500 mg/l sulfate.

OSE witnessing of the well plugging during normal work hours may be requested by calling the District III OSE Office in Deming, at 575-546-5851, at least 24 hours in advance. OSE inspection will occur dependant on personnel availability.

A plugging report itemizing actual plugging process and materials used shall be filed with the State Engineer within 20 days after completion of plugging.

Witness my hand and seal this 3rd day of March, 2008.

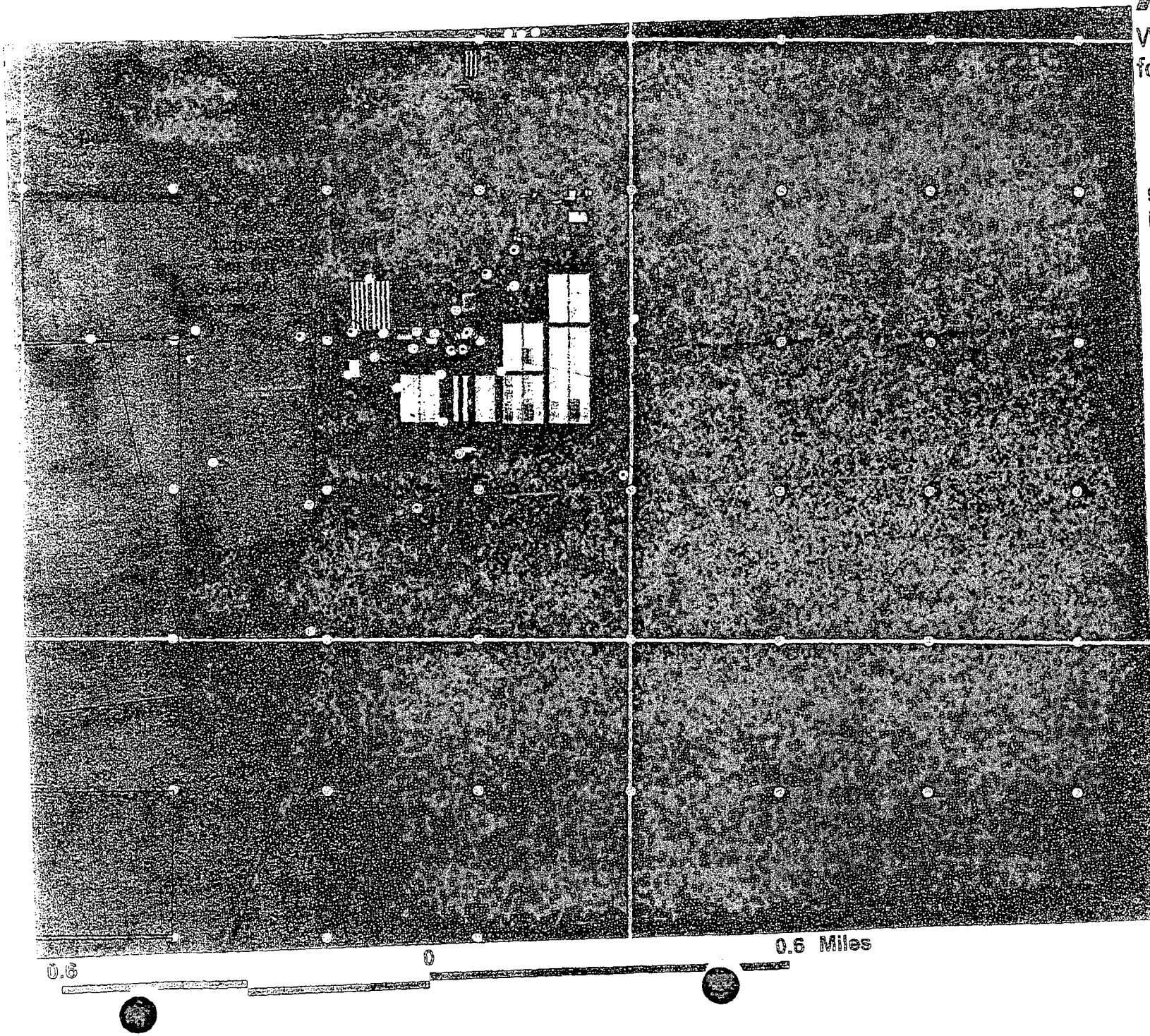
John R. D'Antonio, Jr., P.E., State Engineer

Charles L. Jackson, MPA
District 3 Manager

Animas

Well Plugging Plan for Dale Burgett

9 wells to be plugged in Sec 7, T25S, R19W



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2008 MAR -3 A11:21
ANIMAS ENGINEERING
DEMING, NM

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Las Cruces Field Office
1800 Marquess
Las Cruces, New Mexico 88005
www.nm.blm.gov

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
NMNM34790
3260 (03000)

SEP 22 2005

CERTIFIED MAIL -- RETURN RECEIPT REQUESTED
7004 2510 0005 9045 6325

Mr. Dale Burgett
Burgett Investments, Inc.
H.C. 65, Box 265A
Animas, NM 88020

2008 MAR -3 PM 4:

OFFICE OF THE STATE ENGINEER DEMING, NM

Dear Mr. Burgett:

Under the Settlement Agreement entered into by Rosette, Inc.; the United States Department of the Interior (through its agencies the Bureau of Land Management (BLM) and the Minerals Management Service (MMS)); and the Department of Justice, you agreed to plug and abandon geothermal wells located within Federal Lease NM 34790 (Lease) in compliance with BLM Regulation 43 CFR 3263.10. In addition, on January 22, 2004, the United States District Court for the District of New Mexico ordered you to comply with "all applicable requirements for metering, maintenance and repair of meters, and accurate accounting for production" (Court Order).

On September 12, 2003, Mr. Cunniff, the lessee, doing business as Lightning Dock Geothermal, Inc.; notified BLM that he did not want to plug and abandon wells 20 and 31 as depicted in the map/photo provided to you by Joe Torrez on July 12, 2005. Mr. Cunniff stated that he would seek other opportunities for utilizing the geothermal production from the Lease.

To this date, you have neither plugged and abandoned the wells on the lease nor met all applicable requirements for metering, maintenance and repair of meters, and accurate accounting for production as required by the Court Order. To fulfill our responsibilities as the custodians of the United States mineral resources, we must ensure that you are in compliance with BLM regulations, the Settlement, and the Court Order. Therefore, on or before October 31, 2005, you must do all the following:

1. Either remove all pumps and cut off connection to the greenhouse heating system and weld a steel plate on wells 10, 11, 12, 16, 18, 23, 25, 28, and 29 shown on the provided map/photo, or install flow meters and gate valves that can be locked and sealed between each well entering the greenhouses from these wells.

2. Meet with BLM personnel to discuss how to account for the geothermal production from wells 0, 8, 9, 13, 14, 15, 17, 19, 21, 23, 24, 26, 27, 28, and 38 that are shown in the photo. If we are not able to reach agreement on how to measure production from those wells, you must either remove all pumps and plug and abandon them in accordance with BLM Regulation 43 CFR 3263.10 or install flow meters and gate valves that can be locked and sealed on each pipe entering homes, buildings, and the swimming pool by January 1, 2006.

Sept 22, 05

3. Provide a plumbing schematic that includes temperature and flow for all geothermal wells you are planning to use for irrigation purposes or livestock waters as permitted by the New Mexico State Engineer.

4. Provide us with an accounting of the production that has taken place on the Lease from August 1, 2003 through October 31, 2005.

If you plan on asking for a refund of your bond of $30,000, you will need to submit a Sundry Notice to plug and abandon all Federal geothermal wells according to an approved plugging program pursuant to 43 CFR 3263.10. When we receive your Sundry Notice to plug and abandon, BLM will review and either approve or modify your program. You are required to have all actions you take on the wells witnessed by BLM personnel.

If you do not comply with the above by October 31, 2005, we will request that the U. S. Attorney's Office ask the District Court to enforce the Settlement and Court Order, including but not limited to, allowing BLM to contract with a vendor to, at a minimum, remove the pumps and weld a steel plate on all the wells on the Lease except wells 20 and 31, and bill the expense to you.

Thank you for your prompt attention to this matter. If you have any questions, please call Joe Torrez at (505) 525-4374

Sincerely,

Tim L. Sanders

Tim L. Sanders
Assistant District Manager
Division of Multi-Resources

cc:
Roy Cunniff
Ray Hamilton
Sarah Interbitzen

1 Enclosure

OFFICE OF STATE ENGINEER DEMING, NM
2008 MAR -3 PM 4:30

Fax to SOE

Subject: Cation/anion analysis
From: "Damon Seawright" <damon@vtc.net>
Date: Sat, 1 Mar 2008 09:46:10 -0700
To: <burgett@vtc.net>
CC: "'Damon Seawright'" <damon@vtc.net>

Send to OSE Deming

Hi Dale,

This is the analysis back from 2003:

SAMPLE	SITE	Lab pH	Na	K	Ca	Mg	Sr	Cl	SO_4	HCO_3	F	SiO_2	B	Br	Li	TDS
AM1	Burgett #1	8.40	377	22.3	22.3	0.14	1.41	97.8	543	101	9.76	144	0.373	0.26	0.96	1180
AM2	Burgett #C	8.10	325	15	23.8	0.14	1.22	88.7	493	113	8.93	113	0.387	0.27	0.53	1050
AM3	Burgett #6	8.00	314	15	23.5	0.17	1.24	85.5	482	113	8.31	111	0.376	0.26	0.58	1030
AM4	Americulture Fed	8.00	314	10.6	43.6	0.83	1.16	90.2	444	195	5.56	55.2	0.082	0.37	0.93	1000

I don't know which wells are which, other than all three of the Burgett wells are yours.

Take care and see you in a few weeks,

Damon

Dot Water Samples on Dot Wells
Sec 7 Rosette Wells
Sent to Doug Rappuhn 2/29/08
attn Haddie

OFFICE OF THE STATE ENGINEER
DEMING, NM
2008 MAR -3 AM 11:27

TECHNICAL REPORT NO. 11

State of New Mexico

State Engineer Office

GROUND WATER IN ANIMAS VALLEY, HIDALGO COUNTY, NEW MEXICO

By

H. O. Reeder

U.S. Geological Survey

Prepared in cooperation with the United States Geological Survey

1957

2008 MAR 31 AM 11:21
STATE OF NM
STATE ENGINEER
DEMING, NM

TEMPERATURE

The temperature of ground water may differ from place to place areally in the same ground-water body. However, because of the slow and nearly uniform movement of ground water, the temperature at any given place and depth usually remains relatively constant unless the circulation is disturbed by artificial influences as by pumping. The temperature of ground water immediately below the zone of seasonal fluctuation is generally expected to be about 2° F higher than the mean annual air temperature of the area. Water temperatures normally increase with depth due to natural geothermal gradients at a rate of about 1° F for each 50 to 60 feet of depth. Therefore, "normal" water temperatures in wells from 100 to 200 feet deep in Animas Valley would be expected to range from about 64° to about 66° F. However, in the lower Animas Valley there are localities in which the temperature of the ground water is unusually high. Because of these anomalous temperatures of ground water in the lower Animas Valley, temperature measurements were made of many well waters.

The temperatures of water from 135 wells throughout the lower Animas Valley that were measured are shown in the well tables. All water temperatures were measured at the end of the discharge pipe while the wells were being pumped, but the temperatures measured represent true ground-water temperatures only in irrigation wells or stock and domestic wells with short discharge pipes because appreciable modification of water temperatures may occur in long pipes carrying only small quantities of water.

The water temperatures from 55 wells that were measured in 1948 and 1949 are shown in figure 11. After 1950 many wells were deepened or replaced by deeper wells, and temperatures in these deeper wells would be expected to be greater than those in the older and shallower wells (table 3). The lines in figure 11 are those of equal ground-water temperatures, or isothermal lines. For example, all along the line marked 70 the ground water has a temperature of 70° F. Two main areas of high-temperature water are shown: sec. 7, T. 25 S., R. 19 W. and secs. 10 and 11, T. 26 S., R. 20 W. Water at about 75° F occurs in the vicinity of well 26.20.10.444.

Water of about 210° F was encountered in well 25.19.7.234, which is 95 feet deep. Water in this well is a few degrees above the boiling point for this altitude and at all times is turbulent and appears to boil. This is especially so when the water in the well is agitated. High geothermal gradients within 1 meter of ground surface were found near this well by Kintzinger (1956). Water from well 25.19.7.143, which is half a mile to the west of well 25.19.7.234, has a temperature of 98° F. Water from well 25.19.7.134, depth 74 feet, about 0.6 mile west of well 25.19.7.234, has a temperature of 85° F. Other areas may exist in which hot water occurs relatively near the surface. Chemical analysis of the water from well 25.19.7.234 (table 1) shows it to be a sodium sulfate water. The chloride and fluoride contents also are higher than for other waters in the valley. The source of this hot water is not known, but because it contains only about 1,100 ppm of dissolved solids it probably is chiefly meteoric water that has come in contact with magmatic gases and hot igneous rock, or hot rock in which the heat was generated by friction during faulting. Visible evidence of active volcanism nearby is lacking. The proximity of a Recent fault (see pl. 2 and 3 and p. 9-12) to the hot wells in sec. 7, T. 25 S., R. 19 W. and the similarity in trend of the fault and associated fault zone to the area of abnormally high ground-water temperatures (fig. 11) are further indications of structural control of the hot-water area, as are the high fluoride contents of waters from wells along the line of high water temperature (table 1). Temperatures of ground water decrease to the west and northwest of the heat source as the ground water moves into cooler areas not heated directly by the fault zone.

CHEMICAL QUALITY

As water moves through the ground the water dissolves some of the mineral matter with which it comes in contact. In general, the greater the distance the water moves the greater the amount of dissolved minerals contained in the water. Causes of changes in the amount of dissolved solids in ground water include the interrelated factors of rate of flow, type of flow, aquifer pressures, lithology, and facies changes of the water-bearing materials. The total dissolved minerals, or dissolved solids, can be determined by measuring and adding the weights of individual constituents or by weighing the residue left after the water has been evaporated. An approximate measure of the dissolved solids also can be obtained by determining the electrical conductivity of the water, which bears an approximate relation to the dissolved-solids content in most waters, and this measure frequently is used to compare the quality of one water with another. The term used by the Geological Survey for reporting the electrical conductivity of the water is specific conductance expressed as micromhos at 25° C. In the Animas Valley the specific conductance multiplied by 0.6 approximately equals the dissolved solids expressed in parts per million. Different types of water will depart from this ratio somewhat, ranging from about 0.55 to 0.75. Definite limits cannot be set on the amounts of dissolved solids or salts that will make water un-

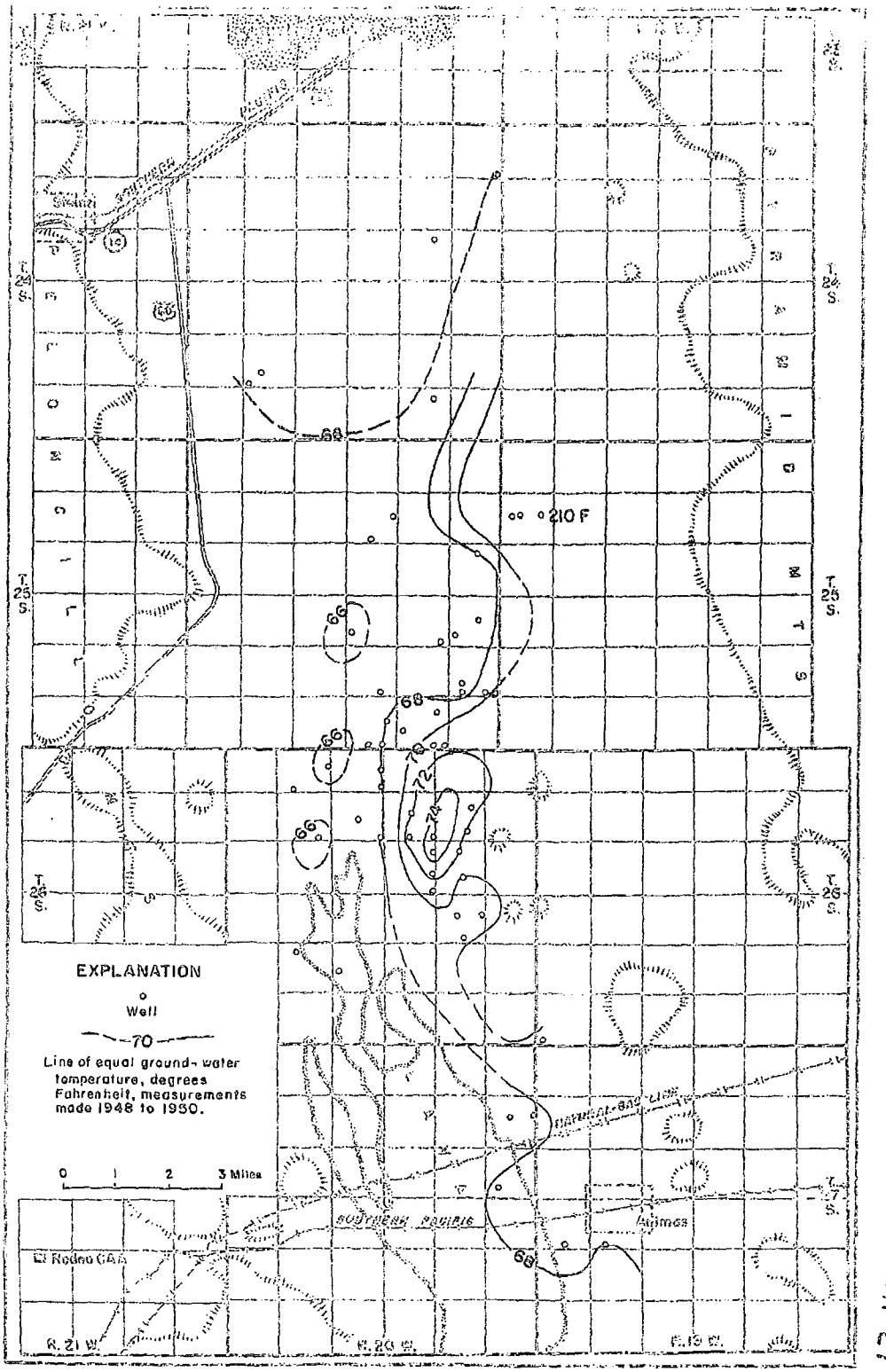

FIGURE 11. Temperature of ground water in lower Animas Valley, Hidalgo County, N. Mex.

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STATE ENGINEER
DEMING, NM

suitable for irrigation or stock. However, the higher the concentration of salts in water, the less suitable it is for irrigation. Land irrigated with water having a high concentration of salts must have good drainage, and a greater amount of water must be applied to the crops than otherwise would be required, to keep the concentration of dissolved salts in the zone of soil moisture within satisfactory limits.

Chemical analyses were made by the Geological Survey of 33 samples of water collected between March 1948 and July 1955 from 16 wells distributed throughout the valley. Of the analyses, 13 were of samples of water collected between March 1948 and August 1949 from 12 wells. Samples from nine of these wells were taken during the 1948 pumping season. Samples have been taken from several of these wells periodically to determine the change in character, if any, of the water. All the samples were taken from wells in or near the irrigated areas of the valley except those from well 23.20.13.414, near the east edge of South Alkali Flat; well 28.19.20.244, about 6 miles south of Animas; and well 25.19.10.311, about 2½ miles up the east slope of the valley. Results of these analyses are given in table 1 and show only the dissolved mineral content of the waters, not their sanitary conditions.

All water analyzed from Animas Valley is low in chloride. The chloride content is least in water in the upper part of the valley and becomes increasingly greater, in general, down the valley to well 23.20.-13.414 near the alkali flats. Water from the latter well is exceeded in chloride content only by the hot water from well 25.19.7.234. However, none of the wells yield water having too much chloride for irrigation.

Use for irrigation of water that contains considerable sodium, particularly a high percentage of sodium in relation to other cations, is injurious to the soil irrigated. Percent sodium is the ratio of the quantity of sodium to the quantity of calcium, magnesium, sodium, and potassium, all in equivalents per million, expressed as a percentage. The percent sodium ranges from about 56 to 68 in most waters analyzed from Animas Valley but runs as high as 93 in the hot water from well 25.19.7.234. The percent sodium found in most waters in the irrigated area of Animas Valley are within satisfactory limits for water having the moderate dissolved-solids concentration characteristic of the Animas Valley. Percentages of 60 and above would be excessive in more highly mineralized water.

A recent method of classification of irrigation waters is based on the electrical conductivity and the sodium-adsorption ratio of the waters. (U. S. Dept. Agriculture, February 1954.) The sodium-adsorption ratio (SAR) is related to the adsorption of sodium by the soil and is used as an index of the sodium or alkali hazard of the water.

The sodium-adsorption ratio is defined by the equation:

$$SAR = \frac{Na^{+}}{\sqrt{(Ca^{++} + Mg^{++})/2}}$$

where Na^{+}, Ca^{++}, and Mg^{++} represent the concentrations of the respective ions in milliequivalents per liter. The diagram from the U. S. Department of Agriculture, Agricultural Handbook 60 (1954, p. 80), figure 12, is useful in interpreting the suitability of water for irrigation as based on the specific conductance and sodium-adsorption ratio of the water. According to this diagram most waters in lower Animas Valley have a medium salinity hazard and a low sodium hazard (Class C2-S1). Water from wells in the northern end of the valley near the Alkali Flats, as represented by water from wells 23.20.13.414 and 24.20.1.444, is not as suitable for irrigation as water from wells farther south. The only other exception encountered is the hot water from well 25.19.7.234 which has a high salinity hazard and a very high sodium hazard.

According to Agricultural Handbook 60 (1954, p. 79 and 81) "medium-salinity water (C2) can be used if a moderate amount of leaching occurs. Plants with moderate salt tolerance can be grown in most cases without special practices for salinity control" and "low-sodium water (S1) can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium. However, sodium-sensitive crops such as stone-fruit trees and avocados may accumulate injurious concentrations of sodium."

Fluoride in excess of about 1.5 parts per million in drinking water of children causes what is commonly known as mottled tooth enamel. (Public Health Service, 1946, p. 371-381.) Teeth affected by fluorosis may have chalky white spots and pits and in many cases later may become stained dark brown. Samples from 8 of the 9 wells, including the hot water from well 25.19.7.234, contained more than 1.5 ppm of fluoride. Much of the water of the valley contains enough fluoride to cause mottled teeth, as is shown by the teeth of many of the residents who have been reared in the valley.

The hardness of the water analyzed in Animas Valley is mostly carbonate (temporary) hardness and ranges from about 50 to 122 parts per million. These waters are classified as only slightly hard. Of the waters analyzed, the hardest is from well 23.-20.13.414 near the alkali flats, with a hardness of 158 parts per million.

WELL CHARACTERISTICS

Data discussed here refer only to irrigation wells, as they are of primary importance to the economy of

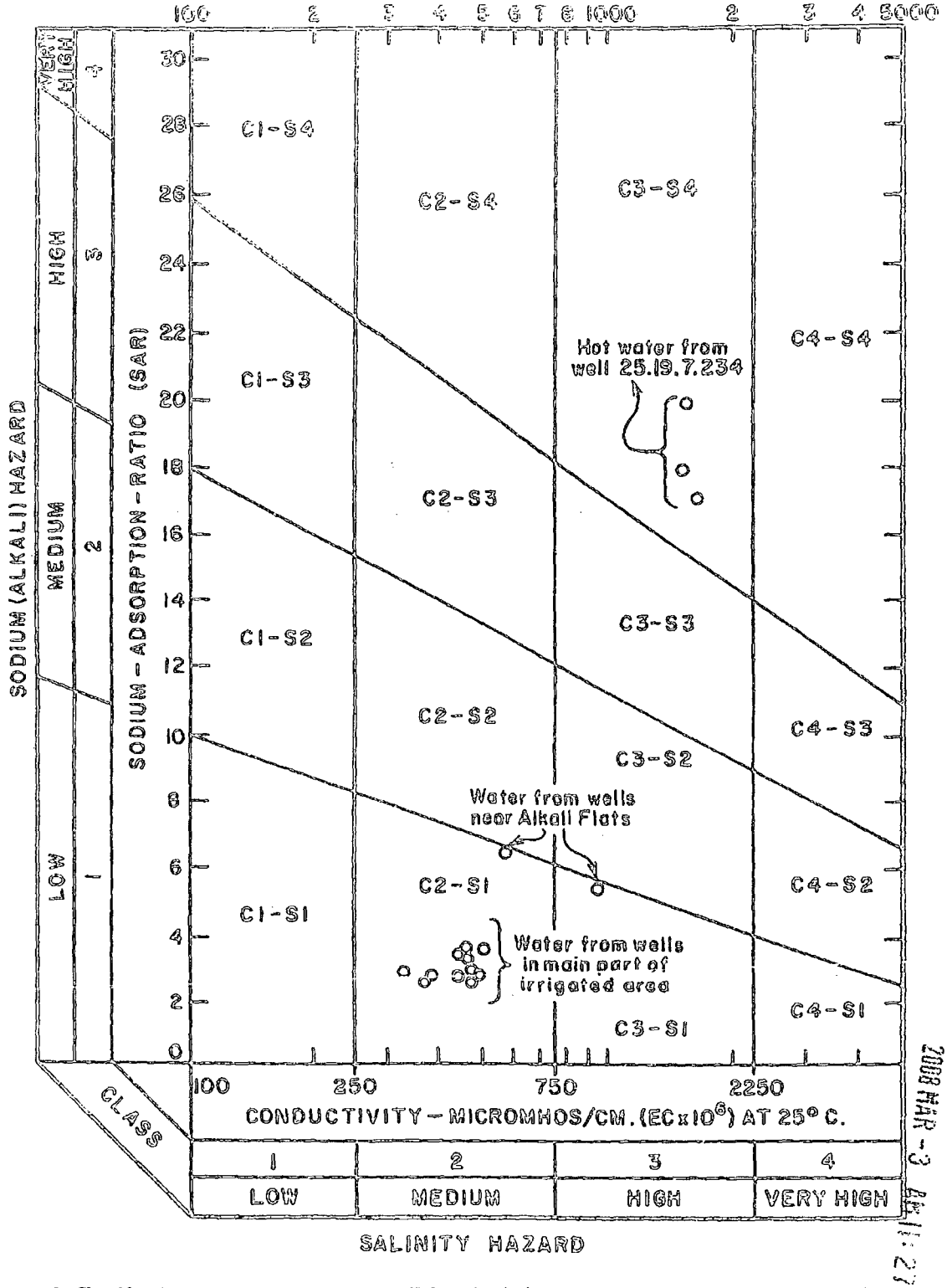

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FIGURE 12. Classification of waters in Animas Valley for irrigation use (classification chart from U. S. Department of Agriculture, Agricultural Handbook 60, 1954, p. 80).

Table 1. Chemical analyses of water from wells in Animas Valley, Hidalgo County, N. Mex.

(Analyses by U.S. Geological Survey. Chemical constituents in parts per million)

Location number	Owner or name	Date collected	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium ($Na+K$)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Hardness as $CaCO_3$: Calcium and magnesium	Hardness as $CaCO_3$: Noncarbonate	Dissolved solids: Parts per million	Dissolved solids: Tons per acre-foot	Specific conductance (micromhos at 25° C)	Percent sodium	SAR	pH
23.20.13.414	-	7/28/48	-	32	19	152	209	0	231	49	1.9	2.4	158	0	590	0.80	945	68	5.3	-
24.20. 1.444	Fred Kerr	3/ /48	-	16	4.4	112	232	0	86	14	-	2.8	58	0	350	0.48	580	81	6.4	-
Do.	do.	7/31/51	-	-	-	-	188	6	-	39	-	-	-	0	-	-	783	-	-	-
Do.	do.	7/18/52	-	-	-	-	187	-	-	22	-	-	-	-	-	-	708	-	-	-
Do.	do.	9/23/53	60	-	-	130	188	10	113	24	7.0	2.7	60	0	-	-	668	82	-	-
Do.	do.	9/16/54	-	-	-	-	190	8	-	30	-	-	-	-	-	-	699	-	-	-
Do.	do.	7/27/55	-	-	-	-	207	0	89	19	-	-	84	0	-	-	589	-	-	8.1
25.19. 7.234	Richins and McDonald	2/ 1/49	-	24	1.5	324	146	0	509	85	-	0.6	66	0	1,020	1.39	1,650	91	17	-
Do.	do.	4/28/49	141	19	1.2	329	181	0	460	78	11	0.9	52	0	1,130	1.54	1,540	93	20	-
Do.	do.	7/30/51	-	-	-	-	163	7	-	81	-	-	-	0	-	-	1,600	-	-	-
Do.	do.	3/28/52	-	-	-	-	163	7	-	82	-	0.4	55	-	-	-	1,600	-	-	8.0
Do.	do.	4/10/55	135	22	1.5	319	157	0	459	80	13	0.2	61	0	1,110	1.51	1,510	92	18	7.6
25.19.10.311	-	4/10/55	33	28	11	60	187	0	56	19	0.2	8.8	115	0	308	0.42	481	55	2.4	7.3
25.20.13.213	George Wright	9/23/53	38	-	-	104	211	0	107	28	3.6	3.3	110	0	-	-	651	67	-	-
25.20.22.313	G. S. Tippetts	4/ 5/48	-	34	3.9	61	189	0	64	7.0	-	2.4	101	0	265	0.36	436	57	2.6	-
25.20.25.334	Richins Bros.	5/24/48	39	30	4.4	80	192	0	79	11	4.0	2.8	93	0	345	0.47	508	65	3.6	7.3
Do.	do.	7/18/52	-	-	-	-	211	0	-	22	-	-	-	-	-	-	621	-	-	-
Do.	do.	9/23/53	39	-	-	101	213	0	110	28	3.6	3.9	122	0	-	-	661	64	-	-
Do.	do.	9/16/54	-	-	-	-	209	0	-	31	-	-	-	-	-	-	664	-	-	-
26.20. 8.434	J. E. Weatherby	4/ 5/48	-	34	4.9	65	187	0	78	7.0	-	1.9	105	0	283	0.38	480	57	2.8	-
Do.	do.	7/27/51	-	-	-	-	189	0	-	7	-	-	-	-	-	-	495	-	-	-
Do.	do.	7/19/52	-	-	-	-	191	0	-	6	-	-	-	-	-	-	490	-	-	-
26.20. 9.144	J. L. Roach	4/ 2/48	-	24	3.5	70	180	0	64	8.0	-	2.0	74	0	260	0.35	444	67	3.5	-
26.20.10.444	K. D. Hudgens	4/ 3/48	-	19	3.1	49	150	0	30	6.8	-	3.7	60	0	186	0.25	322	64	2.7	-
27.19.19.433	W. B. Lupe	5/26/48	43	24	5.9	57	168	0	55	6	0.8	2.9	84	0	277	0.38	388	60	2.7	7.8
27.20.12.444	Mrs. Edna Curry	8/ 1/49	-	28	3.9	50	173	0	40	7	-	2.1	86	0	216	0.29	376	56	2.3	-
Do.	do.	7/30/51	-	-	-	-	173	0	-	8	-	-	-	-	-	-	385	-	-	-
Do.	do.	7/19/52	-	-	-	-	174	0	-	5	-	-	-	-	-	-	378	-	-	-
27.20.12.444	do.	7/25/55	-	-	-	-	174	0	43	8	-	-	90	0	-	-	388	-	-	7.3
27.20.13.[illegible]	[illegible]	7/29/48	-	28	3.5	72	188	0	65	7.0	1.6	5.8	84	0	276	0.38	464	65	3.4	-
27.20.21.223	Adolph Hill	5/23/55	42	31	8.8	66	182	0	82	7	4.0	1.6	144	0	331	0.45	498	56	2.7	7.5
28.19.20.244	U.S. Government	7/29/48	-	28	2.2	76	182	0	77	6	2.0	2.0	79	0	283	0.38	469	68	3.7	-
Do.	do.	7/19/52	-	-	-	-	184	0	-	5	-	-	-	-	-	-	469	-	-	-

2008 MAR -3 AM
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Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Tag Number 121

BLM Map Number 14

Hole Depth 911 ft.

Plugged with (Hole Plug)

911 ft. back to 20 ft.

20 ft. to surface cement slurry

4 1/2 pipe marker in top of casing

Plugging completed March 06, 2008

Everett D. Burgett

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Tag Number A0130

BLM Map Number 27

Depth of hole 190 ft.

(Hole Plug) clay from 190 ft. back to 20 ft.

Cement Slurry to surface 20 ft. to surface

4 1/2 pipe marker in top of casing

Plugging completed March 08, 2008

Everett D. Burgett

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Tag Number A0129

BLM Map Number 26

Depth of hole 150 ft.

5 1/2" surface casing

(Hole Plug) from 150 ft. back to 20 ft.

Cement Slurry to surface 20 ft. to surface

4 1/2 pipe marker in top of casing

Plugging completed March 08, 2008

Everett D. Burgett

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Tag Number A0123

BLM Map Number 9

Depth of hole 120 ft.

8" surface casing

Exploratory Well

(Hole Plug) clay 120 ft. back to 20 ft.

Cement Slurry to surface

4 1/2 pipe marker in top of casing

Plugging completed March 07, 2008

Everett D. Burgett

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Tag Number A0124

BLM Map Number 0

Depth of hole 205 ft.

8" surface casing

(Hole Plug) from 205 ft. back to 20 ft.

Cement Slurry to surface 20 ft. to surface

4 1/2 pipe marker in top of casing

Plugging completed March 08, 2008

Everett D. Burgett

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Number A 36 –AB-S-13

No BLM Number

Depth of hole 275 ft.

10" surface casing

(Hole Plug) clay 275 ft. back to 20 ft.

Cement Slurry to surface

4 1/2 pipe marker in top of casing

Plugging completed March 07, 2008

Everett D. Burgett

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Burgett Investment, Inc. Owner's Well No. _____
Street or Post Office Address Star Route, Box 265-A
City and State Animas, New Mexico 88020

Well was drilled under Permit No. A-36-AB-S-13 and is located in the:

a. _____ ¼ SE ¼ SE ¼ NW ¼ of Section 7 Township 25 S Range 19 W N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in _____ County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor Dale Burgett License No. WD-848

Address Star Route, Box 265-A, Animas, New Mexico 88020

Drilling Began 04/82 Completed 04/82 Type tools Rotary Size of hole 9 7/8 in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 275 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 65 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
90	110	20	Gravel	50

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
8 5/8								

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Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

DRY

Section 5. PLUGGING RECORD

Plugging Contractor _____
Address _____
Plugging Method _____
Date Well Plugged _____
Plugging approved by:
_____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received March 16, 1988

Quad _____ FWL _____ FSL _____

File No. A-36-AB-S-13 Use Supplemental Location No. 25.19.7.144

10 TAG AIN F # Well on W of Dyke 200ft west of House 2

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Tag Number 128

BLM Map Number 17

Depth 110 ft.

Drilled 1948

No Log

12 casing to approximately 100 ft.

10 ft. casing to 110 ft.

(Hole Plug) clay from 110ft to 20 ft.

20 ft. to surface cement slurry.

Mark in top of casing

Everett D. Burgett

Tag 128 Shop
Corner NE

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Burgett Investment, Inc. Owner's Well No. ____
Street or Post Office Address Star Route, Box 265-A
City and State Animas, New Mexico 88020

Well was drilled under Permit No. A-36-AB-S-4 and is located in the:

a. ____ ¼ SE ¼ SW ¼ NE ¼ of Section 7 Township 25 S Range 19 W N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____
Subdivision, recorded in ____ County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor ~~Unknown~~ License No. ____

Address ____

Drilling Began 1948 Completed 1948 Type tools cable Size of hole 8 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 90 ft.

Completed well is ~~x~~ shallow ☐ artesian. Depth to water upon completion of well 65 ft.

Shop

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
			Unknown	

Corner

12"
10"

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
10								

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:
____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received March 16, 1987

Quad ____ FWL ____ FSL ____

File No. A-36-AB-4 Use Supplemental Location No. 25.19.7.234

F. 17

Plug

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Tag Number 98

BLM Map Number 15

Depth of hole 110 ft.

8" casing

(Hole Plug) clay 110 ft. back to 20 ft.

Cement Slurry 20 ft. to surface

4 1/2 pipe marker in top of casing

Plugging completed March 05, 2008

Everett D. Burgett

Dry hole 0088 Tag

Revised June 1972

STATE ENGINEER OFFICE
98
WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well E. B. Burgett Owner's Well No. _____
Street or Post Office Address P. O. Box 265-A
City and State Animas, New Mexico 88020

Well was drilled under Permit No. A-385 and is located in the:

a. _____ ¼ SE ¼ NE ¼ SE ¼ of Section 7 Township 25 S Range 19 W N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in Hidalgo County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor Auburn J. Wright License No. WD-420

Address P. O. Box 35, Hachita, New Mexico 88040

Drilling Began 01/20/79 Completed 02/10/79 Type tools Cable Size of hole 10 in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 110 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 86 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
90	98	8	Gravel	15-20

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
3" I.D.			0 + 4	110	114	None	60	110

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

STATE ENGINEER OFFICE
DISTRICT III
DEMING, N. MEX.
79 FEB 15 AM 8

Section 5. PLUGGING RECORD

Plugging Contractor _____
Address _____
Plugging Method _____
Date Well Plugged _____
Plugging approved by:
_____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received February 15, 1979

Quad _____ FWL _____ FSL _____

File No. A-385 Use Test well Location No. 25.19.7.424

Renumbered A-3848 - 2

BLM #15

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

Well Tag Number 104

BLM Map Number 19

Pump Removed (125 ft. with Bowls)

(Hole Plug) from 260 ft. back to 20 ft.

Cement Slurry from 20-ft. back to surface

4 1/2 pipe marker in top of casing

Plugging completed March 07, 2008

Everett D. Burgett
Everett D. Burgett

well Tag 104
Pumped

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Dale Burgett Nurseries Owner's Well No. 1
Street or Post Office Address 2658 Star Route
City and State Animas N. Mex 88020

Well was drilled under Permit No. ? A-36-AB-S-5CR and is located in the:

? a. ___ ¼ SW ¼ SW ¼ NE ¼ of Section 7 Township 25 S Range 19 W N.M.P.M.

b. Tract No. ___ of Map No. ___ of the ___

c. Lot No. ___ of Block No. ___ of the ___
Subdivision, recorded in ___ County.

Pulled 175 ft Pump

d. X= ___ feet, Y= ___ feet, N.M. Coordinate System ___ Zone in the ___ Grant.

(B) Drilling Contractor Oasis Drilling License No. WD-806

Address Po Box 436 Animas N. Mex 88020

Drilling Began 5-Oct-82 Completed 10-Oct-82 Type tools Rotary Size of hole 12 in.

Elevation of land surface or approximately at well is 4250 ft. Total depth of well 260 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well ___ ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
120	150	30	gravel	20
210	215	5	gravel	10
215	260	45	conglomerate	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
4"	.125		0	6	6	Surface Casing		
8"	.188 wall	Welded	0	260	260	V/A	120	140
8"	188		0	260	260		220	260

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
0	260	12	20	2	Pumped
0	260	12	4		

FH # 18 is wrong No as Per Maps + Drilling Contractor

Plugging Contractor ___
Address ___
Plugging Method ___
Date Well Plugged ___
Plugging approved by:

State Engineer R

FOR

Feet Bottom	Cubic Feet of Cement

Date Received April 7, 1983

___ FSL ___

File No. A-36-AB-S-12 Use Supplemental Irrigation Location No. 25.19.7.233

104 FH 18

Everett D. Burgett Drilling
29 Rose Lane
Animas, NM 88020
PH: (575) 548 2353 Fax: (575) 548 2293

March 8, 2008

State Engineers Office – Deming, NM
VIA FACSIMILE: (505) 546 2290

File Number A-36-AB-S

NO BLM Map Number

Drilled in 1979

Completed 1988

Plugged 1997

No report filed on plugging

Hole Depth 115 ft.

Hole filled with drilling mud

Casing cut off below ground 1 ft. below surface

Well was in the drive

Location of the well in Driveway is 100 ft. west of well #132

Everett D. Burgett

well Drilled Cable Tools

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

12" Casing

Old well

85 Deep

1948

Section 1. GENERAL INFORMATION

(A) Owner of well Burgett Investment, Inc. Owner's Well No.

Street or Post Office Address Star Route, Box 265-A

City and State Animas, New Mexico 88020

Well was drilled under Permit No.: A-36-A and is located in the:

a. ¼ SE ¼ SW ¼ NE ¼ of Section 7 Township 25 S Range 19 W N.M.P.M.

b. Tract No. of Map No. of the

c. Lot No. of Block No. of the Subdivision, recorded in County.

d. X= feet, Y= feet, N.M. Coordinate System Zone in the Grant.

(B) Drilling Contractor Unknown License No.

Address

Drilling Began 1948 Completed 1948 Type tools cable tools Size of hole 12 in.

Elevation of land surface or at well is ft. Total depth of well 85 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 65 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
0	10	10	Surface soil	
10	80	70	Hard clay, Red gravel streaks	
80	85	5	Gravel Large)	

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of shoe	Perforations From	Perforations To
12	54	welded	0	85	85	none	80	85

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Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor

Address

Plugging Method

Date Well Plugged

Plugging approved by:

State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

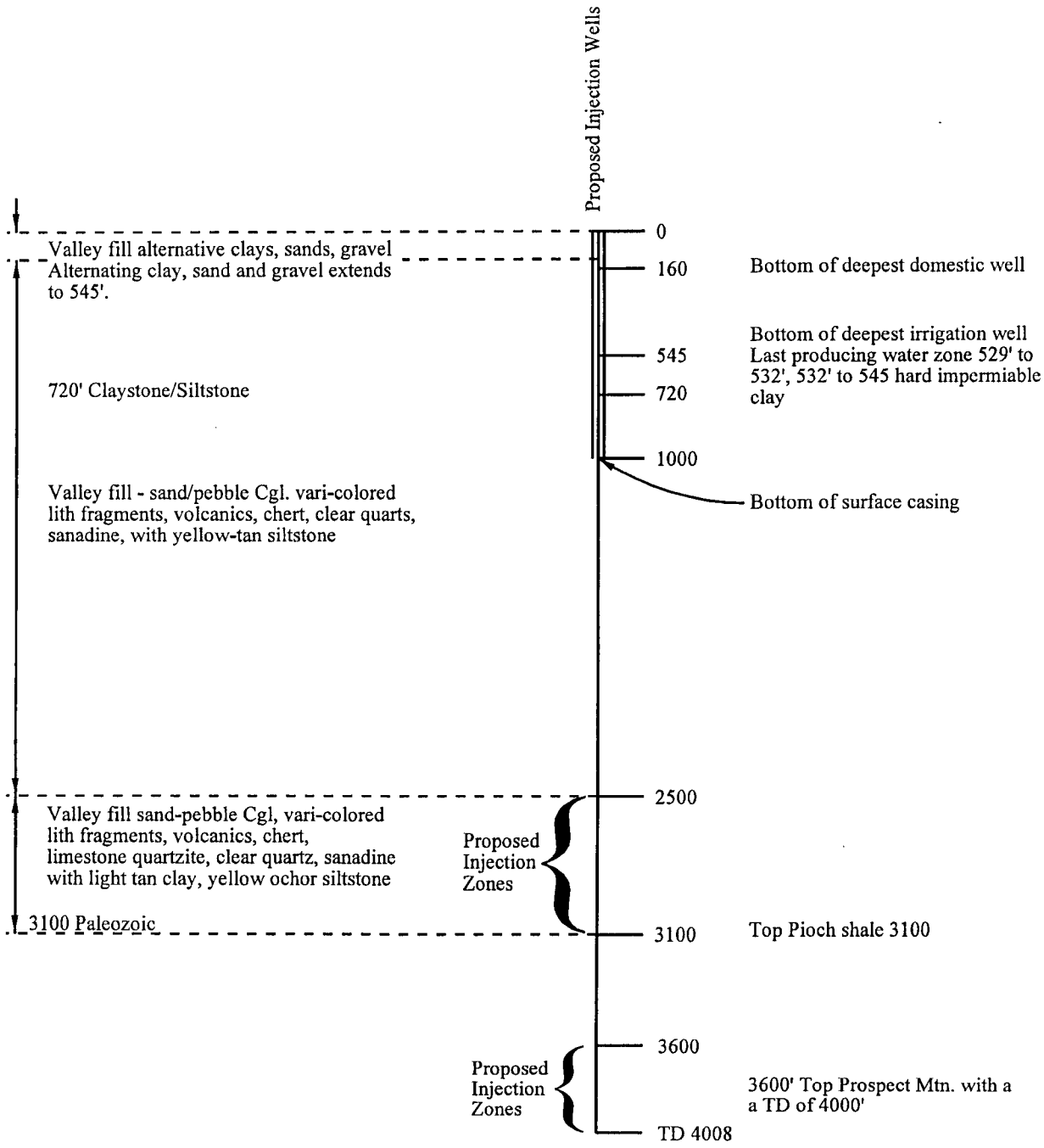
Date Received March 26, 1989

Quad 85' Well for Bot Water FWL FSL

File No. A-36-A, Use Change Location of well Location No. 25.19.7.234

F A 23 TAR 132

Typical Geological Cross Section



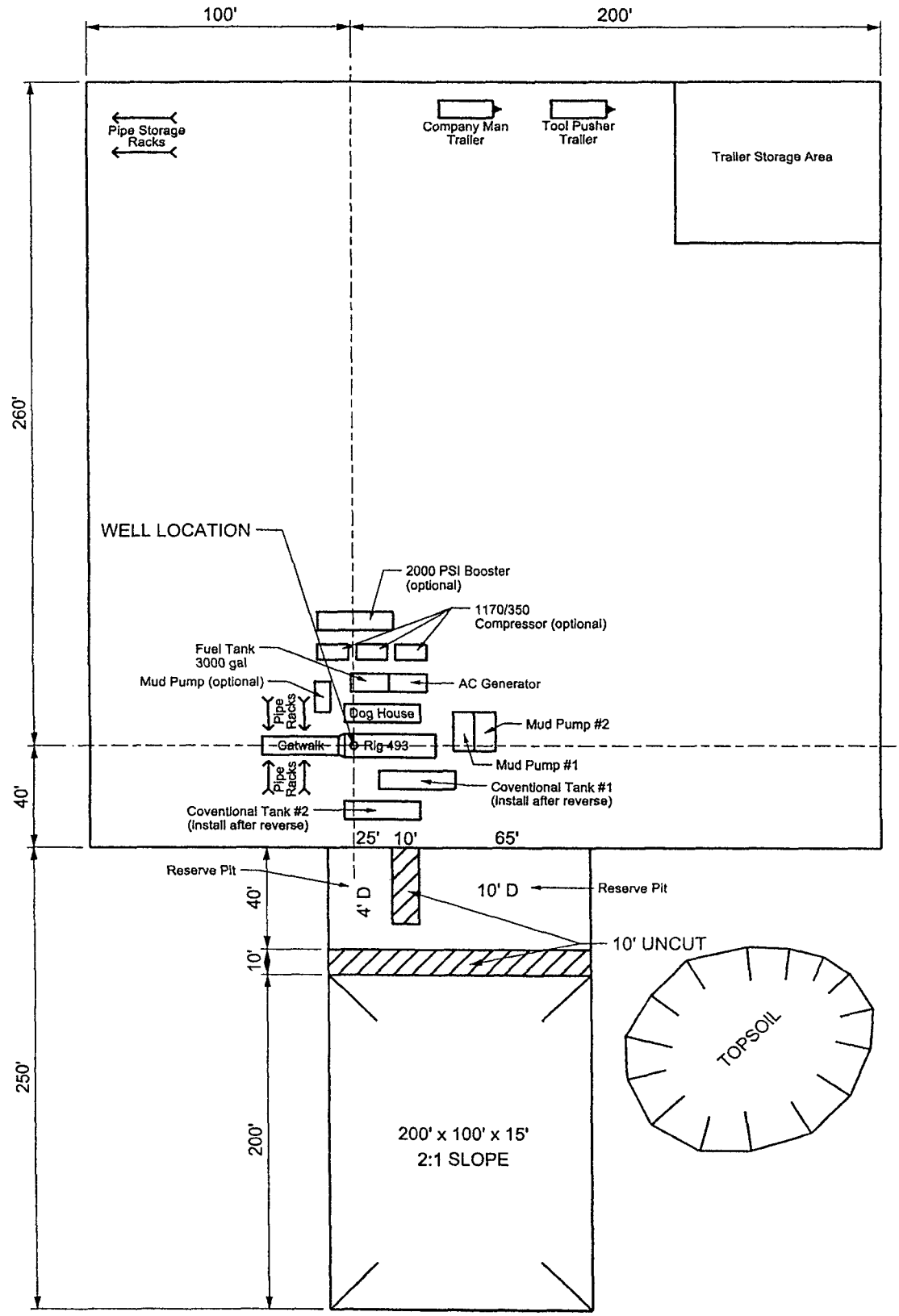
NOTE;
Data to 545' from irrigation wells on RO Ranch. All other data projected from Big Smokey #1 Wild Cat oil and gas well.

LIGHTNING DOCK GEOTHERMAL No. 1 Los Lobos Renewable Energy LLC 5152 North Edgewood Drive Provo, Ut 84604	Figure 2 Typical Geological Cross Section

$PATH$ | $DATE$ | Designed by: | --/---- | Checked by: | --/----

Typical Geothermal

Well Drill Site Layout

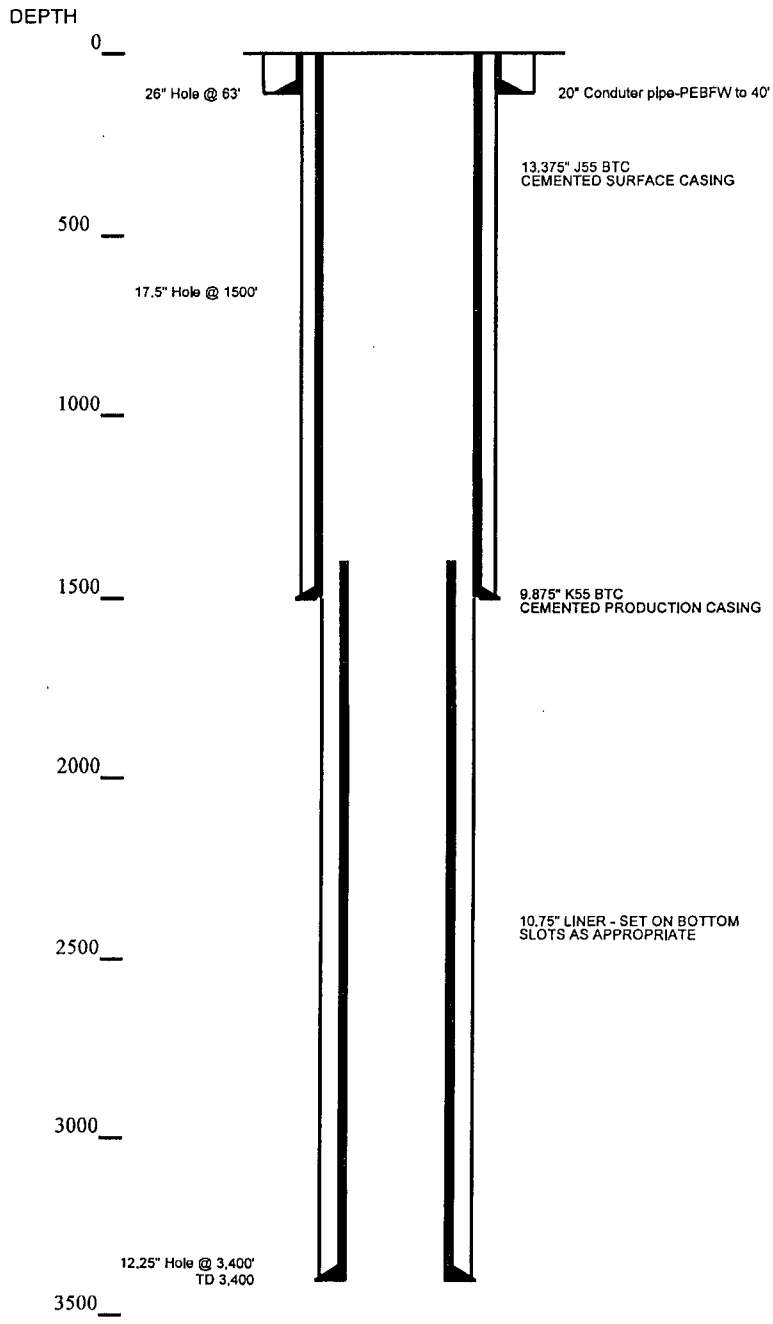


LIGHTNING DOCK GEOTHERMAL No. 1
Los Lobos Renewable Energy LLC

Figure 1

Typical Geothermal Well Drill Site Layout

Geothermal Well Completion Profile



Geothermal Injection Well Completion Profile

LIGHTNING DOCK GEOTHERMAL No. 1 Los Lobos Renewable Power LLC 5152 North Edgemont Drive Provo, Utah 84804	Figure 4 Geothermal Well Completion Profile

Logging, Coring, and Testing Program

Deviation Tests and Directional Drilling

LOGGING, CORING AND TESTING PROGRAM

- The operator of the well will keep a careful and accurate log, core record, and history of the drilling of the wells. These records will be kept in the nearest office of the applicant or the well site, and will be subject to inspection by the Division during business hours with all other reports of the owner, regarding the well. All records, unless otherwise specified, will be filed with the Division within 90 days after completion of the well.

- The operator will prepare a well history that details, in chronological order, all daily significant operations carried out and equipment used during all phases of drilling, testing, completion, and abandonment of any well.

- The operator will prepare a well summary report that will accompany the core record and well history reports. It will be designed to show data pertinent to the condition of a well at the time of completion of work.

- Electric logs and direction surveys will be filed upon re-completion of any well.

- All production from completed geothermal resource will be accounted for by continuous metering or by other methods approved by the Division.

- The operator will make and keep appropriate books and records for a period of not less than five years, covering their geothermal resources in the state.

- The operator will keep a careful and accurate well log and history of the drilling of any well, including the lithologic characteristics and depth of formations encountered, and the depths, pressures, and temperatures of water-bearing and steam-bearing strata. These data, as well as such other tests, surveys and logs which may be taken on the well including the temperatures, chemical compositions and physical characteristics of fluids encountered in the well, deviation, directional and temperature surveys, logs (including electrical logs, physical logs and core logs), and tests (including potential tests), will be placed in the custody of the designated agent of the operator of the well and will remain in their custody within the state of New Mexico until all required forms and attachments pertaining to the well have been filed with the division. The operator understands the data may be subject to inspection, during normal business hours, by the division or its representatives, and by the state engineer or his representatives.

- After placing the geothermal wells in production, the operator will file a production report by the 20th day of each month to the division office in Santa Fe.

- The operator will file a duplicate monthly purchaser's report, which report will be delivered to the Santa Fe office of the division by the 15th day of each month and will show the purchase made from all leases and wells connected to the purchaser's facilities during the preceding calendar month.
- After placing the injection well in a geothermal resources field, the operator will file a duplicate monthly injection report, which report will be due in the Santa Fe office of the division by the 20th day of each month and shall show the zone or formation into which

injection is being made, the volume injected, the average temperature of the injected fluid and the average injection pressure at the well head.

- Annual temperature and pressure tests will be submitted by the operator of each geothermal resource producing well in accordance with the annual testing schedule published by the Division. Flowing temperatures and flowing pressure tests at the wellhead will be recorded after at least 72 hours of continuous flow at normal producing rates. The well will be shut in for 24 hours and shut-in pressure at the wellhead recorded. Results of these tests will be submitted in duplicate to the Santa Fe office of the division.

- All forms and reports required will be filed with the New Mexico Oil Conservation Division, Geothermal Section , Post Office Box 2088, Santa Fe, New Mexico. 87501.

DEVIATION TESTS AND DIRECTIONAL DRILLING

Any well which is deepened or drilled with rotary tools will be tested at reasonable frequent intervals to determine the deviation from the vertical. Such tests will be made at least each 500 feet or at the first bit change succeeding 500 feet. A tabulation of all deviation tests, sworn to and notarized, will bedsiled with form G-105, geothermal resources well log. When the deviation averages more that five degrees in a 500-foot interval, the division director may require that a directional survey be run to establish the location of the producing interval(s)

The division director, at the request of an offset operator, may require any operator to make a directional survey of any well. Said directional survey and all associated costs will be at the expense of the requesting party and will be secured in advance by a $5,000.00 indemnity bond posted with and approved by the division. The requesting party may designate the well survey company, and said survey will be witnessed by a representative of the division.

No well will be intentionally deviated except toward the vertical without prior permission from the division. Permission to deviate a well other than toward the vertical will be on division forms with copies of the form being furnished to all other operators owning leases offsetting the drilling tract, if there be any. Upon request of the division director any well which was intentionally deviated will be directionally surveyed. The division may at its option witness such survey and the Santa Fe office will be notified of the date and hour all directional surveys are to be conducted. All directional surveys run on any well which was intentionally deviated in any manner for any reason will be filed with the division upon completion of the well. The operator understands that the certificate of compliance and authorization to produce geothermal resources form will not be approved until the operator has submitted an affidavit that all such directional surveys have been filed.

Abandonment and Plugging

ABANDONMENT AND PLUGGING

- If it becomes necessary to abandon and seal a well, the following objective will be taken into consideration to block inter-zonal migration of fluids so as to:

  a. Prevent contamination of fresh waters, or other natural resources.
  b. Prevent damage to geothermal reservoirs.
  c. Prevent loss of reservoir energy
  d. Protect life, health, environment and property.

  The operator will complete all New Mexico forms relative to the plugging and abandoning.

- Prior to commencement of plugging operations, notice of intention to plug shall be filed with the Division, and approval obtained by the operator of the well. This will be accomplished by filing the necessary division forms, sundry notices and reports on geothermal wells; which notice will outline the casing and cementing program of the well, the casing which is to be pulled, the size of proposed cement plugs and the depth and other information as may be pertinent.

- For newly drilled wells which are to be plugged, verbal authority and instructions may be given by the division to plug the well provided written notice to plug will be subsequently filed within 30 days and approval obtained. Written approval of the plugging program will included evidence that the plugging program for the well prevented damage to any producing zone, migration of fluids from one zone to another, the waste or contamination of useable underground waters or other natural resources and the leakage of any substance at the surface; all substantiated by the filing of the geothermal well summary report, with the request for approval of plugging program.

- Before any well is abandoned, it will be plugged in a manner that will permanently confine all fluids in the separate strata originally containing them. This operation will be accomplished by the use of mud-laden fluid, cement and plugs, used singly or in combination, as may be approved by the division. In addition, an adequate cement plug at the surface will be installed to permanently prevent intrusion of any substance into the well.

- The exact location of abandoned wells will be shown by a steel marker at least four inches in diameter set in concrete and extending at least four feet above mean ground level. The name and number of the well and its location (quarter-quarter, section, township and range) will be welded, stamped or otherwise permanently engraved into the metal of the marker.

- No well will be temporarily abandoned for a period in excess of six months unless a permit for such temporary abandonment has been approved by the division. Such permit will be for a period not to exceed six months and will be requested from the Santa Fe office of the division by filing division forms in duplicate. No such permit will be approved unless evidence is furnished that the condition of the well is such as to prevent damage to any producing zone, migration of fluids from one zone to another, the waste or contamination of useable underground waters or other natural resources and the leakage of any substance at the surface; all as substantiated by the filing of geothermal resources well log, and

geothermal resources well summary report, with the request from a temporary abandonment permit.

- Upon expiration of the permit for temporary abandonment and any extension, the well will be put into beneficial use or will be permanently plugged and abandoned, unless it can be shown to the division after notice and hearing that good cause exists why the well should not be plugged and abandoned, and a permit for further temporary abandonment will be issued. No such permit for further temporary abandonment will be approved by the division unless a one-well plugging bond for the well, in an amount satisfactory to the division but not to exceed $20,000, is on file with the division to ensure future plugging of the well.

- Injection wells will be abandoned in the same manner as other wells.

"The Effects of Shallow Geothermal Fluid Utilization on Fresh Water"

The Effects of Shallow Geothermal Fluid Utilization On Fresh Water of the Lightning Dock KGRA, Animas Valley, New Mexico

By
Richard Austin
Director of Geologic Services
Raser Technologies Inc

Background

The lightning Dock KGRA lies in the north central portion of the Animas Valley (Fig. 1). The valley extends about 60 miles from the Mexican border north to just north of interstate 10 and ranges from 6 to 12 miles wide. O'Brian and Stone, in New Mexico Bureau of Mines Open File Reports 131, examined the water chemistry of the valley and described it as a closed basin. The Lightning Dock geothermal system was discovered when steam was struck at 40 feet while drilling a shallow water well. Since that time the heated ground water mixed with the geothermal fluids has been produced for direct use. Currently a series of shallow wells supply heat to the greenhouse complex of Dale Burgget and a neighboring fish farm.

The Resource

Deep geothermal fluids are upwelling at the intersection of the north south trending Animas Valley Fault and northeasterly trending shear zone (Fig 2). These fluids rise into and co-mingle with the northward flowing groundwater to produce a thermal plume that extends to the NNW from the proposed development area (See map of thermal plume in Fig. 3). Further evidence of the upwelling and mixing can be seen in the geochemical groundwater mapping done by O'Brian and Stone, OFR 131. The plume of geothermaly influenced ground water is driven to the north and is diluted with ground water from the down basin flow by the time it reaches Interstate 10. As the ground water flow reaches the north end of the Animas Valley past I-10 it enters into a zone of high TDS under and around the alkaline flats. It should be noted that the mapped thermal plume has been expanding as shown by the works of Kintzinger, 1956 (Fig. 3) and later by Lansford, 1981 (Fig. 4). This is most likely due to an increase of the flow of geothermal fluids from the underlying fracture system brought about by the reduction in the water table, thereby reducing the confining head pressure over the supplying fractures.

Planned Development

The mixture of heated ground water and co-mingled geothermal fluids will be produced from the thermal plume. The heat will be extracted and the fluids injected on the

upstream edge (south, southeast side) of the plume to reduce the invasion of cold fluids into the reservoir of heated fluids. Fluid production and injection is planned to be from between 500 and 2000 feet below the surface to reduce the effects of cooling by the currently invading cold groundwater.

The strata to be produced from will vary from unconsolidated valley fill material as seen in most of well 52-7 to fractured volcanic tuff as encountered in well 55-7 to a depth of nearly 2000 feet (Fig. 5). None of the wells drilled to date have encountered any confining pressures in the planned production zones. Static water levels in the wells are controlled by the general water table in the valley and no artesian flows have been encountered in the drilling of the numerous wells for the greenhouse and fish farm production. All production and injection of the fluids from the planned reservoir development will be within the zone already affected by the thermal plume or immediately upstream of the plume.

Conclusions

Based on the data review it is this author's opinion that there will be no significant impact to the fresh water supply of the Animas Valley. The proposed production and injection will be within the area already influenced by the natural co-mingling of the upwelling geothermal fluids and the northerly flowing groundwater headed for the alkali flats in the northern end of the Animas Valley. No salts or fluids will be added to the thermal plume and the overall composition of the aquifer will not be altered. All produced fluids will be injected to allow their circulation back through the thermal plume. Further, there is no major agricultural irrigation pumping between the proposed geothermal operation and the alkali flats to the north that both the ground water and surface waters flow towards.

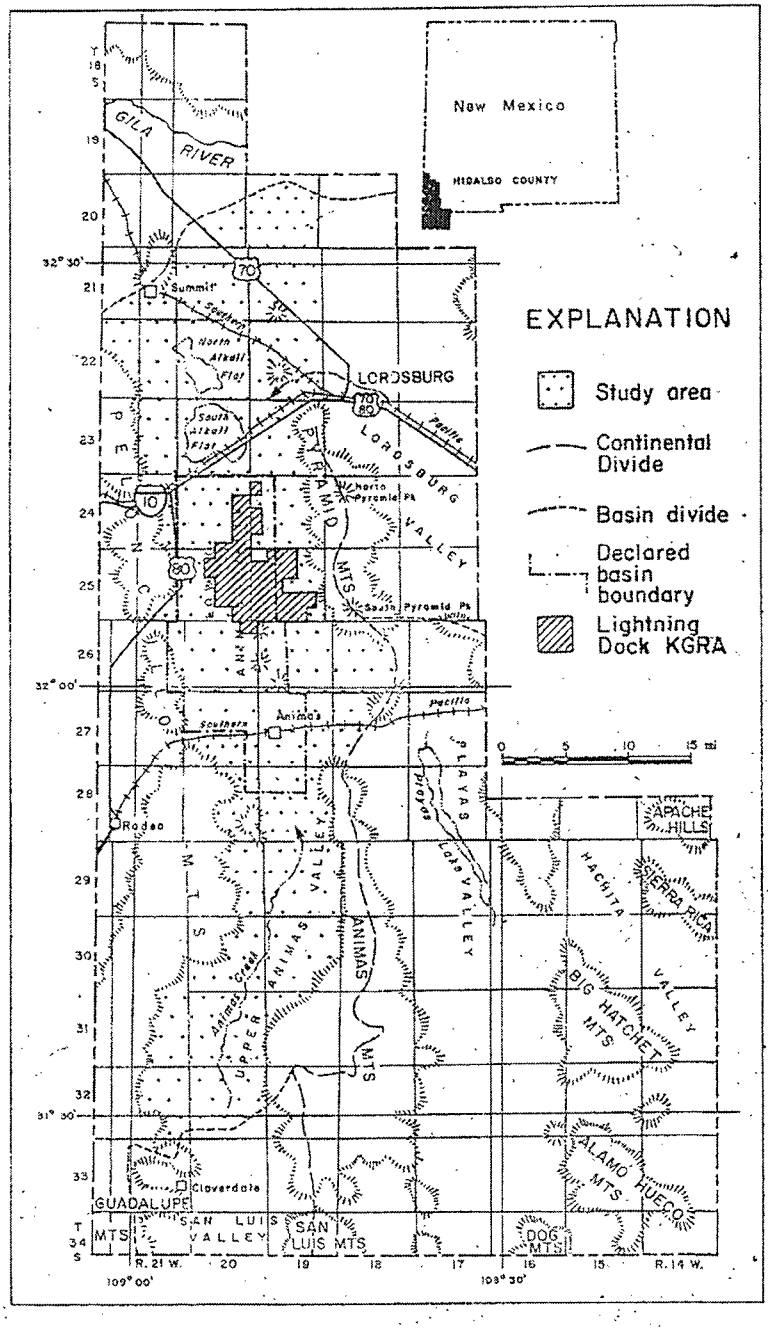


Fig. 1
Area Map of Animas Valley and the Lightning Dock KGRA

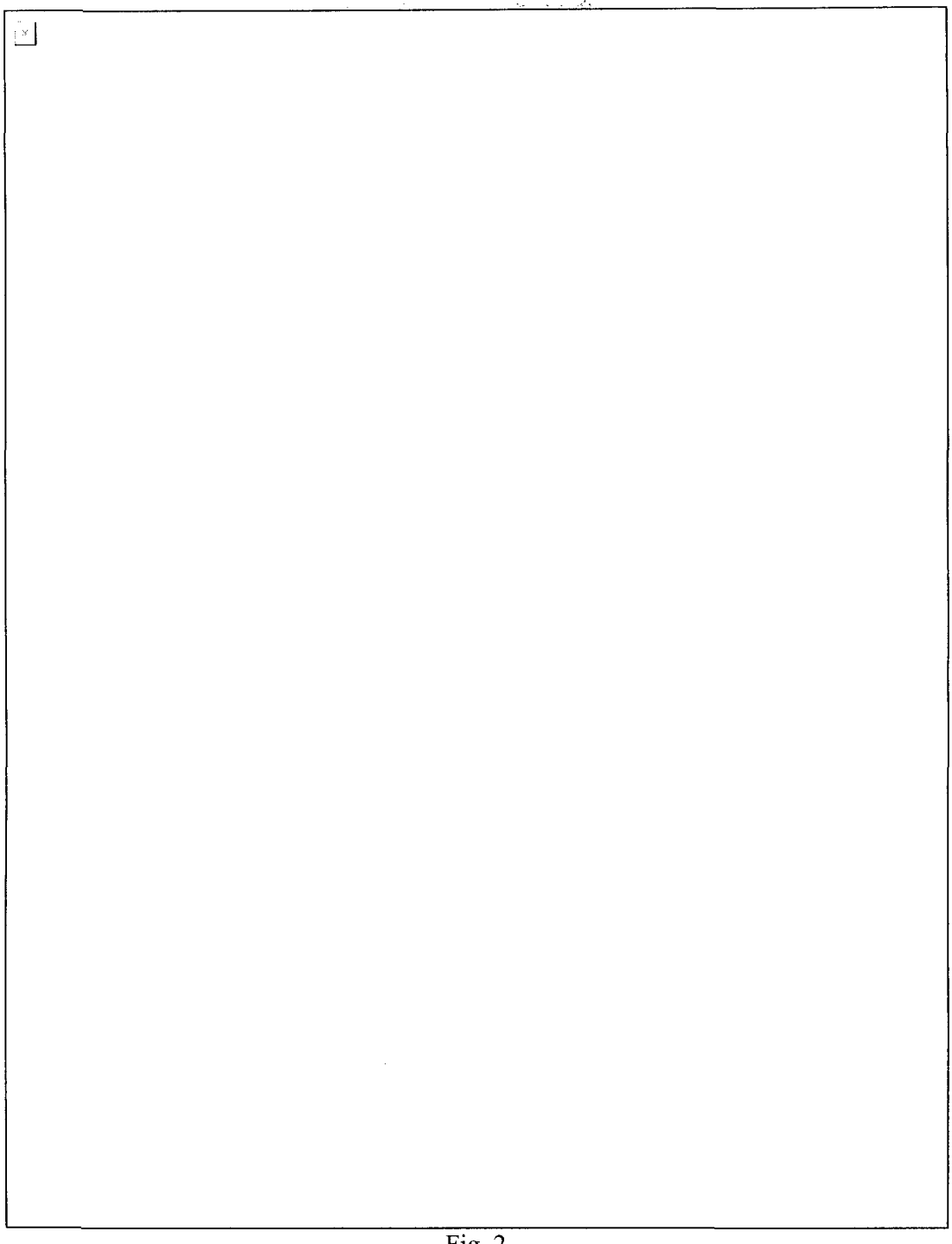


Fig. 2
Location of the Animas Valley Fault and the cross cutting shear zone.

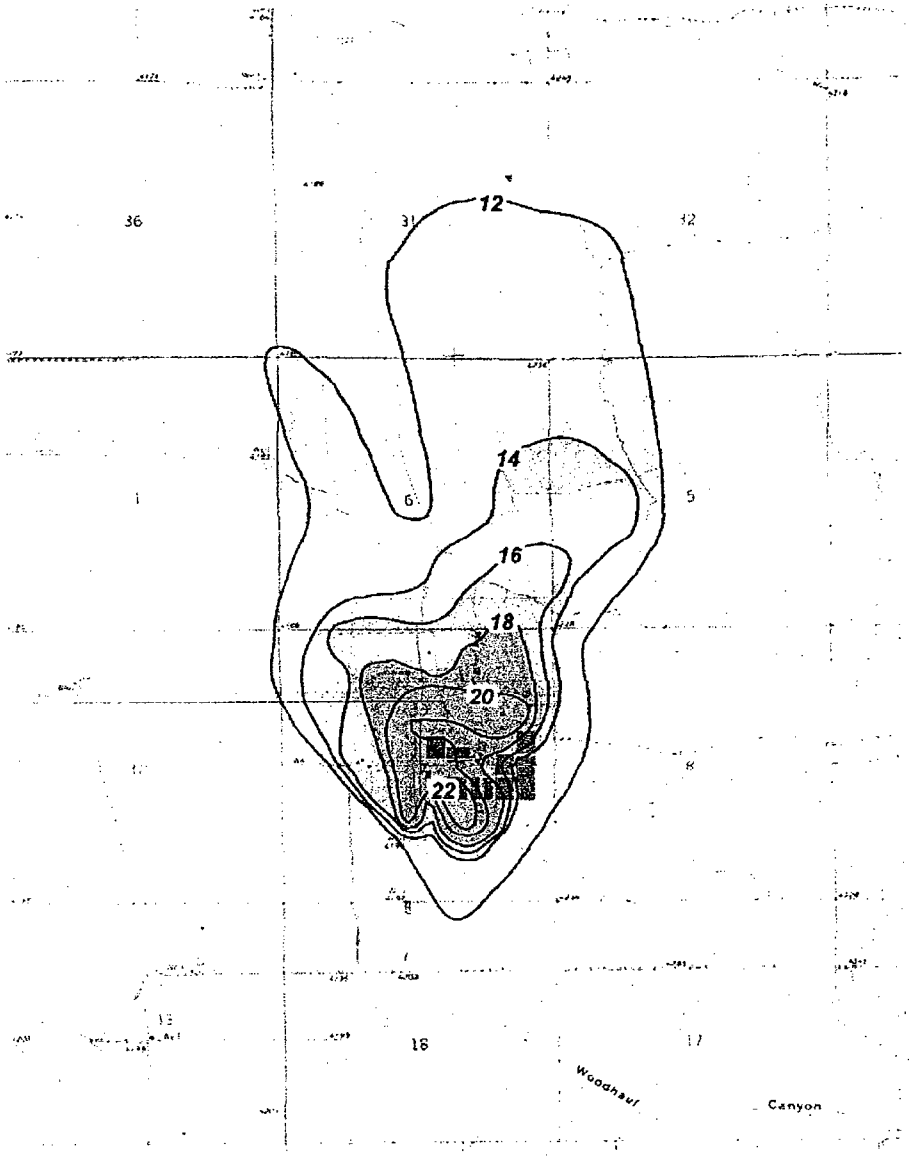


Figure 4. Temperature contours, data source Kintzinger (1956).

Fig. 3

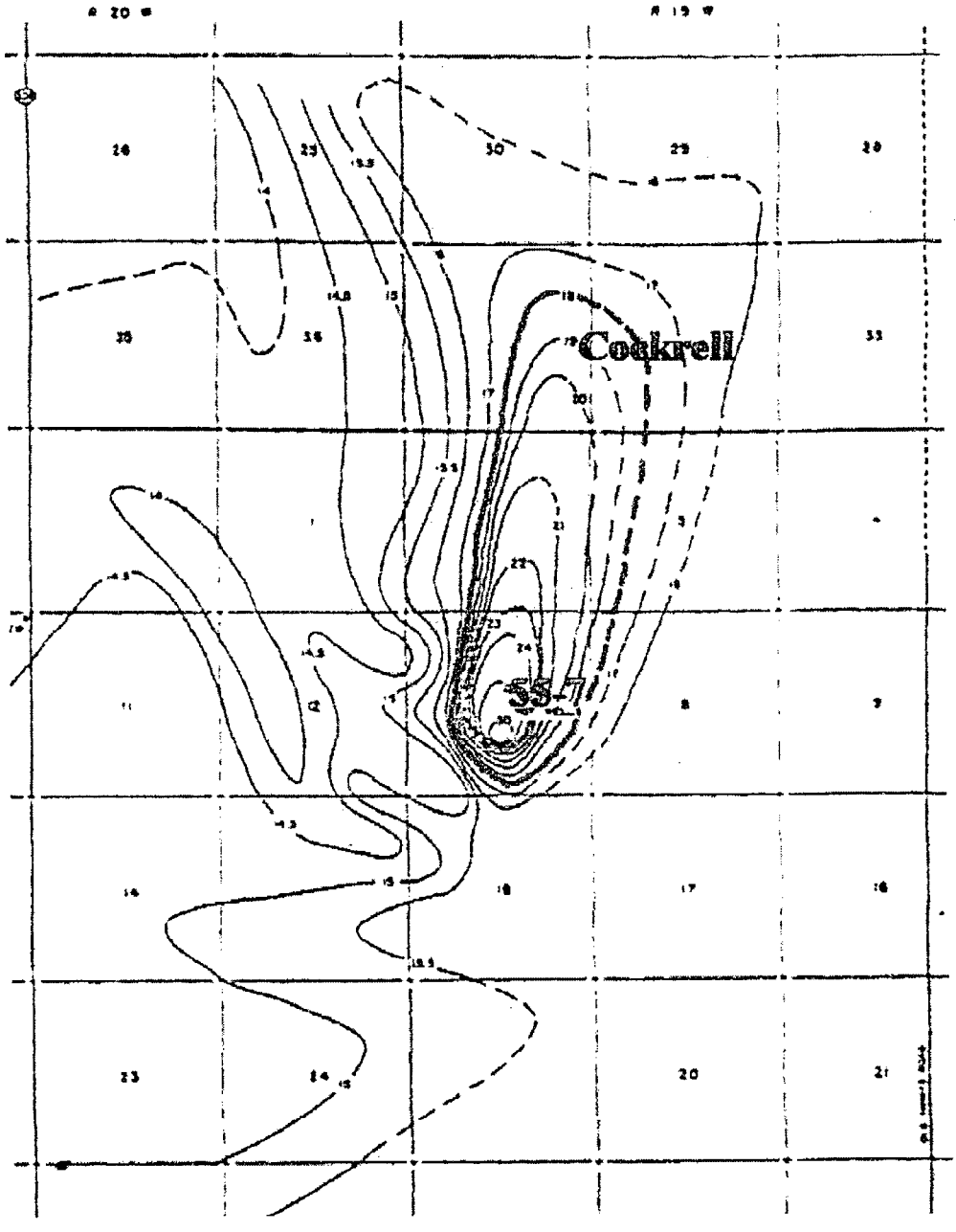


Figure 5. Temperature contours, data source Lansford (1981).

Fig. 4

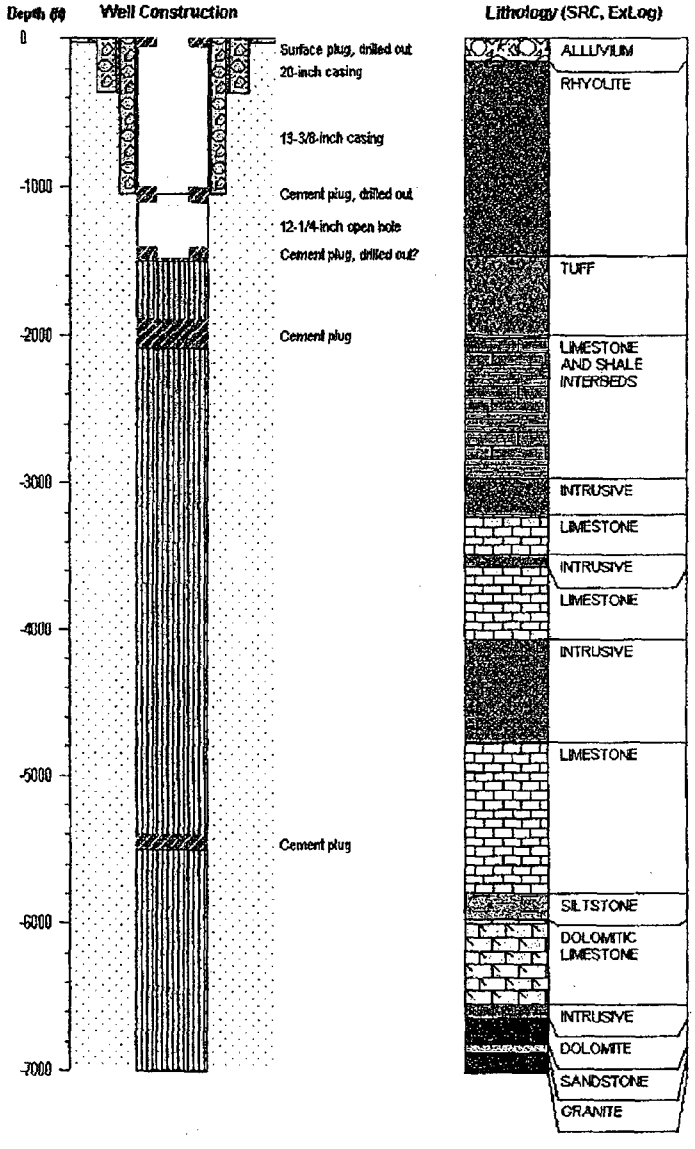


Figure 12. TFD 55-7 well construction and lithology.

Fig. 5

MECHANICAL INTEGRITY TESTING (MIT)

Mechanical integrity testing of the casing will be conducted prior to injection. The Division will be notified 48 hours before the date upon which a test for mechanical integrity is to be performed, so a representative may be on site to witness the test.

- MIT Tests

  a. Internal Test - No leaks from casing or other casing components.
  b. External Test - No movement of fluids/water behind the casing.
  c. MIT Tests to demonstrate the internal and external test will be "Casing Integrity Tool" and "Cement Bond" respectively.
  d. Pressure testing will be conducted before the casing shoe is drilled out.
  e. Division will be notified a minimum of 48 hours before conducting MIT testing, so a representative may be on site to witness the test.
  f. Drilling manager will be responsible in maintaining a pressure monitoring system. The system will record tests in real time and Division will be sent annotated graphics of the test.

- MIT Procedure

  a. Casing Test Pressure – Test 4 hours up to 600 psi, or maximum authorized injection pressure.
  b. A successful test is one in which pressure stabilizes within 10% of the required test pressure, and remains so for a minimum of 4 hours minutes.

- MIT Report

  a. Within 30 days after completion of testing, a Summary Report will be compiled and submitted to Division with the following information:

     i. Conditions of injection well(s) prior to test (e.g. static, injecting at ### gpm, etc)
     ii. Conditions of well(s) during test(s), such as, but not limited to: operating conditions of the well; water level; changes in status/conditions of the well during test; anomalies witnessed prior to, or during test; gauge calibration; and conditions for any gauges used, etc.
     iii. A static temperature, pressure, spinner log will be submitted.

STORM WATER POLLUTION PREVENTION PLAN

SEPARATE ATTACHMENT

This Form Replaces Form 3510-9 (8-98)
Refer to the Following Pages for Instructions

Form Approved OMB Nos. 2040-0188 and 2040-0211

NPDES Form

United States Environmental Protection Agency
Washington, DC 20460

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

Submission of this Notice of Intent (NOI) constitutes notice that the party identified in Section II of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section I of this form. Submission of this NOI also constitutes notice that the party identified in Section II of this form meets the eligibility requirements of the CGP for the project identified in Section III of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Refer to the instructions at the end of this form.

I. Permit Number

NMR15FY66

II. Operator Information

Name: RASER TECHNOLOGIES, INC.

IRS Employer Identification Number (EIN): __ - _____

Mailing Address:

Street: 5152 NORTH EDGEWOOD DRIVE, SUIT

City: PROVO State: UT Zip Code: 84057 - ____

Phone: 801 - 765 - 1200 Fax (optional): 801 - 374 - 3314

E-mail (optional): BRADY.OLSON@RASERTECH.COM

III. Project/Site Information

Project/Site Name: LIGHTNING DOCK GEOTHERMAL NO. 1

Project Street/Location: 49 GREENHOUSE ROAD

City: ANIMAS State: NM Zip Code: 88020 - ____

County or similar government subdivision: HIDALGO

Latitude/Longitude (Use one of three possible formats, and specify method)

Latitude
1. 32 ° 08 ′ 43 ″ N (degrees, minutes, seconds)
2. __ ° __ . __ ′ N (degrees, minutes, decimal)
3. __ . _____ ° N (decimal)

Longitude
1. 108 ° 49 ′ 55 ″ W (degrees, minutes, seconds)
2. ___ ° __ . __ ′ W (degrees, minutes, decimal)
3. ___ . _____ ° W (decimal)

Method: ☐ U.S.G.S. topographic map ☐ EPA web site ☐ GPS ☑ Other: GOOGLE EARTH
• If you used a U.S.G.S. topographic map, what was the scale:

Project Located in Indian country? ☐ Yes ☑ No
If so, name of Reservation or if not part of a Reservation, put "Not Applicable":

Estimated Project Start Date: 04 / 15 / 2008 (Month / Date / Year) Estimated Project Completion Date: 04 / 15 / 2009 (Month / Date / Year)

Estimated Area to be Disturbed (to the nearest quarter acre): 20.00

IV. SWPPP Information

Has the SWPPP been prepared in advance of filing this NOI? [✓] Yes [ ] No

Location of SWPPP for viewing: [ ] Address in Section II [✓] Address in Section III [ ] Other

If Other:

SWPPP Street:

City:

State: Zip Code: -

SWPPP Contact Information (if different than that in Section II):

Name: BRADY OLSON

Phone: - - Fax (optional): - -

E-mail (optional): BRADY.OLSON@RASERTECH.COM

V. Discharge Information

Identify the name(s) of waterbodies to which you discharge. GILA RIVER

Is this discharge consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s)?

[✓] Yes [ ] No

VI. Endangered Species Information

Under which criterion of the permit have you satisfied your ESA eligibility obligations?

[✓] A [ ] B [ ] C [ ] D [ ] E [ ] F

- If you select criterion F, provide permit tracking number of operator under which you are certifying eligibility:

VII. Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated 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.

Print Name: BRADY OLSON

Print Title:

Signature: BRADY OLSON

Date: 03/24/2008

Instructions for Completing EPA Form 3510-9

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

NPDES Form | This Form Replaces Form 3510-9 (8/98) | Form Approved OMB Nos. 2040-0188 and 2040-0211

Who Must File an NOI Form

Under the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et.seq.; the Act), federal law prohibits storm water discharges from certain construction activities to waters of the U.S. unless that discharge is covered under a National Pollutant Discharge Elimination System (NPDES) Permit. Operator(s) of construction sites where one or more acres are disturbed, smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least one acre, or any other site specifically designated by the Director, must submit an NOI to obtain coverage under an NPDES general permit. Each person, firm, public organization, or any other entity that meets either of the following criteria must file this form: (1) they have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) they have day-to-day operational control of those activities at the project necessary to ensure compliance with SWPPP requirements or other permit conditions. If you have questions about whether you need an NPDES storm water permit, or if you need information to determine whether EPA or your state agency is the permitting authority, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755.

Where to File NOI Form

See the applicable CGP for information on where to send your completed NOI form.

Completing the Form

Obtain and read a copy of the appropriate EPA Storm Water Construction General Permit for your area. To complete this form, type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks (abbreviate if necessary to stay within the number of characters allowed for each item). Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755. Please submit original document with signature in ink - do not send a photocopied signature.

Section I. Permit Number

Provide the number of the permit under which you are applying for coverage (see Appendix B of the general permit for the list of eligible permit numbers).

Section II. Operator Information

Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this application. An operator of a project is a legal entity that controls at least a portion of site operations and is not necessarily the site manager. Provide the employer identification number (EIN from the Internal Revenue Service; IRS), also commonly referred to as your taxpayer ID. If the applicant does not have an EIN enter "NA" in the space provided. Also provide the operator's mailing address, telephone number, fax number (optional) and e-mail address (if you would like to be notified via e-mail of NOI approval when available). Correspondence for the NOI will be sent to this address.

Section III. Project/Site Information

Enter the official or legal name and complete street address, including city, state, zip code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for permit coverage to be granted.

The applicant must also provide the latitude and longitude of the facility either in degrees, minutes, seconds; degrees, minutes, decimal; or decimal format. The latitude and longitude of your facility can be determined in several different ways, including through the use of global positioning system (GPS) receivers, U.S. Geological Survey (U.S.G.S.) topographic or quadrangle maps, and EPA's web-based siting tools, among others. Refer to *www.epa.gov/npdes/stormwater/cgp* for further guidance on the use of these methodologies. For consistency, EPA requests that measurements be taken from the approximate center of the construction site. Applicants must specify which method they used to determine latitude and longitude. If a U.S.G.S. topographic map is used, applicants are required to specify the scale of the map used.

Indicate whether the project is in Indian country, and if so, provide the name of the Reservation. If the project is in Indian Country Lands that are not part of a Reservation, indicate "not applicable" in the space provided.

Enter the estimated construction start and completion dates using four digits for the year (i.e., 05/27/1998). Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest quarter acre. Note: 1 acre = 43,560 sq. ft.

Section IV. SWPPP Information

Indicate whether or not the SWPPP was prepared in advance of filing the NOI form. Check the appropriate box for the location where the SWPPP may be viewed. Provide the name,

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

NPDES Form This Form Replaces Form 3510-9 (8/98) Form Approved OMB Nos. 2040-0188 and 2040-0211

fax number (optional), and e-mail address (optional) of the contact person if different than that listed in Section II of the NOI form.

Section V. Discharge Information

Enter the name(s) of receiving waterbodies to which the project's storm water will discharge. These should be the first bodies of water that the discharge will reach. (Note: If you discharge to more than one waterbody, please indicate all such waters in the space provided and attach a separate sheet if necessary.) For example, if the discharge leaves your site and travels through a roadside swale or a storm sewer and then enters a stream that flows to a river, the stream would be the receiving waterbody. Waters of the U.S. include lakes, streams, creeks, rivers, wetlands, impoundments, estuaries, bays, oceans, and other surface bodies of water within the confines of the U.S. and U.S. coastal waters. Waters of the U.S. do not include man-made structures created solely for the purpose of wastewater treatment. U.S. Geological Survey topographical maps may be used to make this determination. If the map does not provide a name, use a format such as "unnamed tributary to Cross Creek". If you discharge into a municipal separate storm sewer system (MS4), you must identify the waterbody into which that portion of the storm sewer discharges. That information should be readily available from the operator of the MS4.

Indicate whether your storm water discharges from construction activities will be consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s). To answer this question, refer to *www.epa.gov/npdes/stormwater/cgp* for state- and regional-specific TMDL information related to the construction general permit. You may also have to contact your EPA regional office or state agency. If there are no applicable TMDLs or no related requirements, please check the "yes" box in the NOI form.

Section VI. Endangered Species Information

Indicate for which criterion (i.e., A, B, C, D, E, or F) of the permit the applicant is eligible with regard to protection of federally listed endangered and threatened species, and designated critical habitat. See Part 1.3.C.6 and Appendix C of the permit. If you select criterion F, provide the permit tracking number of the operator under which you are certifying eligibility. The permit tracking number is the number assigned to the operator by the Storm Water Notice Processing Center after EPA acceptance of a complete NOI.

Section VII. Certification Information

All applications, including NOIs, must be signed as follows:
For a corporation: By a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name and title of the person signing the form and the date of signing. An unsigned or undated NOI form will not be considered eligible for permit coverage.

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 3.7 hours. This estimate includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch 2136, U.S. Environmental Protection, Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB control number on any correspondence. Do not send the completed form to this address.

U.S. ENVIRONMENTAL PROTECTION
AGENCY (EPA)
NATIONAL POLLUTANT DISCHARGE
ELIMINATION SYSTEM (NPDES)
EPA's NOI PROCESSING CENTER

03/24/2008
Company: RASER TECHNOLOGIES, INC.
ATTN: BRADY OLSON
5152 North Edgewood Drive, Suite 375
Provo, UT 84057

Facility: LIGHTNING DOCK
GEOTHERMAL NO. 1 HI-01
49 Greenhouse Road
Animas , NM 88020

Permit Number: NMR15FY66

This email/letter acknowledges that you have submitted a complete Notice of Intent form to be covered under the NPDES General Permit for Stormwater Discharges for Construction General Permit Activity (Construction General Permit). Coverage under this permit begins at the conclusion of your seven-day waiting period, on 03/31/2008.

As stated above, this letter acknowledges receipt of a complete Notice of Intent. However, it is not an EPA determination of the validity of the information you provided. Your eligibility for coverage under the Permit is based on the validity of the certification you provided. Your signature on the Notice of Intent certifies that you have read, understood, and are implementing all of the applicable requirements. An important aspect of this certification requires that you correctly determine whether you are eligible for coverage under this permit.

As you know, the Construction General Permit requires you to have developed and begun implementing a Stormwater Pollution Prevention Plan (SWPPP) and outlines important inspection and record keeping requirements. You must also comply with any additional location-specific requirements applicable to your state or tribal area. A copy of the Construction General Permit must be kept with your SWPPP. An electronic copy of the Permit and additional guidance materials can be viewed and downloaded at www.epa.gov/npdes/stormwater.

For tracking purposes, the following number has been assigned to your Notice of Intent Form: NMR15FY66.

If you have general questions regarding the stormwater program or your responsibilities under the Construction General Permit, please call

EPA Region 6

Brent Larsen 214-665-7523

If you have questions about your Notice of Intent form, please call the EPA NOI Processing Center at 1-866-352-7755 (toll free) or send an inquiry via the online form at http:///www.epa.gov/npdes/noicontact.

Next time, you can use the eNOI system (http://www.epa.gov/npdes) to apply for a Notice of Intent.

EPA NOI Processing Center
Operated by Avanti Corporation
1200 Pennsylvania Ave., NW
Mail Code: 4203M
Washington, DC 20460
1-866-352-7755

STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY
288 North 1460 West, P.O. Box 144870, Salt Lake City, Utah 84114-4870 (801)538-6146

NOI

Notice of Intent (NOI) for Storm Water Discharges Associated with **Construction Activity** Under the UPDES General Permit No. UTR109786

Submission of this Notice of Intent constitutes notice that the party(s) identified in Section I of this form intends to be authorized by UPDES General Permit No. UTR109786 issued for storm water discharges associated with construction activity in the State of Utah. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I. OPERATOR INFORMATION

Name (Main operator): Central Industrial Construction Phone: 801 768-2218

Address: 3398 NE Frontage Road Status of Owner/Operator: P - Private

City: Lehi State: UT Zip: 84043

Contact Person: Rick Francom Phone: 801 376-7758

Name (1st Co-permittee): _____ Phone: _____

Address: _____ Status of Owner/Operator: _____

City: _____ State: ____ Zip: _____

Contact Person: _____ Phone: _____

Name (2nd Co-permittee): _____ Phone: _____

Address: _____ Status of Owner/Operator: _____

City: _____ State: ____ Zip: _____

Contact Person: _____ Phone: _____

Name (3rd Co-permittee): _____ Phone: _____

Address: _____ Status of Owner/Operator: _____

City: _____ State: ____ Zip: _____

Contact Person: _____ Phone: _____

Please copy this form if you have more co-permittees than what is allowed on this form.

II. FACILITY SITE / LOCATION INFORMATION

Is the facility located on Indian Lands?

(Y or N) N

Name: Thermo No. 1 BE-01

Project No. (if any): _____

Address: North of a county road in the Northwest Section 34 of Township 30S, Range 12 WEST Salt Lake Base & Meridian

City: MILFORD State: UT Zip: 84751

Latitude: 38° 9 16 Longitude: 113° 12 41

III. SITE ACTIVITY INFORMATION

Municipal Separate Storm Sewer System (MS4) Operator Name: _____

Receiving Water Body: _____

How far to the nearest water body? _____

List the Number of any other UPDES permits at the site: _____ _____

IV. TYPE OF CONSTRUCTION (Check all that apply)

1. __ Residential 2. __ Commercial 3. X Industrial 4. X Road 5. __ Bridge 6. X Utility 7. X Contouring, Landscaping

8. __ Other (Please list) _____

V. MANAGEMENT PRACTICES

Identify proposed Best Management Practices (BMPs) to reduce pollutants in storm water discharges: (Check all that apply)

1. X Silt Fences 2. X Sediment Pond 3. X Seeding/Preservation of Vegetation 4. __ Mulching/Geotextiles 5. X Check Dams 6. __ Structural Controls (Berms, Ditches, etc.)

7. __ Other (Please list) _____

VI. ADDITIONAL INFORMATION REQUIRED

Project Start Date: 04/01/08 Completion Date: 04/01/09 Estimated Area to be Disturbed (in Acres): 20

A storm water pollution prevention plan has been prepared for this site and is to the best of my knowledge in Compliance with State and/or Local Sediment and Erosion Plans and Requirements.

(Y or N) Y (A pollution prevention plan is required to be on hand before submittal of the NOI)

VII. CERTIFICATION: I certify under penalty of law that I have read and understand the *Part I.B.* eligibility requirements for coverage under the general permit for storm water discharges from construction activities.

I further certify that to the best of my knowledge, all discharges and BMPs that have been scheduled and detailed in a pollution prevention plan will satisfy requirements of *Part I.B.* , and *Part III.* of this permit.

I understand that continued coverage under this storm water general permit is contingent upon maintaining eligibility as provided for in *Part I.B.*

I also certify under penalty of law that this document and all attachments were prepared under the direction or supervision of those who have place their signature below, 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.

Signature: Certification provided online by Kayli Moss, Environmental Professional, kmoss@wildingengineering.com 03/19/08

Amount of Permit Fee Enclosed: $ 100

STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY
288 North 1460 West, P.O. Box 144870, Salt Lake City, Utah 84114-4870

NOT

Notice of Termination (NOT) for Storm Water Discharges Associated with **Construction Activity** Under the UPDES General Permit No. UTR109786 **SEE REVERSE FOR INSTRUCTIONS**

Submission of this Notice of Termination constitutes notice that the operator identified in Section II of this form is no longer authorized to discharge storm water associated with industrial activity under the UPDES program. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I. Permit Information

UPDES Storm Water General Permit Number: UTR109786

Check Here if You are No Longer the Operator of the Facility: Check Here if the Storm Water Discharge is Being Terminated:

II. Facility Operator Information

Name: Central Industrial Construction Phone: 801 768-2218

Address: 3398 NE Frontage Road

City: Lehi State: UT Zip: 84043

III. Facility Site/Location Information

Name: Thermo No. 1 BE-01

Address: North of a county road in the Northwest Section 34 of Township 30S, Range 12 BE SLB Base & Meridian

City: MILFORD State: UT Zip: 84751

Latitude: 38° 9 16 Longitude: 113° 12 41

IV. Certification: I certify under penalty of law that either: a) all storm water discharges associated with construction activity from the portion of the identified facility where I was an operator have ceased or have been eliminated or b) I am no longer an operator at the construction site and a new operator has assumed operational control for those portions of the construction site where I previously had operational control. I understand that by submitting this notice of termination, I am no longer authorized to discharge storm water associated with construction activity under this general permit, and that discharging pollutants in storm water associated with construction activity to waters of the State is unlawful under the State of Utah Water Quality Act where the discharge is not authorized by a UPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Water Quality Act.

Print Name: Date:

Signature:

Instructions for Completing Notice of Termination (NOT) Form

Who May File A Notice Of Termination (NOT) Form

Permittees who are presently covered under the State issued Utah Pollutant Discharge Elimination System (UPDES) General Storm Water Permit for Construction Activity may submit a notice of termination (NOT) form when their facilities no longer have any storm water discharges associated with industrial activity as defined in the storm water regulations at UAC R317-8-3.8(b)(c) and (d), or when they are no longer the operator of the facilities.

For construction activities, elimination of all storm water discharges associated with industrial activity occurs when disturbed soils at the construction site have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with construction activity from the construction site that are authorized by a UPDES general permit have otherwise been eliminated. Final stabilization means that all soil-disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

Where to File NOT Form

Send this form to the following address:

Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114-4870

Completing the Form

Type or print, using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use only one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions about this form, call the Division of Water Quality at (801) 538-6146.

Section I - Permit Information

Enter the existing UPDES Storm Water General Permit number assigned to the facility or site identified in Section III. If you do not know the permit number, contact the Division of Water Quality at (801) 538-6146.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box:

If there has been a change of operator and you are no longer the operator of the facility or site identified in Section III, Check the corresponding box.

If all storm water discharges at the facility or site identified in Section III have been terminated, check the corresponding box.

Section II - Facility Operator Information

There may be more than one operator for a construction project. This form must be filled out and submitted by each of the operators listed on the notice of intent (NOI) that was submitted for receiving coverage under this permit. In this section give the legal name of the person, firm, public organization, or any other entity that is filed as an operator at the facility or site described in this application that is desiring to terminate coverage. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation (referring to operation of construction activity) or a portion of it, rather that the plant or site manager of the finished or rehabilitated facility. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Section III - Facility/Site Location Information

Enter the facility's or site's official or legal name and complete address, including city, state and ZIP code and the latitude and longitude of the facility to the nearest 15 seconds of the approximate center of the site. It is preferred that the location address be the same as that which the site used in the submission of the NOI.

Section IV - Certification

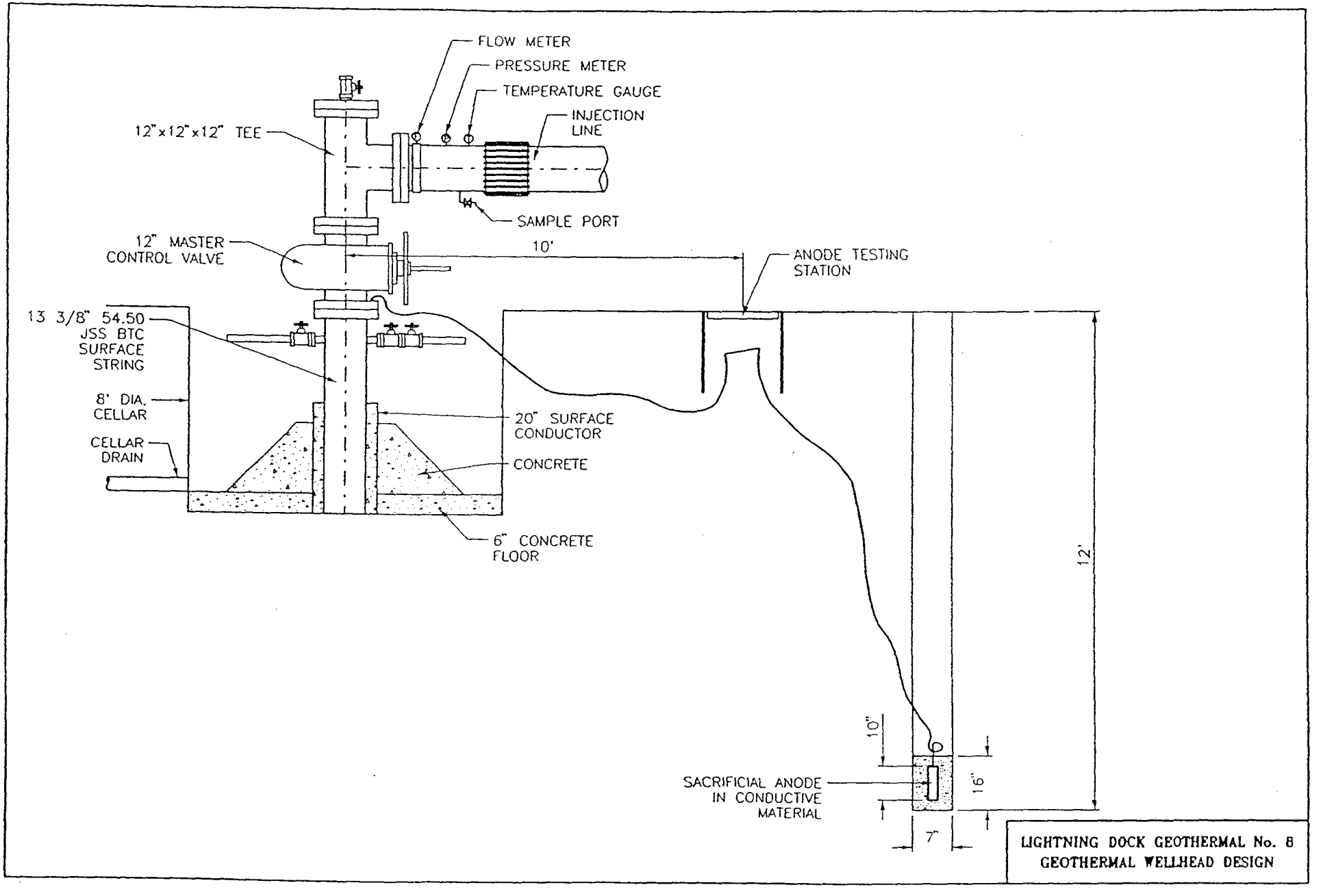
State statues provide for severe penalties for submitting false information on this application form. State regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (I) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

For a municipality, State, Federal, or other public facility: by either a principal executive officer or ranking elected official.

Well Head Design



LIGHTNING DOCK GEOTHERMAL No. 8
GEOTHERMAL WELLHEAD DESIGN

Analytical Summary Report

Summary Report

Jim Rosser
Raser Technologies
5152 North Edgewood Dr.
Suite 375
Provo, UT, 84604

Report Date: May 13, 2008

Work Order: 8031235

Project Location: Animas, New Mexico
Project Name: Cold Water/Hot Water
Project Number: Lighting Dock

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
153439	LDC Cold Water	water	2008-03-12	07:54	2008-03-12

Sample - Field Code	TPH DRO DRO (mg/L)	TPH GRO GRO (mg/L)	TX1005 C6-C12 (mg/L)	TX1005 >C12-C28 (mg/L)
153439 - LDC Cold Water	<5.00	<0.500	<5.00	<5.00

Sample: 153439 - LDC Cold Water

Param	Flag	Result	Units	RL
Total Silver		<0.00500	mg/L	0.00500
Total Aluminum		<0.0500	mg/L	0.0500
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**126**	mg/L as CaCo3	5.00
Total Alkalinity		**126**	mg/L as CaCo3	5.00
Amenable Cyanide		<0.0100	mg/L	0.0100
Ammonia-N		**1.48**	mg/L	1.00
Total Arsenic		<0.00500	mg/L	0.00500
Total Boron		**0.0590**	mg/L	0.00500
Total Barium		**0.0240**	mg/L	0.00100
Total Beryllium		<0.00200	mg/L	0.00200
Total Calcium		**42.8**	mg/L	0.500
Total Cadmium		<0.00100	mg/L	0.00100
Chloride		**20.4**	mg/L	2.00
Chlorine		<0.0400	mg/L	0.0400
Free Chlorine		<0.0400	mg/L	0.0400
Chemical Oxygen Demand		<50.0	mg/L	50.0
Specific Conductance		**550**	uMHOS/cm	0.00
Total Chromium		<0.00100	mg/L	0.00100
Total Copper		**0.0150**	mg/L	0.00500
Total Iron		**0.0130**	mg/L	0.0100

sample 153439 continued ...

Param	Flag	Result	Units	RL
Free Cyanide		<0.0100	mg/L	0.0100
Total Mercury		<0.000200	mg/L	0.000200
Total Potassium		**2.11**	mg/L	0.500
Total Magnesium		**3.81**	mg/L	0.500
Total Manganese		<0.00250	mg/L	0.00250
Total Molybdenum		<0.0100	mg/L	0.0100
Total Sodium		**68.0**	mg/L	0.00
Total Nickel		<0.00500	mg/L	0.00500
Nitrite-N		<0.100	mg/L	0.100
Nitrate-N		**1.19**	mg/L	0.100
Total Lead		<0.00500	mg/L	0.00500
pH		**7.48**	s.u.	0.00
Phenolics		**0.260**	mg/L	0.130
PO4-P		<0.500	mg/L	0.500
Total Antimony		<0.0200	mg/L	0.0200
Total Selenium		<0.0100	mg/L	0.0100
Total Silica		**34.7**	mg/L	0.0500
Sulfate		**94.8**	mg/L	1.00
Sulfide		<0.100	mg/L	0.100
Total Dissolved Solids		**358**	mg/L	5.00
Total Kjeldahl Nitrogen - N		<6.00	mg/L	6.00
Total Thallium		<0.0200	mg/L	0.0200
Total Organic Carbon		<1.00	mg/L	1.00
Total Cyanide		<0.0150	mg/L	0.0150
Total Suspended Solids		<10.0	mg/L	10.0
Turbidity (Nephelometric)		**0.0800**	NTU	0.00
Bromochloromethane		<1.00	µg/L	1.00
Dichlorodifluoromethane		<1.00	µg/L	1.00
Chloromethane (methyl chloride)		<1.00	µg/L	1.00
Vinyl Chloride		<1.00	µg/L	1.00
Bromomethane (methyl bromide)		<5.00	µg/L	5.00
Chloroethane		<1.00	µg/L	1.00
Trichlorofluoromethane		<1.00	µg/L	1.00
Acetone		<10.0	µg/L	10.0
Iodomethane (methyl iodide)		<5.00	µg/L	5.00
Carbon Disulfide		<1.00	µg/L	1.00
Acrylonitrile		<1.00	µg/L	1.00
2-Butanone (MEK)		<5.00	µg/L	5.00
4-Methyl-2-pentanone (MIBK)		<5.00	µg/L	5.00
2-Hexanone		<5.00	µg/L	5.00
trans 1,4-Dichloro-2-butene		<10.0	µg/L	10.0
1,1-Dichloroethene		<1.00	µg/L	1.00
Methylene chloride		<5.00	µg/L	5.00
MTBE		<1.00	µg/L	1.00
trans-1,2-Dichloroethene		<1.00	µg/L	1.00
1,1-Dichloroethane		<1.00	µg/L	1.00
cis-1,2-Dichloroethene		<1.00	µg/L	1.00
2,2-Dichloropropane		<1.00	µg/L	1.00
1,2-Dichloroethane (EDC)		<1.00	µg/L	1.00
Chloroform		<1.00	µg/L	1.00
1,1,1-Trichloroethane		<1.00	µg/L	1.00
1,1-Dichloropropene		<1.00	µg/L	1.00

sample 153439 continued ...

Param	Flag	Result	Units	RL
Carbon Tetrachloride		<1.00	µg/L	1.00
1,2-Dichloropropane		<1.00	µg/L	1.00
Trichloroethene (TCE)		<1.00	µg/L	1.00
Dibromomethane (methylene bromide)		<1.00	µg/L	1.00
Bromodichloromethane		<1.00	µg/L	1.00
2-Chloroethyl vinyl ether		<5.00	µg/L	5.00
cis-1,3-Dichloropropene		<1.00	µg/L	1.00
trans-1,3-Dichloropropene		<1.00	µg/L	1.00
Toluene		<1.00	µg/L	1.00
1,1,2-Trichloroethane		<1.00	µg/L	1.00
1,3-Dichloropropane		<1.00	µg/L	1.00
Dibromochloromethane		<1.00	µg/L	1.00
1,2-Dibromoethane (EDB)		<1.00	µg/L	1.00
Tetrachloroethene (PCE)		<1.00	µg/L	1.00
Chlorobenzene		<1.00	µg/L	1.00
1,1,1,2-Tetrachloroethane		<1.00	µg/L	1.00
Ethylbenzene		<1.00	µg/L	1.00
m,p-Xylene		<1.00	µg/L	1.00
Bromoform		<1.00	µg/L	1.00
Styrene		<1.00	µg/L	1.00
o-Xylene		<1.00	µg/L	1.00
1,1,2,2-Tetrachloroethane		<1.00	µg/L	1.00
2-Chlorotoluene		<1.00	µg/L	1.00
1,2,3-Trichloropropane		<1.00	µg/L	1.00
Isopropylbenzene		<1.00	µg/L	1.00
Bromobenzene		<1.00	µg/L	1.00
n-Propylbenzene		<1.00	µg/L	1.00
1,3,5-Trimethylbenzene		<1.00	µg/L	1.00
tert-Butylbenzene		<1.00	µg/L	1.00
1,2,4-Trimethylbenzene		<1.00	µg/L	1.00
1,4-Dichlorobenzene (para)		<1.00	µg/L	1.00
sec-Butylbenzene		<1.00	µg/L	1.00
1,3-Dichlorobenzene (meta)		<1.00	µg/L	1.00
p-Isopropyltoluene		<1.00	µg/L	1.00
4-Chlorotoluene		<1.00	µg/L	1.00
1,2-Dichlorobenzene (ortho)		<1.00	µg/L	1.00
n-Butylbenzene		<1.00	µg/L	1.00
1,2-Dibromo-3-chloropropane		<5.00	µg/L	5.00
1,2,3-Trichlorobenzene		<5.00	µg/L	5.00
1,2,4-Trichlorobenzene		<5.00	µg/L	5.00
Naphthalene		<5.00	µg/L	5.00
Hexachlorobutadiene		<5.00	µg/L	5.00
Total Zinc		**0.0490**	mg/L	0.00700

Chavez, Carl J, EMNRD

From: Jay Hamilton [hamiltonenviro@yahoo.com]
Sent: Tuesday, May 20, 2008 10:55 AM
To: Chavez, Carl J, EMNRD
Subject: Re: Lightning Dock - Cold Water Analytical Report
Attachments: Cold Water analytical for wells 5-13-08.pdf

Carl,

Thanks,

Jay

----- Original Message ----
From: "Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>
To: Jay Hamilton <hamiltonenviro@yahoo.com>
Sent: Tuesday, May 20, 2008 9:33:34 AM
Subject: RE: Lightning Dock - Cold Water Analytical Report

Jay:

I believe you wanted to send the attached analytical data. Please send the attachment. Thnx.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe , New Mexico 87505
Office: (505) 476-3491
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Jay Hamilton [mailto: hamiltonenviro@yahoo.com]
Sent: Tuesday, May 20, 2008 9:05 AM
To: Chavez, Carl J, EMNRD
Subject: Lightning Dock - Cold Water Analytical Report

Carl,

Here are the analtical results form one of the wells at the Lightning Dock Site. I will provide a map of the location of the well.

This a possible source of the Cooling Tower water.

Thanks,

Jay

This inbound email has been scanned by the MessageLabs Email Security System.

Confidentiality Notice: This e-mail, including all attachments is for the sole use of the intended recipient (s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited unless specifically provided under the New Mexico Inspection of Public Records Act. If you are not the intended recipient, please contact the sender and destroy all copies of this message. -- This email has been scanned by the Sybari - Antigen Email System.

This inbound email has been scanned by the MessageLabs Email Security System.

Confidentiality Notice: This e-mail, including all attachments is for the sole use of the intended recipient (s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited unless specifically provided under the New Mexico Inspection of Public Records Act. If you are not the intended recipient, please contact the sender and destroy all copies of this message. -- This email has been scanned by the Sybari - Antigen Email System.

Summary Report

Jim Rosser
Raser Technologies
5152 North Edgewood Dr.
Suite 375
Provo, UT, 84604

Report Date: March 18, 2008

Work Order: 8031235

Project Location: Animas, New Mexico
Project Name: Cold Water/Hot Water
Project Number: Lighting Dock

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
153439	LDC Cold Water	water	2008-03-12	07:54	2008-03-12
153440	LDC Hot Water	water	2008-03-12	08:23	2008-03-12

	TPH DRO	TPH GRO	TX1005	
	DRO	GRO	C6-C12	>C12-C28
Sample - Field Code	(mg/L)	(mg/L)	(mg/L)	(mg/L)
153439 - LDC Cold Water	<5.00	<0.500	<5.00	<5.00
153440 - LDC Hot Water	<5.00	<0.500	<5.00	<5.00

Sample: 153439 - LDC Cold Water

Param	Flag	Result	Units	RL
Total Silver		<0.00500	mg/L	0.00500
Total Aluminum		<0.0500	mg/L	0.0500
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**126**	mg/L as CaCo3	5.00
Total Alkalinity		**126**	mg/L as CaCo3	5.00
Amenable Cyanide		<0.0100	mg/L	0.0100
Ammonia-N		**1.48**	mg/L	1.00
Total Arsenic		<0.00500	mg/L	0.00500
Total Boron		**0.0590**	mg/L	0.00500
Total Barium		**0.0240**	mg/L	0.00100
Total Beryllium		<0.00200	mg/L	0.00200
Total Calcium		**42.8**	mg/L	0.500
Total Cadmium		<0.00100	mg/L	0.00100
Chloride		**20.4**	mg/L	2.00
Chlorine		<0.0400	mg/L	0.0400
Free Chlorine		<0.0400	mg/L	0.0400
Chemical Oxygen Demand		<50.0	mg/L	50.0
Specific Conductance		**550**	uMHOS/cm	0.00
Total Chromium		<0.00100	mg/L	0.00100
Total Copper		**0.0150**	mg/L	0.00500

continued ...

sample 153439 continued ...

Param	Flag	Result	Units	RL
Total Iron		**0.0130**	mg/L	0.0100
Fluoride		**1.04**	mg/L	0.200
Free Cyanide		<0.0100	mg/L	0.0100
Total Mercury		<0.000200	mg/L	0.000200
Total Potassium		**2.11**	mg/L	0.500
Total Magnesium		**3.81**	mg/L	0.500
Total Manganese		<0.00250	mg/L	0.00250
Total Molybdenum		<0.0100	mg/L	0.0100
Total Sodium		**68.0**	mg/L	0.00
Total Nickel		<0.00500	mg/L	0.00500
Nitrite-N		<0.100	mg/L	0.100
Nitrate-N		**1.19**	mg/L	0.100
Total Lead		<0.00500	mg/L	0.00500
pH		**7.48**	s.u.	0.00
Phenolics		**0.260**	mg/L	0.130
PO4-P		<0.500	mg/L	0.500
Total Antimony		<0.0200	mg/L	0.0200
Total Selenium		<0.0100	mg/L	0.0100
Total Silica		**34.7**	mg/L	0.0500
Sulfate		**94.8**	mg/L	1.00
Sulfide		<0.100	mg/L	0.100
Total Dissolved Solids		**358**	mg/L	5.00
Total Kjeldahl Nitrogen - N		<6.00	mg/L	6.00
Total Thallium		<0.0200	mg/L	0.0200
Total Organic Carbon		<1.00	mg/L	1.00
Total Cyanide		<0.0150	mg/L	0.0150
Total Suspended Solids		<10.0	mg/L	10.0
Turbidity (Nephelometric)		**0.0800**	NTU	0.00
Bromochloromethane		<1.00	µg/L	1.00
Dichlorodifluoromethane		<1.00	µg/L	1.00
Chloromethane (methyl chloride)		<1.00	µg/L	1.00
Vinyl Chloride		<1.00	µg/L	1.00
Bromomethane (methyl bromide)		<5.00	µg/L	5.00
Chloroethane		<1.00	µg/L	1.00
Trichlorofluoromethane		<1.00	µg/L	1.00
Acetone		<10.0	µg/L	10.0
Iodomethane (methyl iodide)		<5.00	µg/L	5.00
Carbon Disulfide		<1.00	µg/L	1.00
Acrylonitrile		<1.00	µg/L	1.00
2-Butanone (MEK)		<5.00	µg/L	5.00
4-Methyl-2-pentanone (MIBK)		<5.00	µg/L	5.00
2-Hexanone		<5.00	µg/L	5.00
trans 1,4-Dichloro-2-butene		<10.0	µg/L	10.0
1,1-Dichloroethene		<1.00	µg/L	1.00
Methylene chloride		<5.00	µg/L	5.00
MTBE		<1.00	µg/L	1.00
trans-1,2-Dichloroethene		<1.00	µg/L	1.00
1,1-Dichloroethane		<1.00	µg/L	1.00
cis-1,2-Dichloroethene		<1.00	µg/L	1.00
2,2-Dichloropropane		<1.00	µg/L	1.00
1,2-Dichloroethane (EDC)		<1.00	µg/L	1.00
Chloroform		<1.00	µg/L	1.00
1,1,1-Trichloroethane		<1.00	µg/L	1.00

continued ...

sample 153439 continued ...

Param	Flag	Result	Units	RL
1,1-Dichloropropene		<1.00	µg/L	1.00
Benzene		<1.00	µg/L	1.00
Carbon Tetrachloride		<1.00	µg/L	1.00
1,2-Dichloropropane		<1.00	µg/L	1.00
Trichloroethene (TCE)		<1.00	µg/L	1.00
Dibromomethane (methylene bromide)		<1.00	µg/L	1.00
Bromodichloromethane		<1.00	µg/L	1.00
2-Chloroethyl vinyl ether		<5.00	µg/L	5.00
cis-1,3-Dichloropropene		<1.00	µg/L	1.00
trans-1,3-Dichloropropene		<1.00	µg/L	1.00
Toluene		<1.00	µg/L	1.00
1,1,2-Trichloroethane		<1.00	µg/L	1.00
1,3-Dichloropropane		<1.00	µg/L	1.00
Dibromochloromethane		<1.00	µg/L	1.00
1,2-Dibromoethane (EDB)		<1.00	µg/L	1.00
Tetrachloroethene (PCE)		<1.00	µg/L	1.00
Chlorobenzene		<1.00	µg/L	1.00
1,1,1,2-Tetrachloroethane		<1.00	µg/L	1.00
Ethylbenzene		<1.00	µg/L	1.00
m,p-Xylene		<1.00	µg/L	1.00
Bromoform		<1.00	µg/L	1.00
Styrene		<1.00	µg/L	1.00
o-Xylene		<1.00	µg/L	1.00
1,1,2,2-Tetrachloroethane		<1.00	µg/L	1.00
2-Chlorotoluene		<1.00	µg/L	1.00
1,2,3-Trichloropropane		<1.00	µg/L	1.00
Isopropylbenzene		<1.00	µg/L	1.00
Bromobenzene		<1.00	µg/L	1.00
n-Propylbenzene		<1.00	µg/L	1.00
1,3,5-Trimethylbenzene		<1.00	µg/L	1.00
tert-Butylbenzene		<1.00	µg/L	1.00
1,2,4-Trimethylbenzene		<1.00	µg/L	1.00
1,4-Dichlorobenzene (para)		<1.00	µg/L	1.00
sec-Butylbenzene		<1.00	µg/L	1.00
1,3-Dichlorobenzene (meta)		<1.00	µg/L	1.00
p-Isopropyltoluene		<1.00	µg/L	1.00
4-Chlorotoluene		<1.00	µg/L	1.00
1,2-Dichlorobenzene (ortho)		<1.00	µg/L	1.00
n-Butylbenzene		<1.00	µg/L	1.00
1,2-Dibromo-3-chloropropane		<5.00	µg/L	5.00
1,2,3-Trichlorobenzene		<5.00	µg/L	5.00
1,2,4-Trichlorobenzene		<5.00	µg/L	5.00
Naphthalene		<5.00	µg/L	5.00
Hexachlorobutadiene		<5.00	µg/L	5.00
Total Zinc		**0.0490**	mg/L	0.00700

Sample: 153440 - LDC Hot Water

Param	Flag	Result	Units	RL
Total Silver		<0.00500	mg/L	0.00500
Total Aluminum		<0.0500	mg/L	0.0500
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00

continued ...

sample 153440 continued ...

Param	Flag	Result	Units	RL
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**94.0**	mg/L as CaCo3	5.00
Total Alkalinity		**94.0**	mg/L as CaCo3	5.00
Amenable Cyanide		<0.0100	mg/L	0.0100
Ammonia-N		**1.01**	mg/L	1.00
Total Arsenic		<0.00500	mg/L	0.00500
Total Boron		**0.369**	mg/L	0.00500
Total Barium		**0.0590**	mg/L	0.00100
Total Beryllium		<0.00200	mg/L	0.00200
Total Calcium		**38.6**	mg/L	0.500
Total Cadmium		<0.00100	mg/L	0.00100
Chloride		**77.0**	mg/L	2.00
Chlorine		<0.0400	mg/L	0.0400
Free Chlorine		<0.0400	mg/L	0.0400
Chemical Oxygen Demand		<50.0	mg/L	50.0
Specific Conductance		**1600**	uMHOS/cm	0.00
Total Chromium		<0.00100	mg/L	0.00100
Total Copper		<0.00500	mg/L	0.00500
Total Iron		**0.138**	mg/L	0.0100
Fluoride		**9.95**	mg/L	0.200
Free Cyanide		<0.0100	mg/L	0.0100
Total Mercury		<0.000200	mg/L	0.000200
Total Potassium		**3.00**	mg/L	0.500
Total Magnesium		**25.3**	mg/L	0.500
Total Manganese		**0.0120**	mg/L	0.00250
Total Molybdenum		<0.0100	mg/L	0.0100
Total Sodium		**254**	mg/L	0.00
Total Nickel		<0.00500	mg/L	0.00500
Nitrite-N		<0.100	mg/L	0.100
Nitrate-N		**4.25**	mg/L	0.100
Total Lead		<0.00500	mg/L	0.00500
pH		**7.91**	s.u.	0.00
Phenolics		**0.139**	mg/L	0.130
PO4-P		<0.500	mg/L	0.500
Total Antimony		<0.0200	mg/L	0.0200
Total Selenium		**0.0460**	mg/L	0.0100
Total Silica		**113**	mg/L	0.0500
Sulfate		**476**	mg/L	1.00
Sulfide		<0.100	mg/L	0.100
Total Dissolved Solids		**1110**	mg/L	5.00
Total Kjeldahl Nitrogen - N		<6.00	mg/L	6.00
Total Thallium		<0.0200	mg/L	0.0200
Total Organic Carbon		<1.00	mg/L	1.00
Total Cyanide		<0.0150	mg/L	0.0150
Total Suspended Solids		<10.0	mg/L	10.0
Turbidity (Nephelometric)		**0.350**	NTU	0.00
Bromochloromethane		<1.00	µg/L	1.00
Dichlorodifluoromethane		<1.00	µg/L	1.00
Chloromethane (methyl chloride)		<1.00	µg/L	1.00
Vinyl Chloride		<1.00	µg/L	1.00
Bromomethane (methyl bromide)		<5.00	µg/L	5.00
Chloroethane		<1.00	µg/L	1.00
Trichlorofluoromethane		<1.00	µg/L	1.00

continued ...

sample 153440 continued ...

Param	Flag	Result	Units	RL
Acetone		<10.0	µg/L	10.0
Iodomethane (methyl iodide)		<5.00	µg/L	5.00
Carbon Disulfide		<1.00	µg/L	1.00
Acrylonitrile		<1.00	µg/L	1.00
2-Butanone (MEK)		<5.00	µg/L	5.00
4-Methyl-2-pentanone (MIBK)		<5.00	µg/L	5.00
2-Hexanone		<5.00	µg/L	5.00
trans 1,4-Dichloro-2-butene		<10.0	µg/L	10.0
1,1-Dichloroethene		<1.00	µg/L	1.00
Methylene chloride		<5.00	µg/L	5.00
MTBE		<1.00	µg/L	1.00
trans-1,2-Dichloroethene		<1.00	µg/L	1.00
1,1-Dichloroethane		<1.00	µg/L	1.00
cis-1,2-Dichloroethene		<1.00	µg/L	1.00
2,2-Dichloropropane		<1.00	µg/L	1.00
1,2-Dichloroethane (EDC)		<1.00	µg/L	1.00
Chloroform		<1.00	µg/L	1.00
1,1,1-Trichloroethane		<1.00	µg/L	1.00
1,1-Dichloropropene		<1.00	µg/L	1.00
Benzene		<1.00	µg/L	1.00
Carbon Tetrachloride		<1.00	µg/L	1.00
1,2-Dichloropropane		<1.00	µg/L	1.00
Trichloroethene (TCE)		<1.00	µg/L	1.00
Dibromomethane (methylene bromide)		<1.00	µg/L	1.00
Bromodichloromethane		<1.00	µg/L	1.00
2-Chloroethyl vinyl ether		<5.00	µg/L	5.00
cis-1,3-Dichloropropene		<1.00	µg/L	1.00
trans-1,3-Dichloropropene		<1.00	µg/L	1.00
Toluene		<1.00	µg/L	1.00
1,1,2-Trichloroethane		<1.00	µg/L	1.00
1,3-Dichloropropane		<1.00	µg/L	1.00
Dibromochloromethane		<1.00	µg/L	1.00
1,2-Dibromoethane (EDB)		<1.00	µg/L	1.00
Tetrachloroethene (PCE)		<1.00	µg/L	1.00
Chlorobenzene		<1.00	µg/L	1.00
1,1,1,2-Tetrachloroethane		<1.00	µg/L	1.00
Ethylbenzene		<1.00	µg/L	1.00
m,p-Xylene		<1.00	µg/L	1.00
Bromoform		<1.00	µg/L	1.00
Styrene		<1.00	µg/L	1.00
o-Xylene		<1.00	µg/L	1.00
1,1,2,2-Tetrachloroethane		<1.00	µg/L	1.00
2-Chlorotoluene		<1.00	µg/L	1.00
1,2,3-Trichloropropane		<1.00	µg/L	1.00
Isopropylbenzene		<1.00	µg/L	1.00
Bromobenzene		<1.00	µg/L	1.00
n-Propylbenzene		<1.00	µg/L	1.00
1,3,5-Trimethylbenzene		<1.00	µg/L	1.00
tert-Butylbenzene		<1.00	µg/L	1.00
1,2,4-Trimethylbenzene		<1.00	µg/L	1.00
1,4-Dichlorobenzene (para)		<1.00	µg/L	1.00
sec-Butylbenzene		<1.00	µg/L	1.00
1,3-Dichlorobenzene (meta)		<1.00	µg/L	1.00

continued ...

sample 153440 continued ...

Param	Flag	Result	Units	RL
p-Isopropyltoluene		<1.00	µg/L	1.00
4-Chlorotoluene		<1.00	µg/L	1.00
1,2-Dichlorobenzene (ortho)		<1.00	µg/L	1.00
n-Butylbenzene		<1.00	µg/L	1.00
1,2-Dibromo-3-chloropropane		<5.00	µg/L	5.00
1,2,3-Trichlorobenzene		<5.00	µg/L	5.00
1,2,4-Trichlorobenzene		<5.00	µg/L	5.00
Naphthalene		<5.00	µg/L	5.00
Hexachlorobutadiene		<5.00	µg/L	5.00
Total Zinc		<0.00700	mg/L	0.00700

Final Technical Report

Geothermal Resource Evaluation and Definition Program

FINAL TECHNICAL REPORT
GEOTHERMAL RESOURCE EVALUATION
AND DEFINITION (GRED) PROGRAM — PHASES I, II and III
for
THE ANIMAS VALLEY, NM GEOTHERMAL RESOURCE

United States Department of Energy
Albuquerque Operations Office
Cooperative Agreement No. DE-FC04-00AL66977

By:

Roy A. Cunniff and Roger L. Bowers
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August 2005

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ABSTRACT

This report contains a detailed summary of a methodical and comprehensive assessment of the potential of the Animas Valley, New Mexico geothermal resource leasehold owned by Lightning Dock Geothermal, Inc. Work described herein was completed under the auspices of the **Department of Energy (DOE) Cooperative Agreement DE-FC04-00AL66977, Geothermal Resource Evaluation and Definition (GRED) Program,** and the work covers the time span from June 2001 through June 2004. A relatively minor segment of this overall program was funded through the DOE Cooperative Agreement DE-FC07-01ID14203 for the Enhanced Geothermal Systems Technology (EGS) Program, and covered completion of two intermediate-depth temperature gradient holes. The Final Report on that segment was released in December 2003, under the report title, "Final Report, Enhanced Geothermal Systems Technology Phase II, Animas Valley, New Mexico." Total DOE plus LDG program funding for the two Cooperative Agreements was $2.2 million, with DOE providing 54 percent and LDG furnishing 46 percent.

Included in this new report are detailed results from the GRED Program, including: geophysical and geochemical surveys, reflection seismic surveys, aeromagnetic surveys, gravity and electrical resistivity surveys, soil thermal ion and soil carbon dioxide flux surveys, four temperature gradient holes, and one deep exploratory well. Summary results from the drilling program are shown below:

WELL NAME	LOCATION	DEPTH (m)	BHT (°C)
TG12-7*	1.0 km N of TFD55-7	305	69
TG56-14*	4 km SW of TFD55-7	381	36
TG36-7	0.5 km SW of TFD55-7	305	90
TG57-7	0.5 km SE of TFD55-7	278	108**
TG52-7	0.5 km N of TFD55-7	771	137

Gradient holes designated with an asterisk were completed under the EGS Cooperative Agreement
Double asterisk for TG57-7 indicates this value is maximum temperature

Results from the deep exploratory hole TG52-7, completed to 771 m (2,528 feet) are: a) Hole spudded on 25 June 2003, and drilling completed on 15 October 2003; b) geophysical and temperature logs and short-term controlled flow test completed, and c) water samples acquired and preliminary reservoir hydrology assessments completed.

Results from the final seismic traverses completed to tie together lithology from gradient and deep exploratory holes, and to develop an integrated resource model are summarized as follows:

> A seismic traverse oriented in a NW-SE alignment portrays a chaotic subsurface regime that contains numerous dipping structures, and likely folded and compressed structures. Two principle faults appear to bound and create a graben, with the graben strata folded and compressed. An E-W traverse depicts a structural setting in which the mapped surface expression (eroded fault scarp) of the old Animas Valley Fault (a Recent, basin-bounding fault along the eastern margin of the valley) cannot be directly tied to the subsurface structures creating the intense shallow geothermal anomaly.

Overall resource assessment is that the potential commercial reservoir contains minimum of 15 MW net to the grid. This compares favorably with the earlier assessment, completed before the drilling and final seismic traverses, that the resource comprised 5 to 15 MW reservoir capacity.

ACKNOWLEDGMENTS

The authors acknowledge the support of several individuals and their contributions to this project:

- Mr. Dan Sanchez, DOE Albuquerque Operations Office, for his firm but friendly management as the program evolved through many twists and turns over four years,

- Dr. Norm Warpinski, Sandia Labs, for invaluable technical assistance through out the completion of the program,

- Mr. Allan Sattler, Sandia Labs, for his technical contributions and a firm "friend in court" for the many problems and technical challenges that arose during the program,

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Our thanks to Mr. Dale Burgett and Mr. Tom McCants for allowing us access on their private land. Special thanks to Mr. Burgett for his cooperation and support during drilling operations and also during the completion of the final seismic surveys.

During the long course of this program, both authors suffered serious medical problems that required surgery and long recovery periods, thus delaying completion of the project. Our sincerest thanks to Dan Sanchez, Norm Warpinski, and Allan Sattler for their patience, understanding, and continued support of our efforts.

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INTRODUCTION

BACKGROUND

Lightning Dock Geothermal, Inc. ("LDG") is the owner of Federal Geothermal Lease NM-34790, comprising about 2,501 acres, in the Animas Valley of Hidalgo County, New Mexico. In addition, in February 2003, LDG filed an application for a second lease comprising some 640 acres adjoining NM-34790. These leases include a shallow and relatively high-temperature geothermal resource that has been developed for direct heating of greenhouses and a fish farm. A deep well drilled by Steam Reserve Corporation in 1984 found high temperatures (>150°C) and significant water flow at a depth of about 350 meters (1,150 feet). Earlier geothermal and geophysical data suggested that the Animas resource was arguably the best prospective geothermal resource for commercially developable electrical power production in New Mexico, but little was known about the lateral extent and deeper characteristics of the reservoir.

The project area covered more than one hundred fifty (150) square kilometers centered more or less on the developed geothermal resource in the northern part of Animas Valley in Hidalgo County. Cotton City is at the southwest corner of the project area.

RESEARCH PROGRAM FUNDING

The DOE program, "GeoPowering the West", provided LDG with the opportunity to further explore and define the resource. Work described herein was completed under the auspices of the Department of Energy (DOE) Cooperative Agreement DE-FC04-00AL66977, Geothermal Resource Evaluation and Definition (GRED) Program, and covers the time span from June 2001 through June 2004. A relatively minor segment of this overall program was funded through the DOE Cooperative Agreement DE-FC07-01ID14203 for the Enhanced Geothermal Systems Technology (EGS) Program, and covered completion of two intermediate-depth temperature gradient holes. The Final Report on that segment was released in December 2003, under the title, "Final Report, Enhanced Geothermal Systems Technology Phase II, Animas Valley, New Mexico."

Total DOE plus LDG program funding for the two Cooperative Agreements was $2.220 million, with DOE providing 53 percent and LDG furnishing 47 percent. Distribution of this funding, by fund source and program, is shown as follows, with dollar amounts listed in millions of dollars:

Cooperative Agreement	DOE Funds	LDG Funds	Total Funds
GRED	$ 0.979	$ 0.821	$ 1.800
EGS	$ 0.200	$ 0.220	$ 0.420
TOTALS	**$ 1.179**	**$ 1.041**	**$ 2.220**
	(53 %)	(47 %)	

SCOPE OF THE REPORT

This report includes a detailed summary of a comprehensive and methodical geothermal assessment of this major geothermal resource. This new assessment had the key objective of developing a unified structural model of the geothermal resource to provide a foundation for ultimate commercial development. This objective was achieved through the use of multiple geophysical surveys and the drilling of deep temperature-gradient and test holes. Using a cost-shared Cooperative Agreement with the Department of Energy under the Geothermal Resource Evaluation and Definition (GRED) Program, LDG conducted work in three phases.

- Phase I was conducted during the time frame from June 2001 through May 2002, and work included field surveys and analytical work covering gravity, dipole-dipole electrical resistivity, and high-resolution aeromagnetic surveys.

- Phase II activities commenced in June 2002 and extended to June 2004. In this phase, reflection seismic surveys were completed, a soil thermal ion survey was conducted, soil gas studies for carbon dioxide flux were completed, and four intermediate-depth temperature gradient holes were drilled to depths ranging from

970 to 1,250 feet (295 to 381 m). (Two gradient holes were partially funded through an Enhanced Geothermal Systems ("EGS") Cooperative Agreement, and two were funded by this GRED Cooperative Agreement.) As a final major exploratory activity, a deep test well was completed to a depth of 2,528 feet (771 m), and this well was analyzed through multiple temperature surveys and water sampling at discrete break points in the drilling.

- Phase III comprised two separate tasks. The first was completion of an abbreviated controlled flow test of TG52-7. The final action was completion of two new reflection seismic surveys to integrate subsurface lithology from gradient holes into a unified structural model.

This report also summarizes the integration of new data with previously acquired geophysical data and interpretations of the thermal data. The integration of new and old data has led to new thermo/structural models of the geothermal circulation system that will serve as a foundation for future development of the resource.

The report is organized with a brief summary section providing the locale and geological setting of the Animas Valley geothermal anomaly. Following this introductory section, each of the sequential research tasks is summarized in detail. The tasks are presented in chronological sequence. Each separate task includes a brief summary of methodology followed by a succinct summary of the key findings from completion of that task.

LOCATION

The Lightning Dock Known Geothermal Resource Area (KRGA) is on the east side of Animas Valley, approximately thirty (30) km southwest of the town of Lordsburg, New Mexico and sixteen (16) km south of Interstate Highway 10 (figure 1). Although the KGRA covers several square kilometers, the known shallow geothermal resource is primarily in Sections 6 and 7 of Township 25 South, Range 19 West, NMPM. The KGRA area is covered by the Cotton City, Steins, Swallow Fork Peak, and Table Top

Mountain 7.5-minute series U.S. Geological Survey topographic quadrangle maps (scale 1:24,000), the Lordsburg 30' x 1°-series metric map (scale 1:100,000), and the Silver City 1° x 2°-series map (scale 1:250,000).

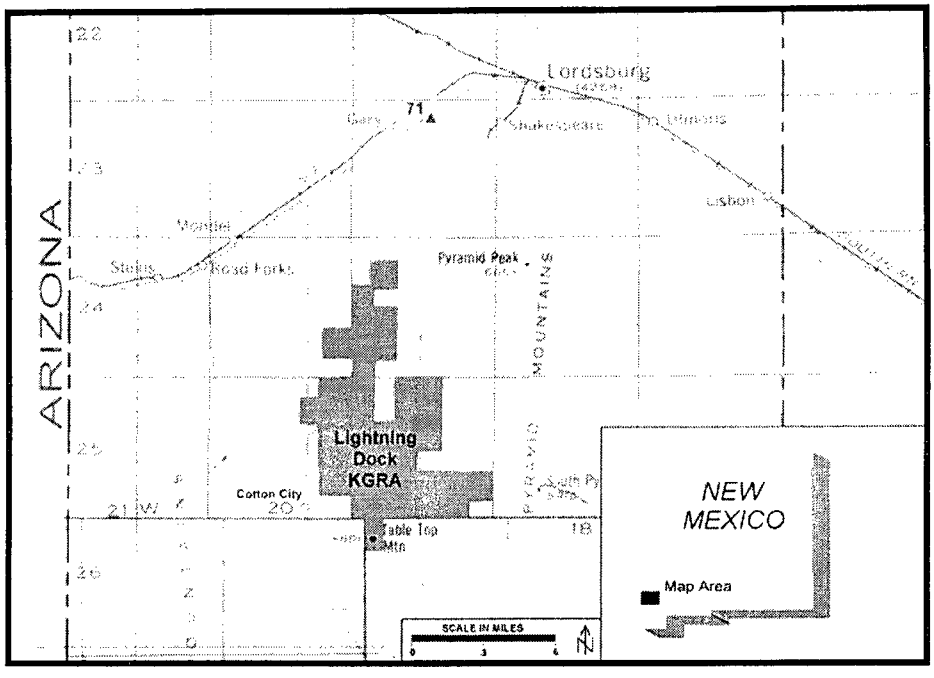

Figure 1. Lightning Dock Known Geothermal Resource Area.

GEOLOGIC SETTING

The Animas Valley of southwestern New Mexico is in the Mexican Highland part of the Basin and Range Province of the Western United States. The complexity of the Animas Valley area is demonstrated by the widely differing structure, stratigraphy, and ages of rocks exposed in the surrounding mountain ranges. The Animas Valley is a topographic low and a structural graben, and is bounded on the west by the Peloncillo Mountains and on the east by the Pyramid Mountains (figure 2). The primary structural trends in the area are the north-trending Basin and Range features and an inferred caldera ring-fracture zone. Relatively young basaltic volcanism is widespread in the area with the most recent activity being a small cinder cone dated at 140,000 years ago on the west side of the valley. These Cenozoic features are superimposed on a Laramide thrust belt setting that

in turn occurs at the edge of the Paleozoic cratonic region of North America (Chang et al, 1999; Corbitt and Woodward 1973, and Woodward and Duchene, 1981). Elston, et al, (1983) give a good overview of the geology and provide a thorough geochemical analysis of the waters of the Lightning Dock KGRA.

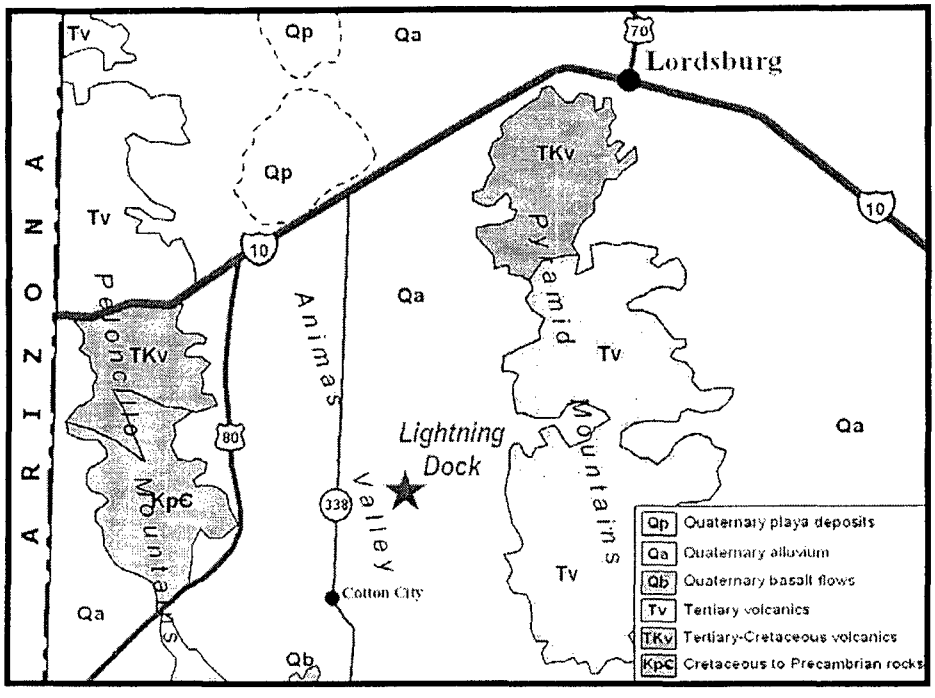

Figure 2. Geologic map of the Animas Valley region.

According to Blackwell and Wisian (2001), gravity data illustrate the basement and fault structure of Animas Valley. North-trending, range-bounding faults define the valley on the west and east. An east-northeast-trending fault with a right-lateral component appears to cut across the valley through the production area. Blackwell and Wisian also filtered and inverted the gravity data to produce a depth-to-basement map that highlights the northeast-southwest structural trend across the Animas Valley.

Rocks exposed in the bordering mountain ranges include Precambrian granodiorite, Paleozoic and Mesozoic sedimentary rocks, Tertiary/Cretaceous volcanic rocks, Tertiary intrusive rocks, Tertiary conglomerate, Quaternary/Tertiary basalt flows, and

Quaternary/Tertiary conglomerate (O'Brien and Stone, 1984). The Pyramid Mountains, composed of rocks primarily of Cretaceous age and younger (Flege, 1959), form a complex volcanic sequence known as the Muir cauldron (Deal and others, 1978, and Elston et al, 1983). In contrast, the Peloncillo Mountains consist of a Precambrian granite core, a complete Paleozoic section, Cretaceous sedimentary rocks, and Tertiary intrusive and eruptive rocks (Gillerman, 1958, Dane and Bachman, 1961, and Dane and Bachman, 1965).

PREVIOUS WORK

Smith (1978) summarized geophysical data available as of the late 1970's. Blackwell and Wisian (2001) described and modeled the thermal data and integrated the data with available geophysical information, particularly gravity data compiled by Dr. George R. Keller at the University of Texas at El Paso (2000). Blackwell and Wisian analyzed the public-domain gravity data as part of the EGS (Enhanced Geothermal Systems) DOE Cooperative Agreement with LDG and Ormat, Inc. Cunniff and Bowers (2001) summarized the pertinent previous work and discussed implications of structural controls. Cunniff and Bowers (2003a) provided a comprehensive review of all facets of prior work, including the new fieldwork completed in GRED Phase I and the initial reflection seismic surveys. This document presented an assessment of likely reservoir productivity completed in advance of the gradient hole drilling program and final reflection seismic surveys described herein.

GEOPHYSICAL SURVEYS – 2001

To initiate Phase I work, a limited gravity survey was conducted in April 2001. Three additional geophysical surveys, namely gravity, high-resolution aeromagnetics, and dipole-dipole electrical resistivity, were conducted concurrently during October 2001.

GRAVITY SURVEYS

Location

Two separate gravity surveys were conducted by LDG as part of this GRED Cooperative Agreement. The first survey was conducted in April 2001 and consisted of 77 stations in the north half of Section 7 and south half of Section 6, both sections being in Township 25 South, Range 19 West. A second and much larger survey was conducted in October 2001. This survey consisted of 227 new stations in nine linear traverses that covered more than one hundred (100) square kilometers centered on the known resource area in Section 7 (figure 3). The following data acquisition and data processing descriptions pertain to both surveys.

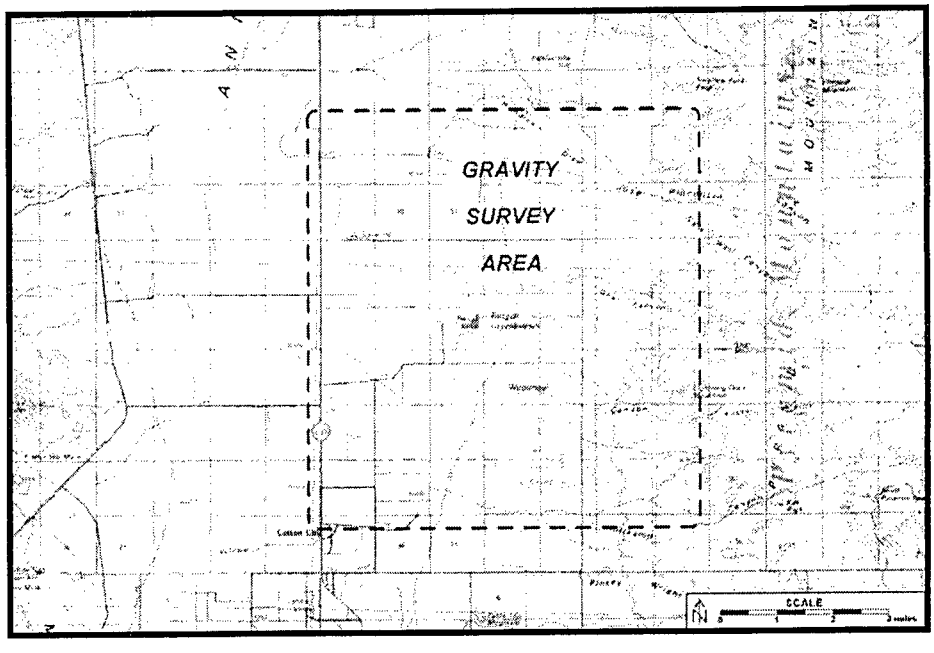

Figure 3. Gravity survey area.

Data Acquisition

The gravity station layouts were planned in advance and plotted on maps. After flagging and surveying each station location, gravity measurements were taken with a LaCoste and Rhomberg Model G gravimeter. Base stations were initially established from public-domain data of previous surveys obtained from Keller (2000). Multiple measurements were taken at the base stations throughout the conduct of the surveys. All gravity measurements of the April 2001 survey were taken by Roger Bowers of LDG and the data were later reduced by Claron Mackelprang (2001) of Consolidated Geophysical Surveys in Cedar City, Utah. All gravity measurements of the October 2001 survey were taken by Claron Mackelprang and all data were reduced by him.

Field Procedures

Several base stations were established and the observed gravity for these base stations were taken from public-domain regional data obtained from Keller (2000). Data were also obtained from the U.S. Geological Survey and the National Geophysical Data Center of NOAA. The observed gravity values for the base stations were taken from the public-domain stations.

All gravimeter counter readings were corrected in the field for the instrument calibration factor. Spring tension, the measure of all components of acceleration when the beam is in its null position, was converted into milligals by multiplying by the meter constant, which is unique for each instrument. LaCoste and Rhomberg calibrated the gravimeter and the calibration factor was supplied with the instrument.

Data Processing

All field data for both surveys were processed by Claron Mackelprang (2001). He used a computer program, written by the LaCoste and Rhomberg Company, that applies drift, free-air, and theoretical (latitude) corrections to the field data to obtain the Simple Bouguer values for a range of rock densities. The software gives Bouguer gravity values for four rock densities of geologic range: 1.80, 2.10, 2.40, and 2.67 g/cc. Bouguer values

for the rock density of 2.67 g/cc were used in this report. The topographic relief of the survey area is minimal; therefore no terrain corrections were applied to data of these surveys.

Results

Gravity data were reviewed and interpreted by Blackwell and Leidig (2002), who concluded: "The prominent nose on the residual gravity pattern has been interpreted to indicate a horst on the pre-valley-fill units." This gravity horst also correlates with the regional gravity data, which also shows a gravity high "nose" extending northward from the south that appears to terminate in the area of the shallow thermal anomaly. It was hoped that this survey would pinpoint the location of the Animas Valley Fault in the thermal anomaly area and the tighter contour spacing trending northeast from well TFD55-7 may indeed indicate a fault. However, it is believed that the gravity survey primarily delineated the northern edge of the buried Laramide overthrust as mapped and described by Woodward and Duchene, 1981 (figure 4).

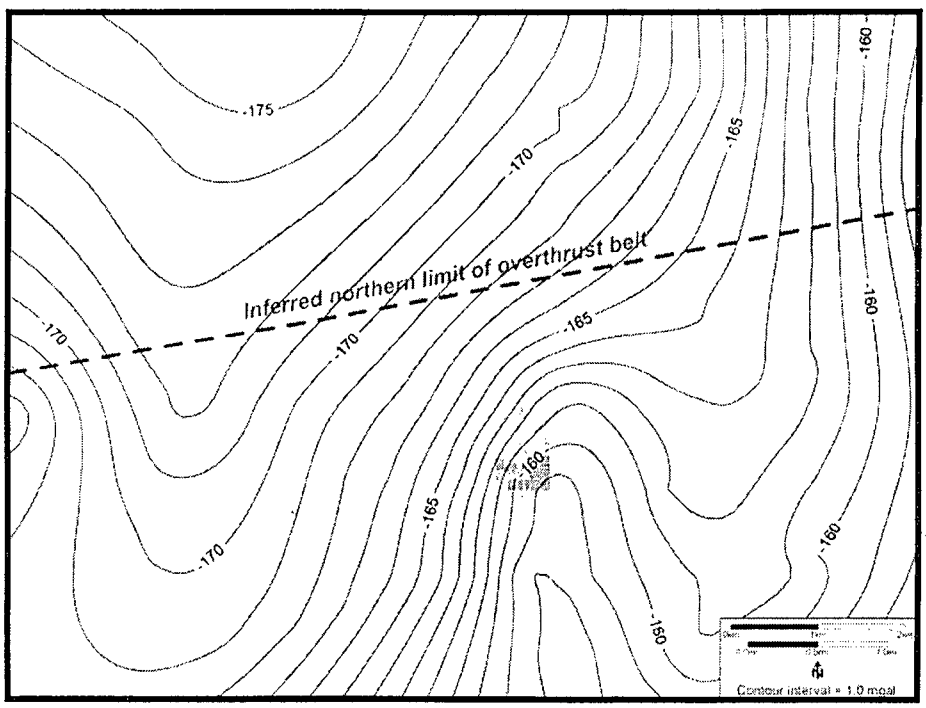

Figure 4. Simple Bouguer gravity contours.

ELECTRICAL RESISTIVITY SURVEY

Location

Claron Mackelprang (2001) of Consolidated Geophysical Surveys, Cedar City, Utah, conducted the electrical resistivity dipole-dipole survey in October 2001. Two electrical resistivity survey lines were run in the project area: a southern east-west line along Caliche Road, and a northern east-west line in the south half Section 6, T25S, R19W (figure 5). The Caliche Road line is located south of the greenhouse complex and was run along the road, which was also used for a gravity traverse. The northern line, named "Church Road", was parallel to the east-west road and gravity traverse, but was offset northward more than 500 feet to avoid the producing geothermal wells and other man-made cultural effects in the area. The locations for these two resistivity lines were selected from the gravity data in an attempt to cross the Animas Valley Fault.

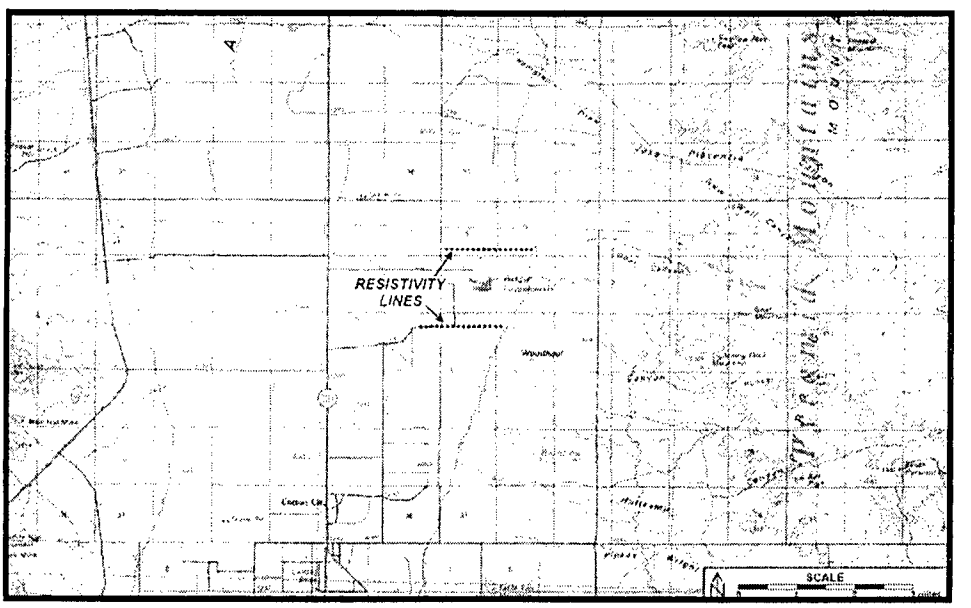

Figure 5. Location of dipole-dipole electrical resistivity lines.

Data Acquisition

The electrical resistivity data were acquired using a 7-spread, dipole-dipole array with 500-foot spacings. Data were collected to sounding depths of n = 6. Once the dipole

center location was selected, the wires were laid out and all locations were surveyed. Electrodes were dug into the ground and conductivity was insured with salt and water. After all electrodes were in place, the generator was started and readings began.

Results

Caliche Road Line

A theoretical block model of the subsurface along the resistivity line was derived using a 2-dimensional, finite element, forward modeling algorithm. The model generates resistivity values that agree to within +/- 10 percent of the observed values. An exact fit is not realistic since a 2-D model is used to match 3-D data. The advantage of being able to generate a block model is that thickness and position of resistivity features can be better identified. The block model for the Caliche Road line is shown in Figure 6.

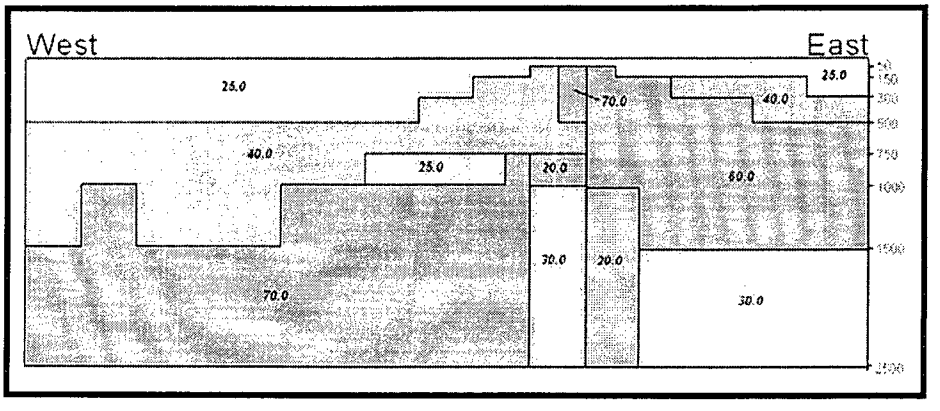

Figure 6. Resistivity block model for the Caliche Road line (from Mackelprang, 2001).

Church Road Line

The resistivity block model of the Church Road line show a shallow zone of very low resistivities (<10 ohm.m) in the central part of the line (figure 7). The nearby producing geothermal well is within this interval; hence, a shallow geothermal plume is probably associated with these low resistivities. A thick section of low resistivity in the range of 10 to 20 ohm.m is present under most of the eastern side of the line. This most likely represents unconsolidated valley fill. A fault is indicated near the east end of the line.

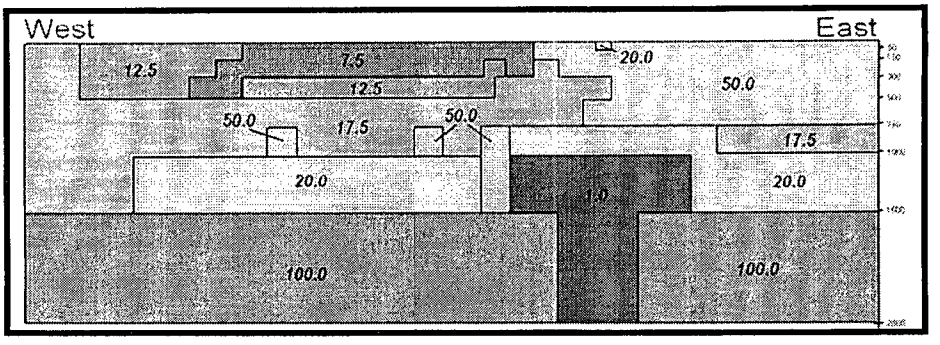

Figure 7. Resistivity block model for the Church Road line (from Mackelprang, 2001).

HIGH-RESOLUTION AEROMAGNETIC SURVEY

In the late 1990's, the U.S. Geological Survey conducted high-resolution aeromagnetic surveys of the Albuquerque Basin in central New Mexico. These detailed surveys successfully identified subsurface faults in shallow volcanic rocks under thin alluvial cover. The geologic setting of Animas Valley is similar in that shallow volcanic rocks cover the geothermal area, but faults are obscured by thin alluvium. Based on the success of the Albuquerque Basin surveys and the similarities in geology at Animas, LDG completed this type of survey at the Lightning Dock geothermal resource.

In October 2001, TerraCon, Inc. (2001) of Arlington, Texas conducted the high-resolution aeromagnetic survey that was designed to explore the known, shallow geothermal resource and surrounding area. Shallow-subsurface Tertiary volcanic rocks were used as a magnetic basis for mapping structures.

Survey Description

The survey was planned to cover the project area (figure 8) with east-west flight lines spaced 200 meters apart and flown at approximately 200 meters above ground level (AGL). North-south tie lines were planned at 1,000-meter spacing. It was anticipated that this flight line configuration would provide maximum definition of the known north-south Animas Valley fault zone and of suspected en echelon structures, including a north-

south tending gravity high or possible horst structure. Evidence of local structures included previous regional gravity surveys, regional geologic trend analysis, and proprietary studies of air photos.

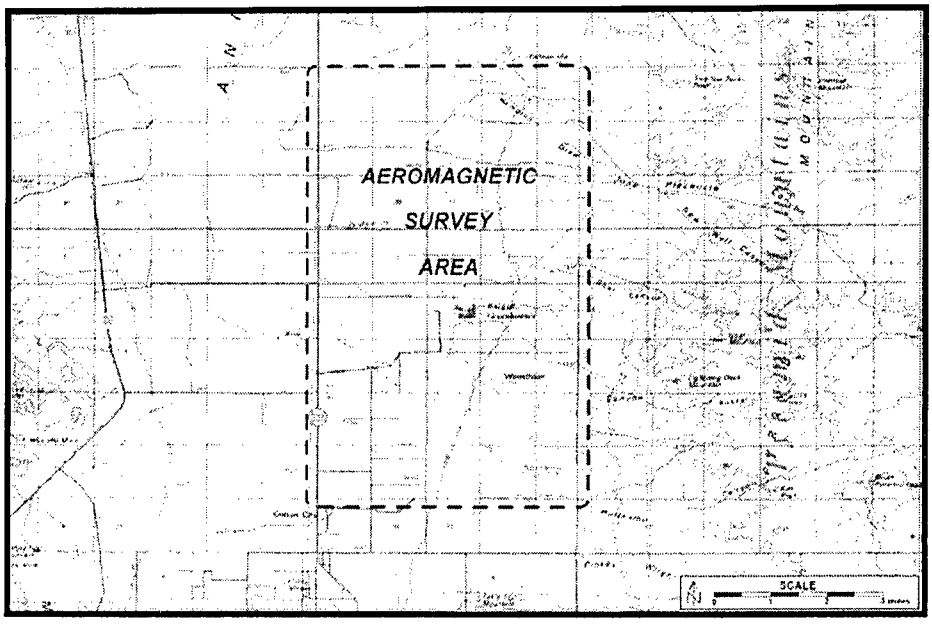

Figure 8. Aeromagnetic survey area.

The magnetic data were acquired at a fixed barometric altitude of 4,800 feet above mean sea level (MSL), which is approximately 200 meters AGL of the main target area in Section 7, Township 25 South, Range 19 West. This fixed flight altitude also provided a stable data set and facilitated data processing. Some flight lines on the east side of the project area had to be modified for safety reasons, since the topography rises abruptly on the flank of the Pyramid Mountains.

After most of the 4,800-ft MSL data had been acquired, the project was expanded to include flight lines at a lower altitude of 4,500 feet MSL or approximately 100 meters AGL. These additional flight lines covered a much smaller area around the thermal anomaly and southward. The lines could not be extended too far east and south due to the flight safety concerns of being too close to the ground and windy weather conditions. For flight safety reasons, the flight lines were re-oriented from east-west to north-south.

Data Acquisition

All field and flight operations were managed by Mr. Kirby Mills of MAG-1 Geoscience, Rome, Georgia. The assembly of data and field quality control were performed by Dr. James Fink of hydroGEOPHYSICS, Tucson, Arizona. A single-engine fixed-wing aircraft (Cessna 172) was used to acquire the magnetic data. The Geometrics 826A magnetometer was installed in the Cessna and was sampled at 10 Hz. The data acquisition unit, including GPS receiver, memory and power source, was housed in the cabin. All magnetic data were collected at a 0.1-second sample rate.

A Geometrics Model G856 magnetometer was located on the ground near the center of the survey area and set to record the magnetic diurnal variation during airborne data acquisition. This location was selected for its distance and remoteness from cultural disturbances, including vehicle traffic and roaming cattle, and yet ease of access and safety. All base station magnetic data were collected at a 5.0-second sample rate. The airborne data were later corrected with this base station information. At the same location, a Trimble Pro XR GPS base station recorded deviation used in processing to provide differential error correction of the aircraft navigation. GPS readings were recorded at a 30.0-second sample rate.

Flights were made during early morning hours in wind conditions of less than 10 mph. As thermal heating throughout the morning hours created increasing turbulence near the ground, it was too difficult to maintain a fixed flight altitude. Overall, the weather conditions were very windy throughout the entire survey. Flights started at sunrise, but commonly lasted only two or three hours before winds increased to unacceptable or unsafe speeds.

Solar Terrestrial Index and magnetic disturbance were monitored by telephone daily with the Solar Physics Lab in Boulder, Colorado. During the first week of the survey, the diurnal magnetic field activity increased from K-3 (quiet to unsettled) to significantly larger disturbances from solar storms. Most international and domestic aeromagnetic surveys were suspended for several days due to the extreme disturbances.

From October 11 through October 24, 2001,Terracon acquired high-resolution airborne magnetic data comprising a total of 2,361 line-kilometers, representing 209 separate flight lines, flown and field processed for quality control. Covering the area of the Lightning Dock KGRA and approximately centered on the known shallow thermal anomaly, the data are divided into four specific sets (total line-kilometers flown):

- 834 line-kilometers north-south at a constant flight altitude of 4800 feet MSL (approximately 200 meters AGL) and 500-meter line separation,

- 1,190 line-kilometers east-west at a constant flight altitude of 4800 feet MSL (approximately 200 meters AGL) and 200-meter line separation,

- 228 line-kilometers north-south at a constant flight altitude 4500 feet MSL (approximately 100 meters AGL) and 200-meter line separation, and,

- 109 line-kilometers east-west at a constant flight altitude 4500feet MSL (approximately 100 meters AGL) used as tie lines.

Data Processing

All survey data collected by Terracon, Inc. were processed by Pearson, deRidder, and Johnson, Inc. (PRJ), Engelwood, Colorado, under the supervision and direction of Dr. Richard Hansen. The GPS base station readings were used to correct the airborne GPS data, utilizing full differential GPS processing. This processing gave accurate latitudes and longitudes (World Geodetic System 1984 datum) of the magnetic readings.

The magnetic data were edited by PRJ to take out erroneous data points that could alter the final products. The IGRF (International Geomagnetic Reference Field) was calculated and applied along with Diurnal and Heading corrections. PRJ then adjusted the leveling to correct some of the miss-ties between flight lines. Data were gridded separately for the 4,800-foot MSL (200-m AGL) and 4,500-foot MSL (100-m AGL) data sets. In addition, each data set was filtered to remove shallow magnetic sources.

Results

The residual magnetic map for the 200-meter AGL survey is shown in Figure 9 and the residual magnetic map for the 100-meter AGL survey is shown in Figure 10. Blackwell and Leidig (2002) analyzed and interpreted the magnetic data:

> *"Both of the contoured magnetic maps show essentially the same information. The main features are very high amplitude positive anomalies at the southeast, east, and northern edges of the survey caused by the exposed igneous rocks in the ranges. These anomalies are accentuated by the fact that the flight lines are closer to the ground in these areas due to elevation increases into the ranges bordering the Animas Valley. The western half of the map is dominated by low amplitude relatively smooth patterns due to the thick cover of alluvium over any volcanics that occur in the valley areas. The center of the map area is occupied by a positive/negative anomaly pair in the south that grades into a negative only anomaly in the north central part of the area."*

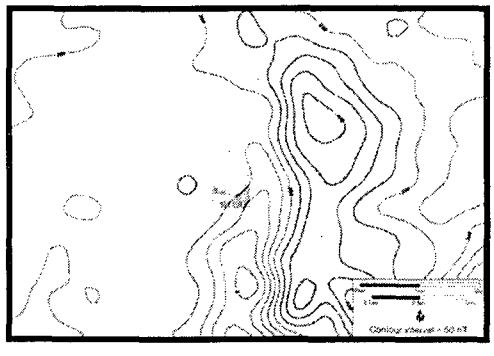

Figure 9. Residual magnetic contours (in nT) for the 200-m AGL survey.

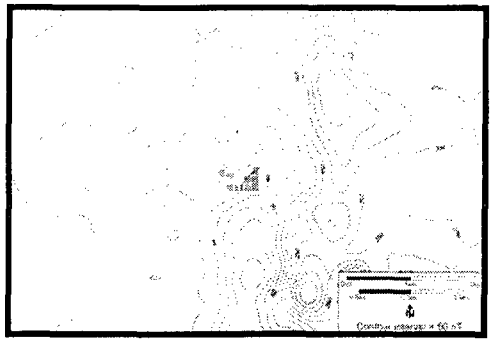

Figure 10. Residual magnetic contours (in nT) for the 100-m AGL survey.

SUMMARY OF GRAVITY AND MAGNETIC DATA

All gravity and magnetic data were reviewed, interpreted, and modeled by Dr. David Blackwell and Mark Leidig of Southern Methodist University, Dallas, Texas. According to their report (Blackwell and Leidig, 2002):

> *"The models through the 55-7 well that fit the magnetic data best share the common feature in that they all put the 55-7 well to the west of the Animas Valley fault, which appears responsible for the narrowing of the magnetic anomaly near the wells by thinning the volcanics. But this sort of model is hard to reconcile with the geologic section in the 55-7 well that has Paleozoic basement at 400 m depth. The gravity data at the 55-7 well indicates that the horst is 2 km wide, but the magnetic data indicates the uplifted volcanics are only 1 km wide and on the east side of the horst. If the fault is assumed to go through the 55-7 well at the temperature overturn at the base of the volcanics then it must have a very low dip from the surface position. Matching the magnetic data and well lithologies with a geologically realistic model and a shallowly dipping Animas Valley fault is extremely difficult if even possible. It is more likely that there is another structure to the west of the 55-7 well bounding the west side of the horst. This westward fault would be the major horst bounding structure while the Animas Valley fault runs through the middle of the horst and thins the volcanic layer on the west side. The magnetic data indicate that the volcanics on the horst around the 55-7 well have been thinned, but the geologic section shows 300 m of volcanics down to 400 m depth. It is difficult to thin the volcanics and match the well lithology simultaneously, but may be possible with two or more faults.*
>
> *The cause of the uplift in the basement of Animas Valley is unknown, but it is likely that the uplift is fault bounded on both sides for most of its length. The mapped Animas Valley fault runs through the gravity nose and does not bound the west side of the uplift north of 3,558,000 N. There appears to be a different fault bounding the west side of the uplift and a third unmapped fault probably bounds the uplift on the east. The faults appear to converge north of the 55-7 well. It is unclear how the structure changes and continues beyond this convergence. The high temperature wells including 55-7 are west of an eastward bend in the magnetic anomaly. It is also not clear why the magnetic anomaly bends and thins out while the gravity anomaly continues northward.*

Blackwell and Leidig (2002) identified numerous lineaments in the mapped magnetic data. Some of these "magnetic linears" correlated with ground features visible on air photos and with structural trends inferred from other geophysical and geochemical surveys. Blackwell and Leidig produced a composite map of the gravity contours, magnetic intensity, temperatures at a depth of 50 meters, the Animas Valley Fault, and air photo linear features (figure 11).

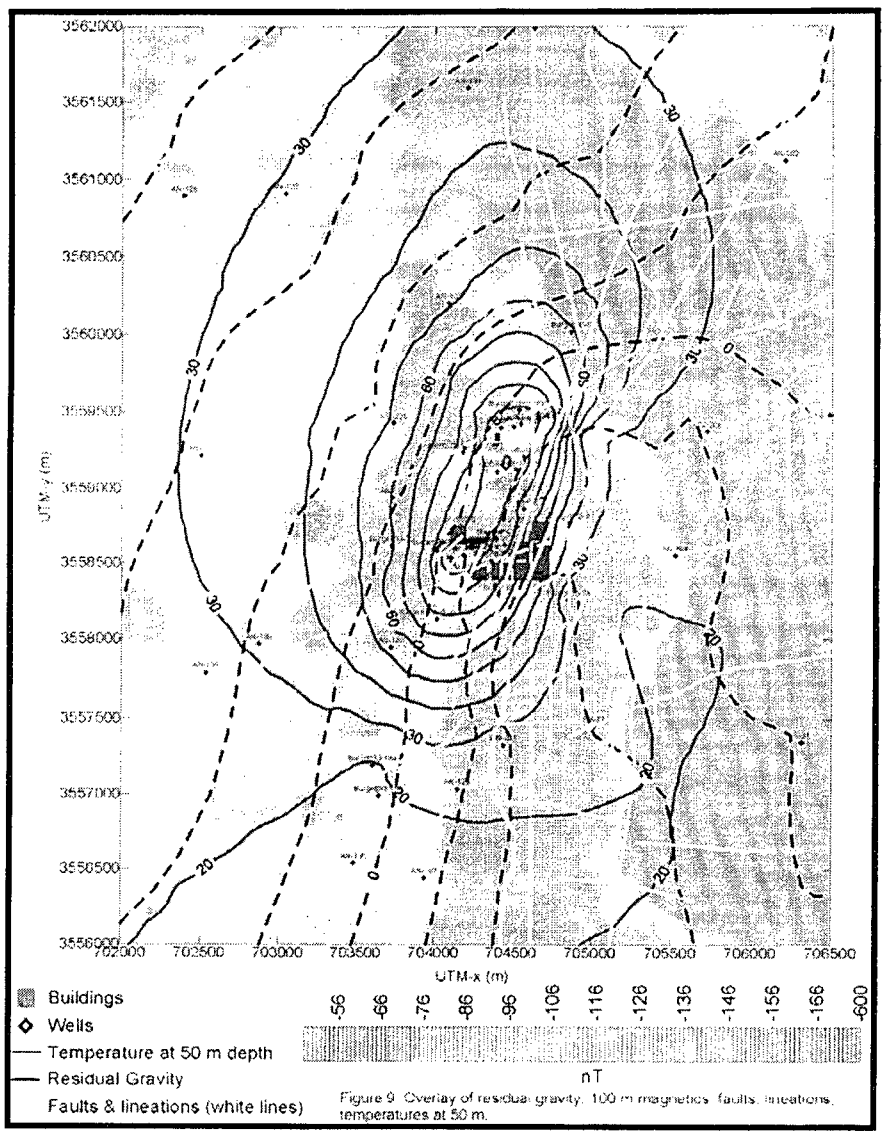

Figure 11. Composite geophysical map (from Blackwell and Leidig, 2002).

SEISMIC SURVEYS – 2002

Phase II of the overall GRED Program included several actions, as follows: Acquiring new seismic data both from industry sources as well as new field traverses, conducting soil-ion and soil-carbon-dioxide measurements, completing two nominal 330-m-deep temperature gradient holes, and drilling a deep exploratory well. The following section provides details covering the seismic program completed in 2002.

OLD INDUSTRY DATA.

LDG negotiated with the trustee for Cockrell Corporation for the purchase of some 16 lineal miles of 6-fold vibroseis data acquired in the early 1960's. After review of the available field notes and data acquisition techniques, LDG chose not to buy the data.

Harvey Seismic Services, Inc. completed almost 65 line miles of seismic vibroseis surveys in the lower Animas Valley in 1982. These are 12-fold data, and the location and measurement methods meet modern standards. To determine if these older data could give useful structural information using modern data processing techniques, LDG purchased a license for five (5) line miles of the Harvey seismic data, which is the northernmost portion of Harvey Line 26. Subsequently, after reviewing the data as processed by Excel Geophysical Services, Lakewood, Colorado, LDG purchased a license for a total of 45 lineal km (27 miles) of the Harvey data.

NEW SEISMIC TRAVERSES

After reviewing bids from six firms, LDG contracted with Bird Geophysical Services ("Bird") to conduct a test to determine if relatively small, spring-assisted, drop weights could be used to successfully acquire deep reflections. This test showed that the contractor could produce usable data to depths of more than 1,500 ms two-way travel time. (For a given velocity model, this two-way travel time is equivalent to several kilometers of depth penetration.) Subsequently, LDG used Bird's services to acquire new traverses totaling about 27.6 km (17.2 mi.) along roads leading through the center of the

LDG lease and the center of the shallow geothermal anomaly. This total included four new traverses across the putative Animas Valley Fault using 1-2-km traverses in four different locations.

Data Acquisition

To acquire the field data, Bird initially surveyed in the planned traverse, with planned "drop" points located on 50-foot (17 m) centers. Then, the geophone array was deployed; depending on the length of the each traverse, the geophone array covered from 1.0 to 1.5 lineal miles. At each drop point, the spring-assisted weight was deployed, and the resulting "ping" was checked for data quality on the geophone array. Then, at the same drop point, five more drops were recorded, so that the final processing could use an arithmetic mean of the signal intensity and reflected energy for that point. The drop equipment then was moved to the next drop point, and the acquisition continued apace. Using this technique, the reflected energy was sampled some 60 times at each geophone location, so that the reflection represents 60-fold data acquisition.

Preliminary Assessment of Structural Implications from Seismic Data

The seismic traverses revealed a very complex subsurface structure. Generally, major faults appear downthrown to the west; however, at depth, there is a trend of significant faults downthrown to the east.

At the eastern end of Caliche Road where it intersects inferred surface expression of the Animas Valley Fault, several hundred meters of vertical displacement appear downthrown to the west. At other places in the western part of the valley, vertical displacement could be as much as 3650-4260 m (12,000 to 14,000 feet) along the basin bounding faults.

Analyses discerned deep bedrock faults extending to more than 2,400 ms of two-way travel time, and this travel time is suggestive of bedrock faults extending to depths of 4570-4870 m (15,000 to 16,000 feet). Circulation along these deep bedrock faults in a Basin and Range setting is believed to be the cause of the intense shallow geothermal anomaly at Burgett's greenhouses.

In the northern reaches of the mapped Animas Valley Fault, minor displacement can be discerned at locations more than 9.6 km (6.0 miles) north of the shallow geothermal anomaly. Further to the south, the vertical displacement is much more pronounced, and reaches its maximum at Caliche Road. Figure 12 depicts the locations of seismic traverses within the LDG geothermal leasehold.

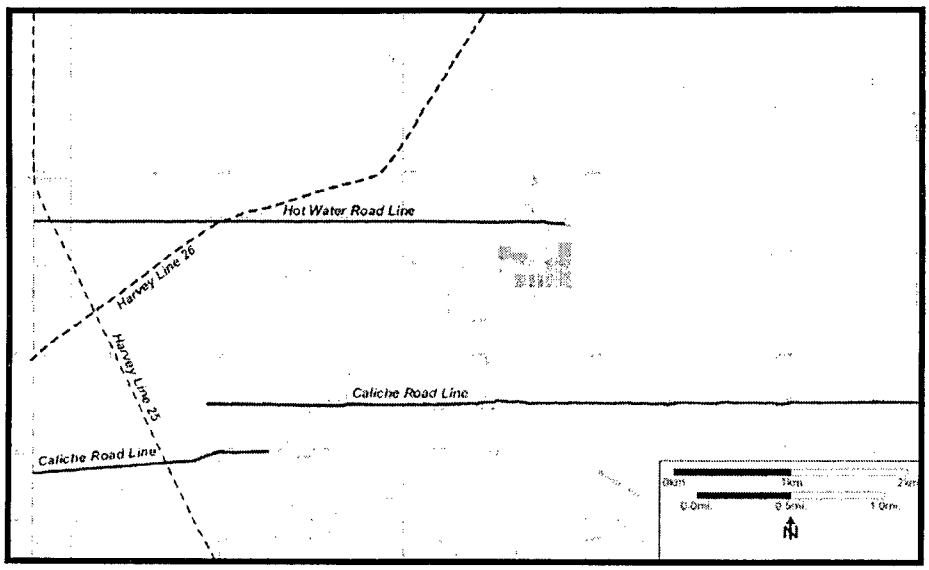

Figure 12. Seismic lines.

GEOCHEMICAL SURVEYS – 2002-2003

CARBON DIOXIDE SOIL-GAS STUDIES

Initial work was performed by a LDG-sponsored graduate student, Dylan Canales, working under the supervision of Dr. David Norman of New Mexico Tech (NMT). Canales used a portable LICOR unit to measure values for CO_2 flux in shallow soils. The initial survey was conducted north and east of Burgett's greenhouses and results showed possible leakage of CO_2 along the mapped Animas Valley Fault.

In January 2003, a second LDG-sponsored NMT graduate student, Kristie McLin, started a second phase of the CO_2 survey. This second phase was designed to verify the initial work and to establish other sampling parameters and techniques necessary to determine if the survey method is useful for geothermal resource delineation. The survey locations were coordinated with Burgett to be completed on his land, and he was very cooperative.

Based on Canales' early work, there appeared to be a strong correlation between the CO_2 results and the NE-SW magnetic linear that runs through the greenhouse complex. This correlation suggested that the thermal plume extends at depth to the southwest, an area of the thermal anomaly that has never been explored by deep drilling.

McLin took additional CO2 measurements during 2003 and early 2004 to fill in previously unsampled areas and to extend the survey along the mapped surface expression of the Animas Valley Fault (AVF), and to determine if a positive correlation could be made between the known faults and CO_2 flux. In addition, McLin reviewed earlier computations by Canales to determine if sampling controls and methodology met rigorous protocol procedures. Based on all of the data, McLin concluded that there was little to no correlation between values for CO_2 flux and known or postulated faults, and between the CO_2 flux and the shallow thermal anomaly. Instead, the flux values appeared to depict a completely random pattern throughout the study area. Notably, absolute values for CO_2 flux were elevated throughout the surveyed areas (McLin, 2004).

A possible explanation not considered by McLin, is that the generally random but uniform CO_2 flux could represent leakage from the massively fractured subsurface formations delineated in the final reflection seismic traverses completed in 2004 after the gradient holes were drilled. If this is a correct assessment, then it is unlikely that a single major fault or faults could provide the vertical conduit for CO_2; instead, vertical leakage could occur ubiquitously through the soil overburden.

THERMAL ION DISPERSION

Thermal Ion Dispersion (TID) is a method used by the precious-metals industry to determine the movement of hot, mineral-bearing waters through rocks, gravels, and soils. The survey involves collection of soil samples and analyses of ions by an enzyme leach process done by commercial laboratories. The method utilizes the property of elements to be dissolved, transported, or deposited depending on the temperature of the thermal waters. The TID method has not been applied to geothermal exploration before.

In July 2002, LDG contracted MagmaChem of Sonoita, AZ to conduct a TID survey in the greenhouse area. The goals of the soil sampling were: 1) to test whether or not the technique could detect the overall thermal anomaly, and 2) if the overall thermal anomaly could be detected, then to examine whether or not surface geochemistry could define geothermal features or distinctive zones within the overall thermal anomaly.

A total of 77 soil samples were collected in the greenhouse area by Dr. Earl Abbott and Roger Bowers in July 2002. The sampling program was designed to cross the known surface thermal anomaly mapped by Kintzinger (1956). The resulting data were then interpreted by MagmaChem using a proprietary procedure that identified six unique metal assemblages at the geothermal anomaly. These assemblages, along with individual element species, were mapped and contoured individually.

The results depicted a new "picture" of the surface thermal anomaly. The data not only detected the thermal anomaly and showed zonation of mineral assemblages outward from the hottest area, but the results also suggested a much more specific fluid flow path for

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Among the conclusions reached by MagmaChem (2002) from the TID survey, the following two provide a useful geochemical insight not seen in the voluminous water sampling done in the past by others:

> *"...all of the element dispersion is arranged as a halo to an area within the thermal anomaly that is characterized by a complete lack of metal assemblage development. Significantly, this negative anomaly correlates with the part of the anomaly where production of thermal waters from past and existing wells has occurred. Consequently, we interpret this area of negative assemblage development as the area underlain by highest temperature thermal water."*

> *"With respect to cooler waters, hotter geothermal waters are anomalously enriched in sodium, potassium, sulfate, fluorine, boron, iron, and silica and somewhat enriched in chlorine and bicarbonate. Significantly, all of the above elements are components of element assemblages sequentially arranged in various element assemblage halos lateral to the depleted zone."*

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TEMPERATURE GRADIENT HOLES – 2003

GRADIENT HOLE PERMITTING PROCESS

Initial Permit Applications

LDG expected that the permitting process would be difficult and time consuming because of the lack of geothermal drilling activity in New Mexico in the past 20 years. The permitting agencies had no current experience for reviewing and approving geothermal gradient holes drilled on federal lands. This problem was magnified by the fact that permits are required from three separate agencies; namely, the Bureau of Land Management (BLM) for federal geothermal gradient holes, the State of New Mexico Oil Conservation Division (OCD) for all gradient holes drilled on privately-owned surface or State land, and the State of New Mexico Engineer for all wells drilled into a Declared Underground Water Basin or Closed Basin (with the Animas Valley designated in both categories).

Each of these permitting actions required lead time for processing; moreover, the State Engineer Permit Application required submittal to that office of the approved OCD Permit. To further compound the difficulties, both the OCD and the State Engineer Permit Applications required identification of the driller to be used, with the State Engineer also requiring identification of the NM Drilling License for the chosen driller. Hence, permit applications had to wait for completion of the bidding and selection process for the contracted well driller.

The Drilling Plan and Sundry Notice for the initial gradient hole, TG12-7, were submitted on December 29, 2002 to the BLM Las Cruces Field Office. Concurrently, on the same date, LDG submitted a permit application to the New Mexico OCD. Subsequent coordination was made with the BLM, and LDG was provided information that BLM wanted the drilling permits submitted on an older form. This revised permit application was submitted on January 31, 2003. Concurrently, to assure that OCD would be acting on the same information, LDG submitted a new application to that office, and this permit was approved on February 6, 2003.

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LDG was required to submit a second revised Drilling Plan transmitted to the BLM on February 20, 2003. In the interim, the BLM had conducted a preliminary environmental investigation and concluded there was minimal to no environmental impact from the proposed drilling. Subsequently, on February 25, 2003, the BLM provided LDG with approval for the proposed drilling activity.

Permit Application for an Exploratory Well (the State Engineer has no category for a gradient hole, per se) was submitted to the NM State Engineer on March 13, 2003. This application finally was approved on March 20, 2003, some two days after the driller had mobilized to the site for TG12-7. From initiation to completion, the permitting process for gradient hole TG12-7 required almost three months.

Subsequent Permit Applications

A different strategy was adopted for subsequent permits. As part of the GRED Program, two additional gradient holes were nominated by LDG. Hence, the continuing permitting process entailed acquiring permits for three additional gradient holes (two GRED holes and one EGS hole), with provisions to change locations based on results from initial drilling as data were acquired from each successive gradient hole.

The decision was made by LDG to use a batch-type process for permit applications. Accordingly, a new Plan of Operations and Drilling Plan were developed and submitted to the BLM; these documents identified a total of eleven (11) separate locations for which environmental clearance and drilling permit approval were needed, with the caveat that only three of the locations would be drilled. Concurrently, LDG used acceptable procurement policies, and contracted with a single driller for all three new gradient holes.

Simultaneous transmittal was made to OCD for all eleven permit applications. The OCD approved the multiple permits on April 12, 2003, and BLM approval for the multiple gradient holes was issued on April 25, 2003. Separate permit applications for each actual drilling location were submitted to the New Mexico State Engineer, with the initial application for TG56-14 submitted on April 4, 2004 and approved by the State Engineer

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Figure 13 shows the locations for the total of 12 gradient holes, with eleven of those representing potential locations for the three new gradient holes, for candidate gradient holes for which BLM and New Mexico OCD approval was given.

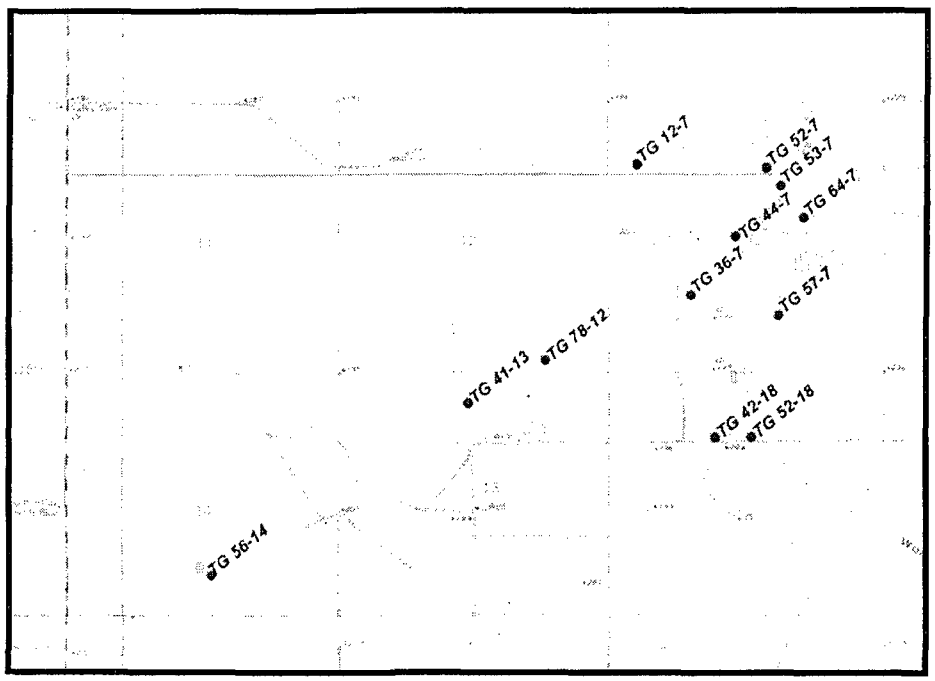

Figure 13. Approved gradient hole locations.

SUMMARY OF THE EGS GRADIENT HOLE DRILLING PROGRAM

The following information is excerpted from the LDG Final Report on the EGS Cooperative Agreement (Cunniff and Bowers, 2003b); the information is repeated here to show the continuity that LDG maintained for the fieldwork completed for these GRED and EGS Agreements.

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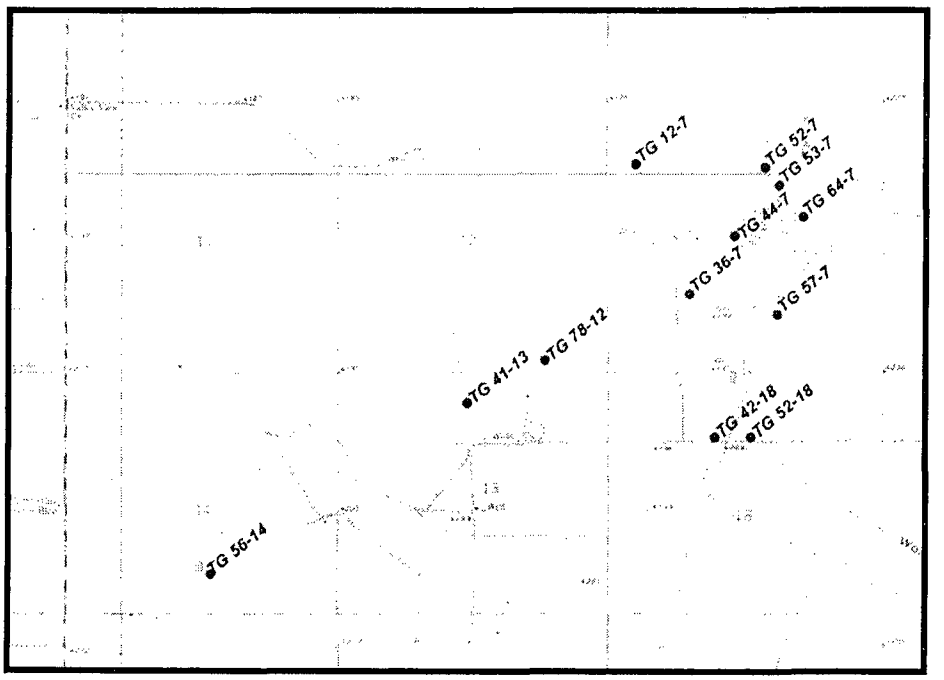

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The two gradient holes were sited on federal geothermal leases owned by Lightning Dock Geothermal, Inc. and both were drilled into lakebed sediments some distance from the intense shallow geothermal anomaly located in the eastern half of Section 7, Township 25 South, Range 19 West.

- Gradient hole TG12-7 was sited about one kilometer to the west of the shallow thermal anomaly. The hole was completed to a total depth of 305 meters (1,000 feet). Bottom-hole temperature was 69°C (156°F),

- Gradient hole TG56-14 was sited about four kilometers southwest of the center of the shallow thermal anomaly. The hole was completed to a total depth of 381 meters (1,250 feet). Bottom-hole temperature was 36°C (96°F).

Lithologies encountered in the two EGS holes were predominantly lakebed sediments deposited in the Pleistocene and Recent Lake Animas. Unconsolidated sand and gravel beds averaged about two feet thick and were interbedded with thin layers of greenish clay. Some of the clay beds were rich in organic material and had a distinctive organic odor. Sand and gravel sediments were volcanic in origin, commonly andesitic and rhyolitic in composition, and derived from source rocks in the Pyramid Mountains.

Final report to the regulatory agencies for these two EGS gradient holes was completed on August 1, 2003. On March 22, 2004, TG56-14 was sold to D. Burgett and TG12-7 was sold to T. McCants for use of the surface casing as a water well. The follow-on reporting, if any, and all liability for these holes are the responsibility of the new owners.

GRED TEMPERATURE GRADIENT HOLE TG36-7

Drilling Summary

Hole TG36-7 was sited in an old cotton field that had not been planted for years, thus a minimal amount of site preparation was required. The New Mexico State Engineers Office issued the drilling permit on May 15, 2003 and the hole was spudded the same

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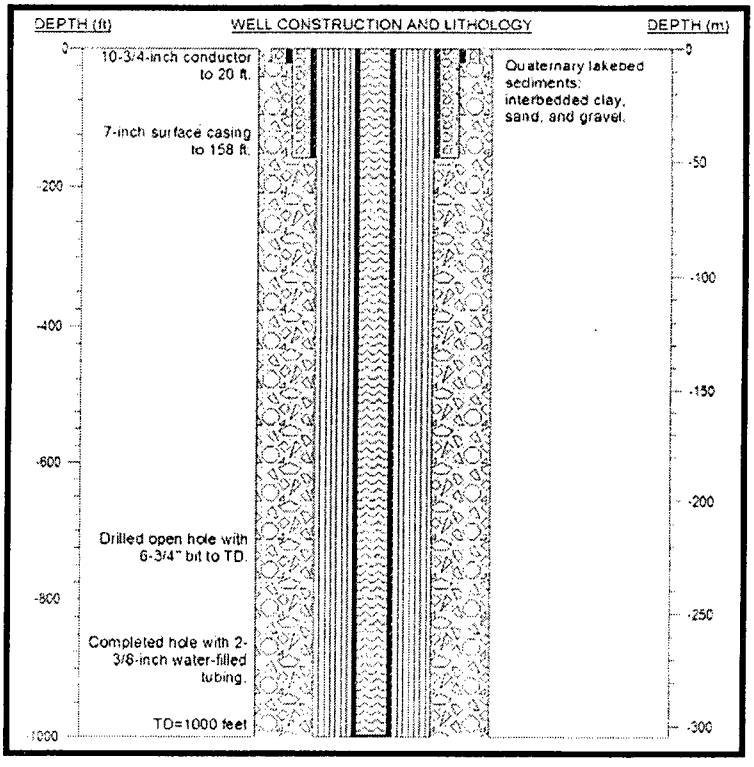
day. Seven-inch steel casing was then run to a depth of 48 meters (158 feet) and grouted. On May 17, 2003, Blow-Out Prevention Equipment (BOPE) was installed on the casing and pressure tested. After successfully testing the BOPE, drilling continued to a depth of 134 meters. Drilling progressed through May 21, 2003 to a depth of 305 meters. After conditioning the hole, 2-3/8-inch-diameter steel tubing was run to total depth and filled with water.

Lithology

The entire hole was drilled in unconsolidated sediments that consisted primarily of coarse-grained sand. Minor thin beds of gravels and lakebed clays were also encountered. Mineralogically, the sand grains consisted of volcanic sediments, including tuff, andesite, and rhyolite. Lakebed clays were commonly greenish in color and very sticky and plastic. A schematic diagram of well construction and lithology is shown in Figure 14.



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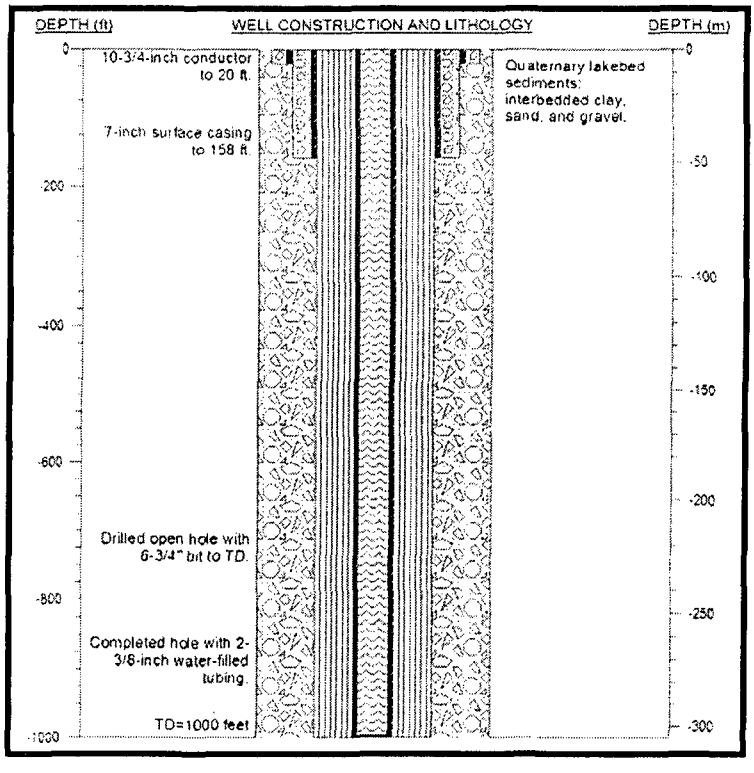

Figure 14. TG36-7 completion schematic.

Temperature Surveys

A total of five temperature surveys were run in hole TG36-7. The first was run on May 21, 2003, just a few hours after completion of the hole. Subsequent surveys were run on May 30, June 5, August 2, and September 17, 2003. The first three surveys were run with a hand-cranked, high-temperature probe provided by Dr. David Blackwell of Southern Methodist University. The fourth survey was run by Dr. Jason McKenna of Southern Methodist University using the SMU Geothermal Laboratory's logging trailer. This trailer is a motorized, wireline logging unit with a tool that provides both precision temperature and gamma ray logs.

The final survey of September 17, 2003 was run by Well Analysis Corporation (Welaco) of Bakersfield, California. This final survey was run with a combination tool that provided temperature, pressure, and gamma ray. The tool hit an obstruction in the tubing at 118 meters (387 feet) and several attempts to get below this obstruction were unsuccessful.

The temperature/depth profile for TG36-7 shows a conductive gradient from 30 meters to total depth. The hole did not intersect the shallow thermal outflow commonly seen in other wells. Bottom-hole temperature was higher than 90°C

Disposition of the Hole

Final report to the regulatory agencies was completed on August 1, 2003. On March 22, 2004 the hole was sold to D. Burgett for use of the surface casing as a water well. The follow-on reporting, if any, and all liability for this well are the responsibility of Mr. Burgett.

GRED Temperature Gradient Hole TG57-7

Drilling Summary

The drill rig was moved to hole TG57-7 on June 3, 2003. This drill site is a few hundred feet south of the Burgett greenhouses and site preparation consisted simply of clearing some sagebrush and digging a mud pit. The hole was spudded on June 4, 2003 and

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drilled with air to a depth of 45 meters. On June 5, 2003, the hole was cleaned and seven-inch steel casing was run to 44 meters and grouted. BOPE was installed on June 6, 2003 and successfully tested.

Drilling operations included both air and mud, and the hole eventually was completed to a depth of 278 m. After circulating to clean the hole, steel tubing was run to 278 meters on June 14, 2003. On June 15, 2003, the rig was moved and the hole was capped.

Lithology

From surface to a depth of about 73 meters, the hole was drilled primarily in coarse sands and gravels. The lost circulation zones yielded only partial samples, but those consisted of gravels of rhyolite and andesite. Below 73 meters, the lithology changed to volcanic tuffs and flows. The tuffs range from partially welded to densely welded, and from rhyolitic to andesitic in composition. A schematic diagram of well construction and lithology is shown in Figure 15.

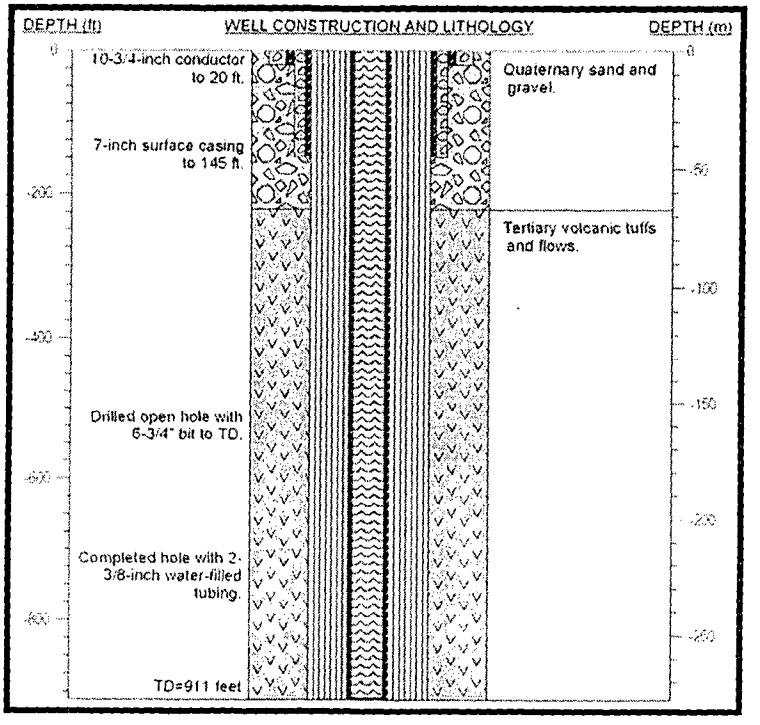

Figure 15. TG57-7 completion schematic.

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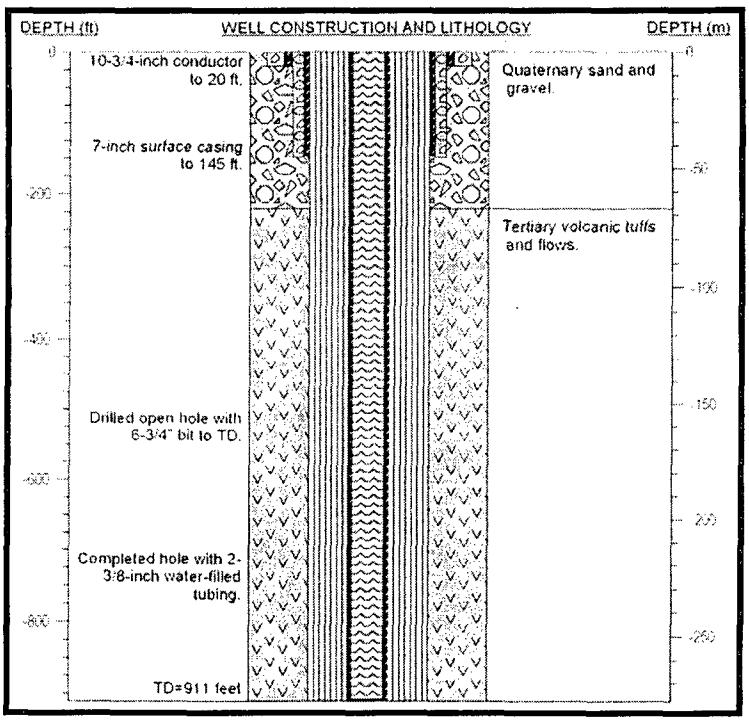

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Temperature Surveys

Two temperature surveys were run in hole TG57-7. The first survey was run on July 3, 2004, approximately 2 weeks after completion of the hole. This survey was run by Dr. Jason McKenna using SMU's logging trailer. The logging tool could not get through an obstruction in the tubing and the survey was completed with a smaller-diameter probe on a hand-cranked cable reel. The second and final survey was run by Welaco on September 17, 2003.

The temperature surveys show that the hole penetrated the shallow hot-water outflow zone at a depth of approximately 50 meters. The peak temperature of this outflow zone at that depth correlates with the major lost-circulation zones encountered during drilling. Maximum temperature in the hole was 108°C.

Disposition of the Hole

Final report to the regulatory agencies was completed on August 1, 2003. On March 22, 2004 the hole was sold to D. Burgett for use of the surface casing as a water well. The follow-on reporting, if any, and all liability for this hole are the responsibility of Mr. Burgett.

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DEEP TEST HOLE TG52-7

SITE SELECTION AND PERMITTING

Site Selection

A prime factor in the decision to site the deep exploratory well at this specific location was seismic imaging data from the traverse along Hot Water Road. At this location, seismic image depicts a buried fault dipping steeply to the north or northwest, likely at a depth of 600 to 900 meters (2,000 to 3,000 feet). In addition, a probable Riedel shear, deduced from the soil ion assessment, has been mapped as traversing this area on a north-south alignment. The likely dip direction of the subsurface fault mapped by the seismic work also correlated with probable depth to rhyolite tuff encountered in the shallow geothermal production wells.

These hints of probable subsurface structures were the best available geophysical data that a deep exploratory well at this location had a reasonable chance of intersecting highly faulted and fractured rock at a target depth of 915 meters (3,000 feet).

Well Permits

Permitting for TG52-7 followed a process similar to that used for the gradient holes. There were notable differences, however, with those changes driven by BLM requirements. The deep exploratory hole represented by TG52-7 required preparation of a Drilling Plan and a Geothermal Drilling Permit (GDP). Key to this Drilling Plan (and for the similar plan developed for the gradient holes) was the requirement that the Plan, if approved, would not cause environmental degradation. An internal BLM Environmental Assessment was completed as part of the approval process for the GDP.

LDG originally filed a Drilling Plan and GDP application in January 2003 for a well at the final site for TG52-7. Final approval of the GDP was provided by BLM on May 5, 2003. Concurrently, LDG filed with the NM OCD the necessary permits for surface disturbance, and also filed the Exploratory Well permit with the NM State Engineer.

DEEP TEST HOLE TG52-7

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Actual drilling operations were conducted in three different stages, with a resulting need for changed permits.

- Stage one represented drilling activity to a total depth of 2,223 feet. Drilling operations in this stage were approved by each of the three permitting agencies.

- In stage two, the well was flow-tested using airlift for 23 hours. New approvals were required from the BLM and the NM OCD. The latter agency controlled the surface discharge plan for disposal of produced water, and the agency required proof that surface disposal would not cause degradation of potable ground water. To meet this test, LDG completed an airlifted drill-stem test from the open hole to 676 meters (2,220 feet). The analyses showed that produced water was near potable, and would cause less degradation than has resulted from the 25-year history of surface disposal of the effluent from the shallow wells. Accordingly, OCD permitted surface disposal of produced water from the flow test.

- In the third stage, drilling operations were completed to total depth of 2,528 feet, with separate approvals from each permitting agency.

Final completion reports were filed with each of these agencies. The completed well was retained as a permanent monitoring well for future temperature observations.

DRILLING OPERATIONS SUMMARY

The hole was spudded on June 20, 2003, and drilled to 20 feet, and 10-3/4-inch conductor casing was set and cemented. Seven-inch (6.5-inch inside diameter) surface casing was set to 470 feet and cemented from 470 feet to surface. Drilling proceeded with good success to 663 feet. At that depth, significant water entry was encountered, and air drilling could not continue because the hole was making large volumes of boiling water (estimated to be about 250 gpm or more). Accordingly, drilling was switched back to mud rotary for the duration of drilling activities. During the period from June 26 until July 2, average footage drilled was about 150 feet per day.

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Intermediate Temperature Survey 1

At a depth of 1,912 feet (about 583 m), an attempt was made to acquire an open hole temperature survey using the crew and equipment from Southern Methodist University (SMU) under the direction of Dr. Jason McKenna. The temperature tool was in the SMU van logging system manufactured by Madden Systems, Odessa, Texas. The tool assemblage included a natural gamma tool module in tandem with the temperature tool.

A partial log was attained to a depth of 1,548 feet (472 m) before the tool failed because of loss of signal. This survey measured an isothermal zone from about 200 to 700 feet, and a positive temperature gradient below 700 feet of depth. The elevated temperature and the positive thermal gradient were both encouraging signs for deeper drilling.

Continuation Drilling

After the temperature survey was completed, drilling resumed. Drilling progressed at normal penetration rates of 25-30 feet per hour to 2,000 feet. Drilling continued over the 4th of July holiday weekend and penetration rates declined steadily below 2,000 feet. Below 2,150 feet, the penetration rate declined to less than 10 feet per hour; below 2,200 feet the penetration rate was less than 6 feet per hour.

Well Conditioning, Logging

On July 6, LDG made the decision to suspend drilling and bring in Southwest Geophysical Services (SGS) to log the hole. To safeguard SGS's tools, the hole had to be conditioned and cooled to less than 140°F (60°C). A hole cooling test was successfully completed on July 6 by pumping 20,000 gallons of cold water down the hole. Return temperatures were less than 120°F (49°C).

The hole was successfully conditioned and cooled on the morning of July 7. The drill pipe was pulled out of the hole and SGS started logging operations about noon. The sonic log was run first because the tool was most sensitive to high temperatures. The tool was run to bottom and logging was started, but signal from the tool started to fail about

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200 feet off bottom. The tool was pulled out of the hole and a second sonic tool was substituted. The signal from this second tool failed before the tool ever got to bottom. Southwest did not have another sonic tool available.

Two separate logging runs were then successfully made for gamma ray/neutron and electric logs (resistivity). Despite the disturbed condition of the hole, LDG insisted on getting a bottom-hole temperature. SGS's temperature tool gave erratic signals at about 300 feet and was pulled from the hole. A second temperature tool failed at about 200 feet. These two temperature tools were supposedly rated to 300°F, but were only calibrated to 160°F. No explanation was given by SGS for failure of four of the six tools.

Conference Call to SNL

On the afternoon of July 7, Alan Sattler of Sandia National Laboratories (SNL) set up a conference call for LDG with two drilling bit experts from private industry. After much discussion, it was concluded that an appropriate bit was being used and drilling parameters (rpm's, weight on bit, etc.) were within recommended ranges. The volcanic formation (welded tuff) was simply difficult to drill. Two provisional recommendations were made by the industry experts: 1) purchase a special rotary bit at a cost of nearly $7,000 (a "10% discount" was offered on the cost) with no guarantees of faster penetration rates, or 2) drill with an air hammer. Air drilling was not possible because of the significant boiling-water entry at 663-670 feet.

Air-Lift Test

Given the likely delays if a new bit were to be purchased, uncertainty of success with a new bit, and the uncertain but worsening condition of the hole, LDG made the decision to conduct a limited short-term air-lift test to obtain estimates of flow rate and flowing temperatures, and to acquire water samples for chemical analyses. Open-ended drill pipe was run to a depth of about 460 feet to stay within the casing and to avoid further damage to the deeper open hole. The air-lift test was conducted on July 8 for one hour. During that test, five sets of water samples were collected at 15-minute intervals. An estimated flow rate of more than 250 gallons per minute was sustained throughout the test period.

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Water samples were immediately chilled and shipped that afternoon to Las Cruces for delivery to the New Mexico State University Soil Water, and Air Testing (SWAT) Laboratory.

Temporary Shut-in

After completion of the air-lift test and acquisition of water samples, 2-3/8-inch steel tubing was run to at depth of 2,211 feet. The well was capped and locked.

LOGGING AND FLOW TEST OPERATIONS

Summary of Test Operations

Coordination with Sandia National Laboratories provided the services of Welaco for logging surveys on all LDG's holes and also for support during the controlled airlift test on TG52-7. The unit mobilized to the site on September 16 and logging runs were completed on four gradient holes and one test well owned by LDG.

After the Welaco temperature survey was completed for TG52-7, preparations were completed for a controlled airlift test. This test was completed in the period from 19-20 September 2003 for some 23 hours. The well produced steady state flow of about 320-325 gpm at a wellhead temperature of 126.7°C (260°F). This production rate is equivalent to about 162,000 pounds per hour, with the production temperature producing usable heat content of about 26 million Btu per hour, or about 2.5 $MW_{thermal}$. Because of excessive friction loss in the small diameter well bore (6-3/8-inch) resulting from turbulent flow caused by the airlift, the flow rate attained is not considered to be representative of likely resource potential. A larger well casing with mechanical pumping should produce higher yields.

The test did not meet all of the test objectives because of equipment malfunctions. The Welaco data recorder malfunctioned mid-way through the test, and pressure recovery values could not be attained. In addition, test objectives to evaluate reservoir hydraulic properties by measuring potential communication between TG52-7 and other nearby

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geothermal wells also were degraded by equipment problems and by the lower flow rate which meant that observation wells were too far distant to be able to detect any communication with the test well.

Controlled Airlift Test

Scope

An airlift flow test was completed for hole TG52-7. Test objectives were:

1. Determine produced water characteristics, including flow rate, flowing temperature, and water quality;

2. Determine well characteristics, including pressure loss (proxy for drawdown during airlift, pressure recovery after flow stopped), and acquire data to determine coefficients of storage and transmissivity for the hole;

3. Evaluate geothermal reservoir characteristics, to include effects on adjacent geothermal wells resulting from fluid withdrawal at TG52-7.

Wellhead Control System

A wellhead surface piping and control system was fabricated to enable safe control of high temperature fluid. This apparatus provided capability of measuring flow rate and flowing temperature, and also provided a mechanism to safely acquire water samples for laboratory analyses. To measure flow rates, use was made of an open-top design steel tank with a known volume of 21,000 gals (500 barrels), rented from Baker Tank Company. The tank was modified by LDG to accept two sets of sight-glass gage isolation valves and two boiler sight glasses, each 48 inches long, mounted so they could measure fluid levels for the critical nine feet of fill levels. The tank also was modified with a one-inch sampling port that terminated in a riser dropping down to slightly above ground level for use in acquiring water samples

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combination of rigid and flexible piping, which in turn connected to the rigid steel airline. Capability was installed to regulate delivered air pressure; however, air volumetric requirements would be controlled by two valves in series, which could be manipulated by trial-and error until a balanced geothermal discharge flow was attained.

Rig-up for Airlift Test

Coordination with Welaco indicated that they were confident their down-hole pressure recording tool would function satisfactorily in the downhole ambient condition of 260°F for the expected test duration of 24 hours, plus an estimated six hours afterwards for pressure recovery tests on the well. The Welaco tool was inserted first, and the pressure tool was suspended at the optimal depth of 700 feet below the top of the surface casing and 130 feet below the bottom of the surface casing.

The 1-1/2-inch airline was successfully inserted so that the bottom of the airline was at 600 feet. This depth was chosen to assure sufficient fluid above the air jet under probable maximum withdrawal rate of up to 700 gpm. The air line terminated in a special fitting that was custom built with multiple ports, each fabricated so they would direct the air flow near-vertically after exiting the air line.

Test Operations

When the Welaco tool had been inserted and the air line installed, the test was started. Initially, two false starts resulted from equipment failures; these false starts thus compromised the data needed for evaluating reservoir and well hydrology at start-up. After start up, air volume rate was reduced to minimize turbulence in the flow stream, and the air compressor supply pressure was reduced to about 214 psig. This supply pressure was maintained for the duration of the test. Back pressure on the wellhead was maintained at a rate of 60-65 psig, and wellhead temperature was steady at 260°F. Flowing temperature was measured with a laser/infrared thermometer by measuring the metal wellhead surface temperature at several points. Four timed fill tests were completed. Before the first three timed fill tests, the Baker tank was filled with cold

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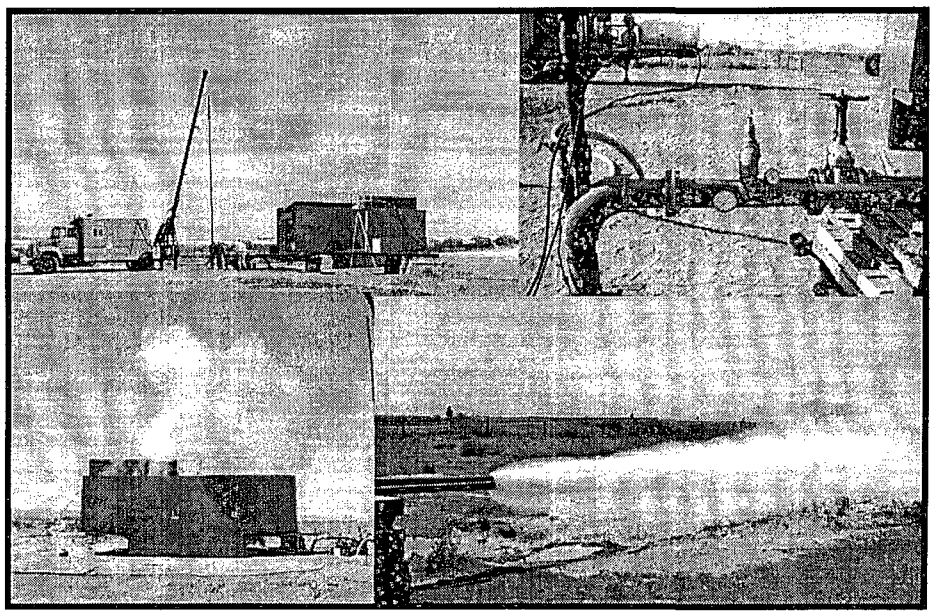
water to a depth of about 4 feet, or until the water level was observable in the bottom of the lower sight glass tube. (Approximate initial volume was 7,500 gallons.)

Discharge into the Baker tank caused violent surging created by both air release and boiling as the water cooled from 260°F to about 205°F (boiling point at the altitude of the well). The extreme surges caused water to slop out of the partially opened roof hatches. A similar procedure was used for the second and third timed fill tests, with a cold-water partial fill. For the last three fill tests, the roof hatches were closed on the side directly above the sight-glass tubes. These two timed tests also were continued for 23 minutes.

For the fourth timed fill test, which also was a water sampling run, the test started with an empty tank so that the samples would not be diluted with fresh water. Because there was no cold-water blanket, discharge from the wellhead into the tank caused violent surges, which resulted in large amounts of boiling water spilling out of every roof hatch opening, even with the hatches closed. This test was terminated after 42 minutes because more boiling water was being expelled than was being contained in the tank. Figure 16 shows the surface equipment used during the flow test.



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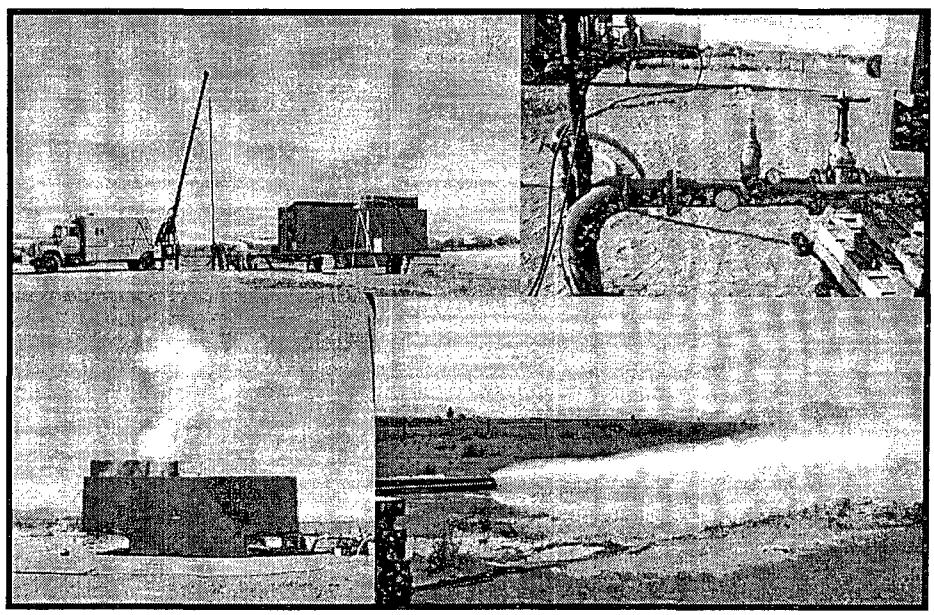

Figure 16. Pictures from flow test of TG52-7.

Water samples were taken using the sample port located on the back of the tank. In addition, immediately after the timed fill test was ended, an attempt was made to get a "hot" sample by using steel flasks suspended in the tank using a wire basket. Multiple samples were taken, and the samples were submitted to the Soil, Water, and Air Testing Laboratory at New Mexico State University.

For each of the first three timed fill tests, fill volume in the 23-minute duration averaged about 7,500 gallons. This total fill is equivalent to a steady state flow rate of about 320-325 gpm (162,000 pounds per hour). Productivity of the well is a function of flow rate and drawdown. From the Welaco downhole tool, indicated pressure was about 239 psig for each of the three tests. This pressure is equivalent to a drawdown of about 122 feet. However, this indicated pressure, hence drawdown, is not real. Because of the large amounts of entrained air, the fluid average density is much lower than pure water and this "frothy" condition biases the pressure to the low side. Thus, the calculated well specific yield of about 2.67 gpm/foot of drawdown is severely understated, and true specific yield would be higher by an unknown but undoubtedly large amount. Accordingly, true formation productivity, would be expected to be much higher using a mechanical pump.

During the middle of the night at about 1:00 AM, after about 11 hours of testing, the Welaco data recorder took itself off line. Welaco and LDG personnel were immediately notified, and it was determined that the down-hole tool was functioning, but data entries were being recorded only for a few minutes before the data recorder would shut down. A procedure was established to manually turn the data recorder on and off throughout the night until the problem could be fully analyzed. Even though this action resulted in numerous data gaps, LDG made an assessment that incomplete data were better than no data, a result that would have occurred if the tool had been left undisturbed. Early in the morning on 20 October, the problem was reviewed and the decision was made to continue the test. This problem worsened as the test continued, so that shortly before the test was terminated, the tool was kicking off line after only a few milliseconds of measurements, and the tool then required at least 5 minutes to be manually reset.

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Because the tool was not functioning properly, LDG terminated the air lift test at 2:12 PM on 20 September after some 23 hours in duration.

When the air supply was cut off, an attempt was made to complete a pressure recovery test. The well continued to free flow at a significant flow rate, estimated to be about 75 to 100 gpm. Because the Welaco data recording problems continued to worsen and Welaco personnel believed data retrieval might end at any moment, and because the well continued to flow free, decision was made to kill the flow by injecting cold water through the air line. After only a few minutes of cold water flow, the well was shut in.

The most plausible cause of the free flow is that an inadvertent gas lift was given to the reservoir from the use of compressed air for the airlift test. A sizeable pressure differential could have been caused by air under pressure of about 218 psig entering a water column under a pressure of less than 200 psig from the weight of the water column over the air line exit point. Under these conditions, large volumes of the air could have been forced into micro fissures and cracks in the subsurface material.

Immediate temperature rebound occurred when the air supply was shut off, and this fact suggests that the air lift operation possibly was withdrawing water from at least two different zones. One zone would have a somewhat higher temperature (based on temperature logs the in situ temperature is 283°F or higher from 1,600 feet to TD) and the second zone would have a lower temperature (260°F from the fracture at about 690 feet of depth). The cooler zone would predominate when airlift was in progress, with the hotter zone then the predominant influence when extraction efforts ended.

The geothermal anomaly is marked by numerous fractures, and possible flow paths have not been mapped. Some of the many fractures have been mapped by LDG prior research, but little is known as to the subsurface strike and dip of these many potential flow conduits. To more fully understand the nature of the geothermal resource will require many more wells and several different, longer term flow tests, using tracer materials to map the flow pathways.

Because the tool was not functioning properly, LDG terminated the air lift test at 2:12 PM on 20 September after some 23 hours in duration.

When the air supply was cut off, an attempt was made to complete a pressure recovery test. The well continued to free flow at a significant flow rate, estimated to be about 75 to 100 gpm. Because the Welaco data recording problems continued to worsen and Welaco personnel believed data retrieval might end at any moment, and because the well continued to flow free, decision was made to kill the flow by injecting cold water through the air line. After only a few minutes of cold water flow, the well was shut in.

The most plausible cause of the free flow is that an inadvertent gas lift was given to the reservoir from the use of compressed air for the airlift test. A sizeable pressure differential could have been caused by air under pressure of about 218 psig entering a water column under a pressure of less than 200 psig from the weight of the water column over the air line exit point. Under these conditions, large volumes of the air could have been forced into micro fissures and cracks in the subsurface material.

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Temperature/Pressure/Spinner Surveys

Pressure log:

a. After operations had been underway for about 60 minutes, the pressure curve was essentially flat and stable for about 4 hours, with a slow decline in pressure as the test progressed.

b. Starting at about tool time 13.5 hours, data become very irregular. These irregularities are artifacts probably caused by the tool dropping off line, and correspond to the procedural action to manually turn the tool on and off to reset it.

Temperature log:

a. For the official flow test start, after two false starts, temperature spiked to about 274.5°F and then rather rapidly declined to about 265°F. From that value, temperature slowly declined to about 261°F at the end of the test.

b The temperature increase at test end is of interest because of the shape of the curve. The plotted increase is relatively gradual and rounded in form, as if a relatively slow infill of warmer water was causing the temperature to rise.

Spinner log:

a. When the actual test was started, the tool recorded a brief spike to a value slightly higher than 10 rps, and this value declined to a value of about 7 rps within 60 minutes. Thereafter, the tool response (average value) was relatively flat and consistent at a value of about 9 rps until very near the end of the test. Starting at about tool time 18.7 hours, a gradual decline in the spinner log resulted in an ending value of about 8.5 rps. Because the spinner tool (along with the other tools) was suspended some 60 feet below the fracture at about 690 feet, this spinner tool undoubtedly was measuring flow originating deeper in the well rather than from the shallow fracture zone.

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Analyses of Reservoir Hydraulic Properties

To assess reservoir hydraulic properties, it is necessary to have one or more observation wells relatively close to the pumped well. When properly instrumented, data observed in these wells at key times will help provide data from which reservoir hydraulic properties can be estimated. Several key assumptions are made in evaluating effects on nearby observation wells when the test well is pumped, and again when the pumping action terminates. These assumptions are:

1. The fluid extraction rate is large enough to produce measurable influence on water levels some distance from the test well.

2. It is possible to acquire precise measurements of the amount of drawdown in observation wells located relatively close to the test well.

3. Observation wells, ideally, should penetrate the same water-bearing subsurface formations as the pumped well; as a minimum, the observation wells should be as close as possible to the same depth as the pumped well.

4. The reservoir is homogeneous, confined or semi-confined, and radial flow conditions are present so that analyses of reservoir hydraulic properties can be completed using the Theis equations and methodology.

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feet deep) and was performed in 1981. Reported data include a transmissivity value of 19,000 gpd/ft, and a well specific yield of about 23 gpm/ft. of drawdown (Lansford, 1981).

Another shallow geothermal well (AmeriCulture State #1, reported depth 400 feet, with the lowest 110 feet an open hole) also was flow tested in late 2000. A consultant report was prepared by Jim Witcher, but has not been released. In a separate public report, Witcher reported only that the transmissivity was larger than 25,000 gpd/ft. (Witcher, et al, 2002). Absent a complete public report, limited anecdotal (and unverified) information is available. AmeriCulture State #1 reportedly was flow tested for at about a 48-hour period at a flow rate of about 1,100 gpm (66,000 gph) and drawdown was less than 20 feet (Dave Duchane, personal communication, Dec 5, 2000). Given this unverified information, the specific capacity of the well would be about 53 gpm per foot of drawdown, which is an exceptionally high capacity considering that the production zone likely consisted of alluvial gravels of volcanic sediments.

It is unknown whether or not the pumped flow test on AmeriCulture State #1 was accompanied by instrumentation placed in nearby wells to measure and record possible effects on those wells of the large fluid extraction from the test well. Anecdotal information supplied by the nearby surface landowner suggests that there was measurable drawdown ("dozens" of feet) in his own State geothermal wells located about 600-700 feet north of the test well, and several feet of drawdown in well TFD 55-7. The land owner used a crude measurement device consisting of a wooden block fastened to the bottom of a steel tape to estimate drawdown during the AmeriCulture test pumping.

To gain valid data for calculating reservoir properties, normally it is preferable that the observation well or wells are located very close to the test well, or at a distance of about 400-500 feet. More distant observation wells can be successfully used if the fluid extraction rate is high enough so that the cone of depression resulting from fluid withdrawal is relatively large, and the influence of fluid extraction can be measured relatively soon after pumping starts and ends.

Very few geothermal wells are within a radius of about 2,500 feet from well TG52-7. Five candidate geothermal wells were considered, as follows:

1. AmeriCulture No. 1 Federal. This is the closest well, and is located about 600 feet north of TG52-7. The well was completed to a depth of 195 feet in unconsolidated gravels and clays, and contains perforated casing from groundwater (60 feet) to total depth (TD). However, the owner posed unacceptable conditions on the use of this well for monitoring drawdown, so the well was eliminated from further consideration.

2. McCants No. 1 State. This well was drilled about 1993 to an approximate depth of 180 feet, and was completed with perforated casing from 60 feet to TD. It is located about 1,200 feet east of TG52-7. This well had an old down-hole heat exchanger requiring removal. Questions regarding liability for the well were unresolved; therefore, this well also was removed from further consideration.

3. Burgett No. 1 State, called "Rosette 1" and also termed by Burgett as "Discovery Well." This well is 440 feet deep, with 8-inch casing to 180 feet and open hole 7-7/8-inch to TD. The well intersected tightly cemented rhyolite at about 380 feet of depth. This well is located about 1,770 feet north-northeast from TG52-7.

4. Burgett Greenhouse No. 2, southeast corner. This well is termed "#2 SE" and is 440 feet deep with 8-inch casing to 300 feet and 7-7/8-inch open hole to TD. The well intersected tightly cemented rhyolite at about 80 feet of depth. It is located about 1,270 feet almost due south of TG 52-7.

5. TFD55-7. This well was drilled in 1984 by Steam Reserve Corporation to a depth of 7,000 feet, and was plugged in 1985. Surface casing, 13-3/8-inch diameter was set at 1,050 feet. The well is now open to about 1,365 feet, with 12-7/8-inch open hole from 1,050 to TD in volcanic rocks and a formation identified as the "Gila Conglomerate" by other researchers. The well is located about 1,600 feet south-southwest from TG52-7.

Based on good reasons for rejecting the nearest two wells, decision was made to use the two Burgett wells and TFD55-7. The following Figure 17 depicts locations for the three monitoring wells used for the airlift test on TG52-7.

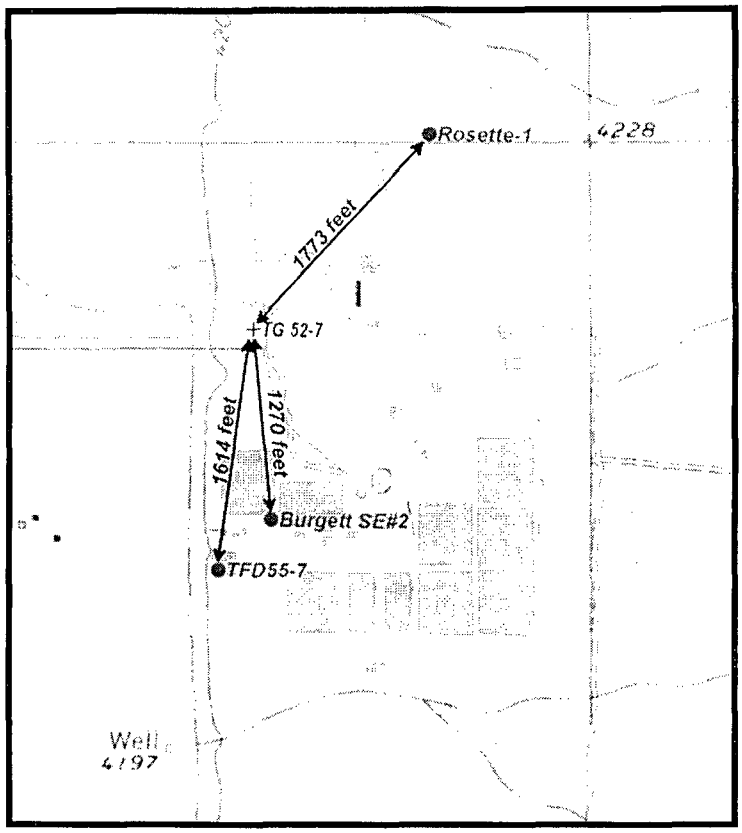

Figure 17. Candidate monitor wells.

For two of the three monitoring wells, one-half-inch rigid stainless steel air line was inserted into the wells to a precisely determined depth. For the third well, the air line was one-quarter inch, because that was all the space available. At the surface, the air line terminated at a tee, with one branch of the tee equipped with a special valve for connecting the compressed air source. The other branch terminated in an isolation valve and pressure gauge. The gauge used was a Dwyer Model 103, with a range of 0-30 psig. Accuracy of the gauge was warranted to be plus or minus 0.25 percent of full scale, which for this pressure range would be 0.075 feet or 0.9 inches of water.

The air line was set at 126 feet of depth in Burgett's Discovery Well, and was set at 84 feet of depth in the remaining two observation wells. Installation was completed one week before the planned air-lift test on TG52-7 so that daily readings would provide background information on possible influences caused by tidal forces and barometric pressure.

During the week preceding the flow test, initial daily readings were widely variable, and it appeared that the pressure gauges had a slow but significant leak rate. Although this leak could be compensated for by charging the air line before each reading, this process would be too slow to catch instantaneous changes in the water level. Contact was made with the supplier, and Dwyer Instrument Company advised that the unit was so new to their inventory, they had not as yet completed the necessary testing of the unit to determine what would be considered a normal and expected leak rate. For this reason, the gauge isolation valve had to be in the closed position between pressure readings.

With a compromise on the method and timing for water level measurements in the observation wells, the test set-up was deemed adequate to assess potential effects, if any, on these observation wells when fluid was extracted from TG52-7. Two other factors subsequently interacted to limit usefulness of the observations:

- First, AmeriCulture was completing drilling actions on its No. 2 State well during the flow test on TG52-7. At unknown intervals, they pumped water from their No. 1 Federal well (the well nearest to TG52-7) to the water storage tank at the new drill site. Each unknown pumping action extracted about 20,000 gallons of geothermal fluid.

- The second factor caused even greater potential impact on LDG observations. To provide greenhouse heating for the cooler September nights, Burgett required geothermal fluid from his State Well "B" located about 400 feet east of the Discovery Well observation well. Burgett provided information as to the duration of each pumped interval, and also provided information on the production rate of 600 gpm.

From changes in water levels at these three observation wells covering a 12-day period, several conclusions can be reached, as follows:

1. Changes in water levels resulting from tidal and barometric pressure either did not occur, or were too small to be detected by the instrumentation.

2. Effects created by pumping action on Burgett well "B" undoubtedly mask any effects created by fluid extraction from TG52-7.

3. The relatively large change on 24 September at TFD55-7 and #2 SE could be an effect of the pumping action on Burgett well "B", or fluid extraction from TG52-7, or a combination of the two causes. Exact relationship cannot be ascertained.

4. If hydraulic communication was established between TG52-7 and the other wells, either the effects were too small to detect, or the effects were masked by pumping actions on Burgett well "B".

5. It is possible that there was mutual interference between pumping action on Burgett "B" and the fluid extraction on TG52-7 that caused a decline in the observed slight productivity decline from the latter well during the flow test.

RE-ENTRY AND DEEPENING

Drilling Summary for Continuation Drilling

After evaluation of data and conferences with DOE, LDG made the decision to re-enter and deepen TG52-7. After extended delays, the drill rig finally mobilized from Texas and arrived at the Animas well site on October 23, 2003. The new inner casing string (4-1/2-inch steel casing) previously had been delivered to the well site. Mud pits were dug, and the casing was landed at 2,220 feet and cemented. The on-site steel Baker tank was filled with 20,000 gallons of cold water to provide a large quantity of water for killing the well in the event uncontrolled steam was encountered which the BOP equipment could not control. BOP equipment was delivered to site, the cellar was dug and the BOPE was installed on October 27, 2003.

Drilling operations resumed on October 28. The drill stem was run into the hole and tagged cement at 2,097 feet. Using air and a down-hole hammer bit, the cement plug was drilled out to a depth of 2,175 feet (or some 45 feet up inside the 4-1/2-inch casing). After rig repairs, using air and a down-hole hammer bit, the well was drilled to depth of 2,320 feet. On November 2, drilling continued using air and a down-hole hammer bit. After only 2 feet of drilling, the well bore intersected a water infiltration zone, and the hole could not be blown down. Drilling operations were converted to mud drilling, and drilling continued to total depth of 2,528 feet.

Below 2,350 feet, the penetration rate dropped to less than 15 feet per hour with water (compared to more than 40 feet per hour in the overlying volcanics), and drilling fluid-return temperatures had cooled. Return fluid temperatures ranged from about 93 to a maximum of 105°F. This change in temperature for the fluid circulating out of the hole was some 55 to 75 degrees cooler than return temperatures during the initial drilling on this hole in July 2003.

Drill Stem Test

Drilling operations to deepen the hole from 2,223 to 2,528 feet intersected a lost circulation zone at about 2,322 feet of depth. This zone was evaluated by completing a short-term (3-hour) drill stem test. Water samples were taken, and later were submitted to the New Mexico State University Soil, Water, and Air Testing (SWAT) Laboratory.

Final Hole Completion

On November 6, 2003, telephonic contact was made with representatives from DOE and SNL. During those discussions, the results of the drilling and short-term flow test were summarized, and the representatives were advised that LDG believed there were no apparent technical factors favoring a continuation of drilling activities. The penetration rate had dropped to less than five feet per hour and mud return temperatures were steadily decreasing. Further, in LDG's opinion, continued drilling would be a waste of time and money.

At the well site, the decision was made to reenter the hole and tag bottom. Accordingly, after the drill bit was checked to determine its condition, a check valve was inserted just behind the bit, and operations proceeded to regain the hole bottom. After about eight hours of slowly drilling and cleaning the hole, the driller was able to regain 2,528 feet of depth. The drill stem and bit were left in the hole to serve as gradient pipe. The final well completion diagram is shown in Figure 18.

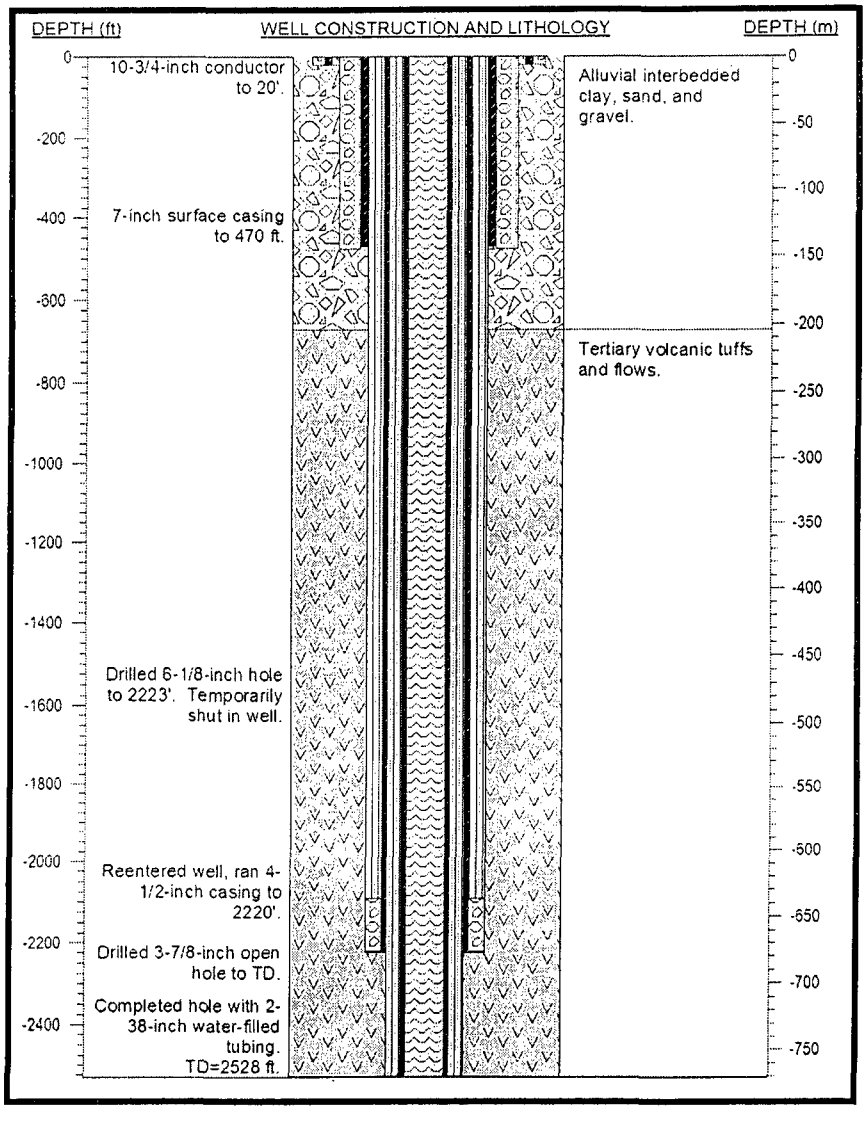

Figure 18. TG52-7 final completion schematic.

Final Well Disposition

Test well TG52-7 is presently shut in, and has been permitted by LDG as an observation well for potential future operations. Final report to the regulatory agencies was submitted on September 28, 2004.

TEMPERATURE SURVEY SUMMARY

Temperature surveys were completed on this hole using several different instruments. An initial survey was completed by the Southern Methodist University geothermal team to a depth of 1,500 feet on July 3, 2003, and again to a depth of 2210 feet on August 2, 2003. Using Welaco, a survey was completed to 2,210 feet on September 17, 2003, and a second survey was completed by the same tool immediately following the flow test on September 20. A final equilibrium survey was completed on December 17, 2003 by the team from Sandia National Laboratories.

In summary, the four surveys to 2,220 feet or deeper, measured a final bottom-hole temperature of about 137°C (280°F), with a slightly higher temperature at shallower depths.

WATER ANALYSES

Water samples were acquired at three distinctly separate zones during the drilling of hole TG52-7. Initial sampling was completed in July 2003 when the hole had reached 2,220 feet of depth. A short drill stem test was completed to acquire samples for analyses to meet regulatory constraints relative to surface disposal during the controlled flow test scheduled for September 2003. Multiple samples were taken during the 23-hour airlifted flow test, with water produced from the open hole to then total depth of 2,220 feet and additional samples were taken during the short drill stem test of the zone at about 2,322 feet.

All of the water samples were chilled to maintain the temperature below 40°F, and were submitted to the New Mexico State University SWAT Laboratory. The "hot" samples acquired during the 24-hour flow test were given special analytical treatment.

Examination of the measured values for dissolved mineral species indicates that probably only the sample acquired from the lost circulation zone at 2320 feet is noticeably different from the samples taken from more shallow zones. In comparison with earlier samples, the deep zone has sharply elevated values for total dissolved solids, chlorides, sulfates, sodium, molybdenum, iron, boron and barium. In addition, the deep zone has an alkalinity value almost three times higher than the shallower water samples.

However, this deep zone sample is the only sample that had not boiled before sampling; hence, possibly this is the best measure of in situ water in the Animas Valley at a depth of about 2,300 feet. However, this sample is depleted in silicon dioxide (SiO_2) and fluoride relative to temperature, and the Na-Ca-Mg geothermometer for this water produces an inferred temperature of only 90.6°C (195°F). Since this temperature is substantially cooler than the in situ temperatures measured in the completed borehole, and also is substantially cooler than the temperature measured by the Welaco tool at about 600 feet of depth during the 23-hour flow test, it is unlikely that this sample accurately reflects in situ geothermal fluid before mixing and cooling occurs.

All of the samples can be characterized as carbonate waters, and the influence of the underlying sedimentary rock appears to be present in the in situ water. Notably, however, the waters are relatively enriched in selected mineral assemblages (sulfates, calcium, sodium) compared to those concentrations normally expected to be present for waters originating in or with long dwell time in volcanic rock such as water from the Geysers area of Iceland. Notably, all of the samples had measured values of SiO_2 at concentrations (50-60 mg/l) roughly one-third of the values measured for the shallow hot wells located in the greenhouse complex. This datum suggests that all of the samples taken from TG52-7 represented mixed water as a combination of the hotter geothermal fluid and the cooler valley groundwater.

Notably, all of the samples were at an elevated pH (range of 9.3 to 9.6). This elevated pH value is strongly suggestive of a mechanism whereby dissolved carbon dioxide (CO_2) is suddenly released because of reduced pressure resulting from air entrained boiling, and

this release in turn triggers a change in the pH from slightly acidic (less than 7.0) to strongly basic (pH values higher than 8.5). This pH change also triggers a solubility decrease for dissolved iron, sulfates, silica and carbonate species that causes portions of these species to precipitate. (Cunniff, 1989.)

It is noted that the geothermal water sampled from TG52-7 had a pH of between 9.24 and 9.33, and these values are sharply higher than the comparative model analyzed by Cunniff (1989). Moreover, the Animas water had a significantly higher temperature, which could act to increase the solubility of CO_2. Accordingly, it is likely that the Animas Valley geothermal water contains a significant dissolved CO_2 content. Among other factors, if this inference is correct, there should be a significant gas lift to add to the elevated pieziometric head caused by elevated temperature. Because of the mechanical constraints imposed by airlift, it was not possible to obtain a pressurized water sample. Accordingly, although interesting, the water analyses do not provide for an accurate gauge of in situ geothermal fluid.

RESOURCE MODELS

SUMMARY OF AVAILABLE RESOURCE INFORMATION

LDG in Phase I of the GRED program conducted airborne magnetic surveys, and ground surveys using gravity, electrical resistivity, and seismic instrumentation. In addition, LDG completed numerous temperature surveys in existing shallow geothermal and irrigation wells. Additionally, LDG owns temperature surveys and other data to a depth of 7,000 feet in well TFD55-7 completed on federal geothermal lease NM 34790 in 1985. LDG also has completed an extensive analysis of the drill cuttings from both well TFD55-7 and an oil and gas test well drilled in 1969 about 2 miles north of well TFD55-7. Moreover, LDG has an extensive library of more than 300 chemical analyses of both geothermal and irrigation wells in the Animas Valley.

Significant additional and definitive geophysical data were acquired and integrated during subsequent phases of the overall GRED program. New information included and extensive array of seismic traverses, soil carbon dioxide and soil ion surveys, gradient hole drilling and logging, deep exploratory well drilling and testing, and a final suite of seismic traverses. All of this new resource information is integrated with earlier regional studies to develop a new model for the structural and thermal controls for the LDG geothermal resource.

In the following sections, a discussion of overall regional geology is followed by a discussion of the results from the final seismic traverses in context of earlier aeromagnetic and gravity surveys. Then, the data are interpreted in a series of three different structural models that are portrayed based on an interpretation of the data from separate phases of the overall program. These three models are summarized as follows:

1. An initial model was developed by Blackwell and Wisian (2001) using information available before the start of the GRED exploration and definition program.

2. The next model was developed by Blackwell and Leidig (2002) using additional data derived from the GRED Phase I aeromagnetic and gravity surveys, and in context of the multiple seismic traverses completed in GRED Phase II.

3. The final model represents a synthesis of new information developed in GRED Phases II and III, including lithology and thermal data produced by the gradient hole drilling program and deep exploratory well drilling and testing. Then, the final seismic traverses were completed to integrate lithologic data from the gradient hole drilling into a unified structural interpretation.

Regional Structure

For many years, the primary hypothesis to explain the intense shallow thermal anomaly was that the geothermal fluids ascended at the intersection of the AVF and the outer ring fracture of the Tertiary Muir Cauldron (figure 19). This hypothesis was developed and described by Elston, Deal, and Logsdon (1983), and AMAX/Steam Reserve used it in their exploration plan and resource model. Research and exploration surveys conducted by LDG under the GRED and EGS programs now form the basis for different hypotheses.

The geologic complexity of the Animas Valley area is demonstrated by the widely differing structure, stratigraphy, and ages of rocks exposed in the bordering mountain ranges. As mentioned above, a major geologic feature of southwestern New Mexico is the overthrust belt that formed during the Laramide Orogeny. The thrust belt was mapped and studied during the 1960's and 1970's as part of the search for petroleum. Numerous wildcat wells were drilled in the region, but most were dry holes, including the Cockrell Pyramid Federal No. 1 which was drilled about 3.5 km north of the geothermal area. Corbitt and Woodward (1973) mapped the approximate northern limit of the thrust belt as depicted in Figure 19. The mapped northern limit of the overthrust belt goes through the geothermal area and very close to well TFD55-7, which had not been drilled when the overthrust belt was mapped. The Cockrell Pyramid Federal No. 1 was drilled

just north of the overthrust limit and did not encounter a thrust block, hence the northern limit is south of the Cockrell well, but north of TFD55-7.

The following Figure 19 is composite of several geologic maps and studies. The base figure is a map modified from Corbitt and Woodward (1973) showing the northern limit (dotted line) of the "thrust and fold belt". The map was modified to show the Animas Valley Fault (AVF), the shallow thermal anomaly (star), and a regional northeast-southwest linear trend (crosshatch area). The inset contour map is depth to basement generated from gravity inversion by Blackwell and Wisian (2001).

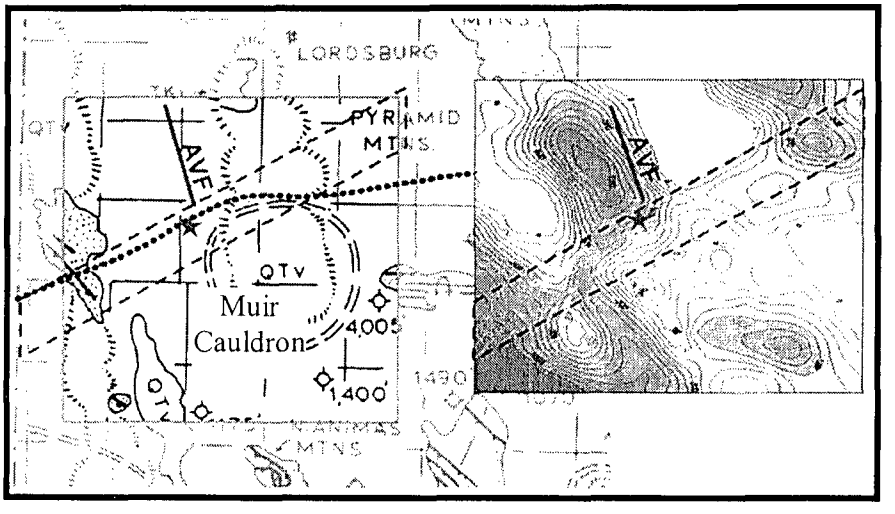

Figure 19. Integrated regional geology.

The surface trace of the AVF from the thermal anomaly area northward is a distinct and easily mapped scarp that has a general topographic relief of from one to three meters. From the area of the thermal anomaly and greenhouses southward, however, there is no surface expression of the fault and its trace has been inferred only from speculative "streaks" of vegetation and slight changes in soil color.

The "disappearance" of the AVF southward from the lateral offset, along with other evidence including the regional gravity and depth-to-basement maps generated by Blackwell and Wisian (2001), suggest that the major vertical displacement component of

the range-front faults in Animas Valley may have shifted from the AVF on the eastern side of the valley to the west side of the valley. In very simple terms, the northern part of the Animas Valley is a half graben with the vertical displacement being on the AVF as far south as the latitude of the thermal anomaly. From this latitude southward, the valley is a half graben with the major vertical displacement on the west side of the valley. The zone of the lateral offset marks the transition of the major range-front faults from the east side of the valley to the west side. This hypothesis is illustrated in Figure 20A below.

Although a major fault has not been mapped on the west side of the valley where most of the land has been farmed, the gravity data suggest its existence. Another piece of evidence for a major fault on the west side of the valley is the linear belt of Quaternary basalt along the geophysical trends south of Cotton City (figure 20A).

The southern part of the mapped fault scarp near the thermal anomaly also shows a pronounced right-lateral offset of up to 500 meters. Similar right-lateral offsets of the fault trace occur north of the thermal anomaly. These lateral offsets have a common east-northeast strike and could be explained by hypotheses such as differential erosion along the fault scarp, or differential vertical displacement along the dipping fault plane. However, the lateral offsets appear to extend for many tens of kilometers, crossing not only Animas Valley, but also the Pyramid and Peloncillo mountain ranges. These lateral "shifts" form a regional "grain" that is evident on maps, air photos, satellite imagery, and regional gravity and magnetic surveys. Figure 20B illustrates this regional "grain".

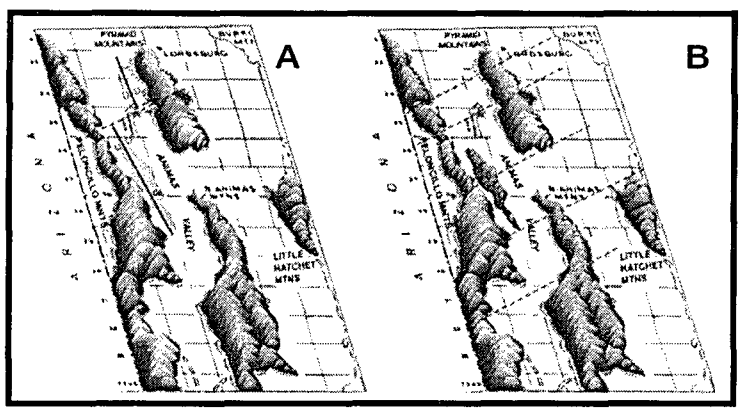

Figure 20. Fault pattern (A) and regional "grain" (B) of the Animas Valley area.

The linear trends identified in the aeromagnetic survey, as discussed earlier in this report, also trend parallel to the east-northeast-striking lateral shifts or regional "grain". The lateral offsets appear to be very young features, especially if they truly displace the AVF. Perhaps they simply reflect the buried Laramide structures and the overthrust belt. However, it is suggested here that the lateral offset of the AVF at the thermal anomaly is quite young. The AVF fault scarp is truncated, and the age of the thermal anomaly is very young as determined by the work of Blackwell and Wisian (2001) and Blackwell and Leidig (2002). The new seismic traverses conducted by LDG as part of this GRED program also support the hypothesis of a very young structural setting, one in which even the Recent lakebed sediments of Lake Animas have been displaced. The Soil Thermal Ion survey conducted by LDG, suggested a set of Riedel shears along this lateral offset.

In summary, it has become evident from new work performed under this GRED program that the intense shallow thermal anomaly of the Lightning Dock geothermal resource is more than just a point source upwelling along a single fault. Instead the reservoir seems to be either a pervasively fractured zone or a series of small faults and shears in the shallow volcanic rocks and deeper sedimentary rocks, created by the relatively recent possible lateral offset of the AVF resulting from strong tectonic extensional forces.

New Seismic Traverses

In April 2004, LDG completed two new reflection seismic traverses. The first (Line 8) of these two traverses was an extension to the east along the original Hot Water Road seismic traverse to map the AVF near the greenhouse complex. As completed, the traverse started about 100 m west of TG12-7, continued to the east to intersect TG52-7, and then was extended past TG52-7 about 0.6 miles (965 m). Total surveyed distance was about 1.2 miles (about 1.9 km). The survey was conducted from the west to the east so as to gain seismic reflections into the face of the putative AVF projected as downthrown to the west.

The second traverse, Line 7, started northwest of TG12-7, and extended to the southeast about 1.3 miles (about 2.1 km) to terminate south of the greenhouse complex. This traverse was designed to approximately intersect TG12-7, TFD55-7, pass relatively

closely to TG36-7, intersect TG57-7 and terminate to the southeast about 100 m beyond TG57-7. This orientation also placed the traverse roughly orthogonal to the postulated northern limit of the buried Laramide overthrust structure. Moreover, this positioning of the traverse provided seismic tie points to Harvey Line 26, the original LDG Hot Water Road traverse, and the new east-west Line 8 traverse defined above. Both traverses crossed private surface land, and the landowners gave permission for the work.

Data Acquisition

The new seismic traverses were completed by Bird Geophysical, Inc. in late March 2004, and the data were processed by EXCEL Geophysical Services, Inc. in mid April 2004. Figure 21 depicts the 2004 seismic lines and the various gradient holes and wells.

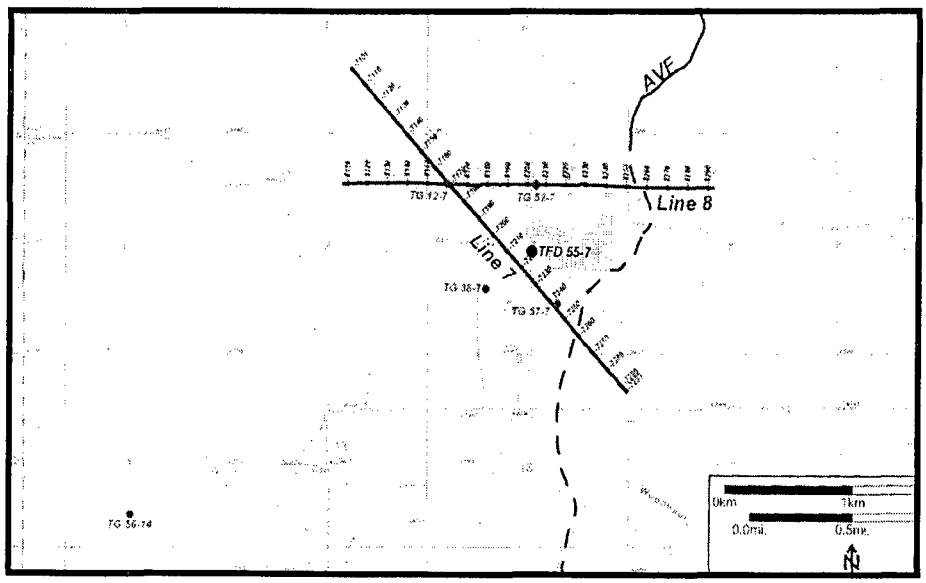

Figure 21. Seismic lines, 2004.

To evaluate the seismic data, EXCEL provided processed data and the stacking velocities used to process the data. LDG also had the synthetic log from TFD55-7 in which the sonic log was evaluated in terms of the velocity of sound at key lithology horizons in the well. A weakness of this data base is that there was no information on sonic velocities in the interval from ground surface to the bottom of the surface casing at 1,050 feet of depth

in well TFD55-7. General lithology for this interval is available from a temperature gradient hole completed several years prior to drilling activity on TFD55-7. However, in neither the gradient holes nor in the well drilling activity was a sonic log completed to 1,050 feet. In the drilling sequence for LDG's new deep test well, TG52-7, drilled and tested in 2003, an attempt was made to acquire a sonic log from ground level to 1,650 feet. The contractor's tools failed because of elevated hole temperature.

Methodology for Analyzing Seismic Data

By an iterative process, subsurface velocities were adjusted based on observed factors. The final adjustment assigned a velocity of 12,000 fps to the "cemented alluvium" found in all of the gradient holes except TG56-14. Using this adjustment in the numerical model produced reasonably good correlation with the seismic reflectors imaged on both new traverses. There is a sound basis for using velocity in the range of 12,000 fps or higher. According to Ackerman, who performed reflection seismic surveys in the Animas Valley in the late 1960's (reported in O'Brien and Stone, 1983), valley fill has a seismic velocity ranging between 8,000 and 12,000 fps, with the faster velocity assumed to represent the "basement rock" as used by O'Brien and Stone. In their model of the hydrological properties of the Animas Valley, O'Brien and Stone were focused on water-bearing shallow alluvial fill, and they assumed that seismic velocities greater than 10,000 to 11,000 ft/s indicate a dense, low-porosity geologic unit that would not yield significant quantities of water from shallow irrigation wells. Hence, their basement rock represented the transition of seismic velocity from about 8,000 ft/s to about 11,000, with this transition occurring at the base of the potential water-bearing sediments at a depth of about 2,000 ft (about 610 m).

Next, an estimate was made as to the two-way travel time to the first fracture in each of the holes for which this information is available. Specifically, drilling history for TFD55-7 suggests fractures were intercepted at about 660 feet and 1,450 feet. For TG52-7, a fracture likely was intercepted at about 660 feet, and for TG57-7, a likely fracture was intercepted at about 160 feet.

Evaluation of Processed Data Images

As an example of the process used, consider drilling data from TFD55-7. Using velocities from the synthetic log, a most-likely total drilled depth was positioned on the seismic image. Precambrian granite was penetrated at about 6,865 feet of depth. For Line 7 at closest approach to TFD55-7, the processed data image shows a series of relatively weak reflectors in depths ranging from about 750 ms to about 850 ms. A somewhat stronger reflector is imaged at about 790 ms. The horizon above that reflector likely could be the granite contact, since the synthetic log for TFD55-7 depicted the granite velocity as being considerably slower than the velocity in the overlying El Paso dolomite.

From about 700 ms to 1300 ms, a series of reflectors is imaged, all dipping to the west at an angle of about 70 degrees. These reflectors could represent en echelon Riedel shear, likely down-dip to the west from the Riedel shear mapped along the west margin of the greenhouse complex. The orientation of these en echelon faults down-dip to the west is an inference derived from gravity and magnetic survey data.

Evaluation of Magnetic Linear Features

From the aeromagnetic surveys, a notable feature was an interpretation of a series of linear features generally striking northeast-southwest, although several of these linears are oriented more nearly north-south. Line 7 was oriented in part on the need to conduct a seismic traverse orthogonal to these linear features to help determine whether or not the features represented real faults. Line 7 intersected five of these linear features, and Line 8 intersected one linear on an oblique angle and was orthogonal to a second linear. For each of the magnetic linears previously mapped, a review of the seismic images was made. From this review, there is reasonably good correlation between the fractures from the seismic images and most of the mapped magnetic linears.

Inspection of the seismic image for Line 7 suggests the presence of a series of reflectors dipping to the west for the southeast segment of Line 7, but dipping to the east near the northwest end of Line 7 traverse. Inspection of the processed image for Line 8 shows a

similar pattern of dipping reflectors although the dip angle is shallower for Line 8 than is depicted for Line 7.

Speculatively, these layered reflectors could be Gila Conglomerate grading into highly silicified volcanic alluvium, similar to that formation exposed on the surface at Table Top Mountain. As speculation, to the northwest the very deep reflectors could be imaging the lateral extent (northern edge) of the Laramide overthrust in which significant thicknesses of Horquilla limestone were thrust to the north-northeast. In addition, if the Precambrian horizon in TFD55-7 is located at about 780 ms, the layering of reflectors below this depth could represent folded layers within the granite.

Evaluation of Other Possible Faults

Multiple fractures are imaged on Line 7 so that one fracture intercepts TFD55-7 at about 40 ms and dips down to the east. This highly fractured region also represents an intersection between Line 7 and the Riedel shear mapped by MagmaChem (2002). There also appears to be one or more nearby faults, dipping down to the west, with one fault intersecting TFD55-7 at about 172 ms, and then intersecting ground level at about station 227. These faults can be traced downward to more than 1500 ms of two-way travel (likely to a true depth of more than 15,000 feet).

A major linear feature shows up clearly on the aeromagnetic surveys and also is a pronounced photo lineament feature. A likely buried fault cutting through the shallow volcanic rock can be discerned on the seismic image for Line 7. The suspected fault or fracture lies in the bottom of the graben produced by the apparent pattern of steeply dipping strata at depths ranging from about 350 ms to 1300 ms. It seems likely that there must be a near-vertical fault where each of the southeast-dipping strata intersects the northwest-dipping strata. In addition, there is a disturbed region at a shallower depth. This perceived near-vertical fault coincides generally with the linear feature deduced from aerial photography and which is mapped generally coincident with the magnetic linear.

Assessment of the Animas Valley Fault

Another, rather surprising, deduction made by reviewing the traverse for Line 8 is the absence of any subsurface feature that clearly depicts the AVF. The surface expression of this fault has been well mapped, at least to the vicinity of Section 8 (northeast of the greenhouse complex). Line 8 traverse deliberately was extended to the east for at least 0.8 kilometer (one-half mile) into Section 8 to provide sufficient traverse to the east of the purported fault.

The purported AVF is not clearly imaged. Instead, Line 8 images a likely case in which two faults are nearly coincident. One fault is downthrown to the west, and the second fault, with much less pronounced expression, is downthrown to the east. Moreover, these deduced faults are located almost ¼-mile to the west of the section boundary line between Sections 7 and 8 (and west of the location for Americulture State #2). Thus, these imaged faults are located more than ¼-mile to ½-mile to the west of the mapped surface expression. If the AVF is an older fault, it might be reasonable to assume that the eroded surface fault-line scarp would be located some distance from the subsurface fault plane. However, the AVF is believed to be very young, and one analysis of the slope of the fault-line scarp suggests an age of not more than 6,000 years. Thus, the probable young age of the fault-line scarp correlates poorly with the seismic imagery.

CONCEPTUAL RESERVOIR MODELS

Initial Model

Blackwell and Wisian (2001) developed a qualitative thermal model for the Lightning Dock resource. The model assumed thermal upflow along a fault that was intersected by well TFD55-7. At the time the model was developed, well TFD55-7 was the only deep well within the thermal area; four intermediate-depth temperature gradient holes had been drilled by AMAX, but only one (672-227) was in the known shallow thermal anomaly. The Blackwell and Wisian model shown in Figure 22 includes the following features:

- Flow up a steeply dipping fault or fault intersection from depth and intersecting well TFD55-7 at a depth of about 400 m (1,310 ft), and

- Discharge of the flow (at 110°-120°C, 230°-248°F) into a permeable zone below the water table, with movement down slope into the valley (to the northwest) and further cooling and dilution.

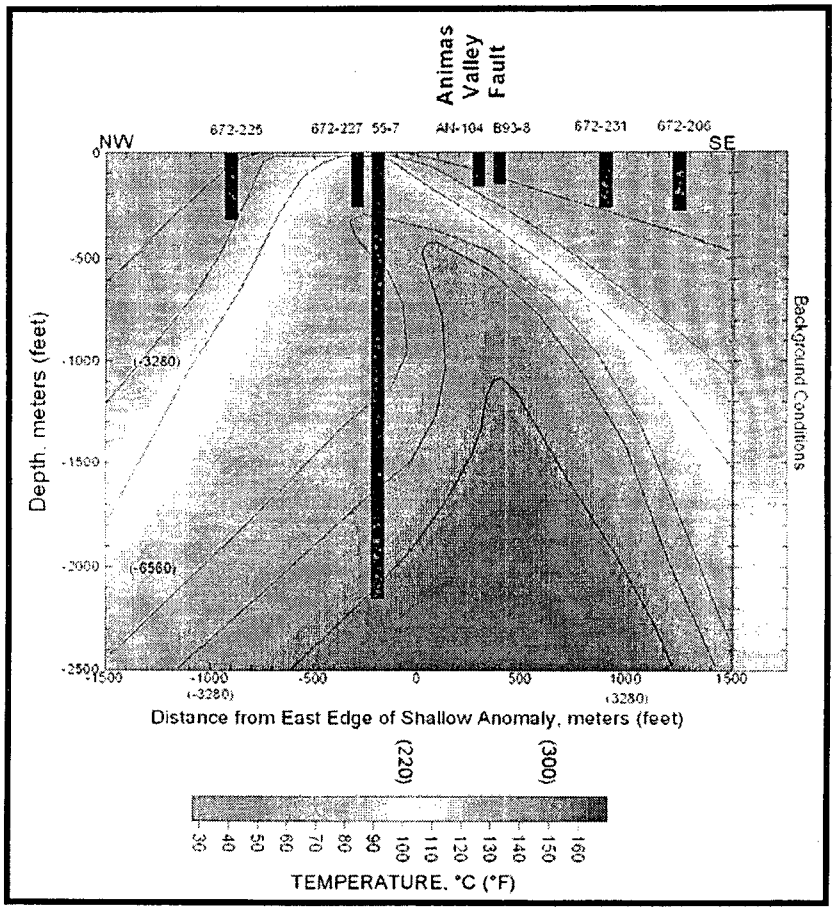

Figure 22. Initial conceptual model by Blackwell and Wisian (2001).

Intermediate Model

Following completion of the Phase I geophysical surveys and the seismic program completed in Phase II, Blackwell and Leidig (2002) completed a new series of analyses. In addition, this 2002 report included an evaluation of all of the available data, to include the thermal data from the report prepared by Blackwell and Wisian (2001).

Figure 23 is also excerpted from their 2002 report. This figure is a synthesis of thermal modeling overlaid on interpretations derived from the Phase I geophysical surveys including gravity, high-resolution aeromagnetic, and dipole-dipole electrical resistivity surveys, and Phase II seismic studies.

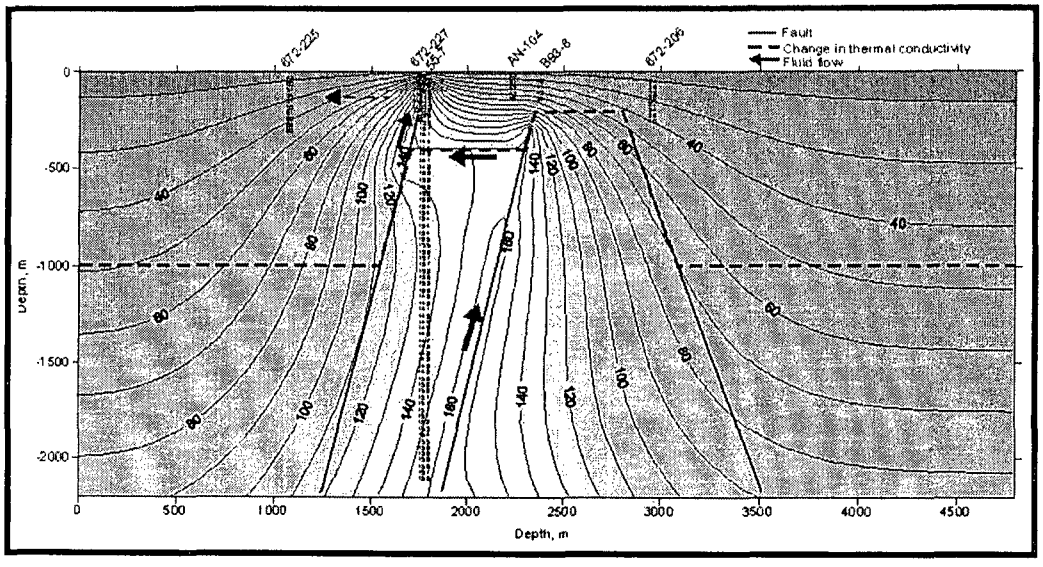

Figure 23. Intermediate thermal model by Blackwell and Leidig (2002).

Constraints for Developing New Model

All of the new information acquired in the past four years can be integrated to produce a final conceptual model of the geothermal reservoir. This concept would meet the following constraints and criteria:

- It must satisfy the thermal regime parameters established by Blackwell and Wisian (2001) as modified by new thermal data developed from the 2003 drilling program.

- It must meet the geologic constraints and factors summarized in preceding sections concerning gravity, resistivity, aeromagnetic measurements, and soil thermal ion data. In particular, the model must fit within the integrated structure

developed by Blackwell and Leidig (2002), as potentially modified by lithologic data developed from the 2003 drilling program.

- The model must incorporate findings from the seismic surveys, including the final traverses for Lines 7 and 8 completed in 2004.

- The model must be capable of being tested against new information that could be developed from either new geophysical work or new deep drilling, or a combination.

In the following sections, information is developed for structural implications from seismic traverses and the combined gravity and magnetic surveys. This section is followed by information developed from the thermal data newly acquired. The final section provides a concept resource model embodying all the lines of evidence acquired to date.

Conclusions from Seismic Traverses and Gravity and Magnetic Surveys

The AVF as now mapped appears to be striking generally north-south until it reaches the vicinity of Section 7; at that point Riedel shear zones are offset from the mapped AVF. These Riedel shear zones are mapped as striking north-south through the center of Section 7 at the western margin of the greenhouse complex. Turning to the middle portions of the valley, at least as far west as Highway 338, seismic traverses oriented principally north-south image what could be a series of horst and graben structures trending possibly east-west, although they could be oriented southwest-northeast.

At the west end of Caliche Road, the seismic image depicts a strong reflector trending westward to a more shallow depth. Similarly, for Line 25, the image defines a horst and graben structure with the graben centered about 1.6 km north of the location for TG56-14. Line 25 images the buried structure trending steeply southward to a shallow bedrock high which reaches its most shallow depth about 4 km south of TG56-14. Thus, the buried structure appears to be trending more shallowly to the south and to the west of TG56-14, and extends northward for several kilometers.

TG56-14 was sited at a point on the juxtaposition of a southwest trending magnetic linear feature and a photo lineament; accordingly, if a shallow horst and graben structure is oriented to the southwest, then TG56-14 likely would have been sited over the graben. TG56-14 was drilled to a depth of 1,250 feet (381 m), and intersected lakebed deposits and zones of cemented aggregate. Because the hole was drilled at possibly the deepest point for the putative graben, it was too shallow to intercept volcanic rock.

In the models developed by Blackwell and Leidig (2002) using the GM-SYS computer model for gravity and magnetic data, an interpretation is that the gravity and magnetic data provide an image of two distinct bedrock layers (volcanic rock and Paleozoic sedimentary rock) that underlie Caliche Road. Near the eastern end of Caliche Road (south-southeast of the TFD55-7) both layers sharply steepen and become shallower at a point where the shallowly buried horst trends north-south underneath the greenhouse complex. Both layers tend to sharply shallow near the western end of Caliche Road. Seismic data analyses confirm the general hypothesis.

These two independent estimating techniques provide converging estimates for the possible depths to volcanic rock and Paleozoic sedimentary rock for the western portions of the Caliche Road traverse. Moreover, these techniques correlate with the depth of saturated sediments derived by O'Brien and Stone (1983).

From gravity and magnetic data, Blackwell and Leidig (2002) modeled the data to show that along the Caliche Road seismic traverse, Paleozoic sedimentary rock underlies volcanic rock, with this layered structure very shallow south of the greenhouse complex where the data indicate the north-south magnetic and gravity high structure is imaged. The layered structure then dips farther to the west, and reaches a low point at which the limestone has a modeled depth of about 1.7 km. The image from Line 8 seismic traverse depicts a somewhat different structure. The layered structure is most shallow approximately 300 m east of TG52-7, and the shallow structure dips relatively slightly to a low point approximately 200 m to the east of TG12-7. At its deepest, the Paleozoic sedimentary rock layer likely is at a depth less than one km.

Combining information from the two seismic traverses, the aeromagnetic linear features, and gravity data suggests that a deep trough is oriented roughly north-south, with the trough sharply deepening to the south at or near Caliche Road and its intersection with a strong magnetic linear feature striking from the southwest. South of that point for several tens of km, seismic traverses fail to delineate any evidence for the putative AVF. Moreover, Blackwell and Wisian (2001) used a gravity inversion technique to map a series of faults trending southwest-northeast in general alignment with this magnetic linear. These lines of evidence suggest that the AVF transitions across the valley to the west side on an alignment at or near the magnetic linear feature.

Conclusions from Thermal Data

A summary review of the thermal data from the gradient hole drilling program includes the following salient facts:

- All of the holes displayed positive gradients at depth, and in all cases the temperature gradients were above background values for cooler valley ground water.
- For selected holes, notably TG52-7, TG12-7, and TG36-7, the deeper gradients were very large.
- Even the coolest hole, TG56-14, showed a positive gradient to depth.
- All of the temperature gradient holes showed evidence of, surprisingly in some cases, large amounts of heat.

Seismic and gravity/magnetic data depict a massively fractured subsurface within both the volcanic rock and the deeper limestone rock. At multiple points, the fractures can be clearly traced up through the cemented alluvium and into the shallowest loose alluvial fill. Widespread distribution of subsurface heat at distances as much as 4 km southwest of the greenhouses indicates the geothermal anomaly at depth likely extends far to the southwest. Hence, the geothermal anomaly appears to be comprised of multiple sources

all with geothermal heat. Prospects are strongly enhanced for intersecting power plant grade geothermal heat at numerous locations.

New Conceptual Model

Synthesis of all of the information now available indicates that a working reservoir model consists of multiple points of geothermal fluid upflow, which might merge into a sheet upflow at depth. One such point is the intense shallow anomaly around and near well TFD55-7. The strong likelihood exists that wells drilled within a few hundred meters of either TG52-7, TG36-7, or TFD55-7 would be productive, and would be hot from near surface to total depth.

Farther to the west, wells drilled on the flanks of the imaged horst and graben structure likely would intersect power plant grade resources at depths ranging from about 600 m (ca 2,000 feet) to about one km (3,280 feet) in the center of the putative southwest-trending graben. Confirmed temperature data are lacking for these more speculative wells, although the temperature profile for TG12-7 suggests that such step-out wells should have a reasonable success rate.

A new conceptual thermal model across seismic Line 7 and adjacent terrain is illustrated in Figure 24. Comparison of the area under the 140°C (285°F) contour interval in Figure 24 with the earlier model illustrated in Figure 23 suggests that the area is significantly larger for Figure 24. Thus, a far larger heat source is illustrated in Figure 24 for the area at the northeasterly portion of the geothermal anomaly. A similar cross-section cannot be derived for points farther to the west, but the anomalously elevated temperatures for TG56-14, drilled at the low point near the center of the putative southwesterly trending graben, strongly suggests that a potential production grade geothermal anomaly is at reasonable production well depths for all of LDG's leases.

The new conceptual model illustrates not only isotherms from drilling data, but also geology interpreted from drilling data and the seismic lines. As discussed earlier in this report, the new reflection seismic lines show significant shallow fracturing and faulting in the volcanic rocks and overlying older alluvium.

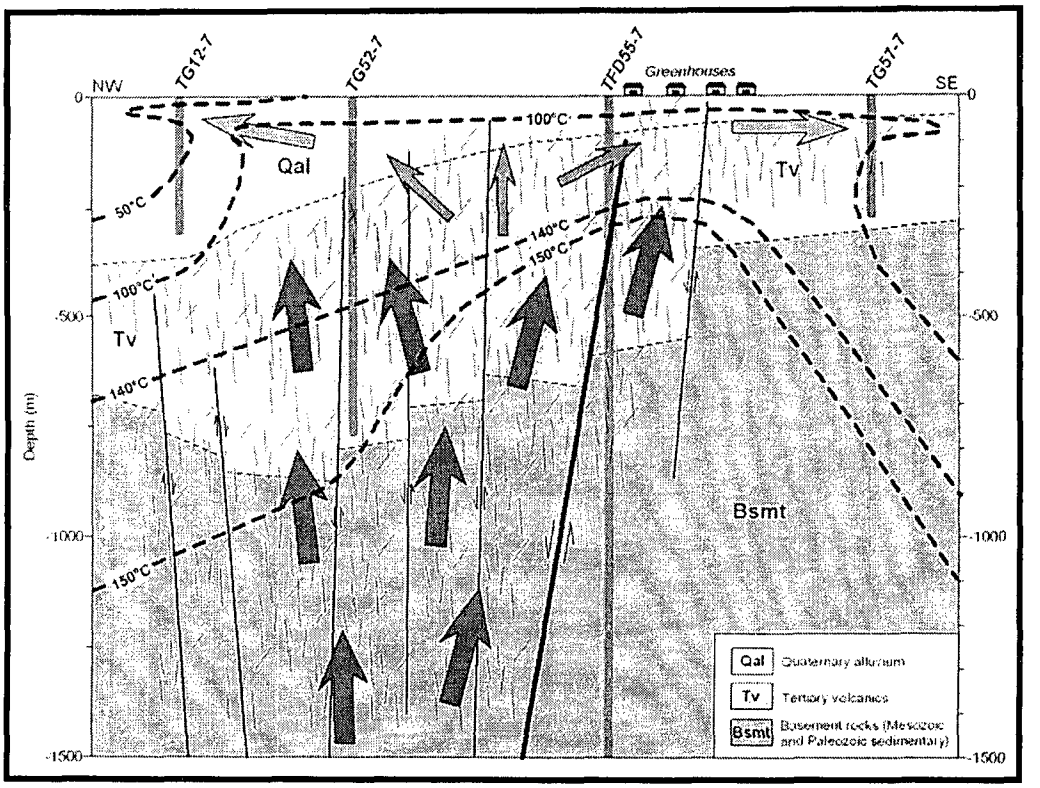

Figure 24. New conceptual model.

ESTIMATED RESERVOIR PRODUCTIVITY

General

Reservoir engineers conventionally use volumetric information together with measured subsurface temperatures to model estimated reservoir productivity of geothermal systems. These techniques work well in practice, but only when sufficient information is available from test drilling to establish key parameters. For Basin and Range systems, however, there is doubt that a fault-dominated system can be accurately portrayed by such methodology. Simply stated, in order for the volumetric method to have a high order of precision, an implicit assumption underlies the calculations; that is, that the reservoir is massively fractured with many lateral and vertical flow paths.

The reservoir productivity for the Animas Valley has been estimated using both the volumetric and thermal methods and the results of these estimates are summarized in the following section.

Summary of USGS Work

Productivity of the Animas geothermal resource was estimated by using volumetric methodology developed by Muffler, in the Assessment of Geothermal Resources of the United States –1978: U.S. Geological Survey Circular 790 (Muffler, 1979). At that time (1978), the only known information was temperatures of three very shallow wells at the hot spot. Muffler also had limited information about an "...oil test well 3 km north of the area recorded at 122°C at 2.2 km." (This well is Cockrell Pyramid Federal No. 1 completed in 1969 to a reported depth of 2.25 km.) Muffler estimated the volume of the Lightning Dock geothermal resource to be a default value of between 1 and 3 km^3, with a most likely volume of 2 km^3. From the observed shallow well temperatures and his estimated reservoir volume, Muffler assumed that the resource could produce recoverable thermal energy of about 4 percent of the reservoir thermal energy, which he estimated was about 0.8 to 1.5 x 10^{18} joules. Using his methodology, his 1978 values represent an electricity potential of about 24 MWe for 30 years. Notably, this estimate implicitly assumes a reject temperature of 15°C.

GeothermEx Estimate, January 31, 2001

As part of a comprehensive proposal for continuation funding under the DOE Idaho Falls Enhanced Geothermal Systems Program (EGS), LDG commissioned GeothermEx to develop an estimate of the potential productivity of a small portion of the Lightning Dock KGRA (GeothermEx, 2001). The reservoir was purposefully restricted to the Horquilla limestone rock intersected by well TFD55-7 from about 1,900 feet to about 4,000 feet of depth, and with a surface areal extent of 2 km^2. This conceptual EGS reservoir would contain about 1.1 to 2.4 km^3. From the temperature surveys on TFD55-7, they assumed the temperature of this reservoir was 285°F (140°C). Using these values, GeothermEx concluded the most likely productivity was 9.3 MW from this narrowly constrained EGS conceptual reservoir. Notably, GeothermEx also assumed a reject temperature of 15°C.

Estimated Productivity Based on Thermal Regime

Blackwell and Wisian (2001) used the net flow-through methodology to derive an estimate of potential reservoir productivity. They reviewed the available thermal and hydrologic data, and believed that the Animas geothermal resource is typical of relatively small Basin and Range geothermal systems. They concluded that an intense shallow anomaly about 1.2 km long had been delineated by drilling data prior to 2001. Using data from all available deep wells (well TFD55-7 and four gradient holes about 300 m deep), they created several models of the subsurface thermal regime that met all of the temperature and structural geologic constraints imposed by actual measured temperatures. Key to the modeling analyses is the estimated reservoir parameters. Blackwell conservatively used the one deep wellbore represented by TFD55-7 to indicate that there is a minimum volume of ±1 km around the wellbore that should be productive. His calculations show that there has likely been a minimum of 1 to 2 km of subsurface rock that has been heated by the geothermal flow since the likely faulting that created the intense shallow anomaly.

They conservatively estimated that conductive heat loss was 2-3 MW, with an average intensity of about 200,000 W/km^2. Using a conservative source temperature of 140°C (285°F), they estimated that the normal flow through the system at depth was about 6.7 liters per second (about 5,000 gallons per hour). In turn, this large flow-through rate makes the system a candidate for moderate temperature hydrothermal development. They also added that commercially developed hydrothermal systems generally produce from 10 to 1,000 times the natural flow-through rate. They concluded that comparison with other Basin and Range systems suggests that the system should be capable of sustaining power production at a rate of 5 to 15 MW.

Productivity Calculations for Well 55-7

Cunniff (2003) used data developed from a 24-hour flow test conducted on well TFD55-7. Based on observed drawdown for a production rate of about 375 gpm, the well specific yield was used to estimate overall well productivity. Depending on the pump setting depth, the well appears to be capable of producing from 7 to 8 gross MW, and

after subtracting well pumping electricity, the well could produce 5.5 to 7 net MW to the grid. This productivity should be confirmed by conducting an extended and carefully instrumented long-duration flow test.

Revised Productivity Estimate Based on New Drilling Data

Modifications for Reservoir Volume

Based on the thermal record from all of the well drilling in the past 20 years, including the five new gradient and deep holes drilled in 2003 by LDG, a more current, and presumably more correct, volume can be estimated. From well TFD55-7, the depth to Precambrian bedrock is about 2.5 km, and this depth interval has a measured average temperature of about 145°C. The area enclosed by the new LDG and older AMAX gradient holes contains about 6 square km. Using these dimensions produces an estimated volume of about 12-18 km^3, or a volume one-half to one order of magnitude larger than estimated by Muffler or GeothermEx.

Modifications for Reject Temperature

Note that the calculations by Muffler and GeothermEx do not represent electricity that could be generated by binary cycle machinery. Muffler and GeothermEx used a reject temperature of 15°C as the reference standard, whereas the reject temperature for typical binary cycle equipment is in the range of 70 to 85°C. If this latter temperature were to be used, the more correct value for commercial hydrothermal electricity potential would be in the range of about 60 percent of the values estimated by Muffler and GeothermEx.

Substituting this higher reject temperature in the calculated estimates for Muffler and GeothermEx, and also substituting new estimates for the possible reservoir volume produces newly estimated volumetric-based productivity in the range of 86 to 130 MWe (for Muffler) and 30 to 50 MWe (for GeothermEx, but using the larger reservoir).

Modification of the Productivity of the Thermal Regime

The thermal-based productivity estimate by Blackwell and Wisian (2001) can be considered to be very conservative. Their assumed conductive heat flow is roughly only

one-third the rate calculated by Kintzinger (1956), who based his calculations on measurements from a grid of shallow thermistors arrayed over more than three square miles. Kintzinger made temperature measurements at a depth of 1 m and he calculated the natural heat flow as "approximately 7500 kW for the area enclosed by the 18°C contour line." (This area is roughly 0.5 square miles in extent, or about 1.3 km^2.) This rate of heat flow represents about 650,000 W/km^2, or a value roughly three times higher than the conservative value estimated by Blackwell and Wisian.

Conclusions

The volumetric-based productivity estimates are noticeably much larger than those based on the thermal regime. In this regard, the thermal regime is a more conservative estimating technique; however, precision calculations from this method require much more thermal data which can be acquired only by drilling multiple deep wells.

New information was obtained from the LDG drilling program completed in 2003. However, only one of those wells (TG52-7) was deep enough to assure penetration below the shallow outflow from the shallow geothermal system. Two of the gradient holes were sited so that new drilling data did represent partial or total penetration of the shallow outflow system. However, only the one deep well (TG52-7) gave a thermal datum point fully useable in the thermal-based methodology.

Given the estimated productivity from a single well (TFD55-7) of 6 to 8 gross MW, it is reasonable to project a 2- or 3-well program easily should produce enough geothermal heat to generate 15 MW or more.

Based on the drilling program and the flow test for well TFD55-7, the most likely scenario for the LDG geothermal system is that the productivity likely will be at least 15 MW. From the volumetric-based calculations, a high probability exists that the geothermal anomaly can produce at least 25 MW. Either of these two production rates, if achieved, would represent a viable commercial-scale geothermal power plant.

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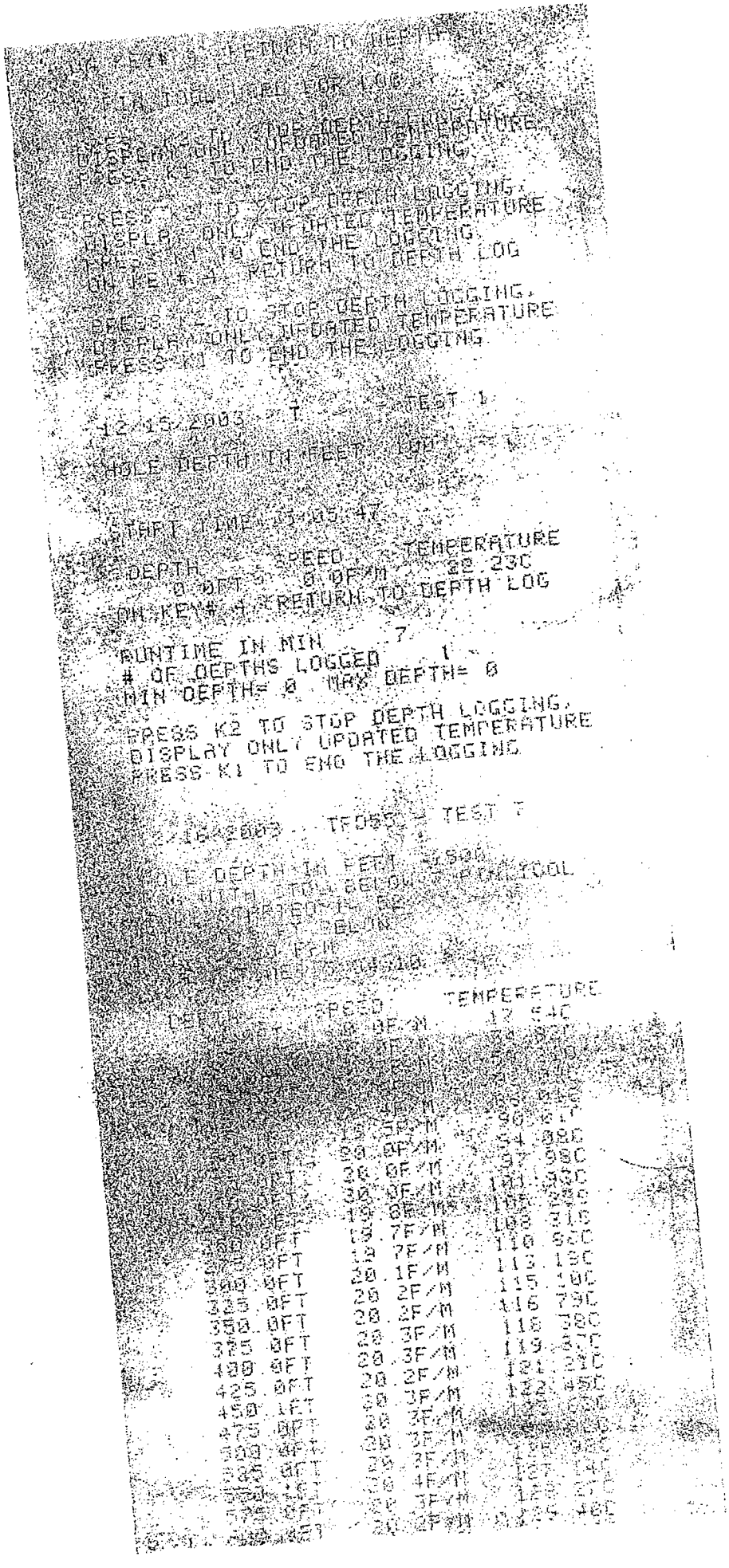
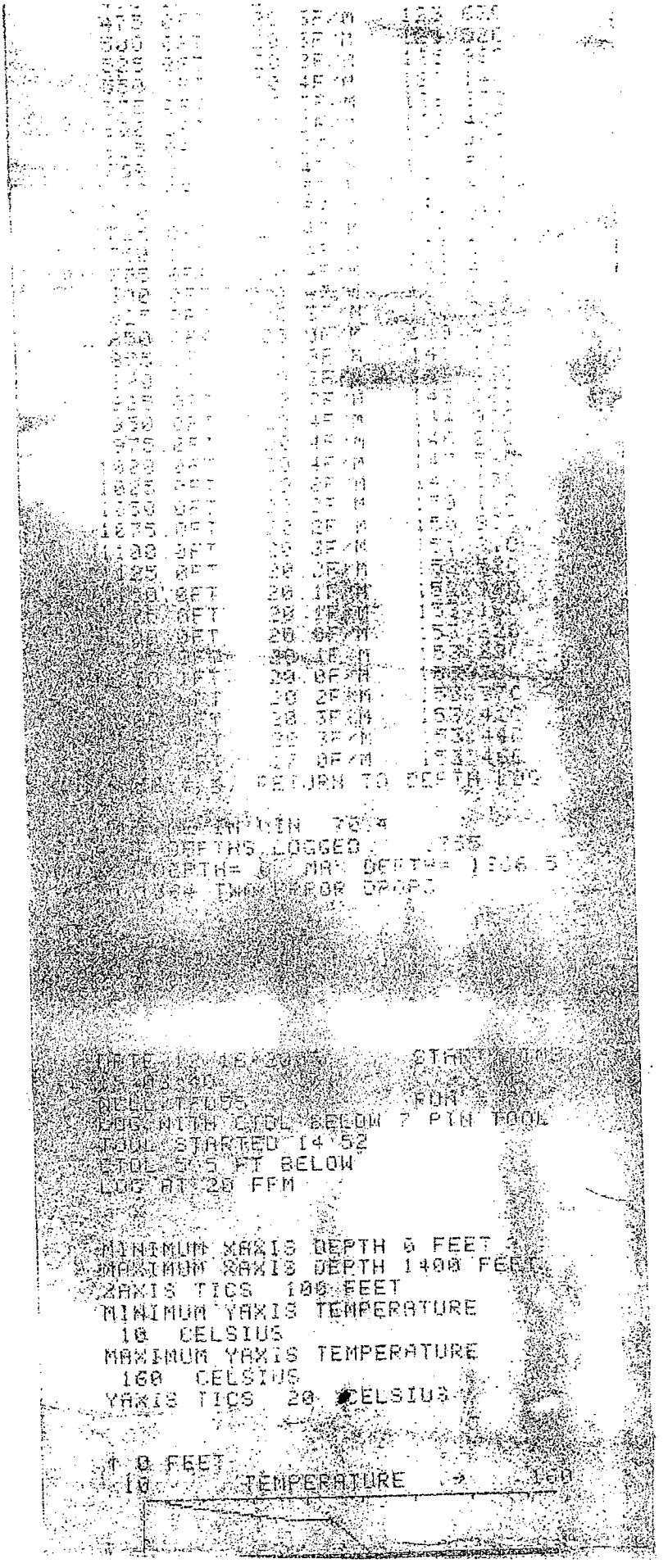
Well Log 55-07
and
Evaluation



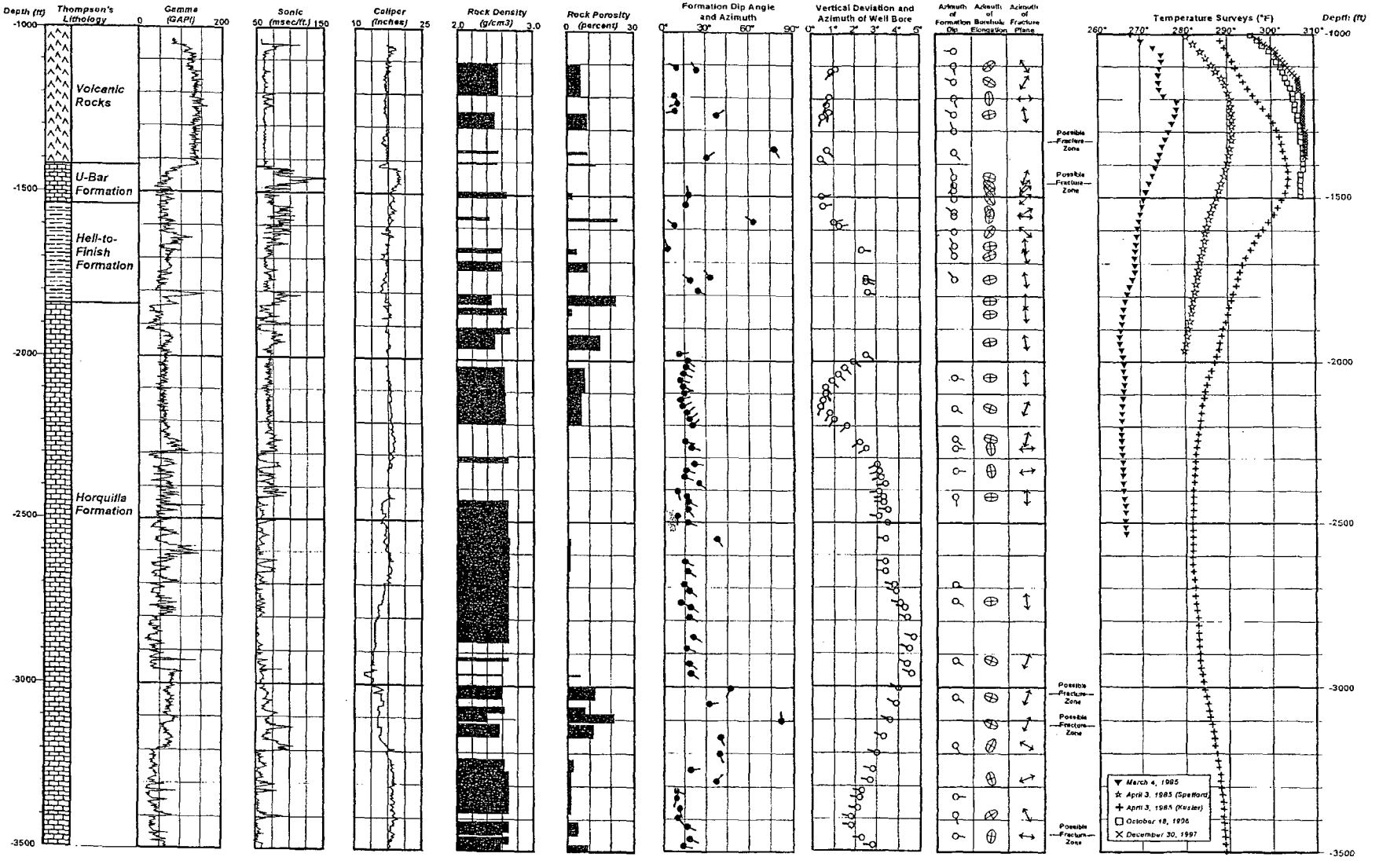

DEPTHS LOGGED
DEPTH= 0 MAX DEPTH= 1306.5
FOR DROPS
DEPTH IN FEET
DOG WITH CYCL BELOW 7 PIN TOOL
TOOL STARTED 14'52
TOOL 50.5 FT BELOW
LOG AT 20 FPM
MINIMUM XAXIS DEPTH 0 FEET
MAXIMUM XAXIS DEPTH 1400 FEET
XAXIS TICS 100 FEET
MINIMUM YAXIS TEMPERATURE
10 CELSIUS
MAXIMUM YAXIS TEMPERATURE
160 CELSIUS
YAXIS TICS 20 CELSIUS
0 FEET
10 TEMPERATURE 160

MINIMUM XAXIS DEPTH 0 FEET
MAXIMUM XAXIS DEPTH 1100 FEET
XAXIS TICS 100 FEET
MINIMUM YAXIS TEMPERATURE
10 CELSIUS
MAXIMUM YAXIS TEMPERATURE
160 CELSIUS
YAXIS TICS 20 CELSIUS

0 FEET
10 TEMPERATURE 160

1100 FEET

SANDA LOG - 12/17/2003
TG 557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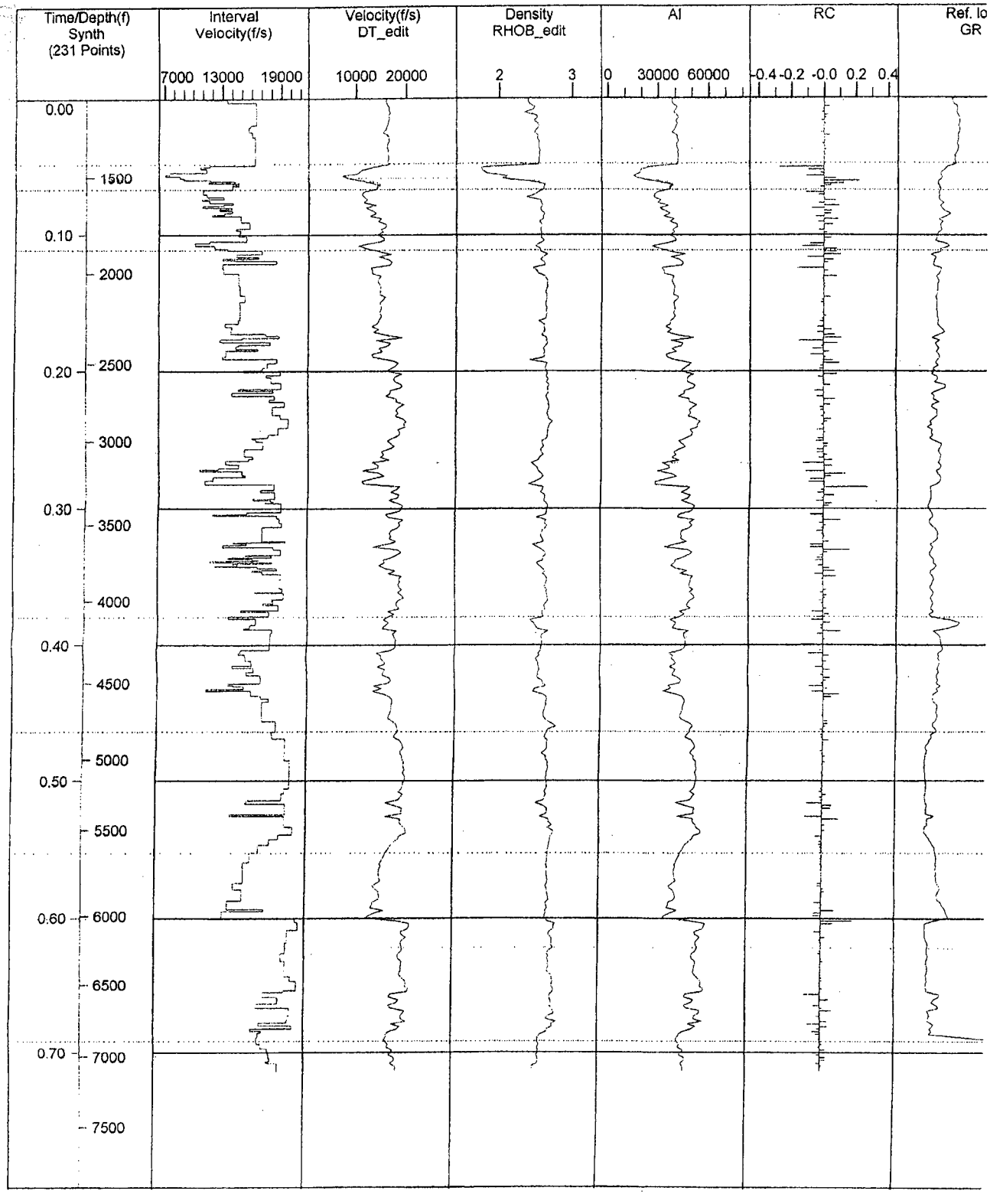
Thompson's Lithology
Gamma (GAPI)
0
200
Sonic (msec/ft)
50
150
Caliper (inches)
10
25
Rock Density (g/cm3)
2.0
3.0
Rock Porosity (percent)
0
30
Formation Dip Angle and Azimuth
0°
30°
60°
90°
Vertical Deviation and Azimuth of Well Bore
0°
1°
2°
3°
4°
5°
Azimuth of Formation Dip
Azimuth of Borehole Elongation
Azimuth of Fracture Plane
Temperature Surveys (°F)
260°
270°
280°
290°
300°
310°
Depth (ft)
-1000
-1500
-2000
-2500
-3000
-3500
Volcanic Rocks
U-Bar Formation
Hell-to-Finish Formation
Horquilla Formation
Possible Fracture Zone
Possible Fracture Zone
Possible Fracture Zone
Possible Fracture Zone
Possible Fracture Zone
March 4, 1985
April 3, 1985 (Spelford)
April 3, 1985 (Kessler)
October 18, 1996
December 30, 1997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Synth
(231 Points)
Interval
Velocity(f/s)
7000 13000 19000
Velocity(f/s)
DT_edit
10000 20000
Density
RHOB_edit
2 3
AI
0 30000 60000
RC
-0.4 -0.2 -0.0 0.2 0.4
Ref. lo
GR
0.00
1500
0.10
2000
0.20
2500
3000
0.30
3500
4000
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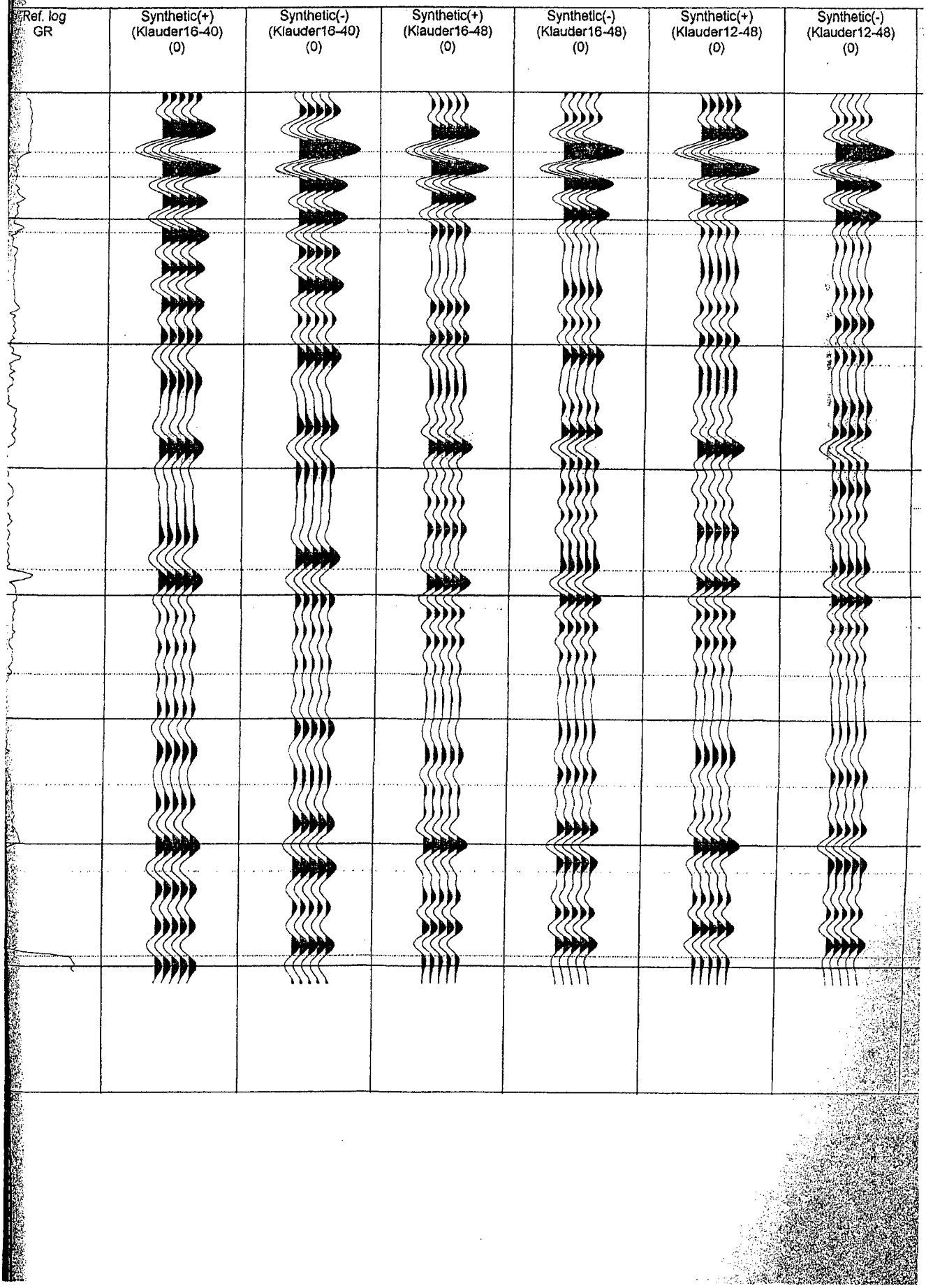
4500
5000
0.50
5500
0.60
6000
6500
0.70
7000
7500


Ref. log
GR
Synthetic(+)
(Klauder16-40)
(0)
Synthetic(-)
(Klauder16-40)
(0)
Synthetic(+)
(Klauder16-48)
(0)
Synthetlc(-)
(Klauder16-48)
(0)
Synthetic(+)
(Klauder12-48)
(0)
Synthetic(-)
(Klauder12-48)
(0)

TIME INT VEL THICKNESS
THICKNESS

0.04572	49429.2	1130.0
0.02048	11720.0	120.0
0.04497	13342.6	300.0
0.26886	16588.4	2230.0
0.08390	16685.6	700.0
0.08846	19217.9	850.0
0.04803	14990.6	360.0
0.02174	20238.6	220.0
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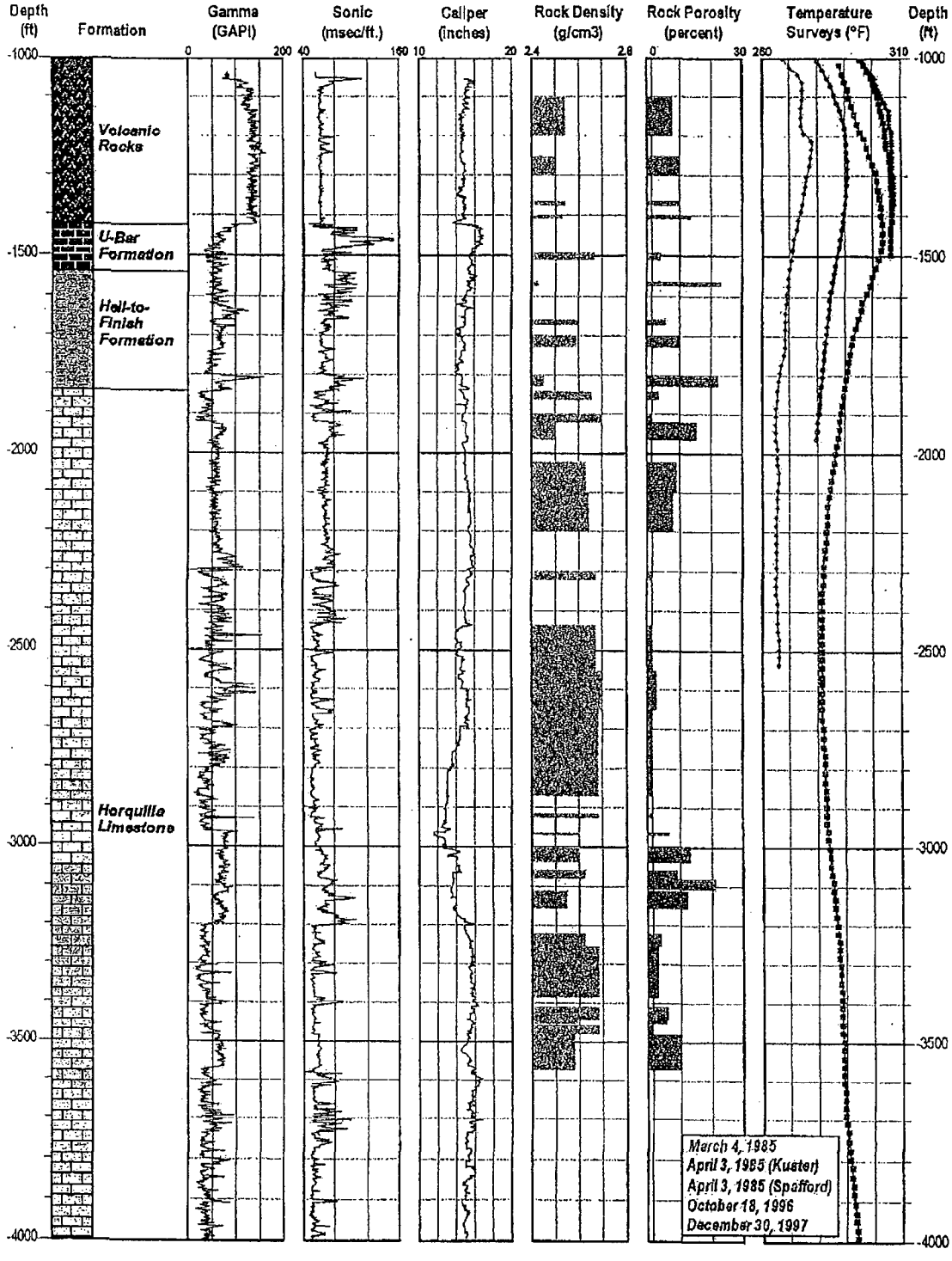
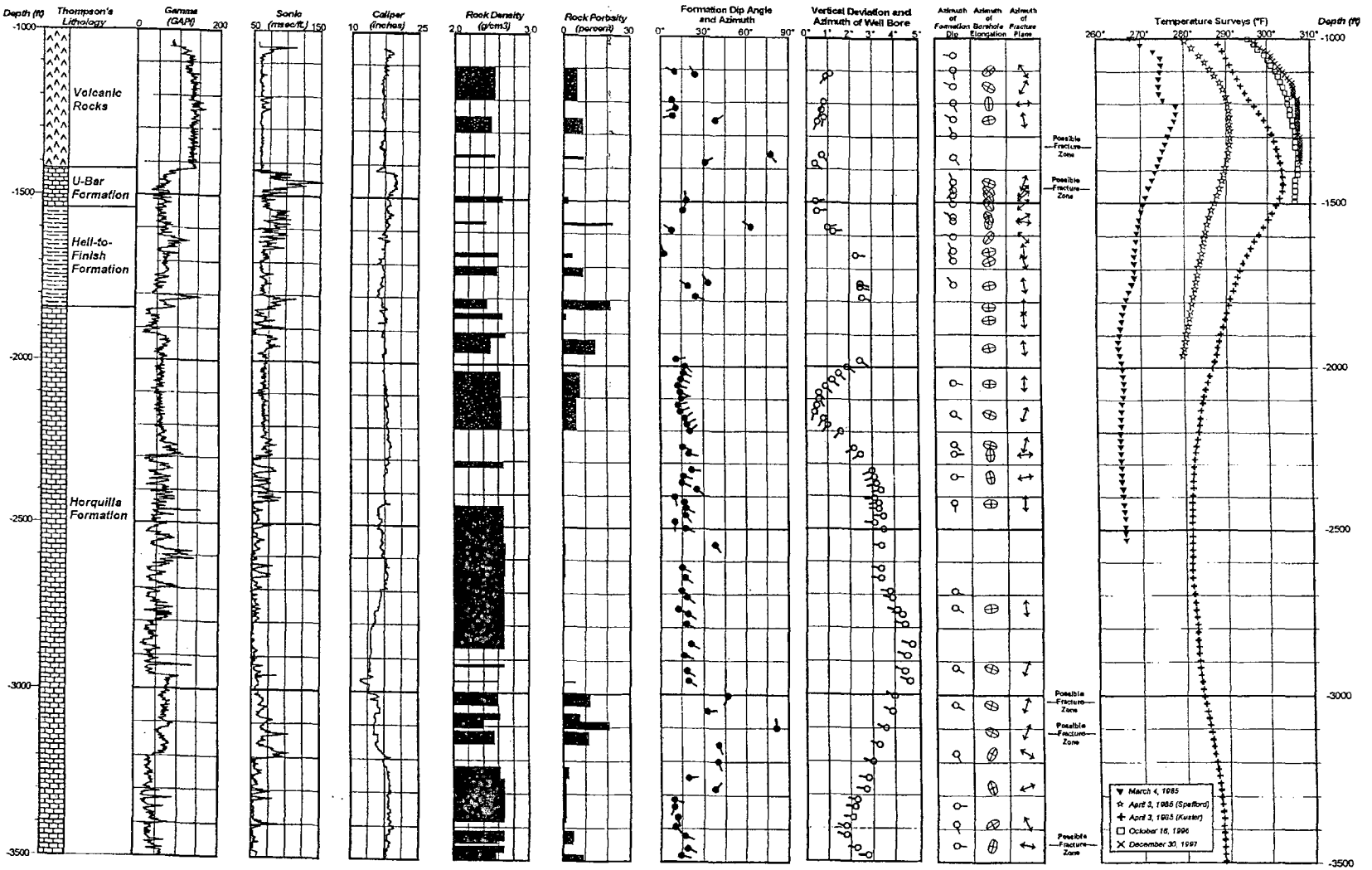
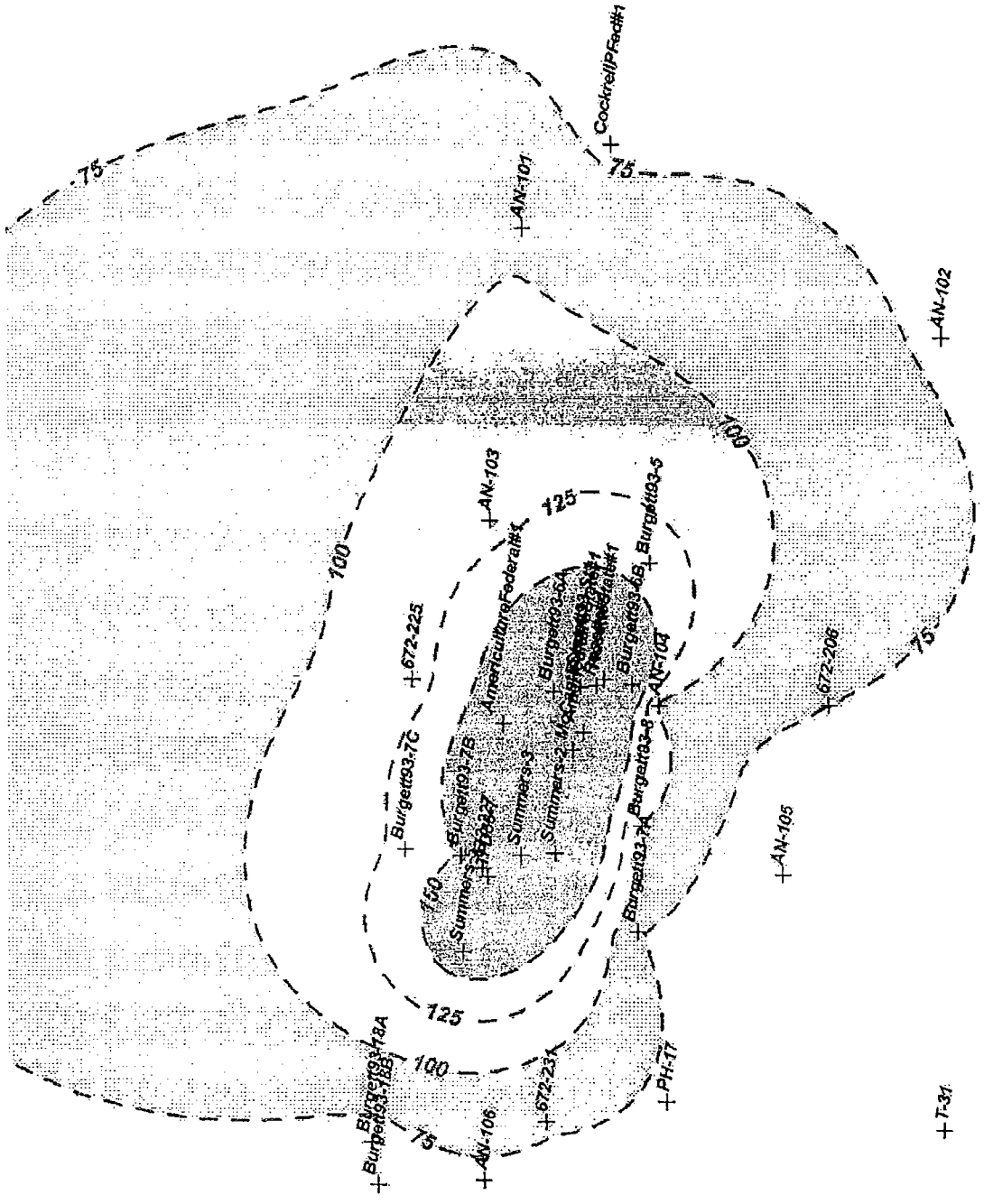

Depth (ft)
Formation
Gamma (GAPI)
Sonic (msec/ft.)
Caliper (inches)
Rock Density (g/cm3)
Rock Porosity (percent)
Temperature Surveys (°F)
Depth (ft)
-1000
-1500
-2000
-2500
-3000
-3500
-4000
0
200
40
160
10
20
2.4
2.8
0
30
260
310
Volcanic Rocks
U-Bar Formation
Hell-to-Finish Formation
Horquilla Limestone
March 4, 1985
April 3, 1985 (Kuster)
April 3, 1985 (Spafford)
October 18, 1996
December 30, 1997

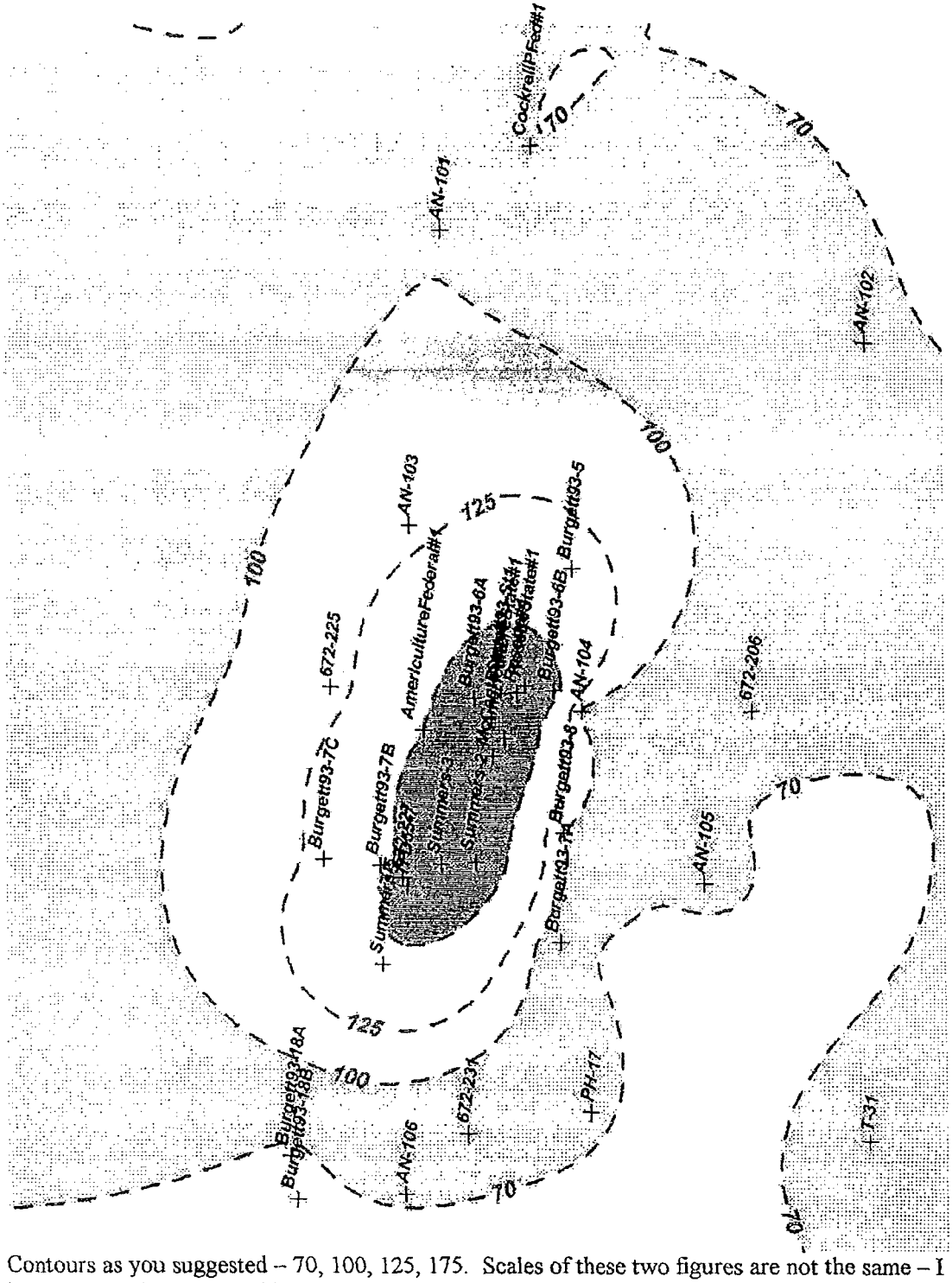
PROPRIETARY





Contours at 75, 100, 125, and 150. Susie's "Easter" color scheme.

7,300' x 13,500'



Contours as you suggested -- 70, 100, 125, 175. Scales of these two figures are not the same – I just cropped them to an arbitrary size.

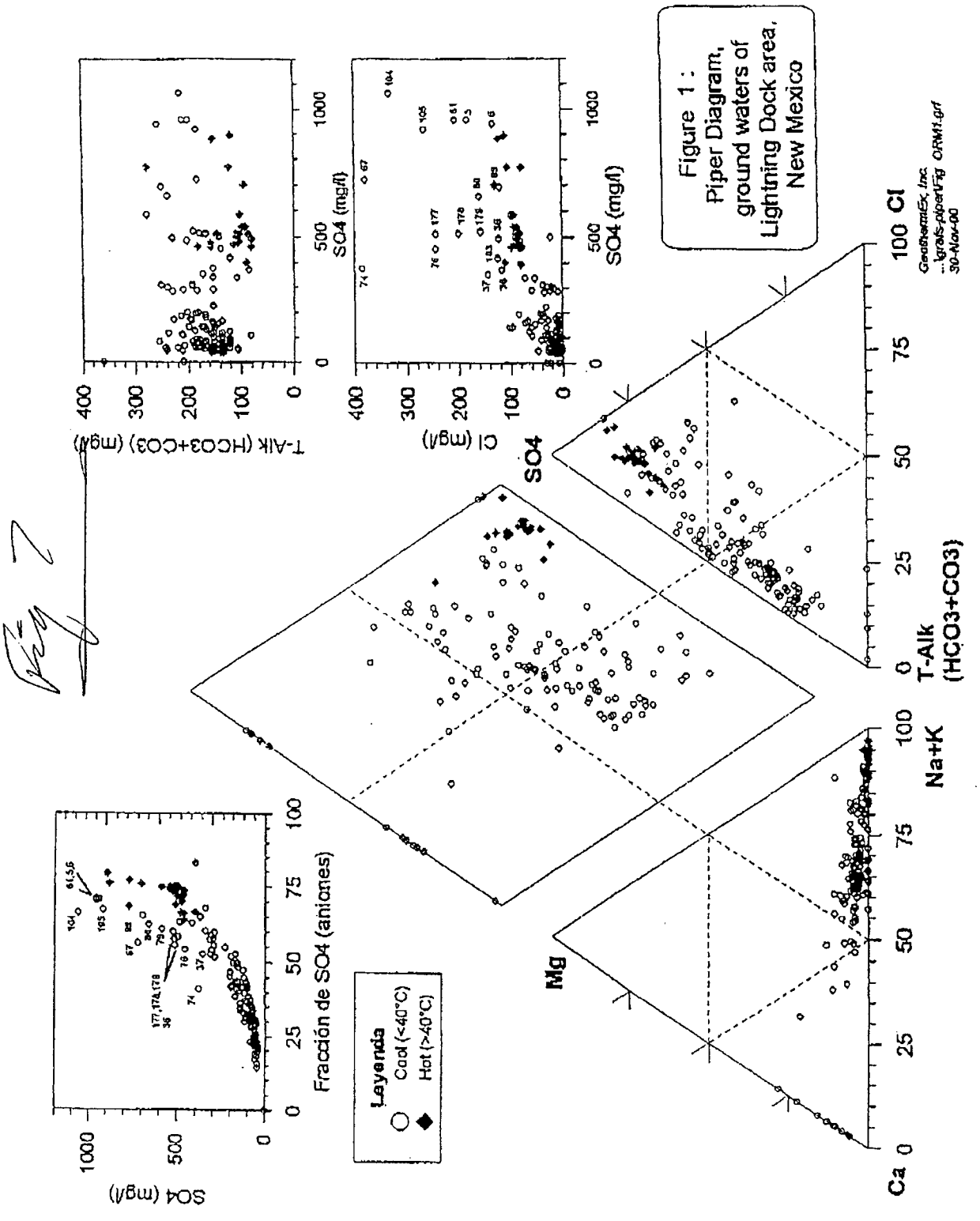


Figure 1 :
Piper Diagram,
ground waters of
Lightning Dock area,
New Mexico
GeoThermEx, Inc.
...\grafs-piper\Fig ORM1.grf
30-Nov-00
Ca
Mg
Na+K
Cl
SO4
T-Alk
(HCO3+CO3)
Leyenda
Cool (<40°C)
Hot (>40°C)
Fracción de SO4 (aniones)
SO4 (mg/l)
Cl (mg/l)
T-Alk (HCO3+CO3) (mg/l)

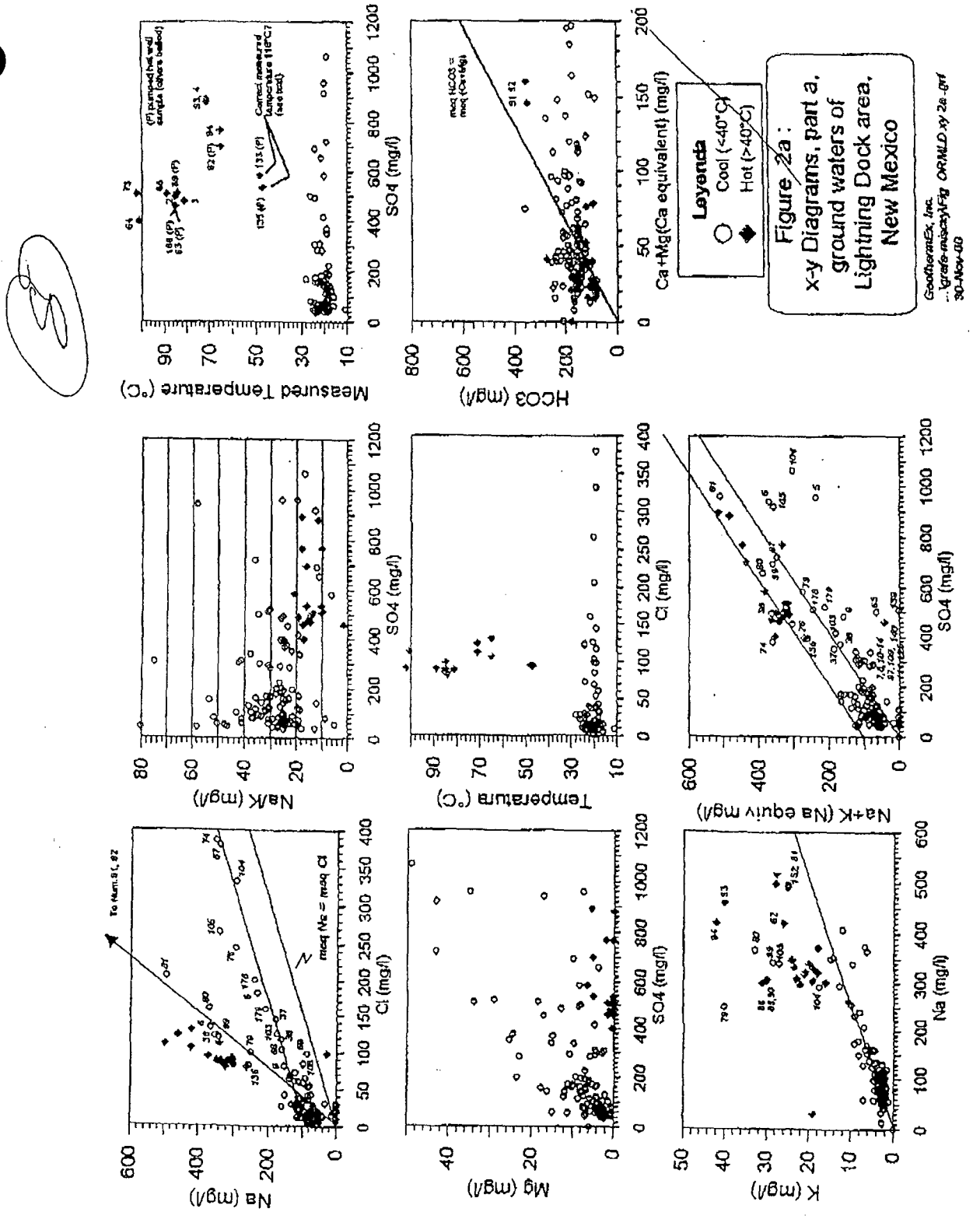


Figure 2a :
x-y Diagrams, part a, ground waters of Lightning Dock area, New Mexico

GeothermEx, Inc.
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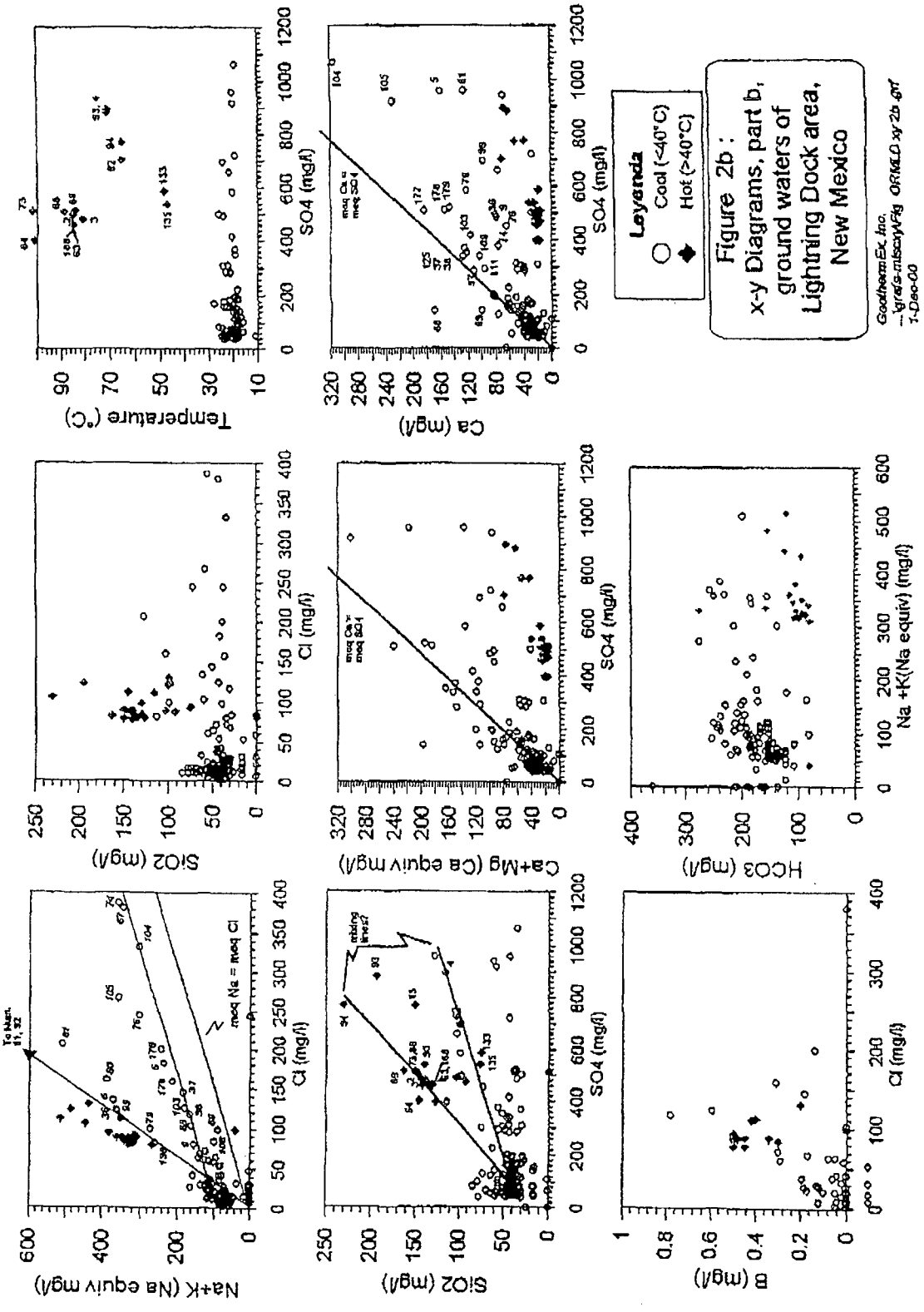
30-Nov-00


Na+K (Na equiv mg/l)
Cl (mg/l)
meq Na = meq Cl
SiO2 (mg/l)
SO4 (mg/l)
B (mg/l)
Cl (mg/l)
SiO2 (mg/l)
Cl (mg/l)
Ca+Mg (Ca equiv mg/l)
SO4 (mg/l)
HCO3 (mg/l)
Na +K(Na equiv) (mg/l)
Temperature (°C)
SO4 (mg/l)
Ca (mg/l)
SO4 (mg/l)
Leyenda
Cool (<40°C)
Hot (>40°C)
Figure 2b :
x-y Diagrams, part b,
ground waters of
Lightning Dock area,
New Mexico
GeothermEx, Inc.
--\gra\s-misc\yFig ORMLD xy-2b.grf
1-Dec-00

Lightning Dock Area Thermal Wells

GeothermEx, Inc.

Table 1: Aqueous Geothermometers

Num	Coordenates E	N	Name	Date	T°C	Flow gpm	pH	Cl mg/l	Geothermometers, °C(1) Quartz 0°-330° Con.	Quartz 0°-330° Ad.	Chalcedony 0°-250° Con.	Chalcedony 0°-250° Ad.	Arnór 0°-250°	Na-K-Ca 4°-340° SQ-CaNa	Na-K-Ca 4°-340° B=4/3	Na-K-Ca 4°-340° B=1/3	Na-K-Ca 4°-340° Final Temp	Na-K-Ca-Mg 4°-340° Fact.R	Na-K-Ca-Mg 4°-340° Final Temp	Na/K (F) >150°	K-Mg (Fg) 30°-350°
Type: well																					
13	187008.6	431307.7	Well	01-Jul-81			7.92	79	161	154	137	131	39	2.22	121	156	156	6	146	172	101
172	189342.7	416548.7	Folk well	04-Apr-60			7.80	42	—	—	—	—	—	4.05	89	144	89	36	52	168	22
62	189342.7	416548.7	Folk well	27-Jan-75	65	50	7.00	130	137	133	110	110	16	2.29	123	160	160	9	134	179	90
4	189342.7	416548.7	Well	01-Jul-81	71		7.84	111	146	141	120	117	24	1.89	129	158	158	10	130	172	92
135	189625.3	418045.8	Burgett greenhouse discharg	28-Jan-86	47		8.10	92	123	121	94	—	4	2.13	127	162	162	16	101	180	75
133	189887.8	418576.5	Burgett geothermal well	28-Jan-86	48		8.10	94	122	120	93	—	3	1.29	145	157	157	28	59	161	66
139	190266.5	418095.5	Richins & McDonald well	01-Feb-49				85	—	—	—	—	—		—	—	—	—	—	—	—
140	190266.5	418095.5	Richins & McDonald well	28-Apr-49				78	158	151	133	128	35		—	—	—	—	—	—	—
141	190266.5	418095.5	Richins & McDonald well	30-Jul-51				81	—	—	—	—	—		—	—	—	—	—	—	—
142	190266.5	418095.5	Richins & McDonald well	28-Mar-52			8.20	82	—	—	—	—	—		—	—	—	—	—	—	—
143	190266.5	418095.5	Richins & McDonald well	10-Apr-55			7.60	80	155	149	130	125	33		—	—	—	—	—	—	—
171	190266.5	418095.5	Well	30-Apr-66					—	—	—	—	—	1.48	154	173	173	1	162	187	153
64	190266.5	418095.5	Hot well (Superheated hot	02-Jul-75	101		7.80	112	159	153	135	130	37	1.51	145	165	165	2	165	175	129
93	190266.5	418095.5	Burgett well	07-Aug-80	71		8.70	123	178	169	156	148	54	1.97	147	181	181	—	—	205	—
94	190266.5	418095.5	Burgett well	06-Jan-81	65		8.50	106	190	178	170	160	66	1.97	153	188	188	0	188	217	169
89	190266.5	418095.5	Burgett well	27-Mar-81	84		7.30	82	167	159	143	137	44	1.84	159	192	192	1	192	220	142
2	190266.5	418095.5	Burgett hot well	01-Jul-81	85		7.71	88	160	154	136	131	38	1.61	149	173	173	2	173	189	127
167	190628.0	418274.0	Well	28-Apr-49				78	158	151	133	128	35		—	—	—	—	—	—	—
168	190628.0	418274.0	Well	27-Apr-54			8.40	83	156	150	132	127	34	1.62	145	168	168	4	165	182	118
90	190628.0	418274.0	Burgett well	06-Jan-81			8.00	88	157	151	133	128	35	1.87	155	188	188	0	188	215	170
155	190647.0	418237.5	Animas Valley well 6-19-		96		6.80		141	137	114	113	20	2.07	136	171	171	—	—	192	—
188	190691.7	419719.7	McCants Hot Well		85		8.10	84	153	147	127	123	31	1.59	141	163	163	1	152	174	145
63	190691.7	419719.7	McCants well	26-Jan-75	85	50	8.10	98	153	147	127	123	31	17.54	107	261	261	1	257	451	145
88	190691.7	419719.7	McCants well	06-Aug-80	88.9		8.50	89	161	155	137	132	39	1.51	170	192	192	—	—	216	—
3	190691.7	419719.7	McCants well	01-Jul-81	88		8.16	88	158	152	134	129	36	1.74	142	168	168	4	164	184	117

(1) See references at end of table

Num	Coordenates E	N	Name	Date	T°C	Flow gpm	pH	Cl mg/l	Geothermometers, °C[1] Quartz 0° - 330° Con.	Ad.	Chalcedony 0° - 250° Con.	Ad.	Amór 0° - 150°	Na - K - Ca 4° - 340° SQ-CaNa	B= 4/3	B= 1/3	Final Temp	Na-K-Ca-Mg 4° - 340° Fact.R	Final Temp	Na/K (F) >150°	K-Mg (Fg) 30° - 350°
137	190691.7	4119719.7	Well, McCants greenhous	07-Nov-85			8.23	80	151	146	126	122	29	1.78	119	144	144	—	—	150	—
169	190797.0	4118140.6	Well	30-Apr-66			8.75	88	133	130	105	107	13	1.32	161	175	175	1	167	187	153
170	190797.0	4118140.6	Well	30-Apr-66			9.10	89	139	135	112	112	18	1.61	136	158	158	1	151	168	140
73	190797.0	4118140.6	Burgett "Hot Well"	20-Jan-75	102		9.00	89	161	155	137	132	39	1.74	147	174	174	2	174	193	126
91	190797.0	4118140.6	Burgett well	07-Aug-80	89.4		10.90	1581	186	175	165	155	61	0.33	435	314	314	—	—	342	—
92	190797.0	4118140.6	Burgett well	06-Jan-81	94		8.10	1690	177	167	155	146	53	0.33	408	294	294	0	294	313	300

(1) See references at end of table

Table1: Aqueous Geothermometers

DEC-22-2000 14:30 GEOTHERMEX, INC 15105278164 P.11

Num	Coordenates E	N	Name	Date	T°C	Flow gpm	pH	Cl mg/l	Geothermometers, °C(1) Quartz 0° - 330° Con.	Ad.	Chalcedony 0° - 250° Con.	Ad.	Amór 0° - 250°	Na - K - Ca 4° - 340° SQ-CaNa	B= 4/3	B= 1/3	Final Temp	Na-K-Ca-Mg 4° - 340° Fact.R	Final Temp	Na/K (F) >150°	K-Mg (Fg) 30° - 350°

References:

1) Henley, R.W., Truesdell, A.H., Barton, P.B.Jr., 1984, Fluid-Mineral Equilibria in Hydrothermal Systems. Reviews in Economic Geology, Vol.1. Society of Economic Geologists. The Economic Geology Publishing Company, El Paso Texas USA.

Quartz: quartz geothermometer of Fournier and Potter
Con. = conductive
Ad. = adiabatic, for waters boiling at 100°C

Chalcedony: chalcedony geothermometer of Fournier
Con. = conductive
Ad. = adiabatic, for waters boiling at 100°C

Amor (amorphous silica): amorphous silica geothermometer of Fournier

Na-K-Ca: Na-K-Ca geothermometer of Fournier and Truesdell
SQ-CaNa = factor square root(Ca)/Na
B13 = temperature for factor B = 4/3
B43 = temperature for factor B = 1/3
Final Temperature = B43 or B13, according to rules for B and SQ-CaNa

Na-K-Ca-Mg: Na-K-Ca-Mg geothermometer of Fournier and Truesdell
Factor R (Mg, K, Ca) = relative concentration of Mg, the applicable range is 5 - 50.
Final Temperature = final result, according to rules for application of Factor R.

Na-K (F): Na/K geothermometer of Fournier

2) Fournier, R.O., 1990, The interpretation of Na-K-Mg relations in geothermal waters. Geothermal Resources Council Transactions, vol.14, part II, pp. 1421 - 1425. August 1990.

K-Mg (Fg): K-Mg geothermometer of Fournier (equations corrected by GeothermEx)

(1) See references at end of table

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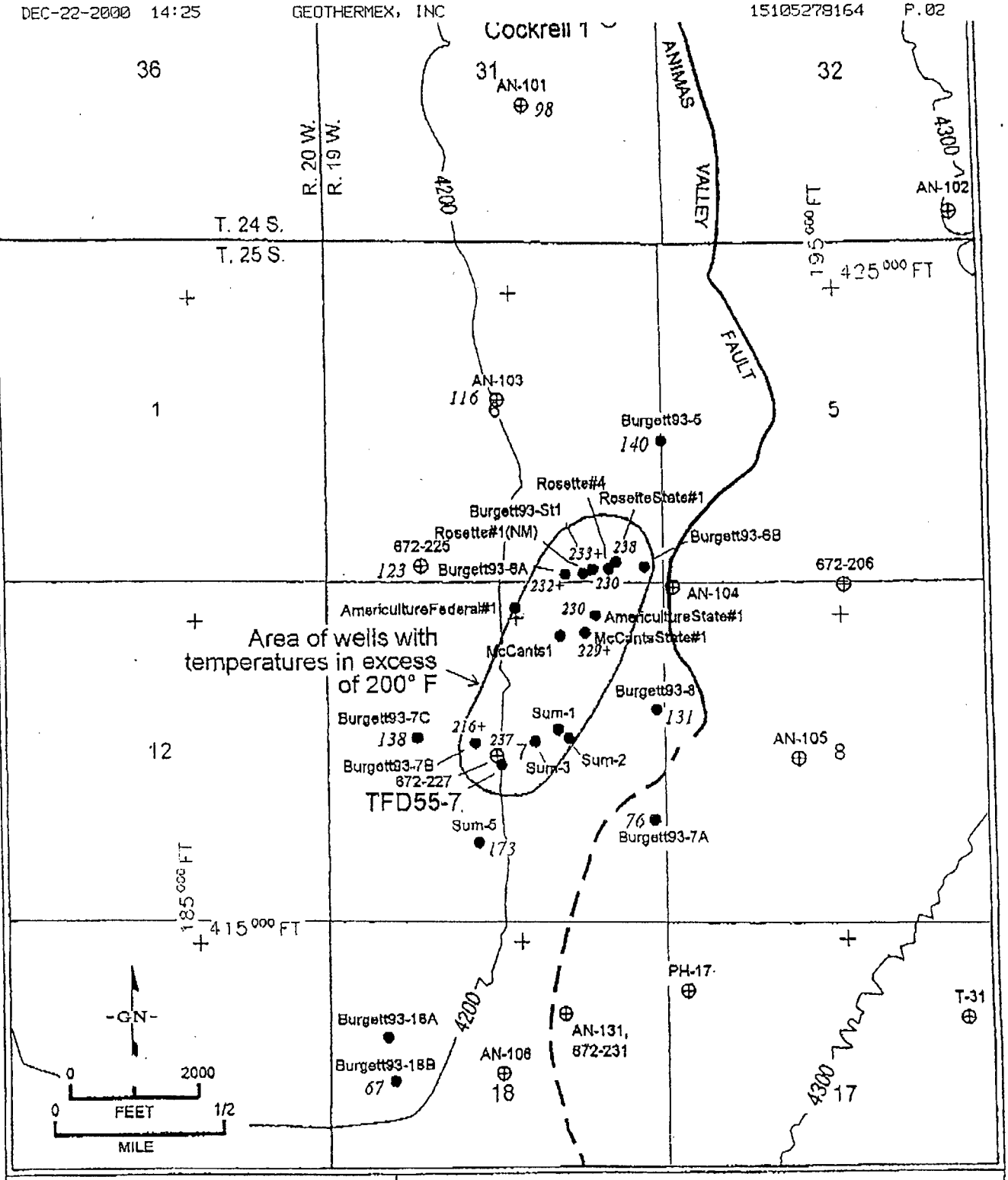


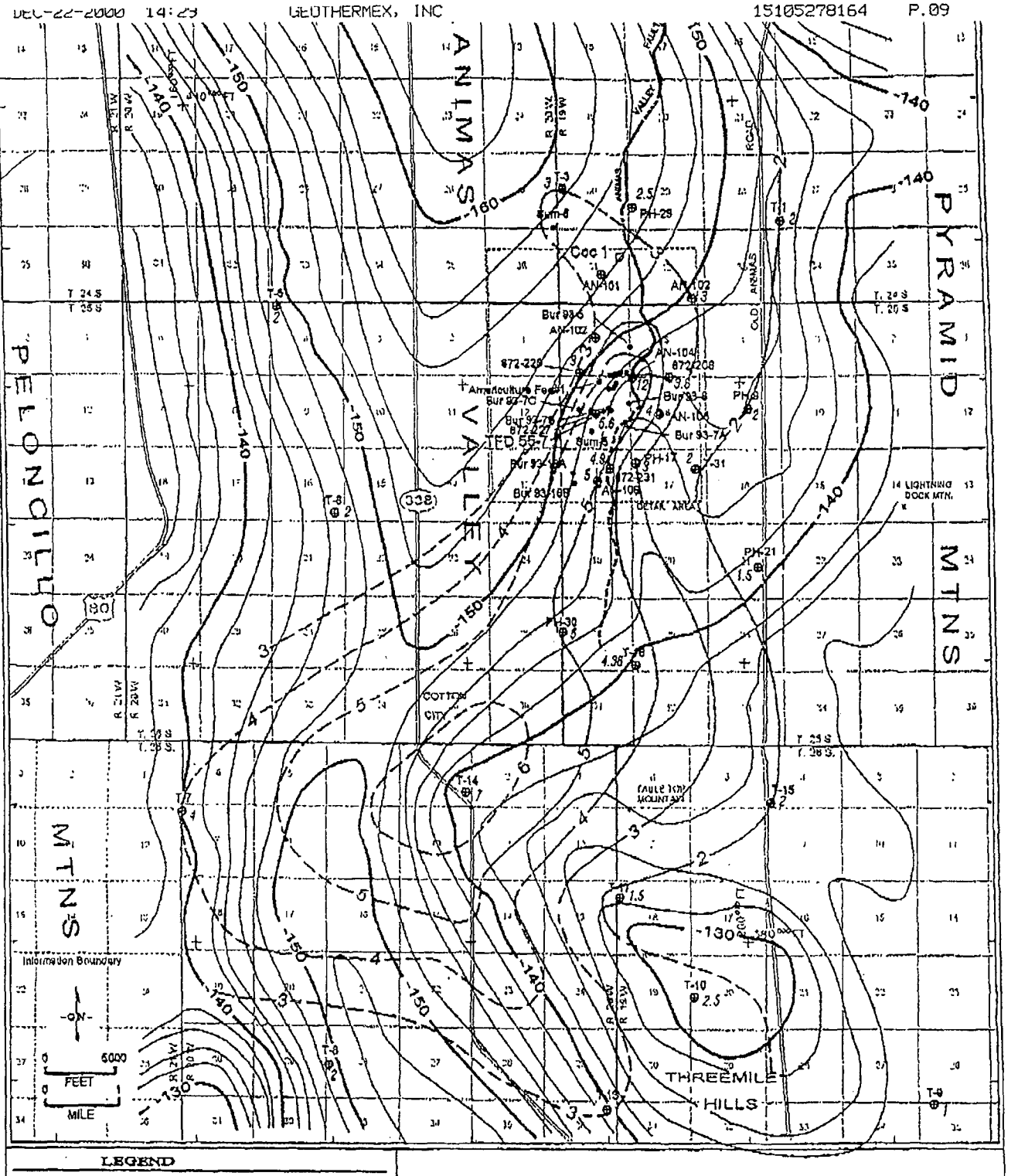
LEGEND

- ⊕ Temperature gradient hole
- ● Well with temperature survey
- Area of wells with temperatures in excess of 200° F
- 167 Maximum measured temperature, °F

Figure 1: Map showing maximum temperatures, °F, measured in Lightning Dock Field, New Mexico

GeothermEx, Inc.
GEOTHERMAL EXPLORATION DEVELOPMENT AND OPERATIONS
5221 Central Ave., Suite 201, Richmond, CA 94804
TEL (510) 527-9876 FAX (510) 527-8164 EMAIL info@geothermex.com

FILE: LD PS F1.DWG | SCALE: 1 : 24000
PLOTDATE: 14DEC2000 | DRAWN: RRS | APP.: JPH
PAGESETUP: LD PSFIG | REV.:



LEGEND

- Temperature gradient hole
- Well with temperature survey
- 3 — Temperature contour, °C/100 feet dashed where inferred
- 2 — Measured temperature, °C/100 ft.
- -130 — Gravity contour (complete Bouguer), mgal (10^{-3} cm/sec^2)

Figure 10:
Combined gravity and temperature gradient map, Animas Valley near Lightning Dock Field, New Mexico

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5221 Central Ave., Suite 201, Richmond, CA 94804
TEL (510) 527-0876 FAX (510) 527-8164 EMAIL NW@GEOTHERMEX.COM

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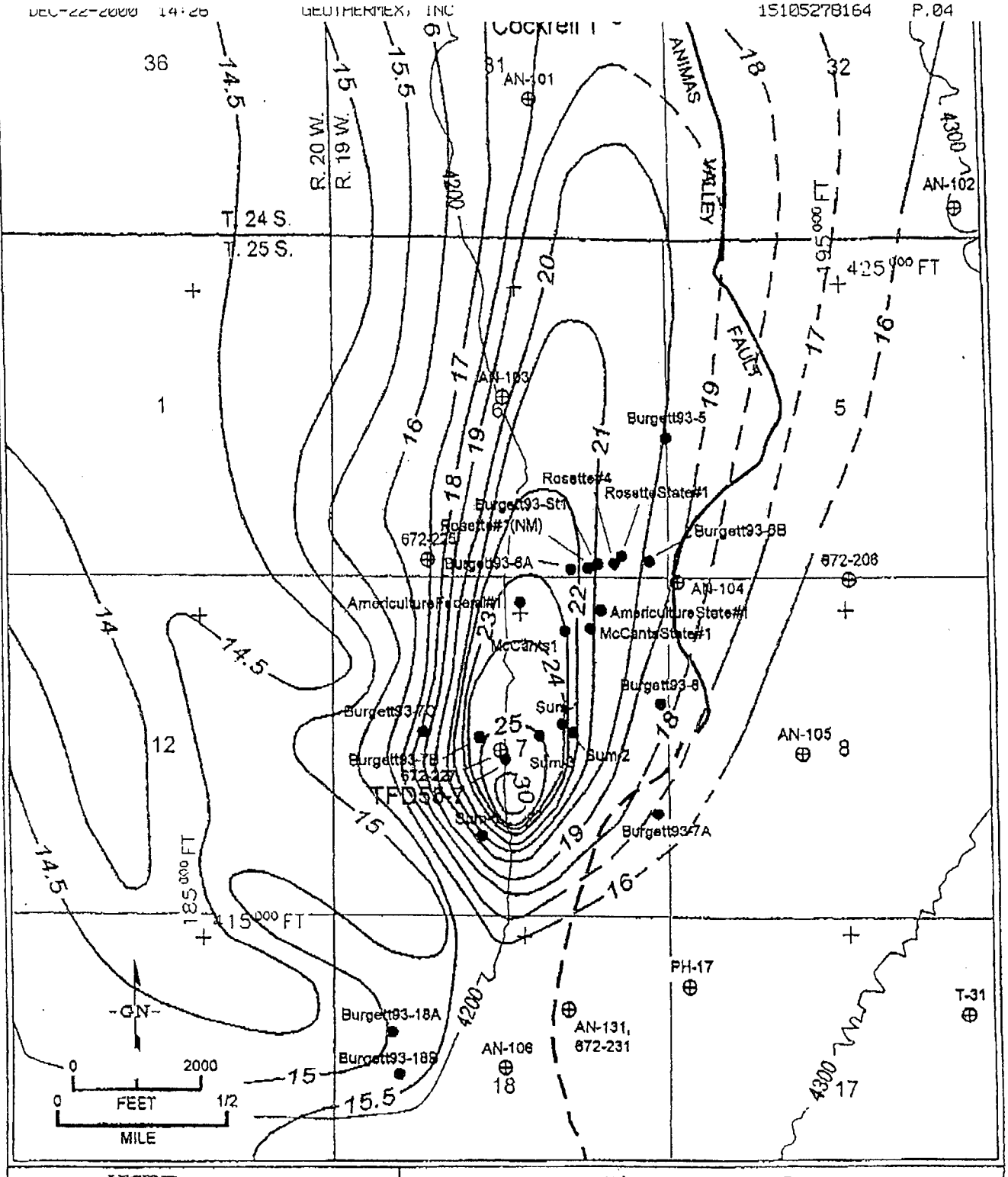
PAGESETUP: LO REGIONAL	REV.:



LEGEND

- ⊕ Temperature gradient hole
- ● Well with temperature survey
- —15— Temperature contour at 2-meter depth, °C

Figure 3: Map of 2-meter depth temperature survey (Landsford et.al.), Lightning Dock Field, New Mexico

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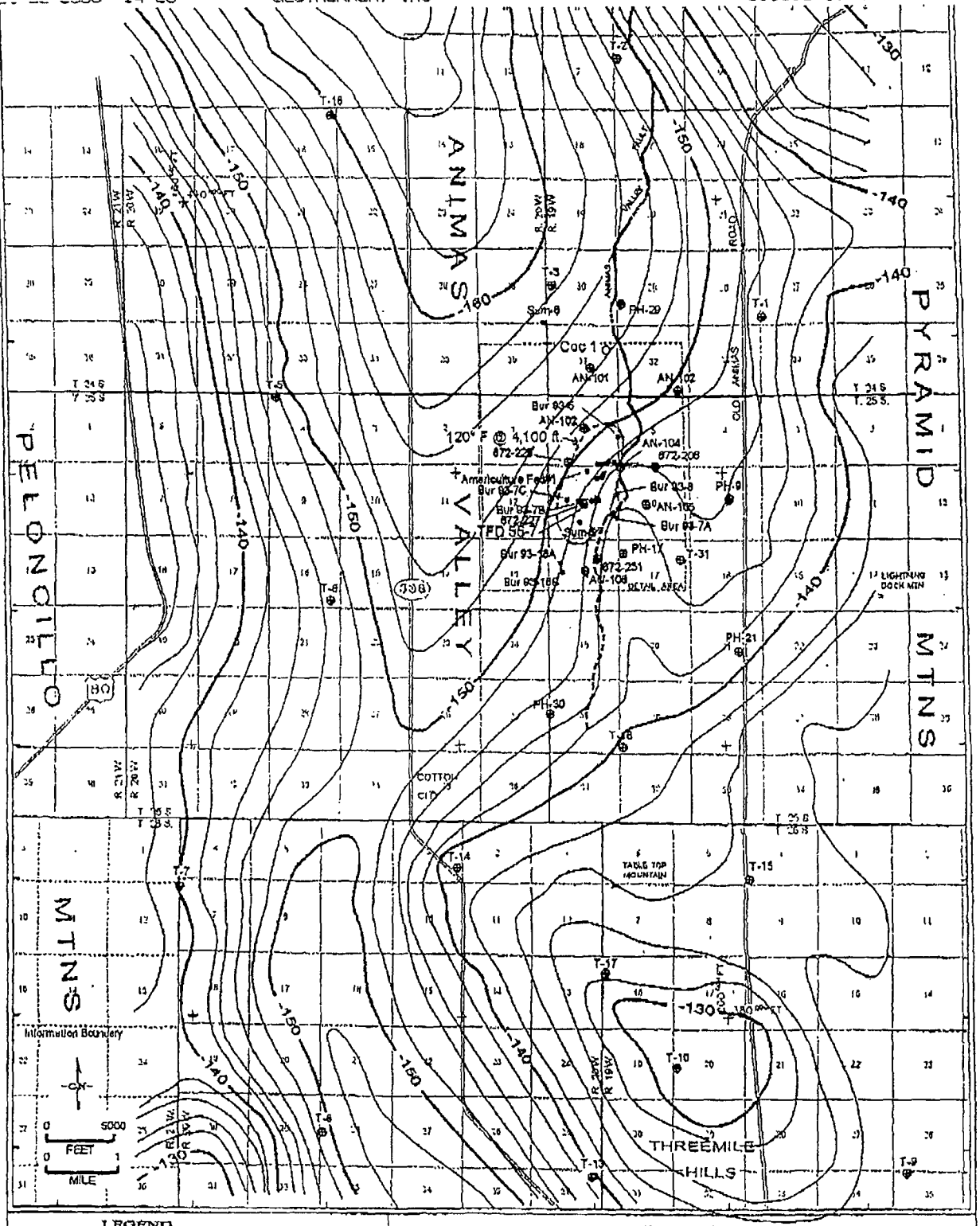

LEGEND

- ⊕ Temperature gradient hole
- • Well with temperature survey
- -140 — Gravity contour (complete Bouguer), mgal (10^{-3}cm/sec^2)
- 120° F temperature contour at +4,100 ft. elevation

Figure 4:
Map of complete gravity (Preslar, 1978) in the Animas Valley near Lightning Dock Field, New Mexico

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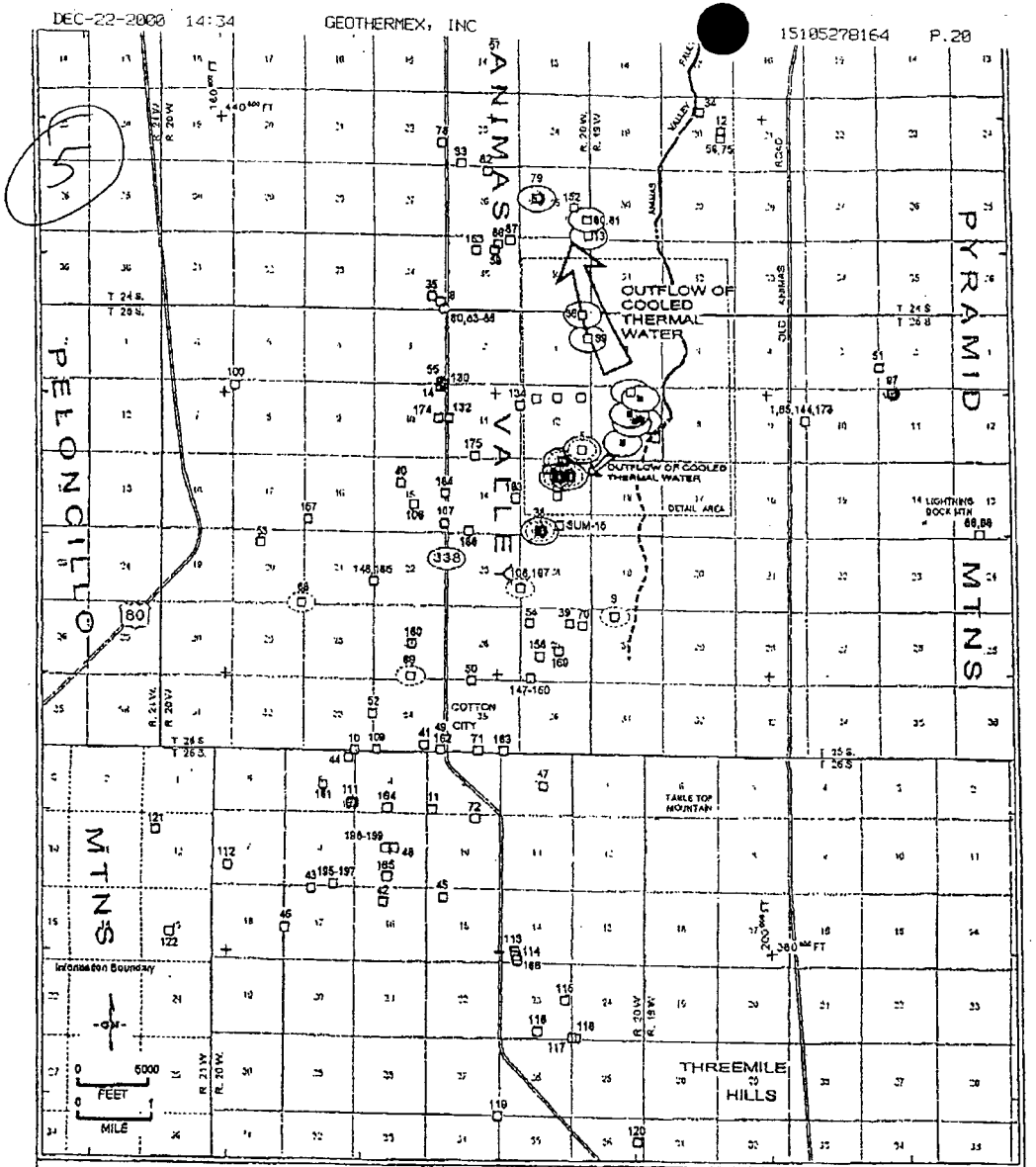

LEGEND

- 119 Sample number
- Water chemistry sample (< 40° C)
- Water chemistry sample (≥ 40° C)
- Na-SO_4 thermal water
- Na-Cl component at Cl > 75 mg/l
- Ca-SO_4 component

Figure A:
Water chemistry sample locations,
Animas Valley near Lightning Dock Field, New Mexico

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FILE: LDR GEOCHEM.DWG	SCALE: 1 : 112000	
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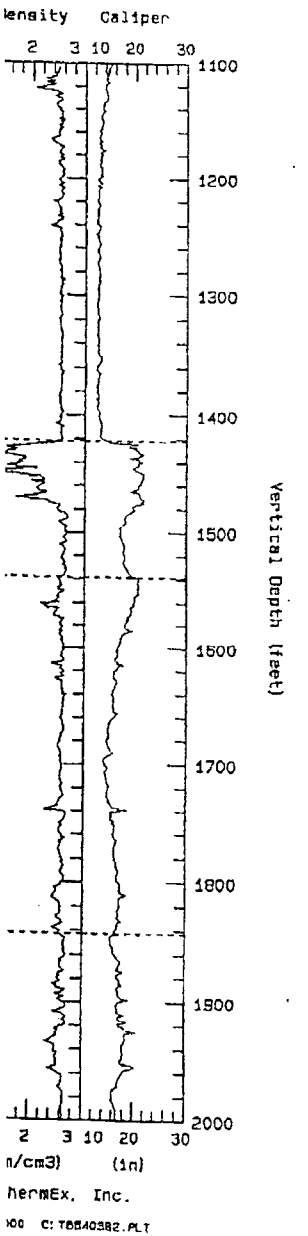
PAGESETUP: LD REGIONAL	REV.:	

ING DOCK WELL 55-7



hermEx, Inc.

100 C:\TBS40382.PLT

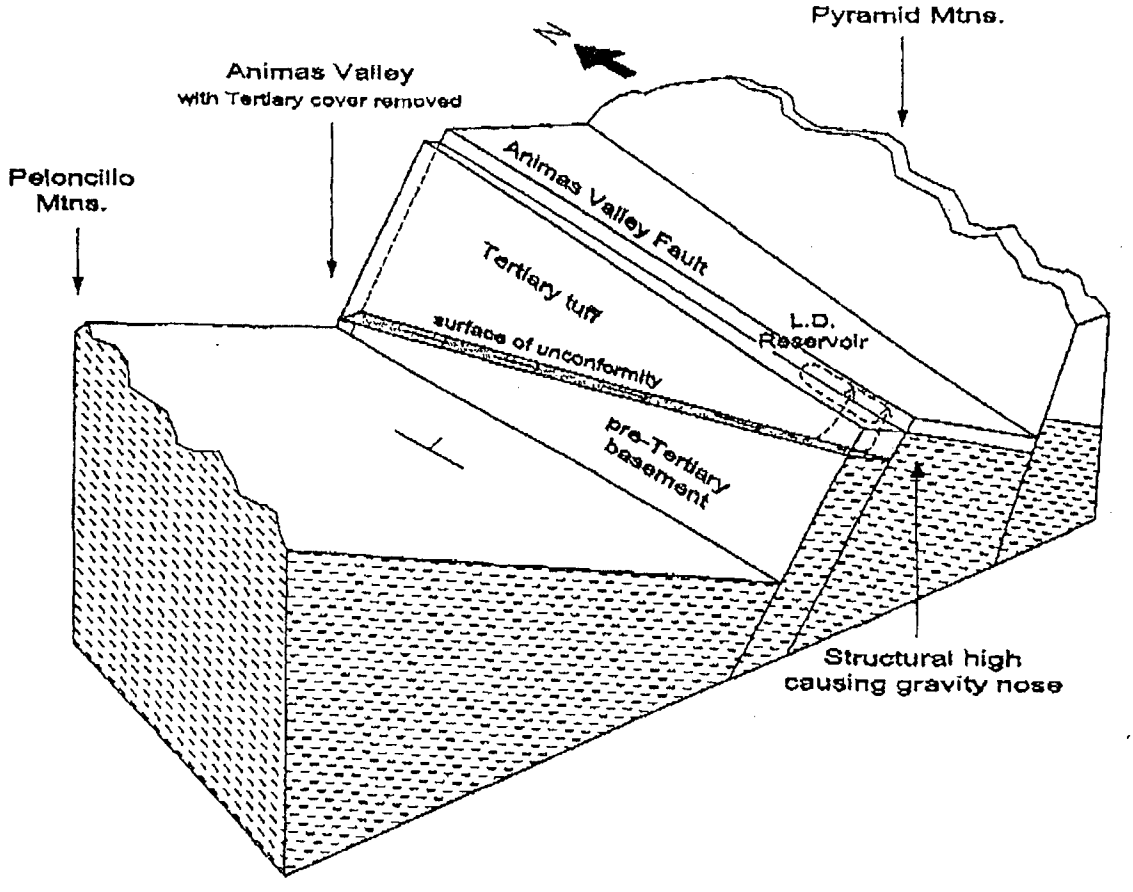


Figure 9:
Sketch of hydrothermal fluid delivery system, Lightning Dock Field, New Mexico

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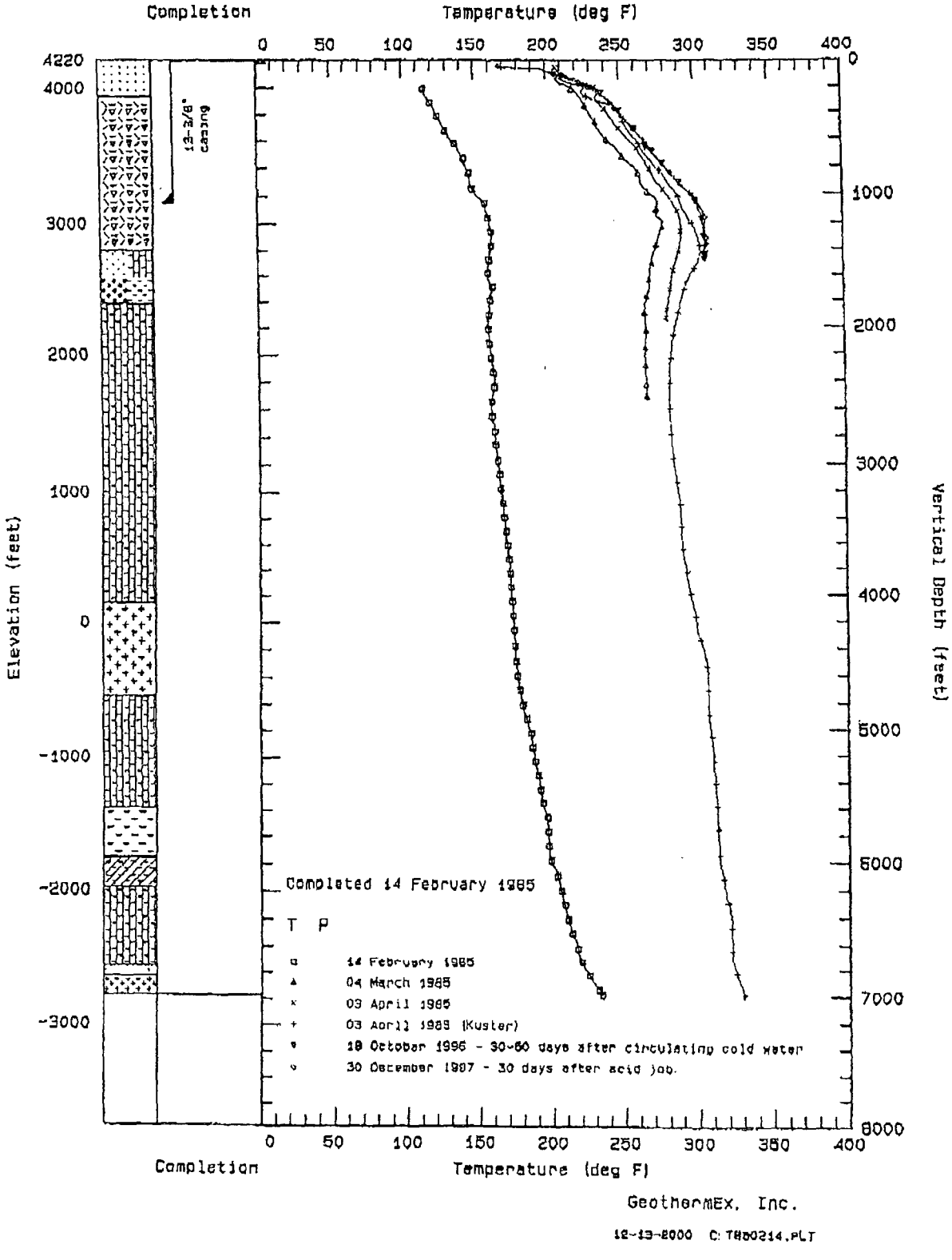
GEOTHERMAL EXPLORATION DEVELOPMENT AND OPERATIONS
5221 Central Ave., Suite 201, Richmond, CA 94804
TEL (510) 527-9876 FAX (510) 527-8164 EMAIL info@GEOTHERMEX.COM

FILE: LD SKETCH FS-DWG	SCALE: Not to Scale
PLOTDATE: 22DEC2000	DRAWN: RRS APP.: JPW
PAGESETUP: LD SKETCH	REV.:

FIGURE 7: TEMPERATURE SURVEYS, LIGHTNING DOCK WELL 55-7



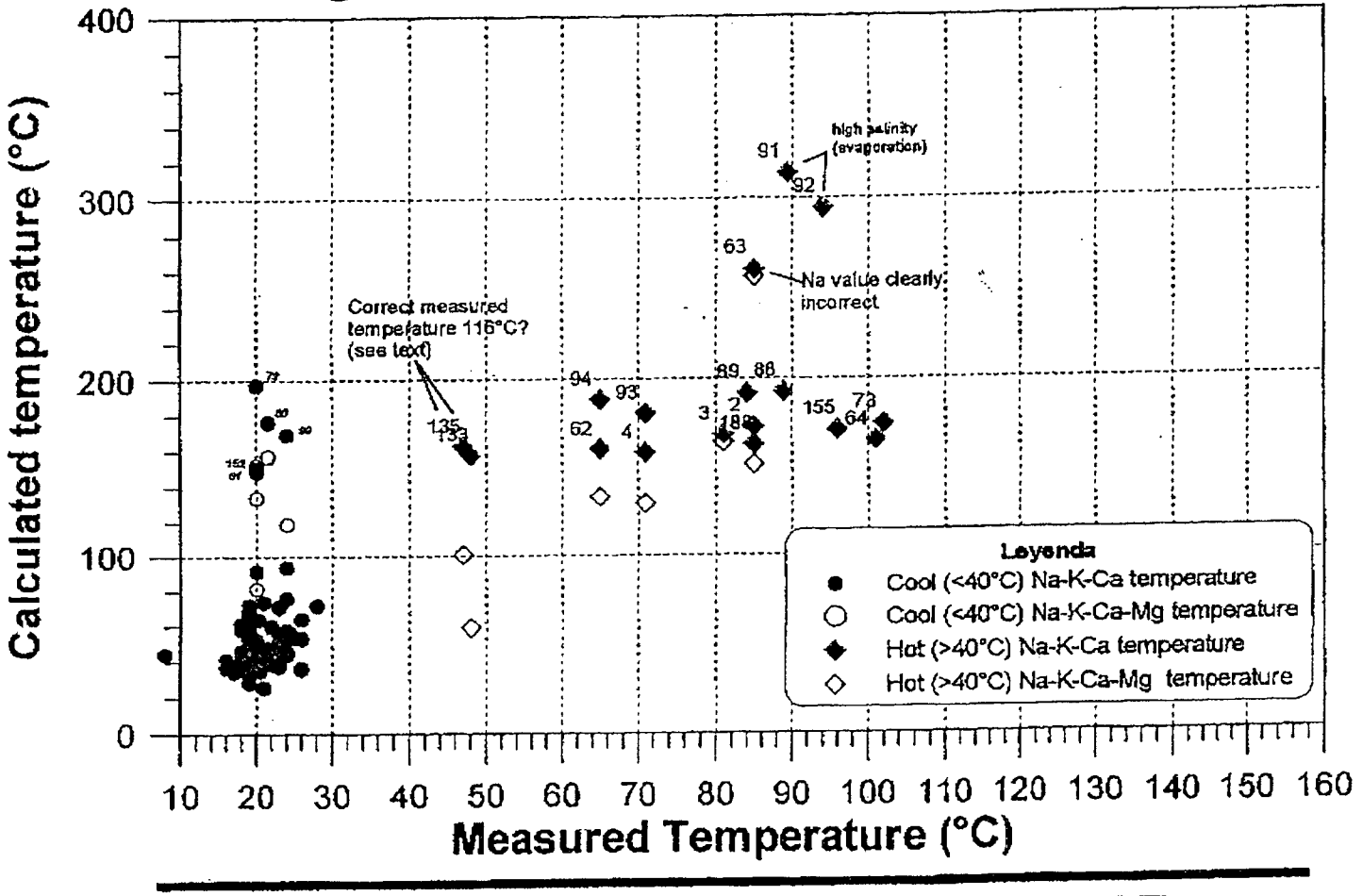


Figura 4: Cation temperature vs temperature, ground waters of Lightning Dock area, New Mexico

GeothermEx, Inc.
...\figrafs-sio2...\Fig 4.grf
29-Nov-00

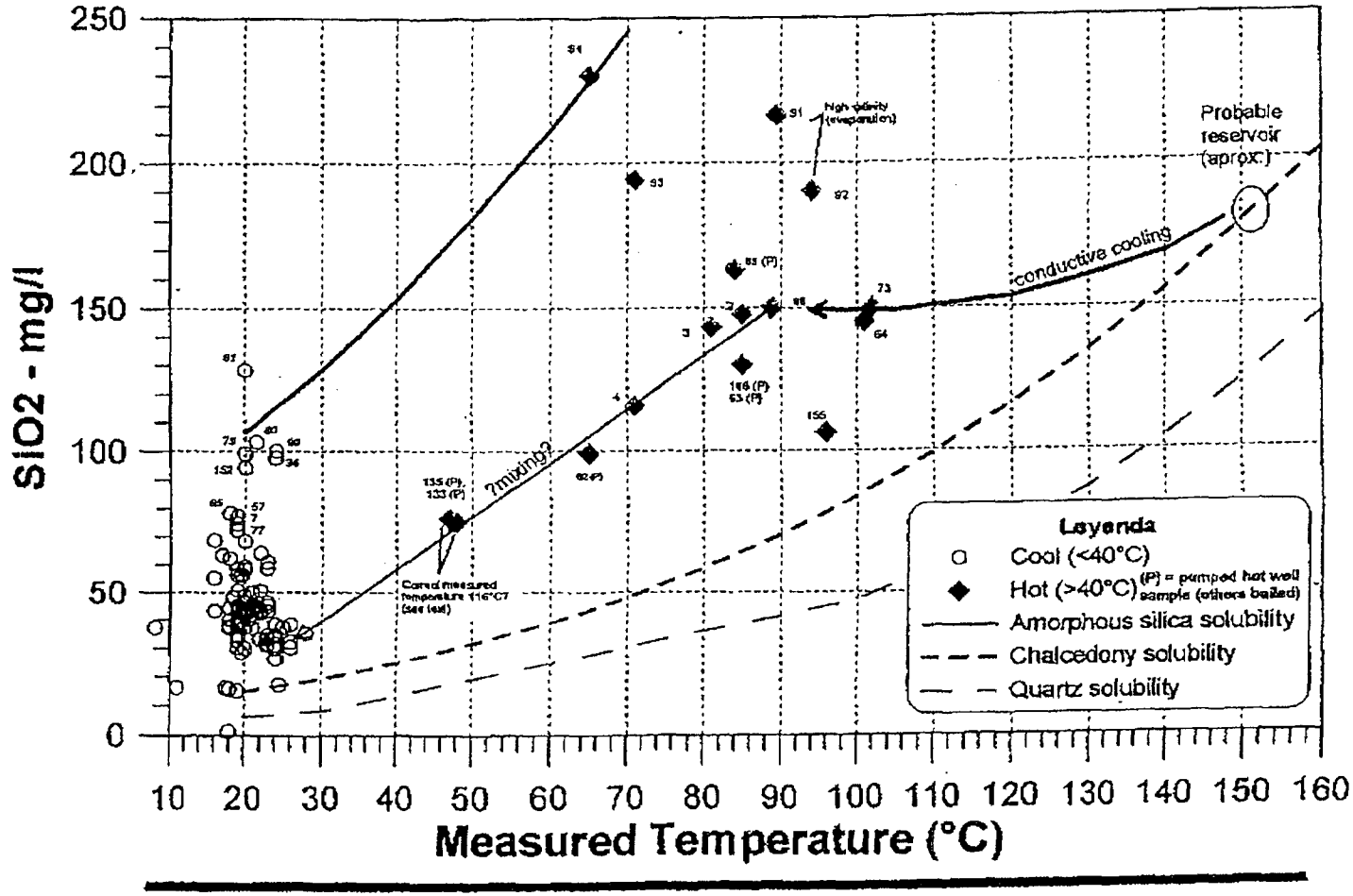


Figure 3b: Silica vs temperature, ground waters of Lightning Dock area, New Mexico - alternate model

GeothermEx, Inc.
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1-Dec-00

10

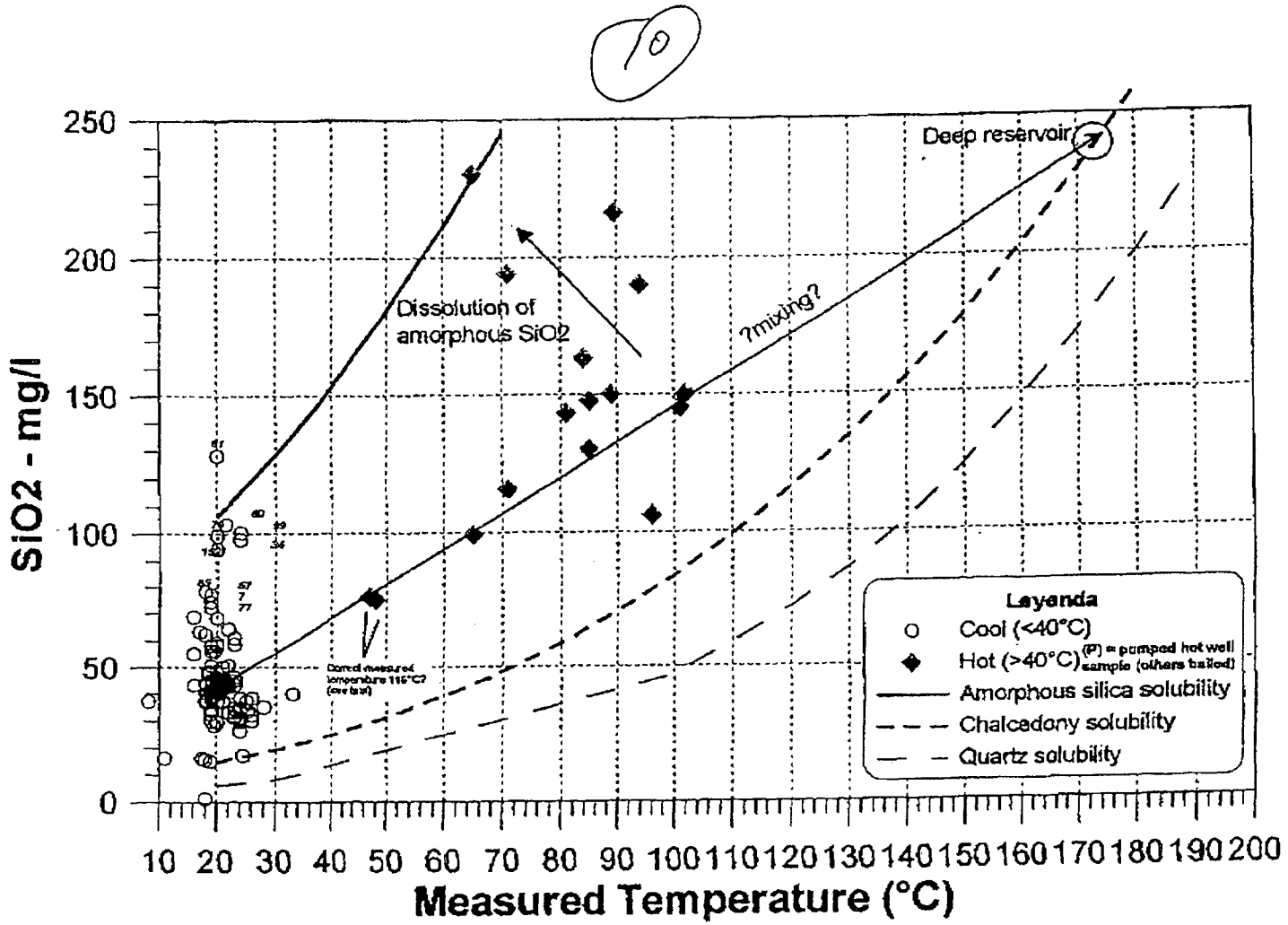


Figure 3a: Silica vs temperature, ground waters of Lightning Dock area, New Mexico - mixing model

GeothermEx, Inc.
...\grafs-sio2....\Fig 3a.grf
1-Dec-00

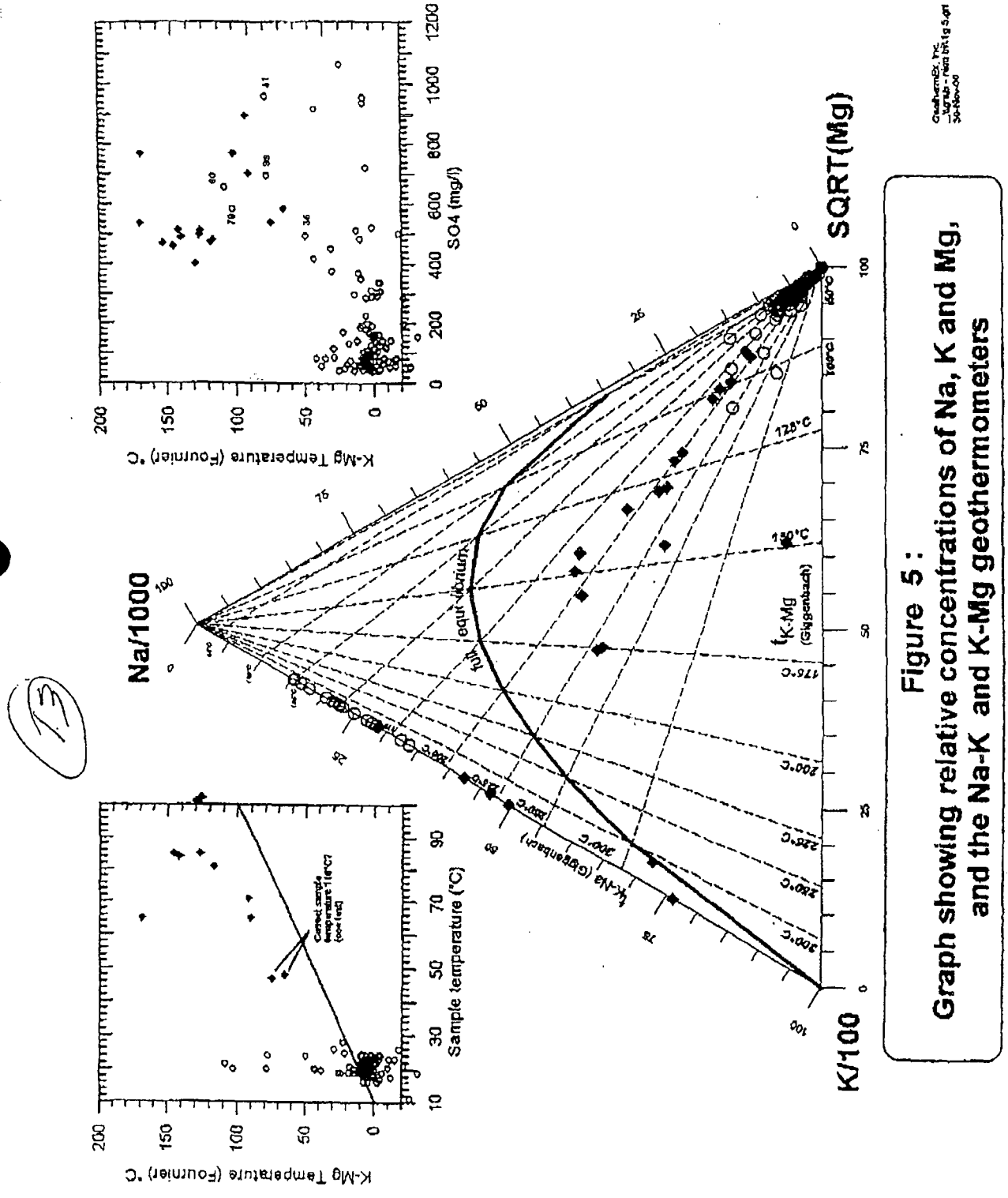
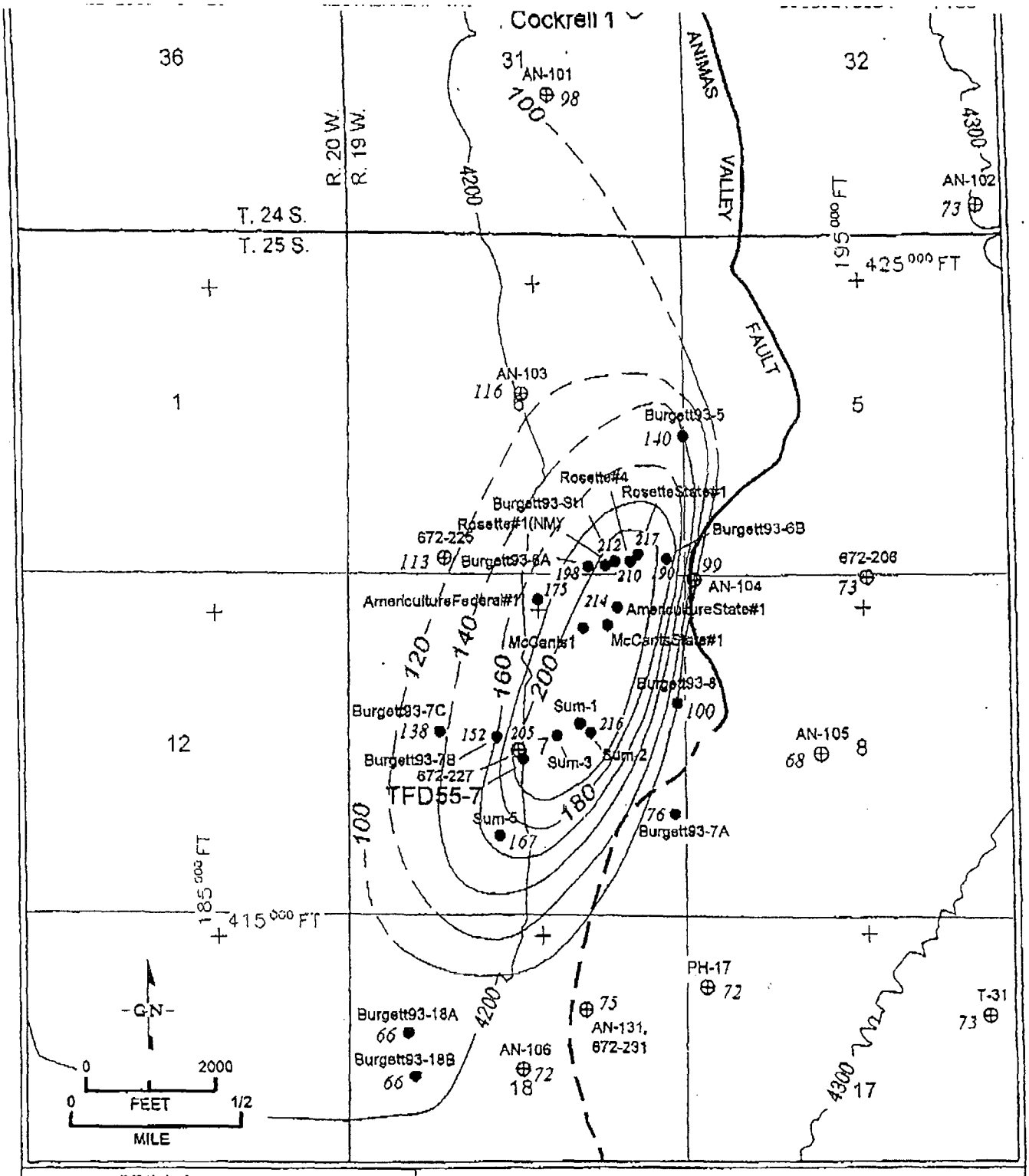


Figure 5 :
Graph showing relative concentrations of Na, K and Mg, and the Na-K and K-Mg geothermometers



LEGEND	
⊕	Temperature gradient hole
●	Well with temperature survey
-180-	120° F temperature contour at +4,100 ft. elevation
167	Measured temperature, °F

Figure 2: Map showing temperature distribution, °F, at +4,100 feet elevation, Lightning Dock Field, New Mexico

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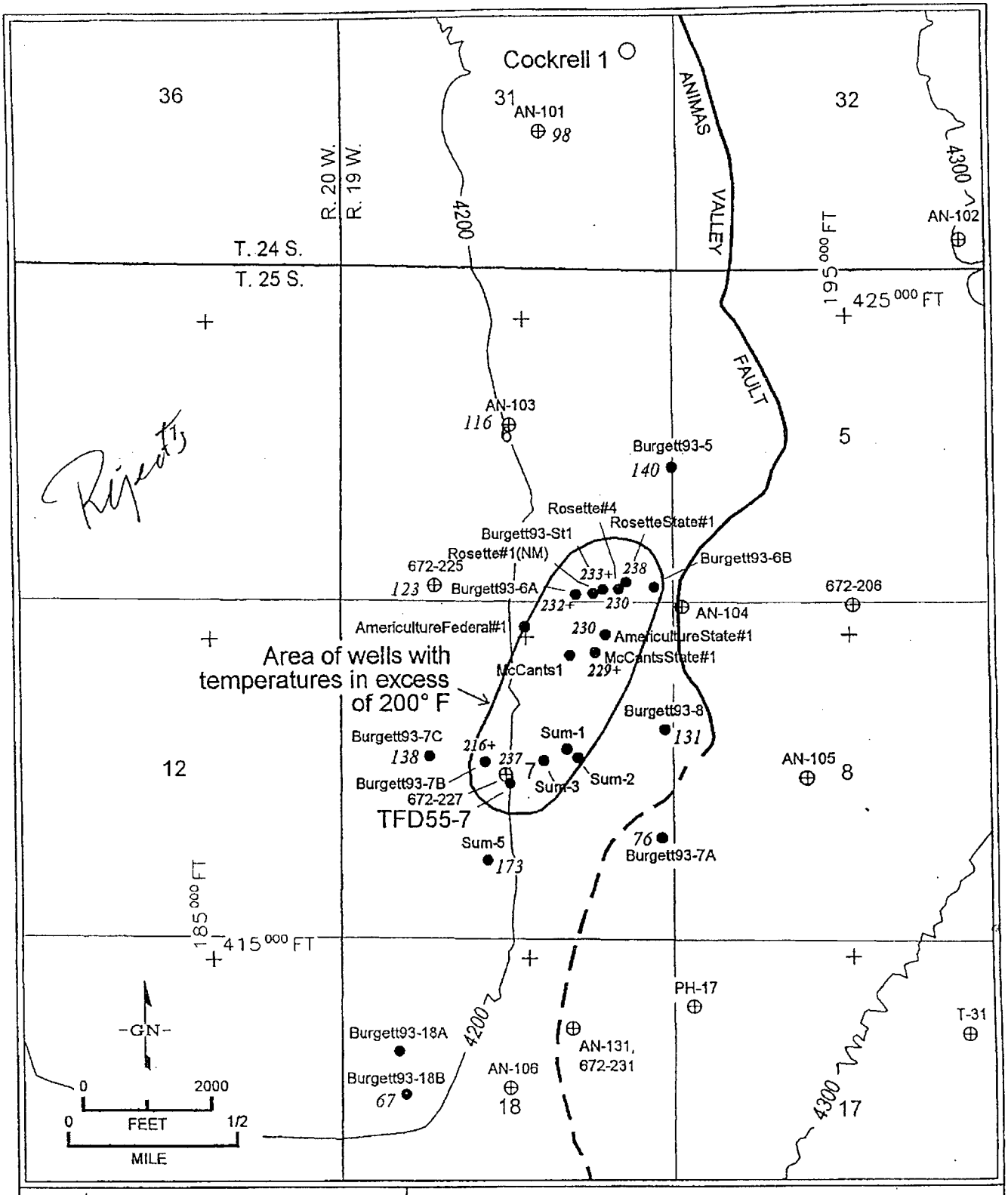

LEGEND

- ⊕ Temperature gradient hole
- ● Well with temperature survey
- Area of wells with temperatures in excess of 200° F
- 167 Maximum measured temperature, °F

Figure 1: Map showing maximum temperatures, °F, measured in Lightning Dock Field, New Mexico

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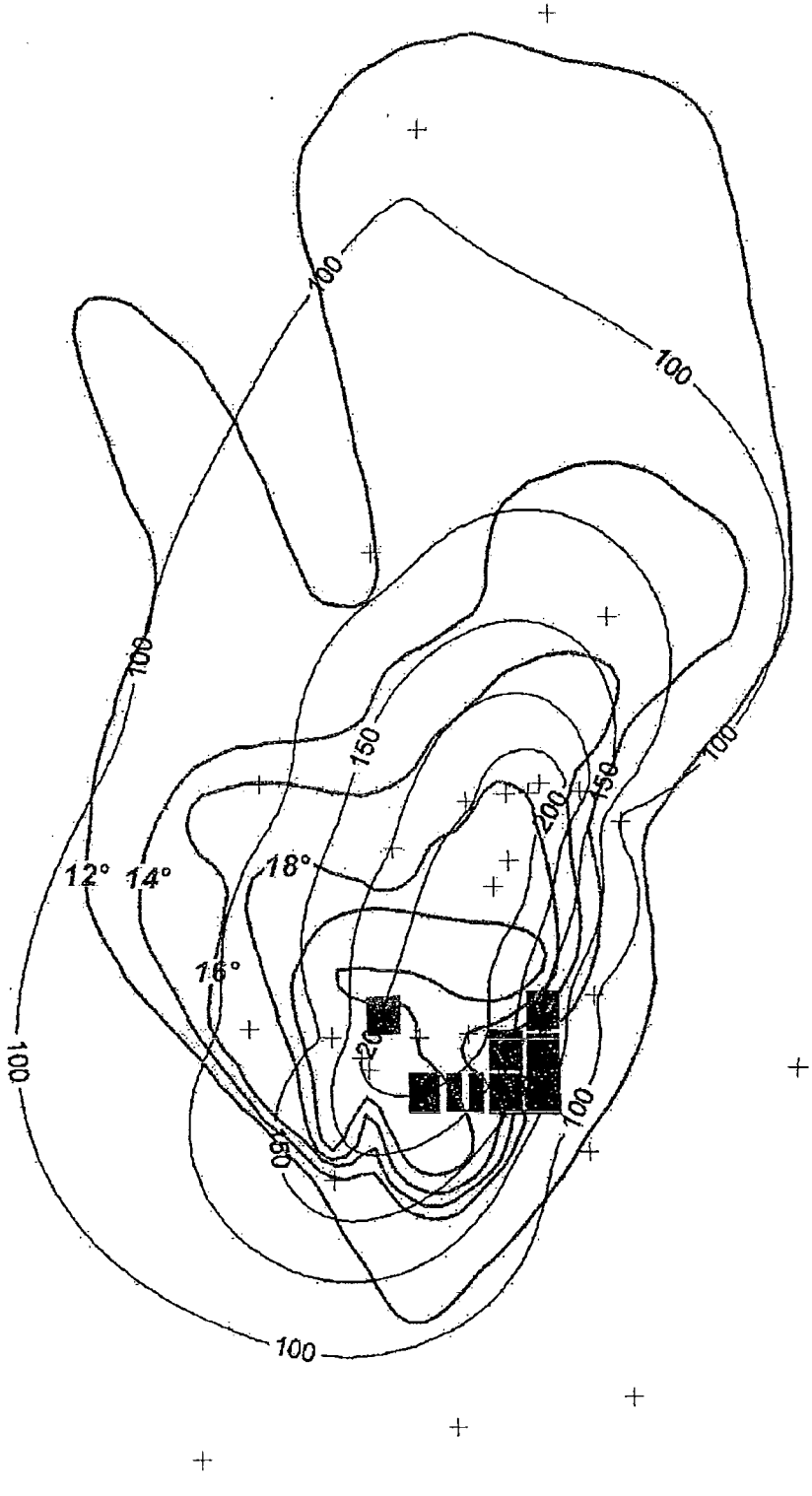
Temp plus kinte.doc



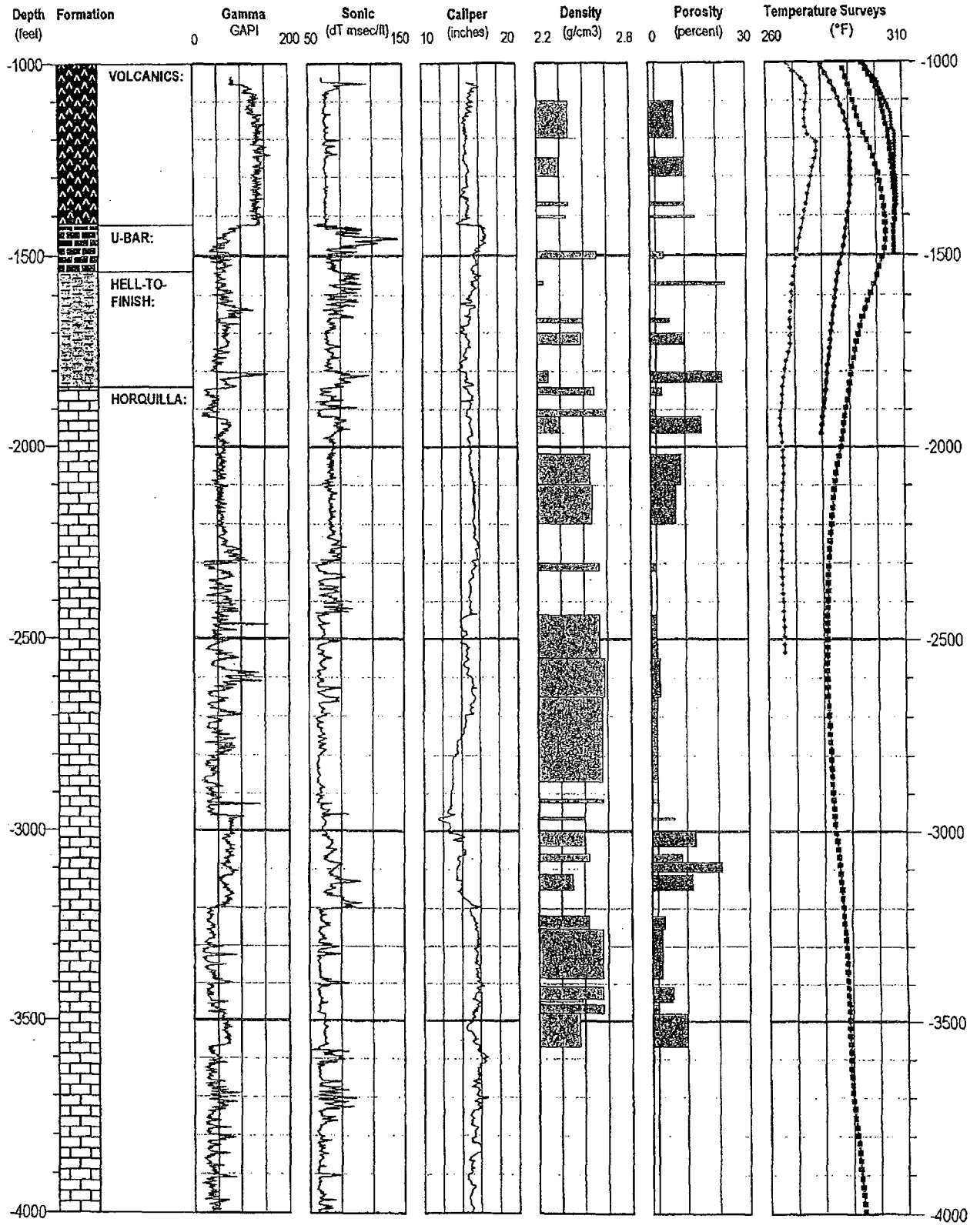
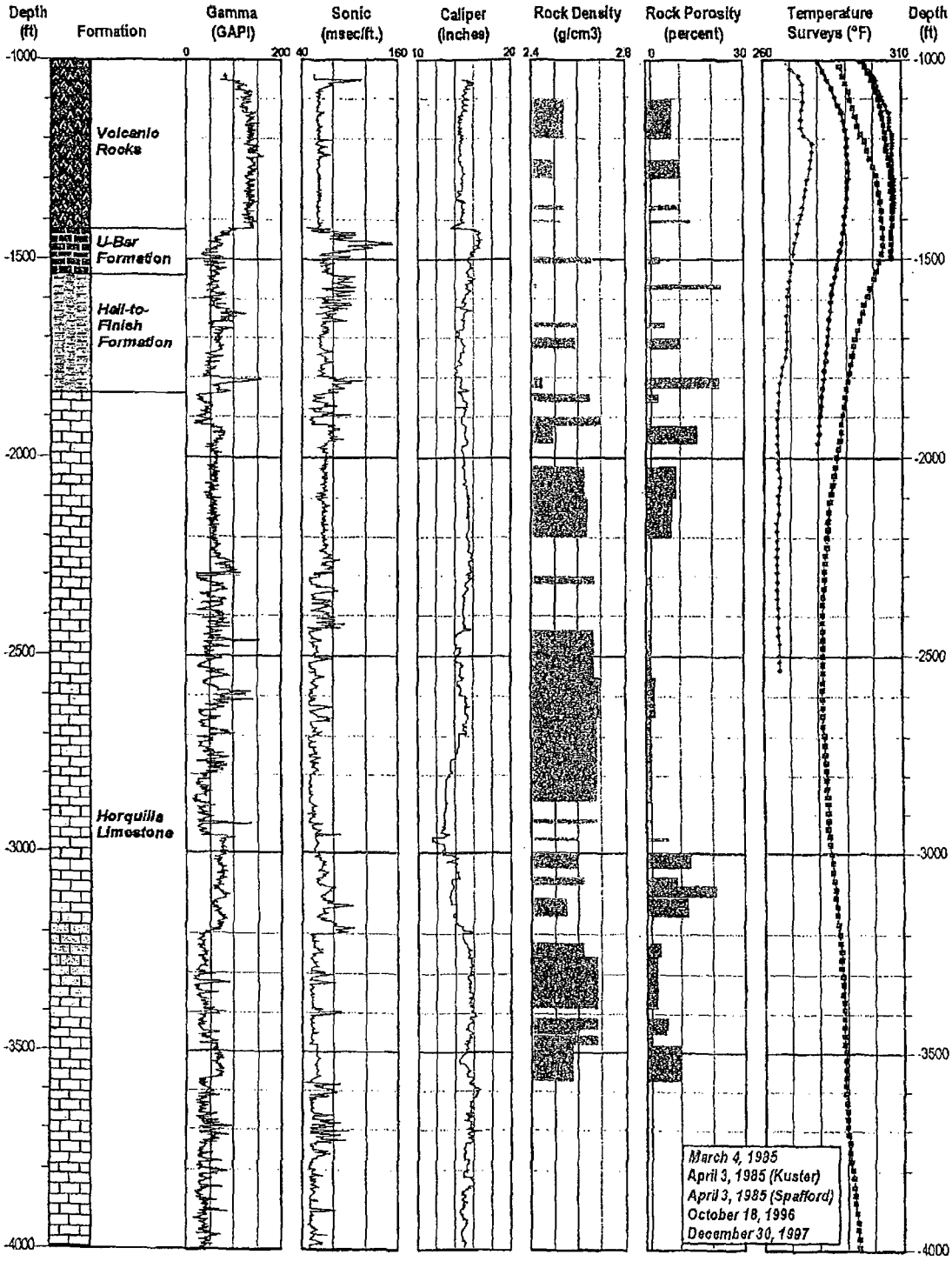
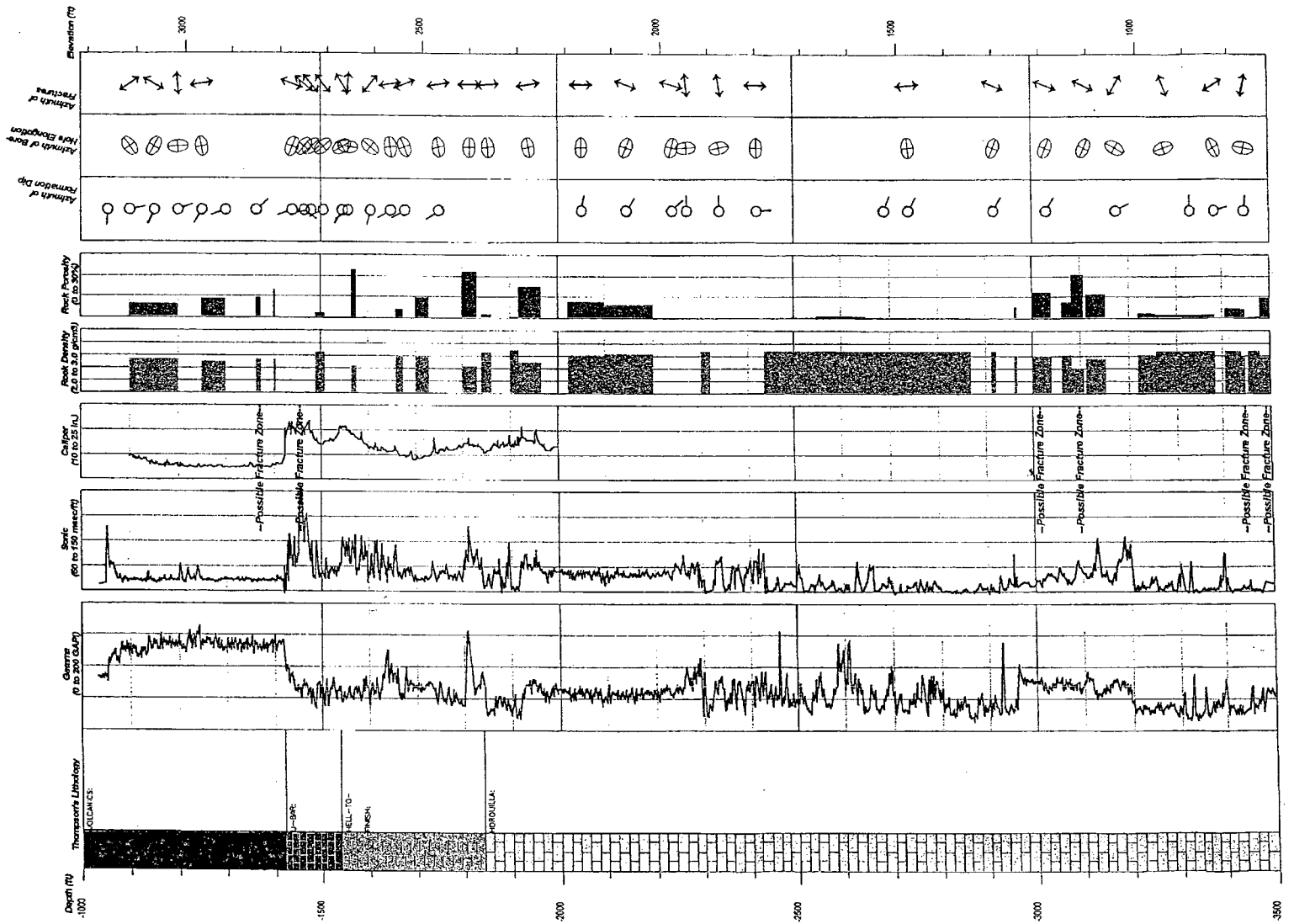
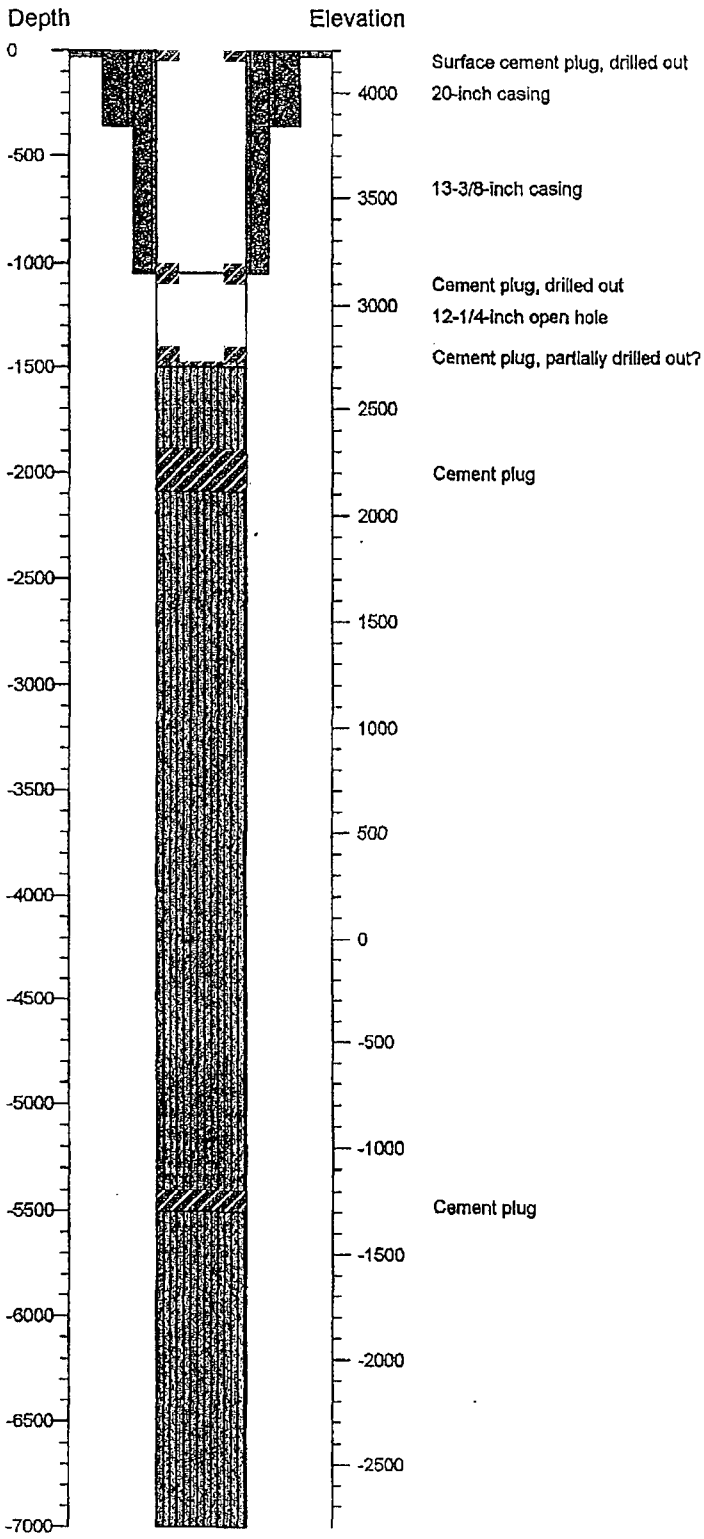

Depth (feet)
Formation
Gamma GAPI
0
200
Sonic (dT msec/ft)
50
150
Caliper (inches)
10
20
Density (g/cm3)
2.2
2.8
Porosity (percent)
0
30
Temperature Surveys (°F)
260
310
VOLCANICS:
U-BAR:
HELL-TO-FINISH:
HORQUILLA:
-1000
-1500
-2000
-2500
-3000
-3500
-4000

Fig 9

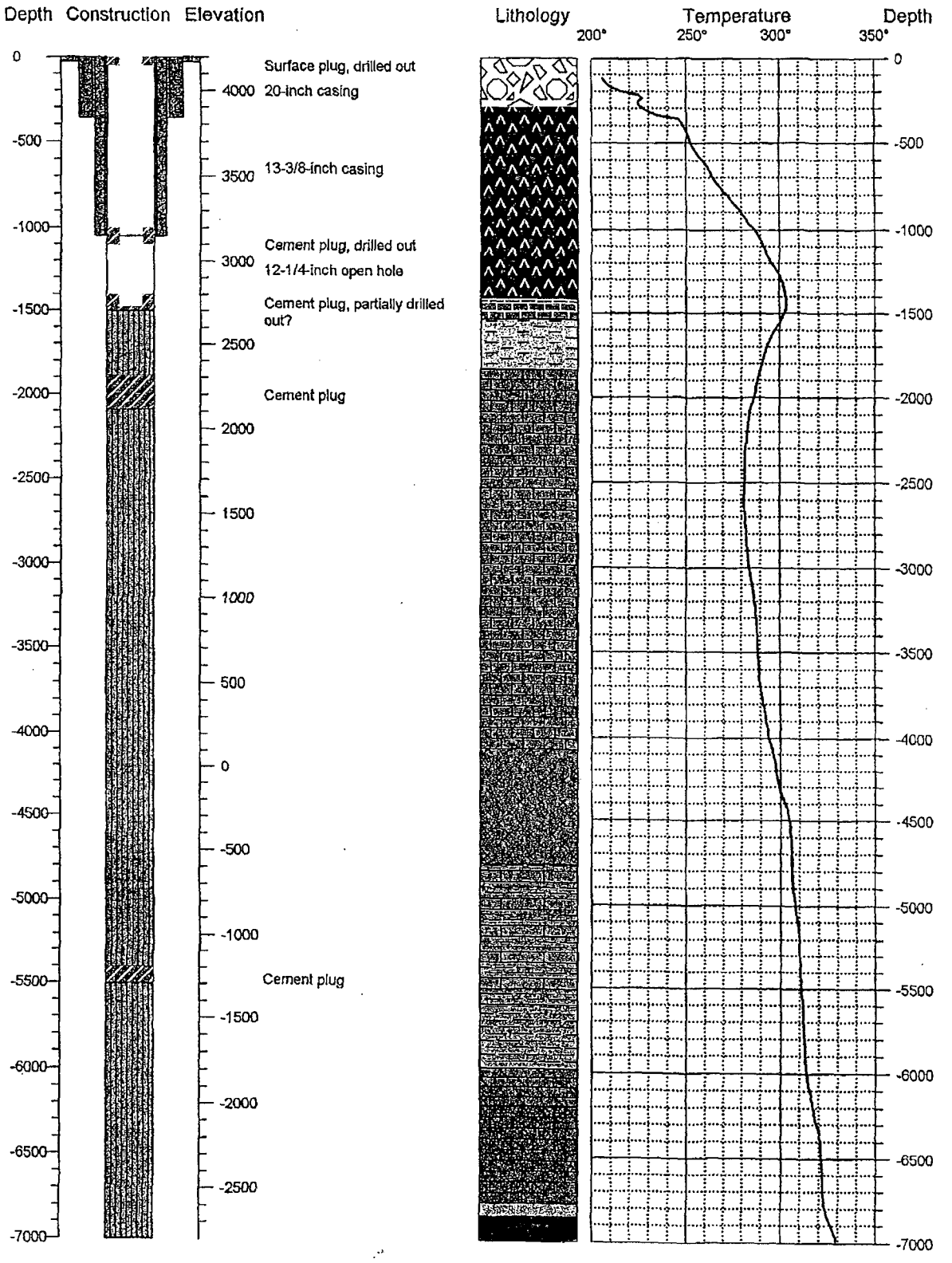

Depth (ft)
Formation
Gamma (GAPI)
0
200
Sonic (msec/ft.)
40
160
Caliper (inches)
10
20
Rock Density (g/cm3)
2.4
2.8
Rock Porosity (percent)
0
30
Temperature Surveys (°F)
260
310
Depth (ft)
-1000
-1500
-2000
-2500
-3000
-3500
-4000
Volcanic Rocks
U-Bar Formation
Hell-to-Finish Formation
Horquilla Limestone
March 4, 1985
April 3, 1985 (Kuster)
April 3, 1985 (Spafford)
October 18, 1996
December 30, 1997


Elevation (ft)
3000
2500
2000
1500
1000
Azimuth of Fracture
Azimuth of Bore Hole Elongation
Azimuth of Formation Dip
Rock Porosity (0 to 50%)
Rock Density (2.0 to 3.0 gm/cc)
Caliper (10 to 25 in.)
Possible Fracture Zone
Sonic (60 to 150 msec/ft)
Gamma (0 to 200 GAPI)
Thompson's Litholog
GILCANCES
J-SAPE
HELL-TO-
FINISH
HORQUILLA
Depth (ft)
-1000
-1500
-2000
-2500
-3000
-3500

Well Construction TDF 55-7



Animas Well TDF 55-7



Log compiled for:

Lightning Dock Geothermal, Inc.
Las Cruces, New Mexico

Log compiled by:

TerraCon, Inc. 316 West Main Street, Suite 203 Arlington, Texas 76010 USA

Composite Geothermal Well Log

Well:

TFD 55-7

Project Data

Company: AMAX
Project: Animas Valley
State: New Mexico
County: Hidalgo
Township: T25S, R19W, Sec. 7

Location Data

Grid Type: UTM NAD27
Easting: 704181
Northing: 3558520
Ground Elev.: 4200
Kelly Elev.: 4217.6

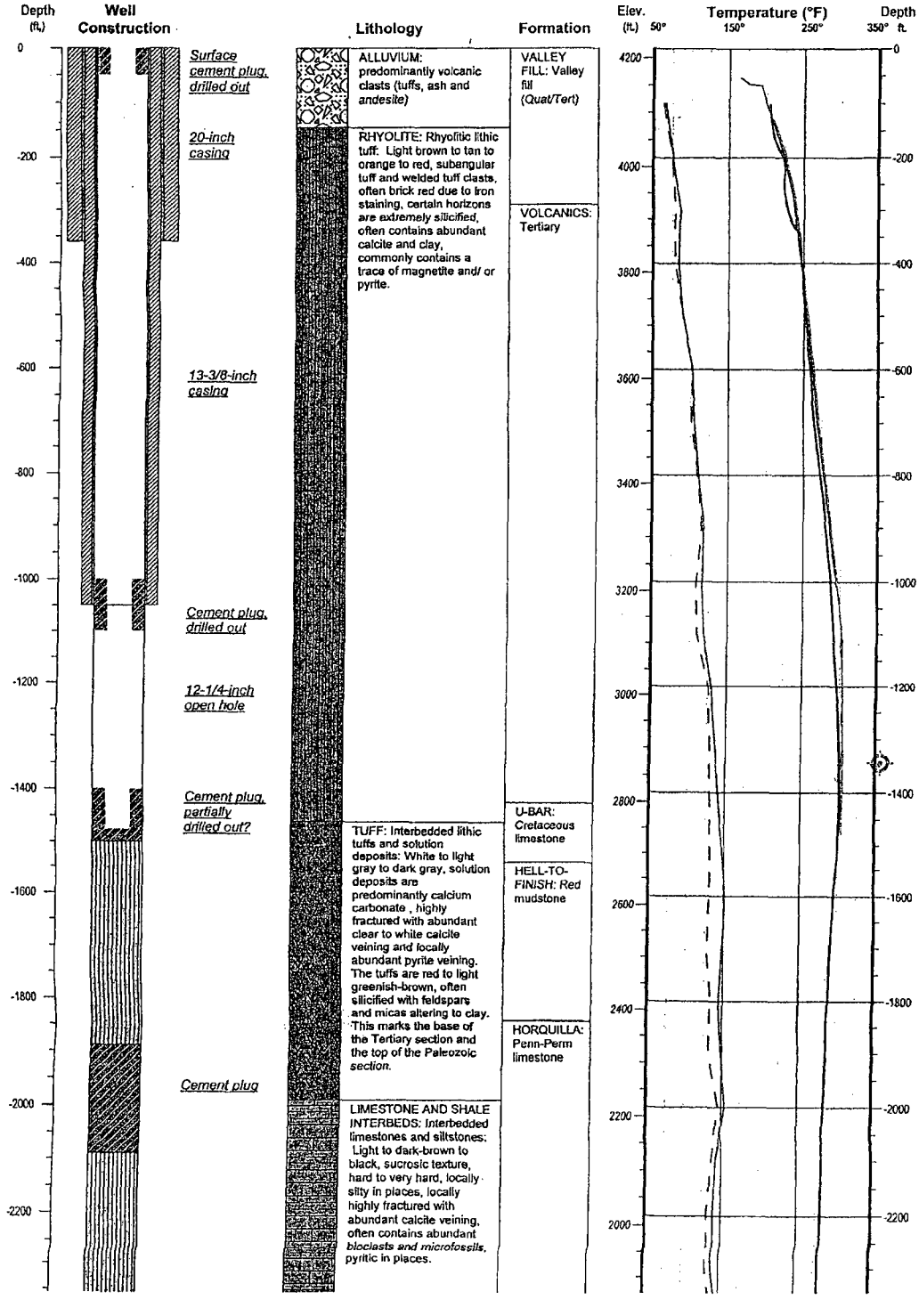
Well Data

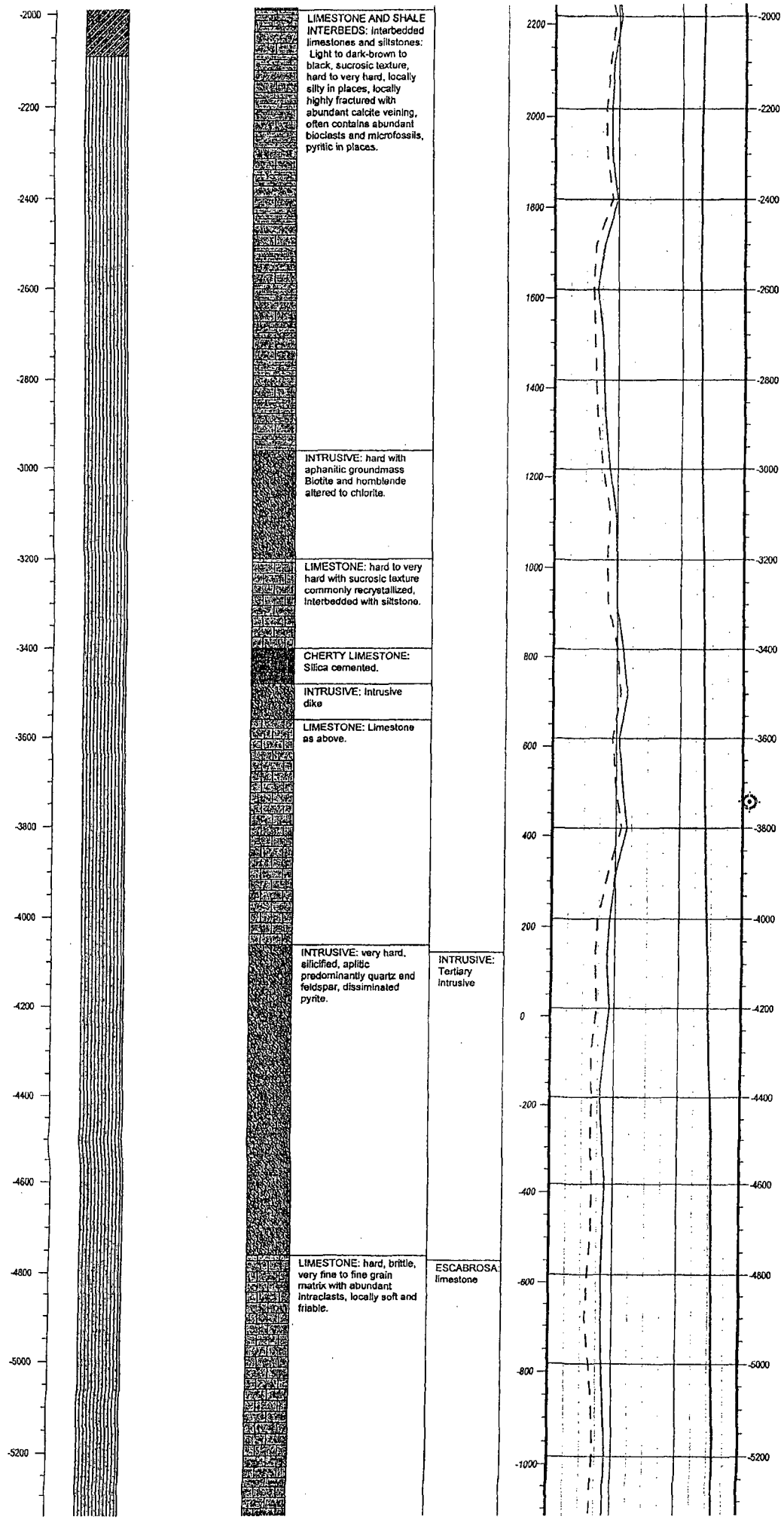
Well Type: Geothermal Wildcat
Spud Date: 12-28-84
Completion Date: ABD 12-22-85
Total Depth: 7000
Logged Depth: 7000

Log Print Date: 1-14-02

Log Scale: 1 in. = 200 ft.

Mud In / Mud Out — Static-1 / Static-2 — Static 3




-2000
-2200
-2400
-2600
-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
-4400
-4600
-4800
-5000
-5200
LIMESTONE AND SHALE INTERBEDS: Interbedded limestones and siltstones: Light to dark-brown to black, sucrosic texture, hard to very hard, locally silty in places, locally highly fractured with abundant calcite veining, often contains abundant bioclasts and microfossils, pyritic in places.
INTRUSIVE: hard with aphanitic groundmass Biotite and hornblende altered to chlorite.
LIMESTONE: hard to very hard with sucrosic texture commonly recrystallized, interbedded with siltstone.
CHERTY LIMESTONE: Silica cemented.
INTRUSIVE: Intrusive dike
LIMESTONE: Limestone as above.
INTRUSIVE: very hard, silicified, aplitic predominantly quartz and feldspar, dissiminated pyrite.
INTRUSIVE: Tertiary Intrusive
LIMESTONE: hard, brittle, very fine to fine grain matrix with abundant intraclasts, locally soft and friable.
ESCABROSA: limestone
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
-1000
-2000
-2200
-2400
-2600
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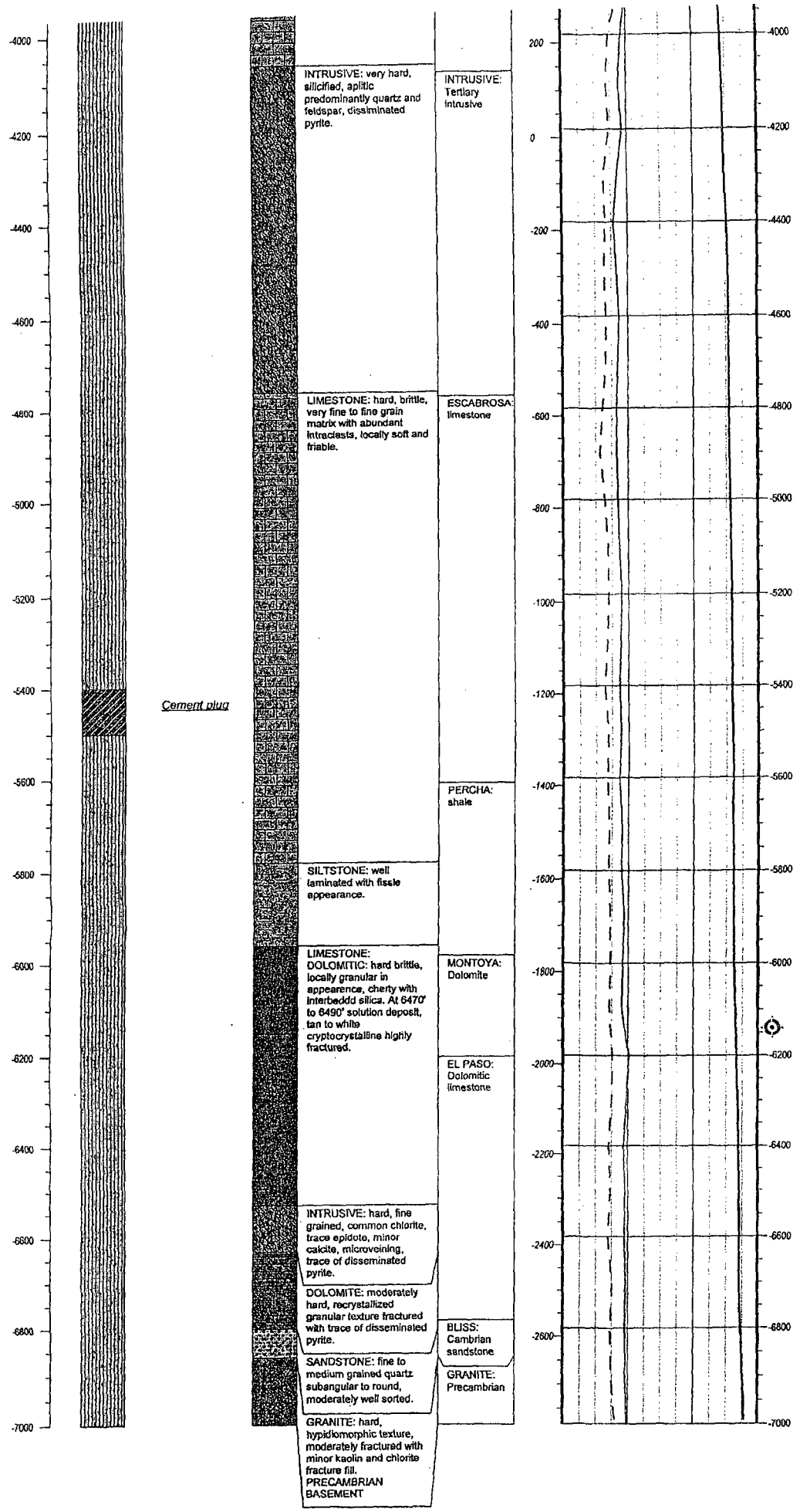
-4800
-5000
-5200


-4000
-4200
-4400
-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000
Cement plug
INTRUSIVE: very hard, silicified, aplitic predominantly quartz and feldspar, dissiminated pyrite.
LIMESTONE: hard, brittle, very fine to fine grain matrix with abundant intraclasts, locally soft and friable.
SILTSTONE: well laminated with fissle appearance.
LIMESTONE: DOLOMITIC: hard brittle, locally granular in appearence, cherty with interbeddd silica. At 6470' to 6490' solution deposit, tan to white cryptocrystalline highly fractured.
INTRUSIVE: hard, fine grained, common chlorite, trace epidote, minor calcite, microveining, trace of disseminated pyrite.
DOLOMITE: moderately hard, recrystallized granular texture fractured with trace of disseminated pyrite.
SANDSTONE: fine to medium grained quartz subangular to round, moderately well sorted.
GRANITE: hard, hypidiomorphic texture, moderately fractured with minor kaolin and chlorite fracture fill. PRECAMBRIAN BASEMENT
INTRUSIVE: Tertiary intrusive
ESCABROSA: limestone
PERCHA: shale
MONTOYA: Dolomite
EL PASO: Dolomitic limestone
BLISS: Cambrian sandstone
GRANITE: Precambrian
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600
-4000
-4200
-4400
-4600
-4800
-5000
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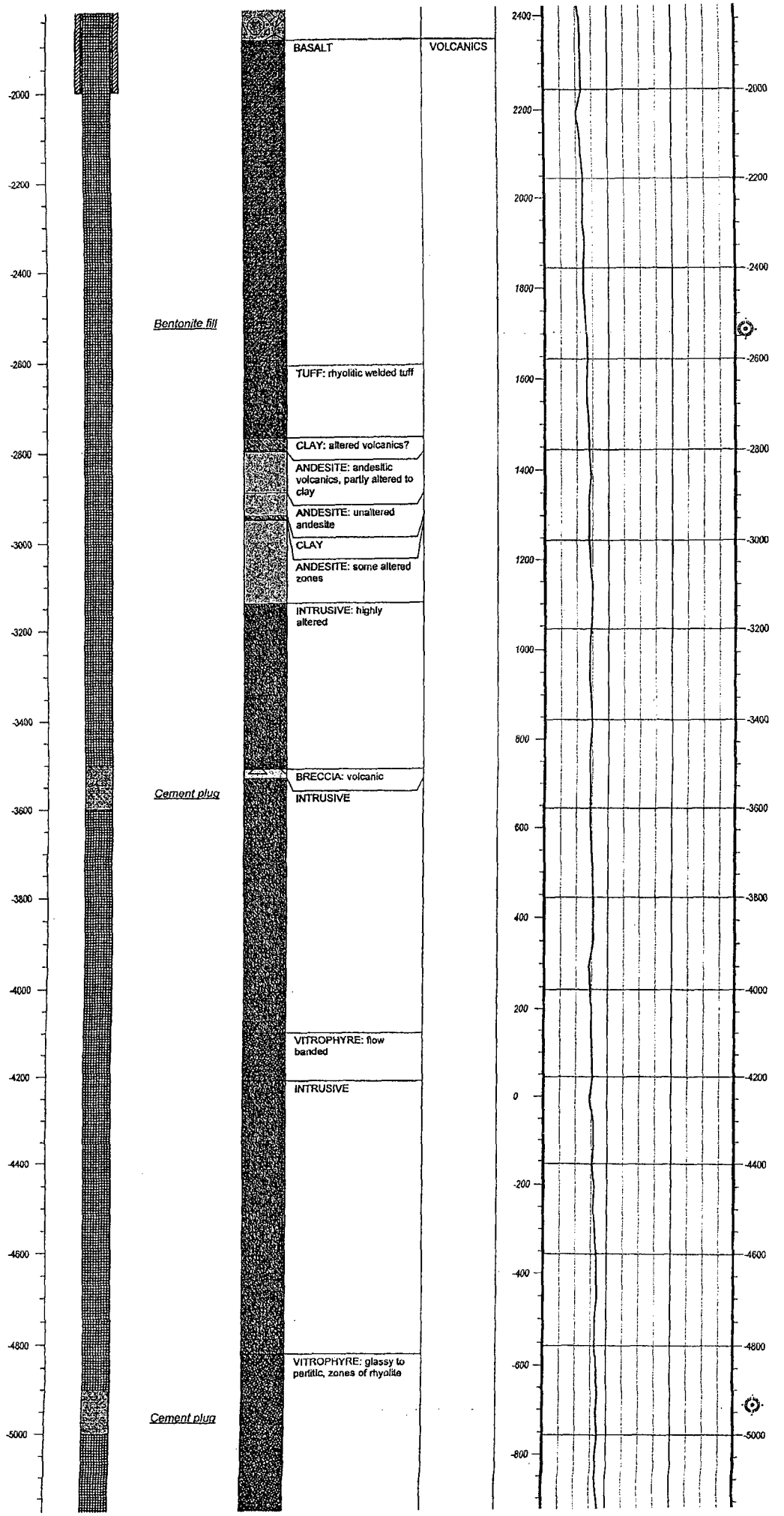
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000


-2000
-2200
-2400
-2600
-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
-4400
-4600
-4800
-5000
Bentonite fill
Cement plug
Cement plug
BASALT
VOLCANICS
TUFF: rhyolitic welded tuff
CLAY: altered volcanics?
ANDESITE: andesitic volcanics, partly altered to clay
ANDESITE: unaltered andesite
CLAY
ANDESITE: some altered zones
INTRUSIVE: highly altered
BRECCIA: volcanic
INTRUSIVE
VITROPHYRE: flow banded
INTRUSIVE
VITROPHYRE: glassy to perlitic, zones of rhyolite
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
-2000
-2200
-2400
-2600
-2800
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-3600
-3800
-4000
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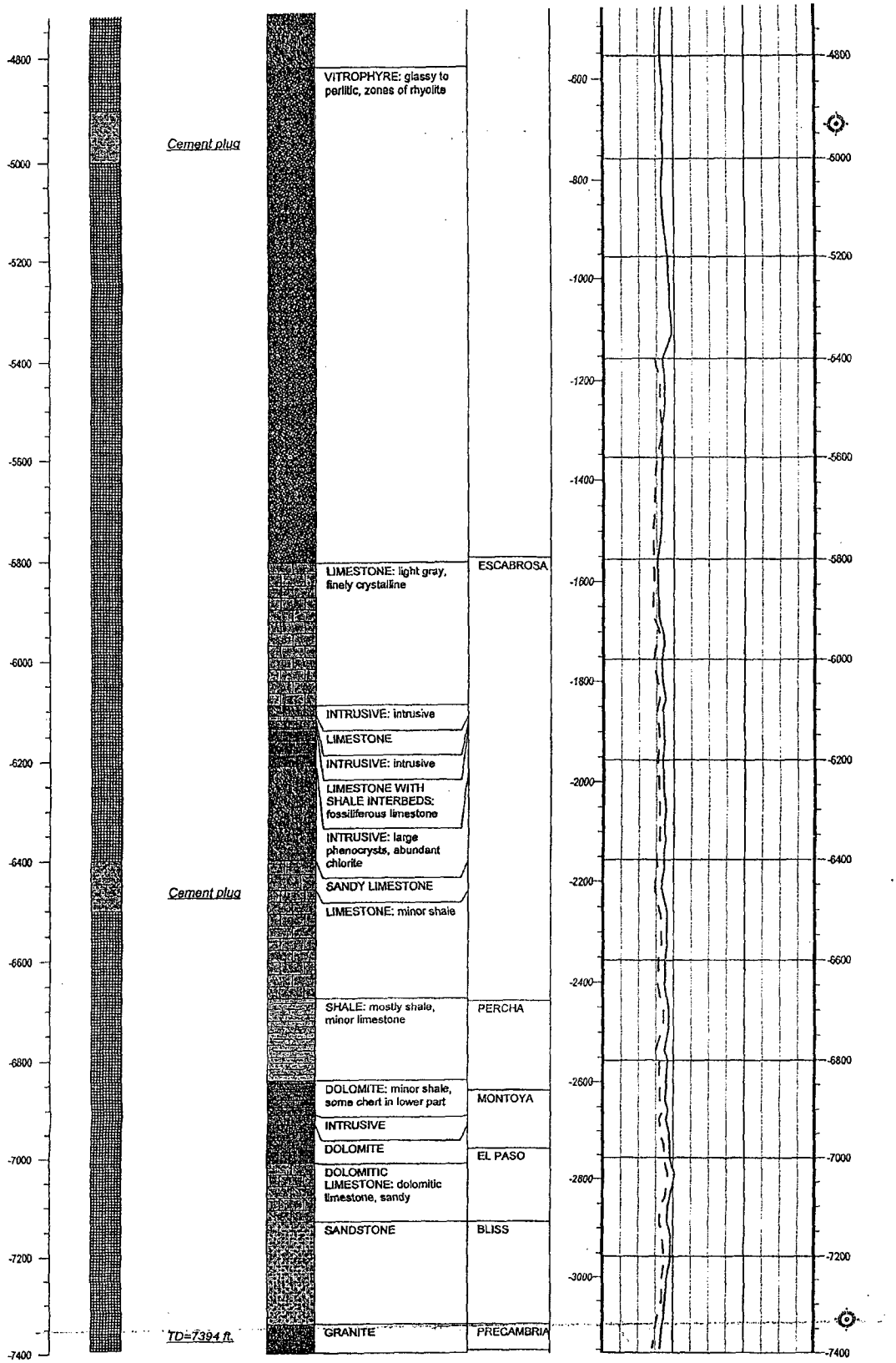
-4600
-4800
-5000


-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000
-7200
-7400
Cement plug
Cement plug
TD=7394 ft.
VITROPHYRE: glassy to perlitic, zones of rhyolite
LIMESTONE: light gray, finely crystalline
INTRUSIVE: intrusive
LIMESTONE
INTRUSIVE: intrusive
LIMESTONE WITH SHALE INTERBEDS: fossiliferous limestone
INTRUSIVE: large phenocrysts, abundant chlorite
SANDY LIMESTONE
LIMESTONE: minor shale
SHALE: mostly shale, minor limestone
DOLOMITE: minor shale, some chert in lower part
INTRUSIVE
DOLOMITE
DOLOMITIC LIMESTONE: dolomitic limestone, sandy
SANDSTONE
GRANITE
ESCABROSA
PERCHA
MONTOYA
EL PASO
BLISS
PRECAMBRIA
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600
-2800
-3000
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000
-7200
-7400

Log compiled for:

Lightning Dock Geothermal, Inc.
Las Cruces, New Mexico

Log compiled by:

TerraCon, Inc. 316 West Main Street, Suite 203 Arlington, Texas 76010 USA

Composite Geothermal Well Log

Well:

Pyramid Federal #1

Project Data

Company: Cockrell Corp.
Project: Animas Valley
State: New Mexico
County: Hidalgo
Township: T24S, R19W, Sec. 31

Location Data

Grid Type: UTM NAD27
Easting: 704690
Northing: 3562008
Ground Elev.: 4230
Kelly Elev.: 4244

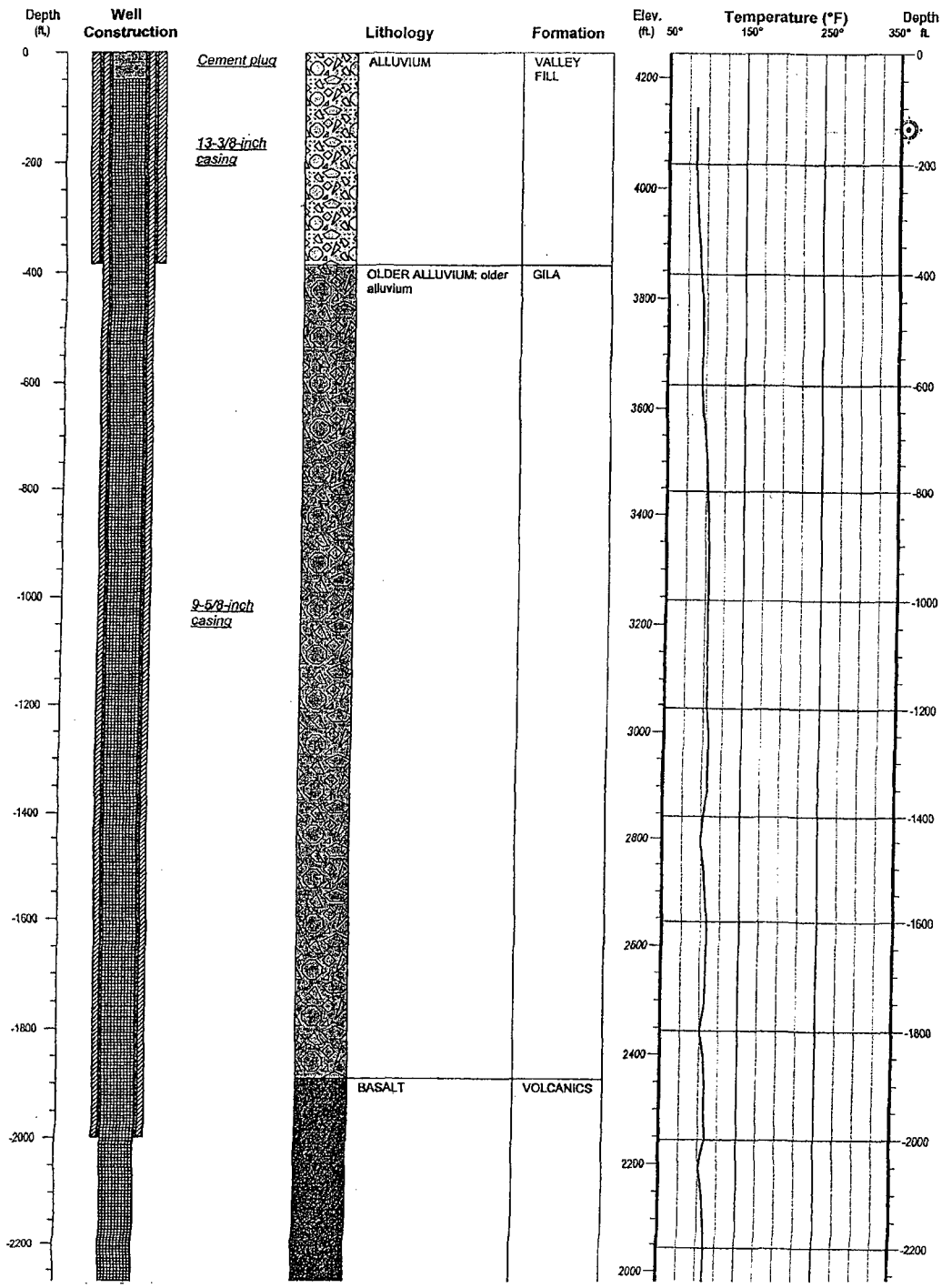
Well Data

Well Type: Wildcat
Spud Date: 9-1-69
Completion Date: 9-30-69
Total Depth: 7394
Logged Depth: 7394

Log Print Date: Jan 15, 2002

Log Scale: 1 in. = 200 ft.

Mud In — Mud Out — Static-1 — Static-2 — Static 3



Lightning Dock Geothermal, Inc.
224 West Greening Ave.
Las Cruces, NM 88005

June 24, 2002

Via UPS Next Day Air

Jerry D. Schwinkendorf, VP
Excel Geophysical Services, Inc.
8301 East Prentice Ave., Ste. 402
Englewood, CO 80111

Dear Mr. Schwinkendorf:

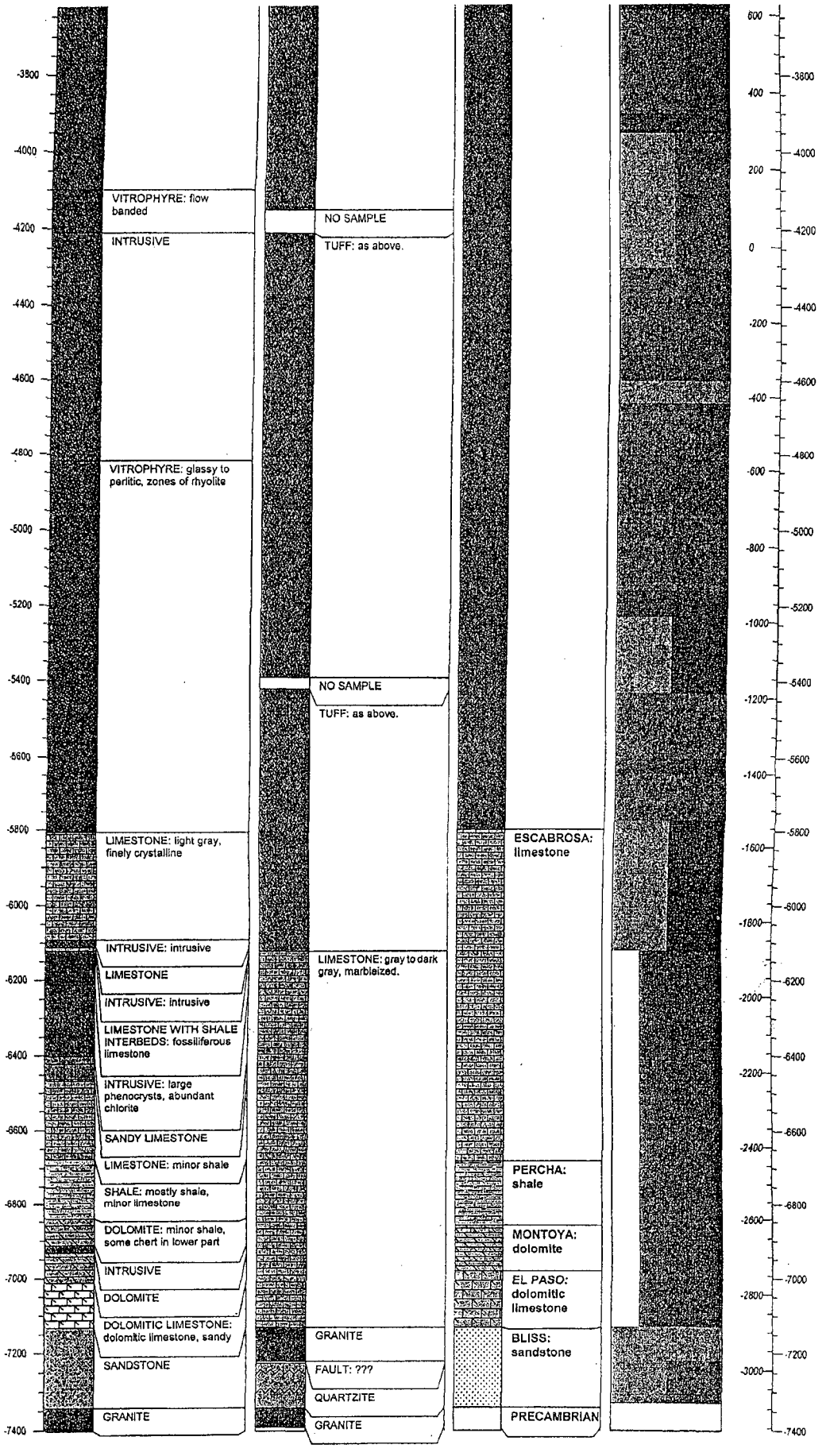
As a follow-up to your discussions with Roy Cunniff regarding seismic surveys in Animas Valley, New Mexico, I have enclosed some geotechnical information for your use. This package contains the following:

1. A "Geologic Overview" report that summarizes the regional geology and geophysics and the two deep wildcat wells (Cockrell Pyramid Federal #1 and TFD 55-7) in our area of interest.

2. Lithology logs for both deep wells. These composite logs show a comparison of lithology descriptions by the operating company (Cockrell, Steam Reserve), by New Mexico Tech, and formation picks by Thompson. We prefer to use the most recent descriptions by NMT since we believe them to be more accurate.

3. A CD with digitized logs for TFD 55-7 and Cockrell. These were digitized from the Schlumberger logs and include caliper, gamma, sonic, and density. Another company digitized these logs two years ago and not all logs were completely digitized. We have prints of the original Schlumberger logs, but we have not had time to digitize any of them. We can provide you hardcopies of these logs after I complete my move to Nevada in about two weeks.

4. A hardcopy of the Schlumberger Borehole Compensated Sonic log for the Cockrell Pyramid well. This is the only geophysical log available for this well. Someone at Cockrell marked the formations identified on the log.


-3800
-4000
-4200
-4400
-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000
-7200
-7400
VITROPHYRE: flow banded
INTRUSIVE
VITROPHYRE: glassy to peritic, zones of rhyolite
LIMESTONE: light gray, finely crystalline
INTRUSIVE: intrusive
LIMESTONE
INTRUSIVE: intrusive
LIMESTONE WITH SHALE INTERBEDS: fossiliferous limestone
INTRUSIVE: large phenocrysts, abundant chlorite
SANDY LIMESTONE
LIMESTONE: minor shale
SHALE: mostly shale, minor limestone
DOLOMITE: minor shale, some chert in lower part
INTRUSIVE
DOLOMITE
DOLOMITIC LIMESTONE: dolomitic limestone, sandy
SANDSTONE
GRANITE
NO SAMPLE
TUFF: as above.
NO SAMPLE
TUFF: as above.
LIMESTONE: gray to dark gray, marbleized.
GRANITE
FAULT: ???
QUARTZITE
GRANITE
ESCABROSA: limestone
PERCHA: shale
MONTOYA: dolomite
EL PASO: dolomitic limestone
BLISS: sandstone
PRECAMBRIAN
600
400
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600
-2800
-3000
-3800
-4000
-4200
-4400
-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000
-7200
-7400

Log compiled for:

Lightning Dock Geothermal, Inc.
Las Cruces, New Mexico

Log compiled by:

Roger Bowers, Geologist
Arlington, Texas USA

Composite Lithology Well Log

Well:

Pyramid Federal #1

Project Data

Company: Cockrell Corp.
Project: Animas Valley
State: New Mexico
County: Hidalgo
Township: T24S, R19W, Sec. 31

Location Data

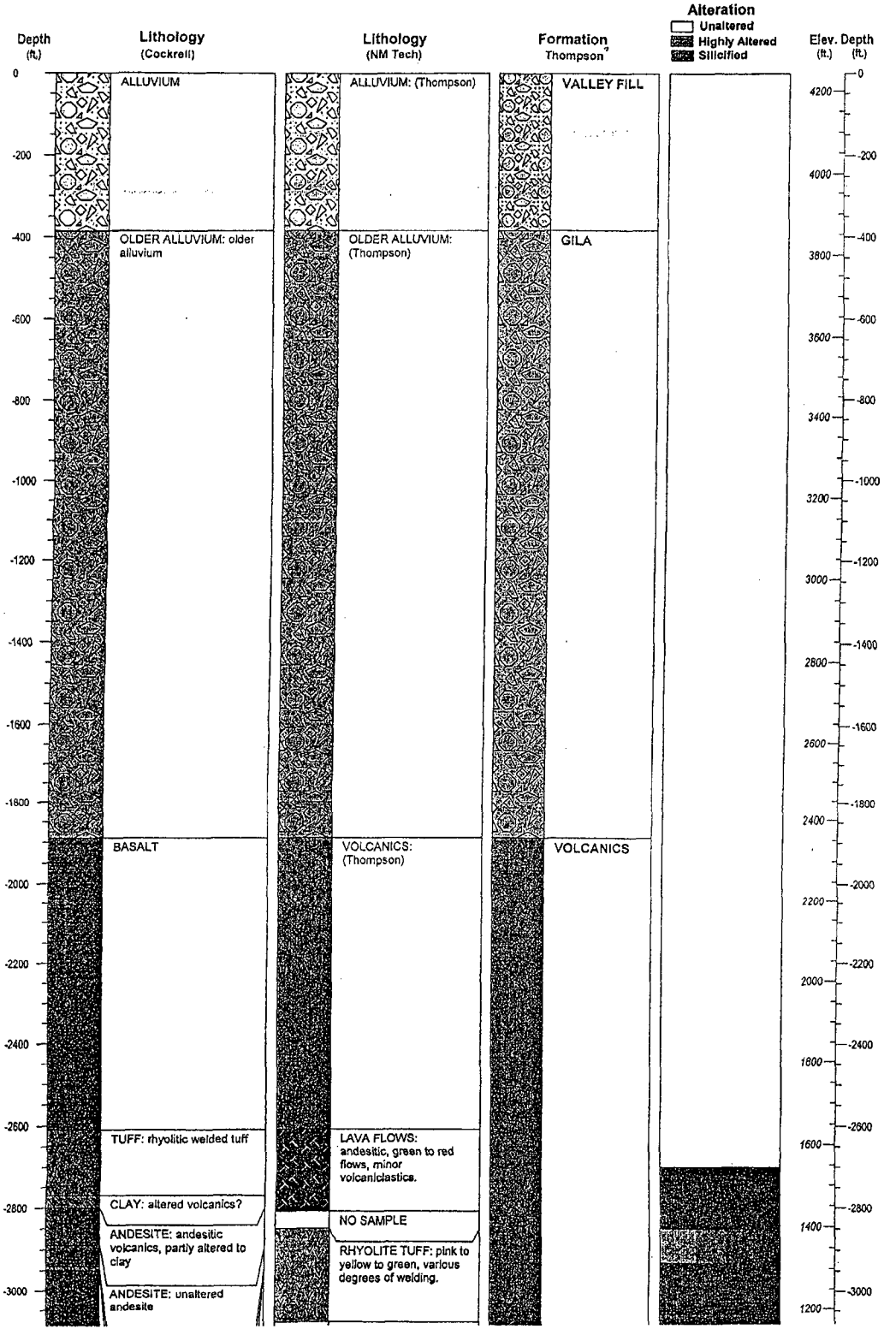
Grid Type: UTM NAD27
Easting: 704690
Northing: 3562008
Ground Elev.: 4230
Kelly Elev.: 4244

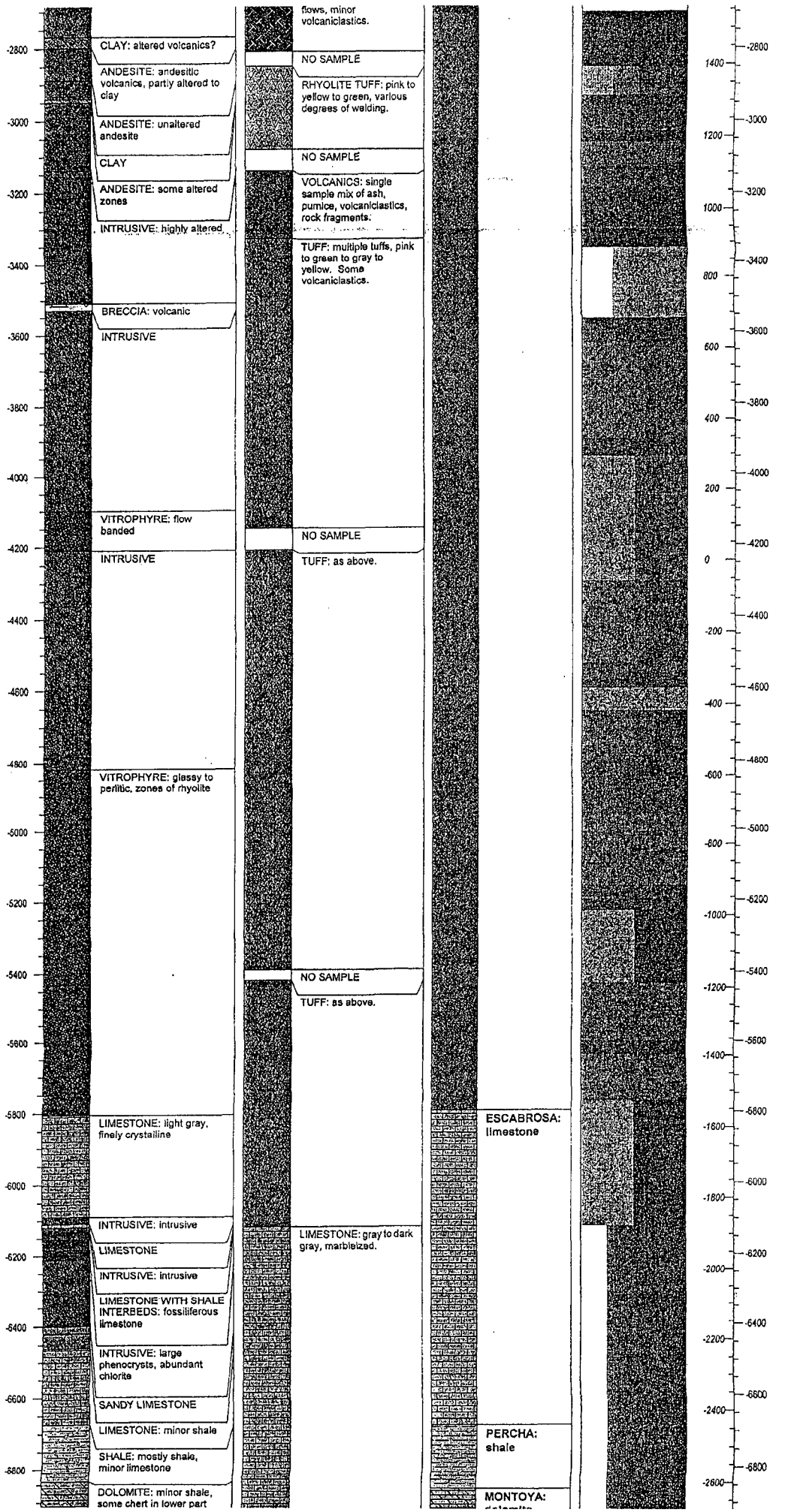
Well Data

Well Type: Wildcat
Spud Date: 9-1-69
Completion Date: 9-30-69
Total Depth: 7394
Logged Depth: 7394

Log Print Date: June 7, 2002

Log Scale: 1 in. = 200 ft.




-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
-4400
-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
CLAY: altered volcanics?
ANDESITE: andesitic volcanics, partly altered to clay
ANDESITE: unaltered andesite
CLAY
ANDESITE: some altered zones
INTRUSIVE: highly altered
BRECCIA: volcanic
INTRUSIVE
VITROPHYRE: flow banded
INTRUSIVE
VITROPHYRE: glassy to perlitic, zones of rhyolite
LIMESTONE: light gray, finely crystalline
INTRUSIVE: intrusive
LIMESTONE
INTRUSIVE: intrusive
LIMESTONE WITH SHALE INTERBEDS: fossiliferous limestone
INTRUSIVE: large phenocrysts, abundant chlorite
SANDY LIMESTONE
LIMESTONE: minor shale
SHALE: mostly shale, minor limestone
DOLOMITE: minor shale, some chert in lower part
flows, minor volcaniclastics.
NO SAMPLE
RHYOLITE TUFF: pink to yellow to green, various degrees of welding.
NO SAMPLE
VOLCANICS: single sample mix of ash, pumice, volcaniclastics, rock fragments.
TUFF: multiple tuffs, pink to green to gray to yellow. Some volcaniclastics.
NO SAMPLE
TUFF: as above.
NO SAMPLE
TUFF: as above.
LIMESTONE: gray to dark gray, marbleized.
ESCABROSA: limestone
PERCHA: shale
MONTOYA:
1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600
-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
-4400
-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800

Log compiled for:

Lightning Dock Geothermal, Inc.
Las Cruces, New Mexico

Log compiled by:
Roger Bowers, Geologist
Arlington, Texas USA

Composite Lithology Well Log

Well:
TFD 55-7

Project Data

Company: AMAX
Project: Animas Valley
State: New Mexico
County: Hidalgo
Township: T25S, R19W, Sec. 7

Location Data

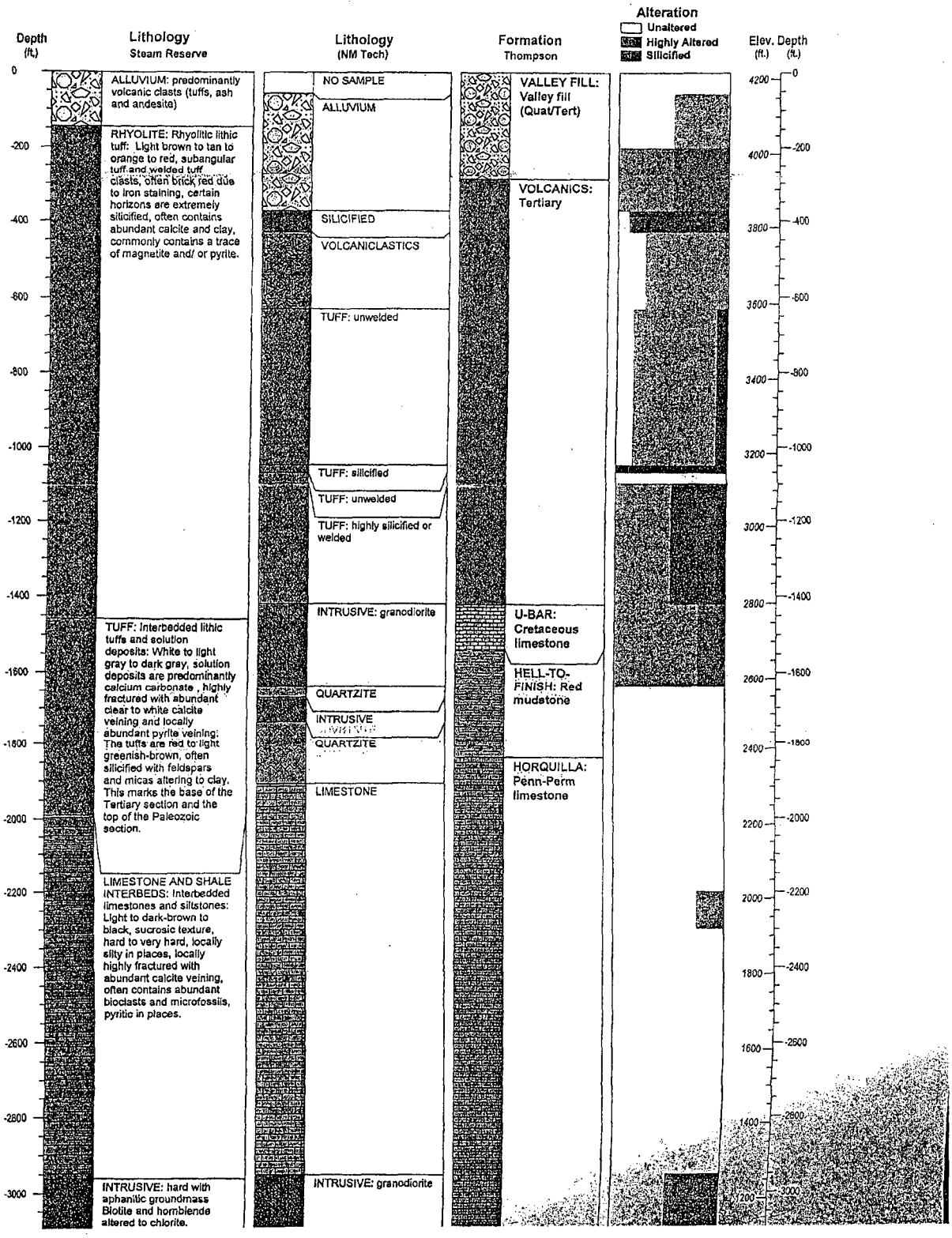
Grid Type: UTM NAD27
Easting: 704181
Northing: 3558520
Ground Elev.: 4200
Kelly Elev.: 4217.6

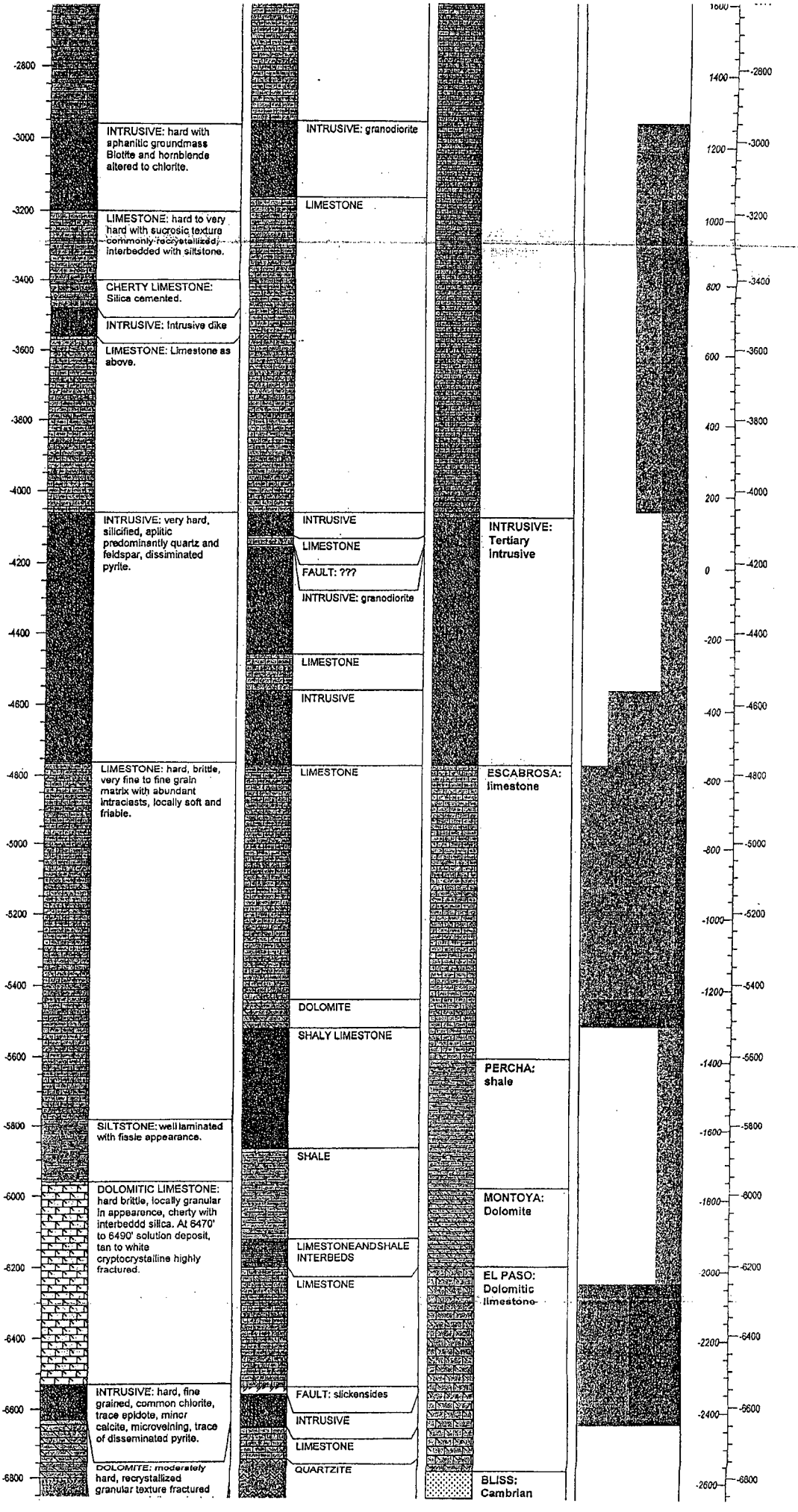
Well Data

Well Type: Geothermal Wildcat
Spud Date: 12-28-84
Completion Date: ABD 12-22-85
Total Depth: 7000
Logged Depth: 7000

Log Print Date: 1-14-02

Log Scale: 1 in. = 200 ft.




-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
-4400
-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
INTRUSIVE: hard with aphanitic groundmass Biotite and hornblende altered to chlorite.
LIMESTONE: hard to very hard with sucrosic texture commonly recrystallized; interbedded with siltstone.
CHERTY LIMESTONE: Silica cemented.
INTRUSIVE: Intrusive dike
LIMESTONE: Limestone as above.
INTRUSIVE: very hard, silicified, aplitic predominantly quartz and feldspar, dissiminated pyrite.
LIMESTONE: hard, brittle, very fine to fine grain matrix with abundant intraclasts, locally soft and friable.
SILTSTONE: well laminated with fissle appearance.
DOLOMITIC LIMESTONE: hard brittle, locally granular in appearence, cherty with interbeddd silica. At 6470' to 6490' solution deposit, tan to white cryptocrystalline highly fractured.
INTRUSIVE: hard, fine grained, common chlorite, trace epidote, minor calcite, microveining, trace of disseminated pyrite.
DOLOMITE: moderately hard, recrystallized granular texture fractured
INTRUSIVE: granodiorite
LIMESTONE
INTRUSIVE
LIMESTONE
FAULT: ???
INTRUSIVE: granodiorite
LIMESTONE
INTRUSIVE
LIMESTONE
DOLOMITE
SHALY LIMESTONE
SHALE
LIMESTONEANDSHALE INTERBEDS
LIMESTONE
FAULT: slickensides
INTRUSIVE
LIMESTONE
QUARTZITE
INTRUSIVE: Tertiary intrusive
ESCABROSA: limestone
PERCHA: shale
MONTOYA: Dolomite
EL PASO: Dolomitic limestone
BLISS: Cambrian
1600
1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600
-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
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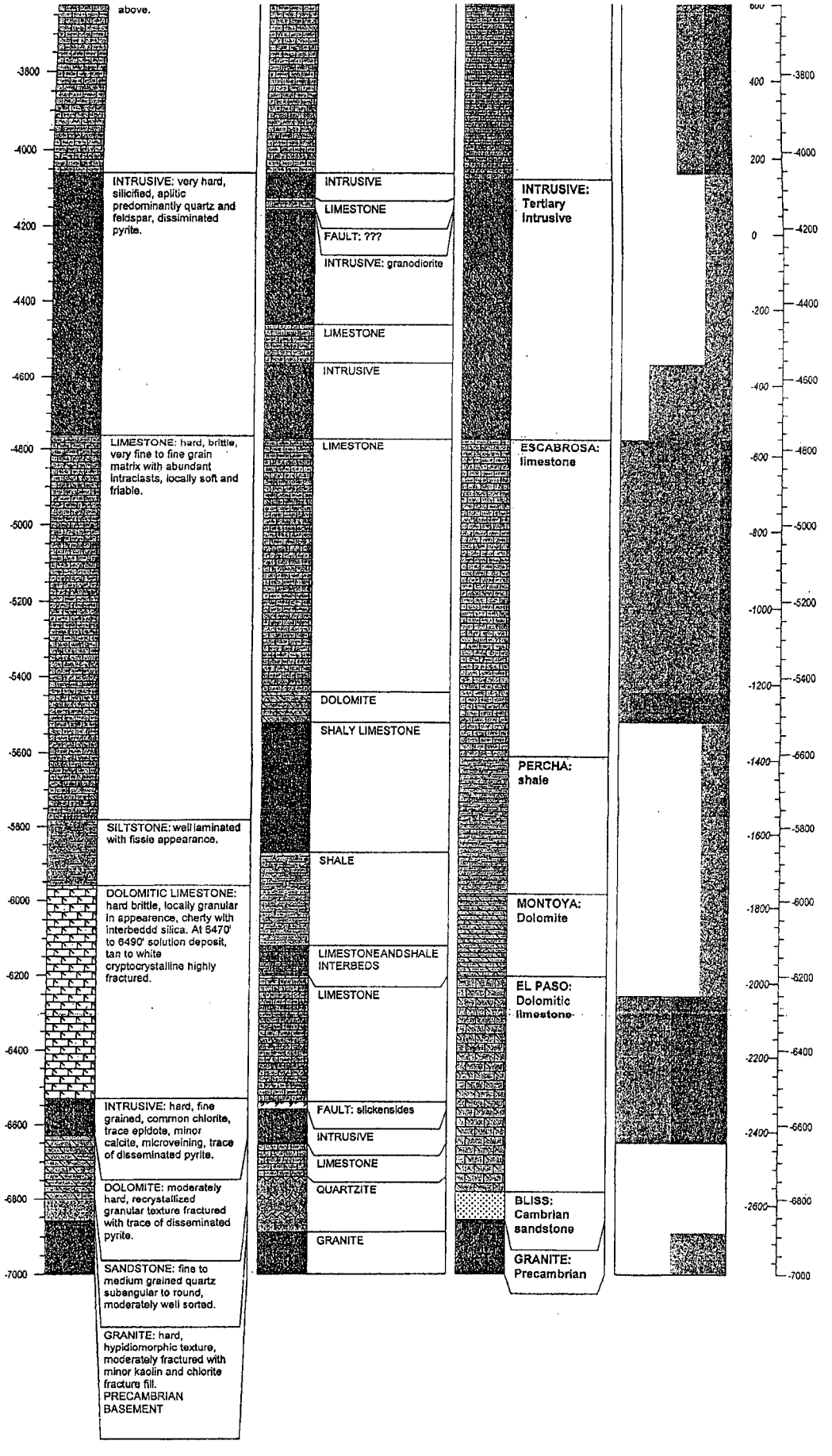
-6400
-6600
-6800


above.
INTRUSIVE: very hard, silicified, aplitic predominantly quartz and feldspar, dissiminated pyrite.
LIMESTONE: hard, brittle, very fine to fine grain matrix with abundant intraclasts, locally soft and friable.
SILTSTONE: well laminated with fissle appearance.
DOLOMITIC LIMESTONE: hard brittle, locally granular in appearence, cherty with interbedded silica. At 6470' to 6490' solution deposit, tan to white cryptocrystalline highly fractured.
INTRUSIVE: hard, fine grained, common chlorite, trace epidote, minor calcite, microveining, trace of disseminated pyrite.
DOLOMITE: moderately hard, recrystallized granular texture fractured with trace of disseminated pyrite.
SANDSTONE: fine to medium grained quartz subangular to round, moderately well sorted.
GRANITE: hard, hypidiomorphic texture, moderately fractured with minor kaolin and chlorite fracture fill. PRECAMBRIAN BASEMENT
INTRUSIVE
LIMESTONE
FAULT: ???
INTRUSIVE: granodiorite
LIMESTONE
INTRUSIVE
LIMESTONE
DOLOMITE
SHALY LIMESTONE
SHALE
LIMESTONE AND SHALE INTERBEDS
LIMESTONE
FAULT: slickensides
INTRUSIVE
LIMESTONE
QUARTZITE
GRANITE
INTRUSIVE: Tertiary intrusive
ESCABROSA: limestone
PERCHA: shale
MONTOYA: Dolomite
EL PASO: Dolomitic limestone
BLISS: Cambrian sandstone
GRANITE: Precambrian
-3800
-4000
-4200
-4400
-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000
400
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600

DRAFT DRAFT

Log compiled for: Lightning Dock Geothermal, Inc, Las Cruces, New Mexico	Composite Geothermal Well Log	Well: Pyramid Federal #
Log compiled by: TerraGen, Inc. 318 West Main Street, Suite 203, Arlington, Texas 76010 USA		

Project Data

Company: Cockrell Corp.
Project: Animas Valley
State: New Mexico
County: Hidalgo
Township: T24S, R19W, Sec. 31

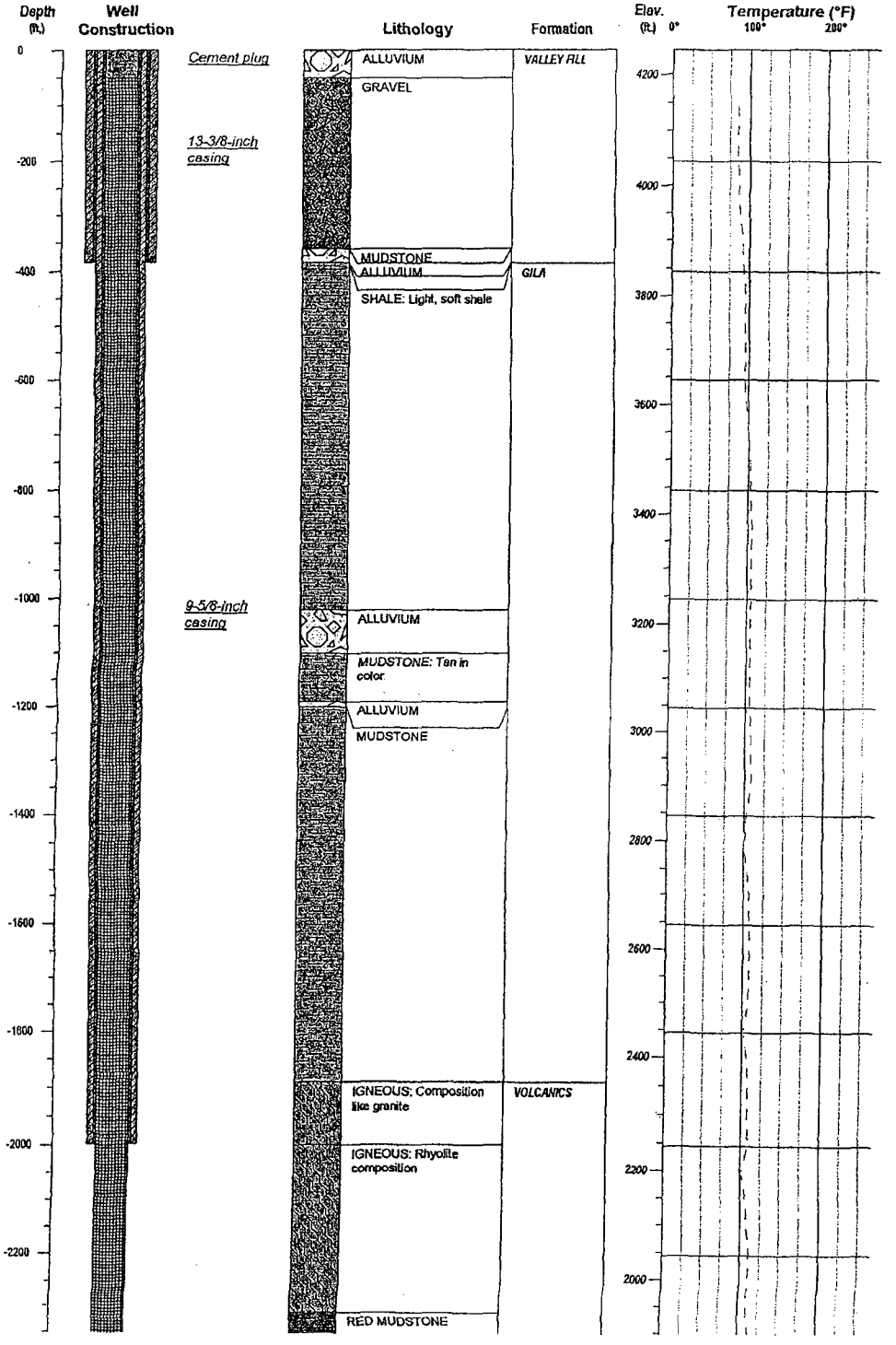
Location Data

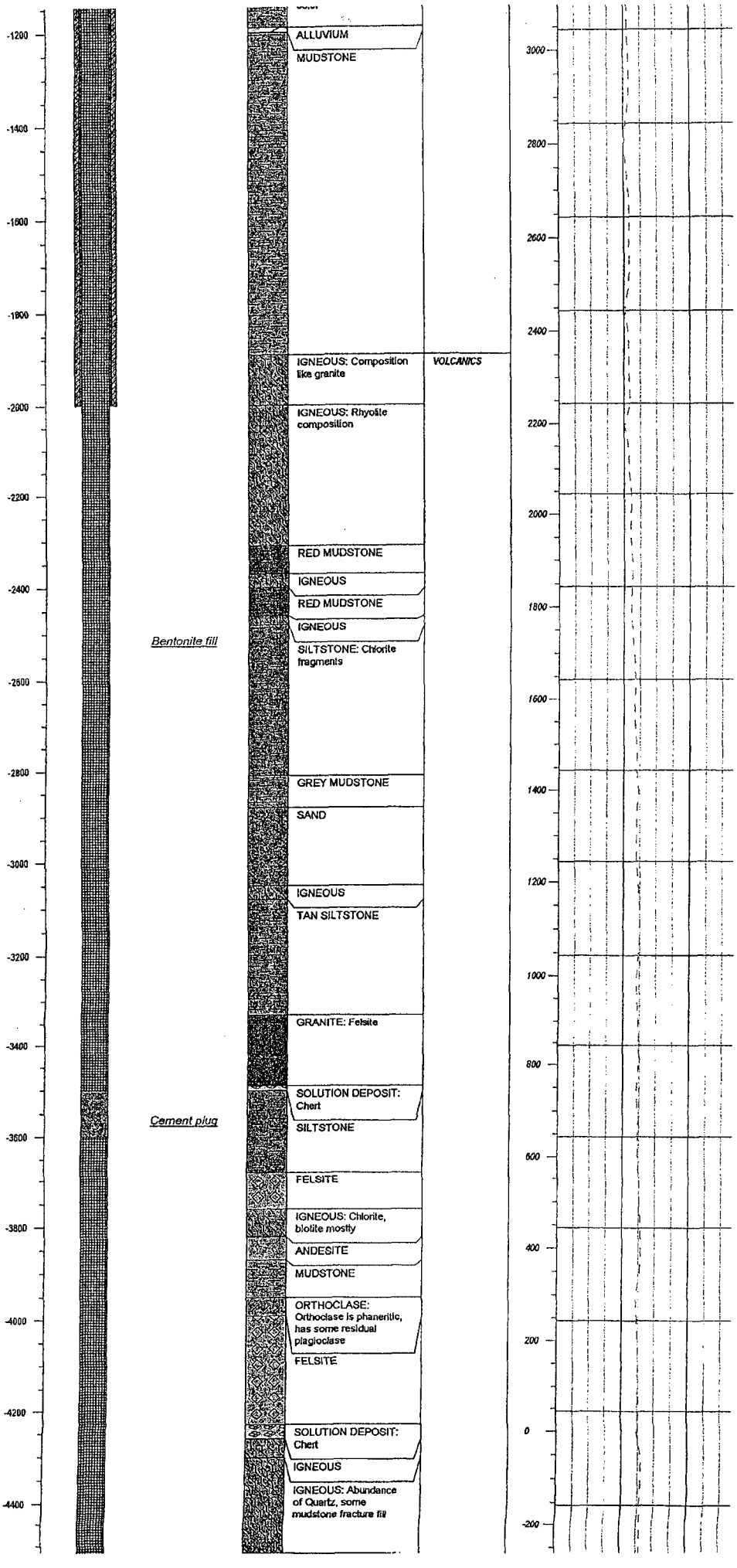
Grid Type: UTM NAD27
Easting: 704690
Northing: 3562008
Ground Elev.: 4230
Kelly Elev.: 4244

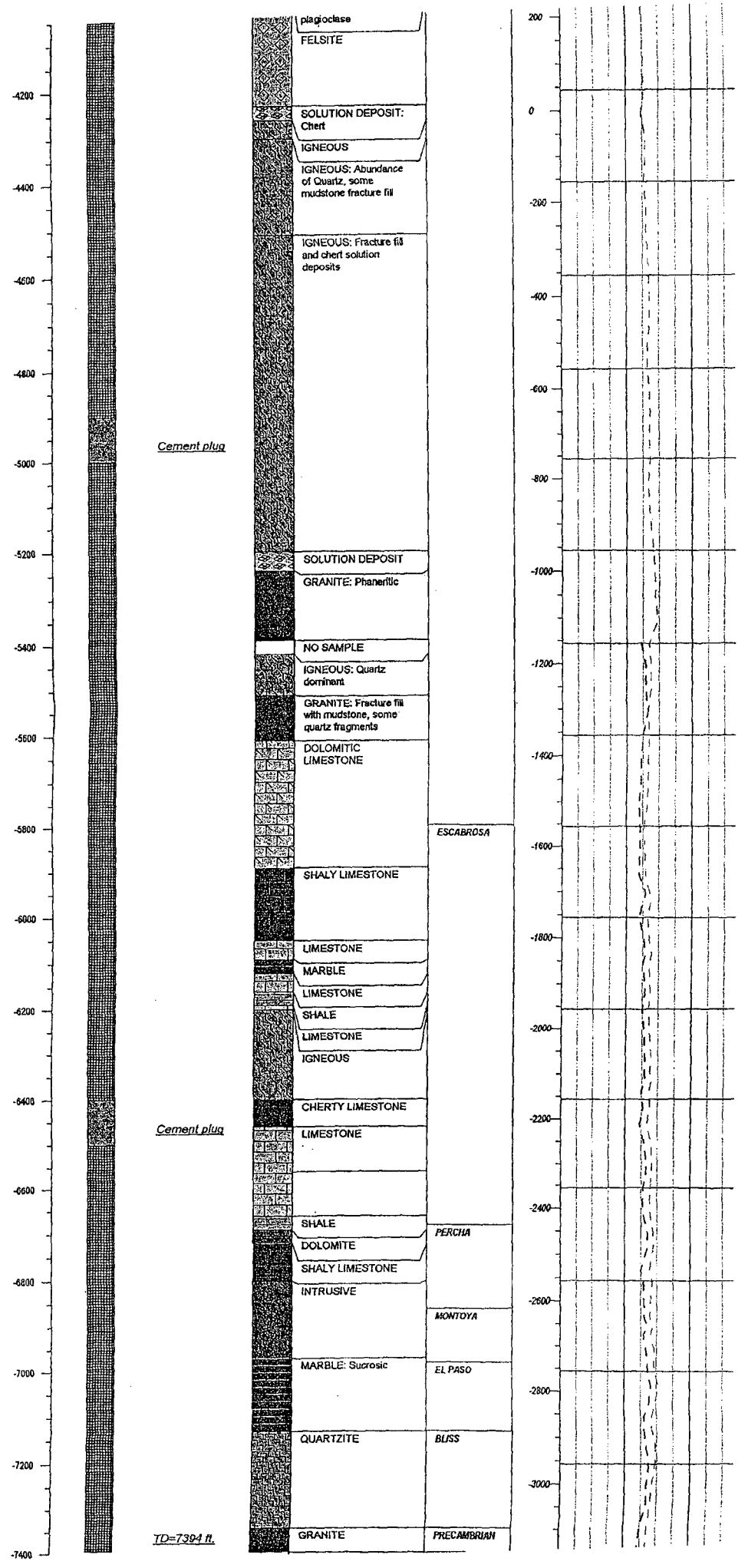
Well Data

Well Type: Wildcat
Spud Date: 9-1-69
Completion Date: 9-30-69
Total Depth: 7394
Logged Depth: 7394

Log Print Date: Jan 15, 2002 | Log Scale: 1 in. = 200 ft. | - - - Mud In, - - - Mud Out, ——— Stati, ——— Stati




-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600
-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
-4400
Bentonite fill
Cement plug
ALLUVIUM
MUDSTONE
IGNEOUS: Composition like granite
VOLCANICS
IGNEOUS: Rhyolite composition
RED MUDSTONE
IGNEOUS
RED MUDSTONE
IGNEOUS
SILTSTONE: Chlorite fragments
GREY MUDSTONE
SAND
IGNEOUS
TAN SILTSTONE
GRANITE: Felsite
SOLUTION DEPOSIT: Chert
SILTSTONE
FELSITE
IGNEOUS: Chlorite, biotite mostly
ANDESITE
MUDSTONE
ORTHOCLASE: Orthoclase is phaneritic, has some residual plagioclase
FELSITE
SOLUTION DEPOSIT: Chert
IGNEOUS
IGNEOUS: Abundance of Quartz, some mudstone fracture fill
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200


-4200
-4400
-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000
-7200
-7400
Cement plug
Cement plug
TD=7394 ft.
plagioclase
FELSITE
SOLUTION DEPOSIT: Chert
IGNEOUS
IGNEOUS: Abundance of Quartz, some mudstone fracture fill
IGNEOUS: Fracture fill and chert solution deposits
SOLUTION DEPOSIT
GRANITE: Phanerific
NO SAMPLE
IGNEOUS: Quartz dominant
GRANITE: Fracture fill with mudstone, some quartz fragments
DOLOMITIC LIMESTONE
SHALY LIMESTONE
LIMESTONE
MARBLE
LIMESTONE
SHALE
LIMESTONE
IGNEOUS
CHERTY LIMESTONE
LIMESTONE
SHALE
DOLOMITE
SHALY LIMESTONE
INTRUSIVE
MARBLE: Sucrosic
QUARTZITE
GRANITE
ESCABROSA
PERCHA
MONTOYA
EL PASO
BLISS
PRECAMBRIAN
200
0
-200
-400
-600
-800
-1000
-1200
-1400
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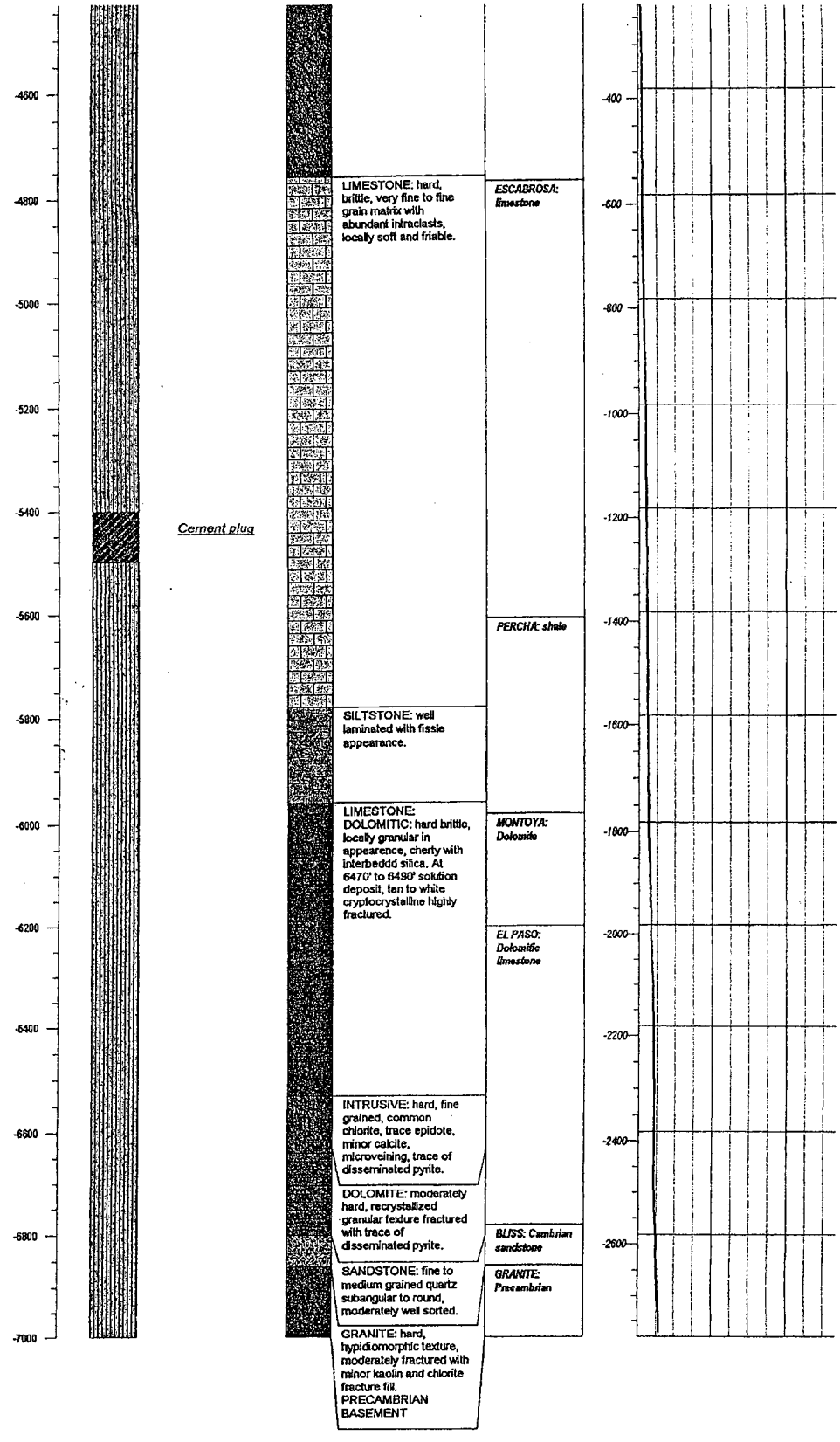
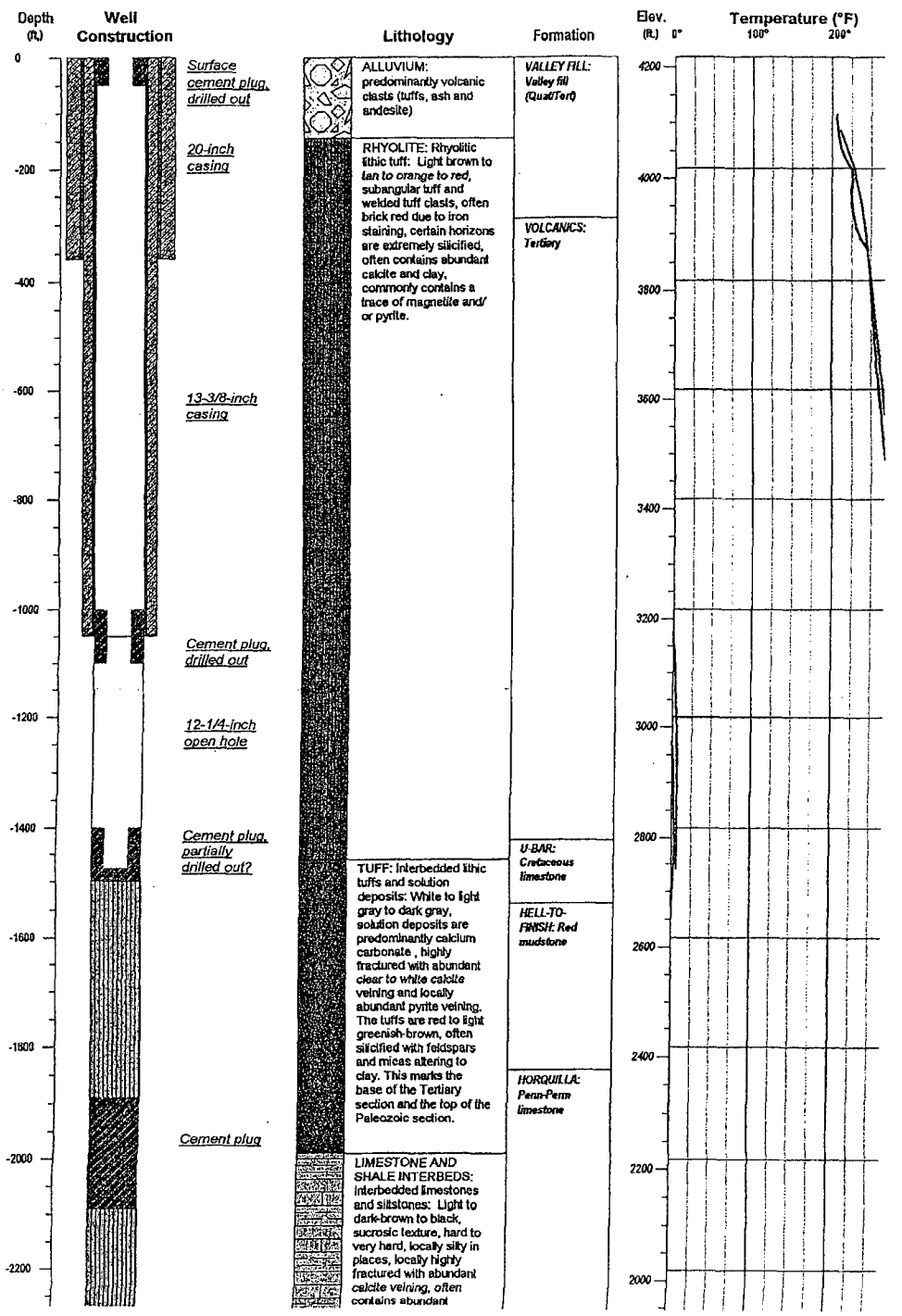
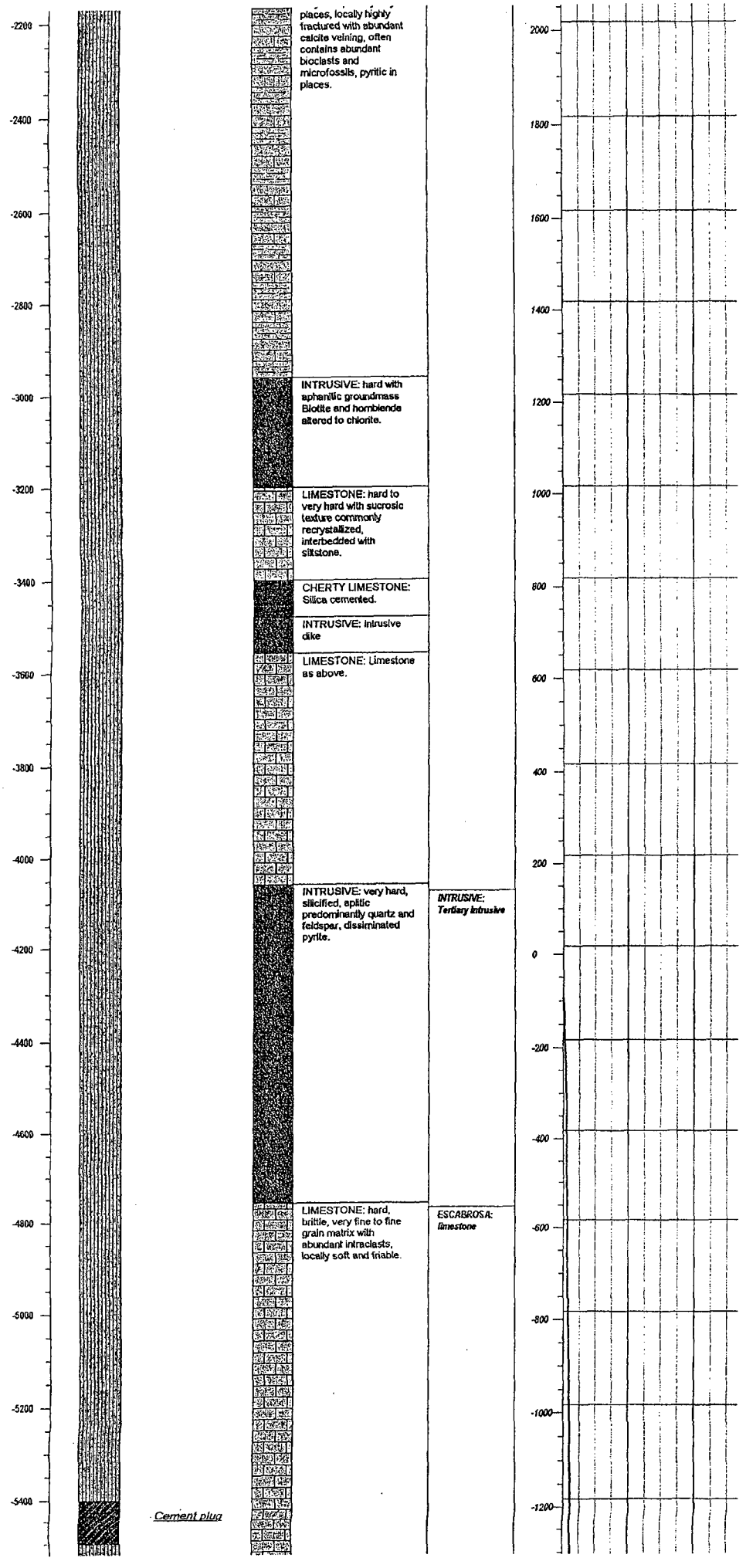
-2400
-2600
-2800
-3000

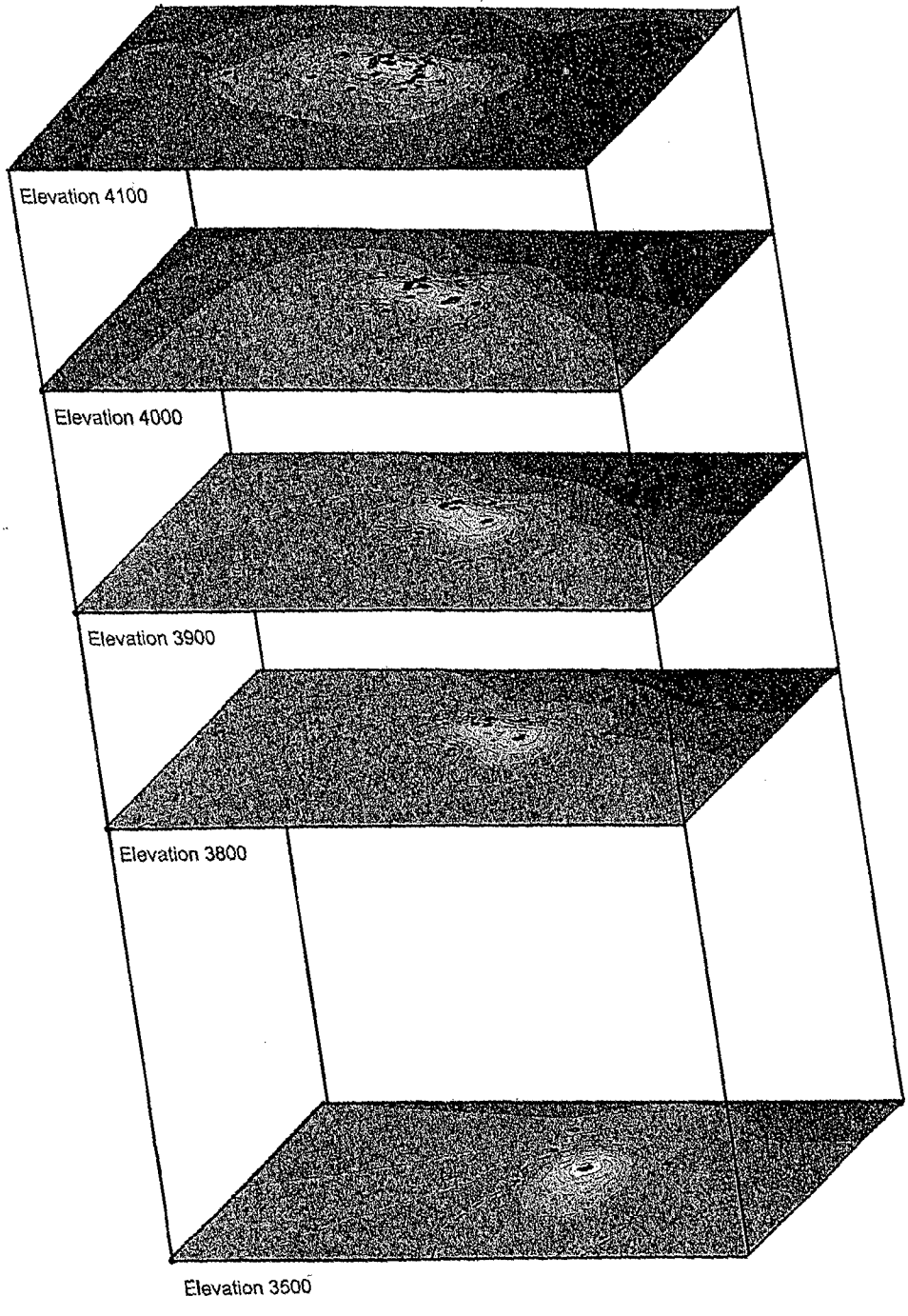

-4600
-4800
-5000
-5200
-5400
-5600
-5800
-6000
-6200
-6400
-6600
-6800
-7000
Cement plug
LIMESTONE: hard, brittle, very fine to fine grain matrix with abundant intraclasts, locally soft and friable.
SILTSTONE: well laminated with fissle appearance.
LIMESTONE: DOLOMITIC: hard brittle, locally granular in appearence, cherty with interbeddd silica. At 6470' to 6490' solution deposit, tan to white cryptocrystalline highly fractured.
INTRUSIVE: hard, fine grained, common chlorite, trace epidote, minor calcite, microveining, trace of disseminated pyrite.
DOLOMITE: moderately hard, recrystallized granular texture fractured with trace of disseminated pyrite.
SANDSTONE: fine to medium grained quartz subangular to round, moderately well sorted.
GRANITE: hard, hypidiomorphic texture, moderately fractured with minor kaolin and chlorite fracture fill. PRECAMBRIAN BASEMENT
ESCABROSA: limestone
PERCHA: shale
MONTOYA: Dolomite
EL PASO: Dolomitic limestone
BLISS: Cambrian sandstone
GRANITE: Precambrian
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600

DRAFT DRAFT

Log compiled for: **Lightning Dock Geothermal, Inc** **Las Cruces, New Mexico** Log compiled by: TerraCon, Inc. 318 West Main Street, Suite 203 Arlington, Texas 76010 USA	**Composite Geothermal Well Log**	Well: **TFD 55-7**
Project Data *Company:* AMAX *Project:* Animas Valley *State:* New Mexico *County:* Hidalgo *Township:* T25S, R19W, Sec. 7	**Location Data** *Grid Type:* UTM NAD27 *Easting:* 704181 *Northing:* 3558520 *Ground Elev.:* 4200 *Kelly Elev.:* 4217.6	**Well Data** *Well Type:* Geothermal W *Spud Date:* 12-28-84 *Completion Date:* ABD 12-22-85 *Total Depth:* 7000 *Logged Depth:* 7000
Log Print Date: 1-14-02	Log Scale: 1 in. = 200 ft.	— — · Mud In ——— Stati — — · Mud Out ——— Stati




-2200
-2400
-2600
-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
-4400
-4600
-4800
-5000
-5200
-5400
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
-1000
-1200
places, locally highly fractured with abundant calcite veining, often contains abundant bioclasts and microfossils, pyritic in places.
INTRUSIVE: hard with aphanitic groundmass Biotite and hornblende altered to chlorite.
LIMESTONE: hard to very hard with sucrosic texture commonly recrystallized, interbedded with siltstone.
CHERTY LIMESTONE: Silica cemented.
INTRUSIVE: intrusive dike
LIMESTONE: Limestone as above.
INTRUSIVE: very hard, silicified, aplitic predominantly quartz and feldspar, dissiminated pyrite.
INTRUSIVE: Tertiary intrusive
LIMESTONE: hard, brittle, very fine to fine grain matrix with abundant intraclasts, locally soft and friable.
ESCABROSA: limestone
Cement plug


Elevation 4100
Elevation 4000
Elevation 3900
Elevation 3800
Elevation 3500

cunniff

From: Roger Bowers [rbowers@flash.net]
Sent: Sunday, December 31, 2000 12:06 PM
To: cunniff@zianet.com
Subject: Re: Your 55-7 figures

The left scale is depth; the right scale is elevation. I either forgot to label them or made the labels too small. The figure is just a "working draft" to see if anything made sense. I also wanted to correct the depths of different logs/surveys -- KB vs ground level.

I hope to finish the section on log interpretation today. I'm no expert either, but I've learned a lot from Keith and Bill Stallsworth. (Stallsworth, by the way, started with Schlumberger in 1951 -- can't remember if I sent you his resume.) The whole idea was to try to get a much info about fractures from the well logs. We got more than I thought possible. The only way we could do this was by combining (with tedious graphing) the results of the caliper, sp, dipmeter logs, etc. The dipmeter at least gave us enough information to show which way the beds are dipping -- important for structural interpretation.

The hole elongation is critical to show likely fractures -- the horizontal cross-sectional shape of the wellbore means more than I ever thought. A circular shape generally indicates solid, unfractured rock. An ellipsoidal shape, as indicated by the four pads of the caliper, shows that the drill bit was "eating" the rock preferentially along a certain axis. Turns out that, if the fractures are near vertical in horizontal beds, the fracture plane is parallel to the short axis of the ellipsoid cross section. This is opposite of what I first assumed -- that the wellbore would "erode" along the fracture plane = the long axis of the ellipsoid cross section of the wellbore -- and it still feels contrary to my "gut feel".

The plots of the wellbore elongation and the fracture planes are in azimuth, so the arrows show which direction the fracture planes are running at a given depth.

The temp surveys, adjusted for KB, shows that the temp inversion is closer to the volcanics/U Bar contact than I had thought. As far as Tom saying that the cooling is coming from the west, I have no idea where he got that idea from -- other than Elston, Deal, Logsdon, GeothermEx, et al.

I've now had some computer glitches that seem to have corrupted some of my report and graphics files. I'm sure my problems and frustration level are nowhere near yours, but in the interest of time, I'm going to take liberally from our old report and add the new geology and 55-7 log info where I can. I've got to email something to the others NLT Tuesday 10:00 a.m. my time, if not Monday night. I'll probably include much of the old hydrology section and we can add what you're doing later in the week. I know I'll have a bunch of revisions. The other thing is how to combine Dave and Ken's work (forget about G-Ex) with ours, or do we even worry about it right now. Maybe the best thing would be to give everyone the separate reports and then we can fight it out in Reno. I find myself wanting to do Tom's job of taking everybody's work and combining them into a single document -- probably very premature at this point.

My other big problem right now is structuring my report with the EGS outline. The single section 2.2.4 Geologic Setting will have to cover a sh__load of material: previous work, stratigraphy, structure, Cockrell, 55-7, photos, geophysics, hydrology, etc. How much detail do we really need? I guess I'll send everything I can -- it will be easier to cut out parts later??

"Roy A. Cunniff" wrote:

> After reviewing on screen the well logs, I was struck by the fact that on the left vertical, the depth increases as you move down the figure, whereas on the right vertical, the depths are inversed. Was this on

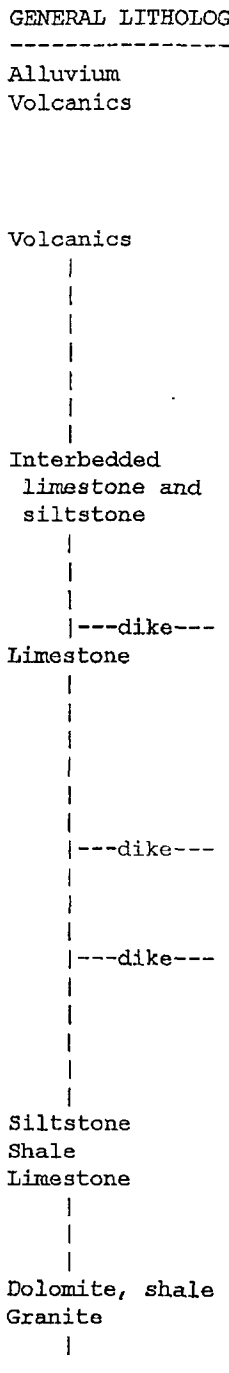
purpose? Another random thought. After viewing this figure, I again realize how totally ignorant I am about well logs. A snap impression is that I can see where Tom Flynn says the cooling inversion in the temp survey is an indication that cool water is coming in from the west at the contact between the U-bar and the limestone. He picked the wrong depth (1,450) for the rollover, which Dave's temp plot shows by using the Spafford probe, is more like at 1,250.What are the implications of the dip meter, hole orientation, etc.? Since I am so ignorant, I hesitate to even offer any opinions.If my computer cooperates, I should have my version of hydrology to you by Tuesday.

WELL TFD 55-7
Lightning Dock KGRA
Animas Valley, Hidalgo Co., NM

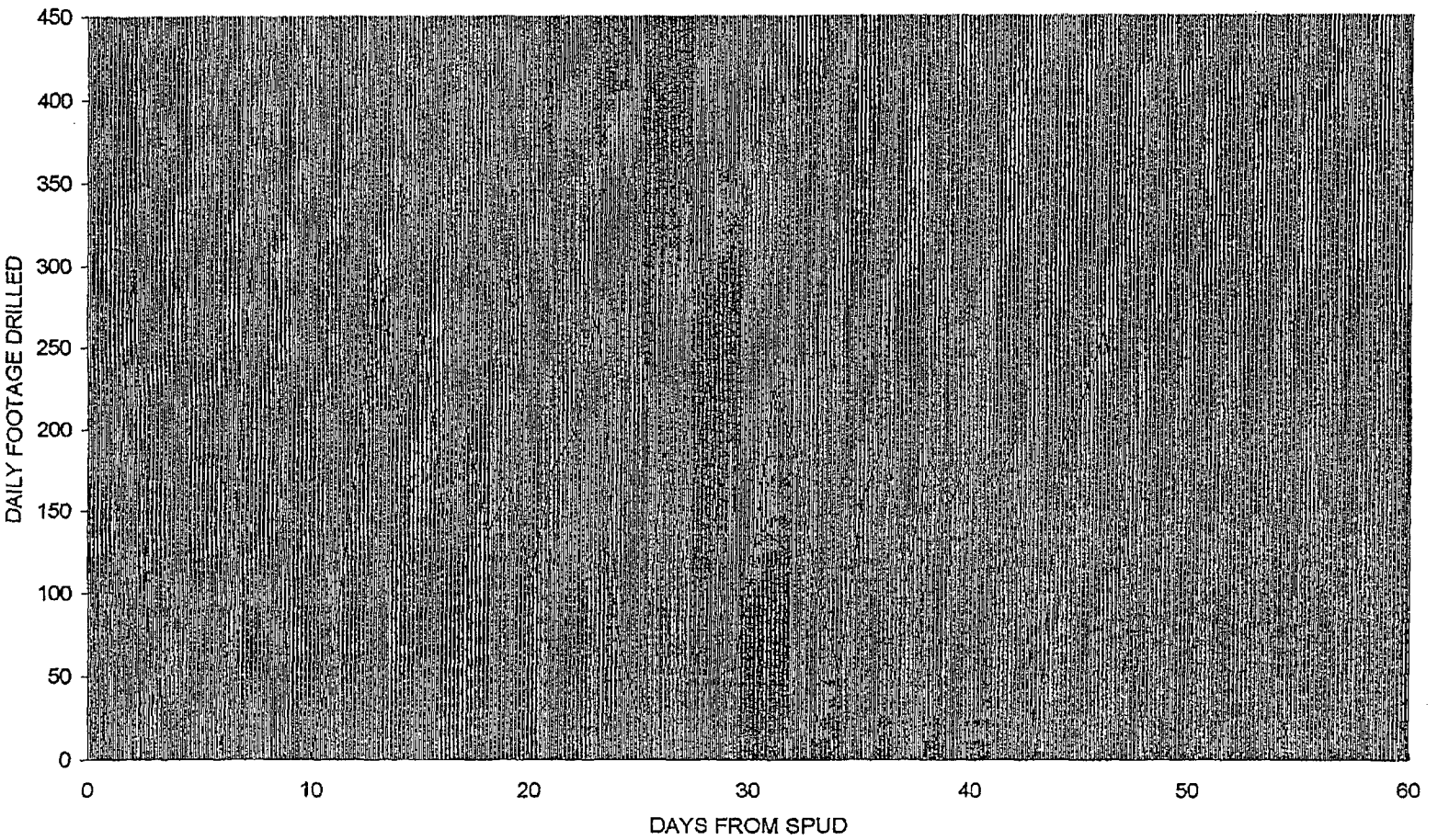
DAY		DATE	DEPTH	FOOTAGE	REMARKS
1	-76	29-Dec-84	76	76	
2	-385	30-Dec-84	385	309	Drill pilot hole
3	-212	31-Dec-84	212	0	Ream hole for casing
4	-320	01-Jan-85	320	0	Ream hole for casing
5	-384	02-Jan-85	384	0	Set 20-in. casing
6	-384	03-Jan-85	384	0	at 360 feet
7	-642	04-Jan-85	642	258	
8	-1070	05-Jan-85	1070	428	
9	-1070	06-Jan-85	1070	0	Set 13-3/8-in. casing
10	-1070	07-Jan-85	1070	0	at 1050 feet
11	-1140	08-Jan-85	1140	70	
12	-1320	09-Jan-85	1320	180	
13	-1620	10-Jan-85	1620	300	
14	-1822	11-Jan-85	1822	202	
15	-2087	12-Jan-85	2087	265	
16	-2229	13-Jan-85	2229	142	
17	-2430	14-Jan-85	2430	201	
18	-2566	15-Jan-85	2566	136	
19	-2733	16-Jan-85	2733	167	
20	-2843	17-Jan-85	2843	110	
21	-3020	18-Jan-85	3020	177	
22	-3220	19-Jan-85	3220	200	
23	-3495	20-Jan-85	3495	275	
24	-3568	21-Jan-85	3568	73	
25	-3589	22-Jan-85	3589	21	
26	-3778	23-Jan-85	3778	189	
27	-3894	24-Jan-85	3894	116	
28	-4133	25-Jan-85	4133	239	
29	-4165	26-Jan-85	4165	32	
30	-4272	27-Jan-85	4272	107	
31	-4498	28-Jan-85	4498	226	
32	-4684	29-Jan-85	4684	186	
33	-4788	30-Jan-85	4788	104	
34	-4840	31-Jan-85	4840	52	
35	-4998	01-Feb-85	4998	158	
36	-5192	02-Feb-85	5192	194	
37	-5299	03-Feb-85	5299	107	
38	-5480	04-Feb-85	5480	181	
39	-5635	05-Feb-85	5635	155	
40	-5826	06-Feb-85	5826	191	
41	-5990	07-Feb-85	5990	164	
42	-6184	08-Feb-85	6184	194	
43	-6184	09-Feb-85	6184	0	Logging
44	-6372	10-Feb-85	6372	188	
45	-6592	11-Feb-85	6592	220	
46	-6854	12-Feb-85	6854	262	
47	-7001	13-Feb-85	7001	147	TD
48	-7001	14-Feb-85	7001	0	Logging

49	-7001	15-Feb-85	7001	0	Logging
50	-7001	16-Feb-85	7001	0	Logging
51	-7001	17-Feb-85	7001	0	Rig down

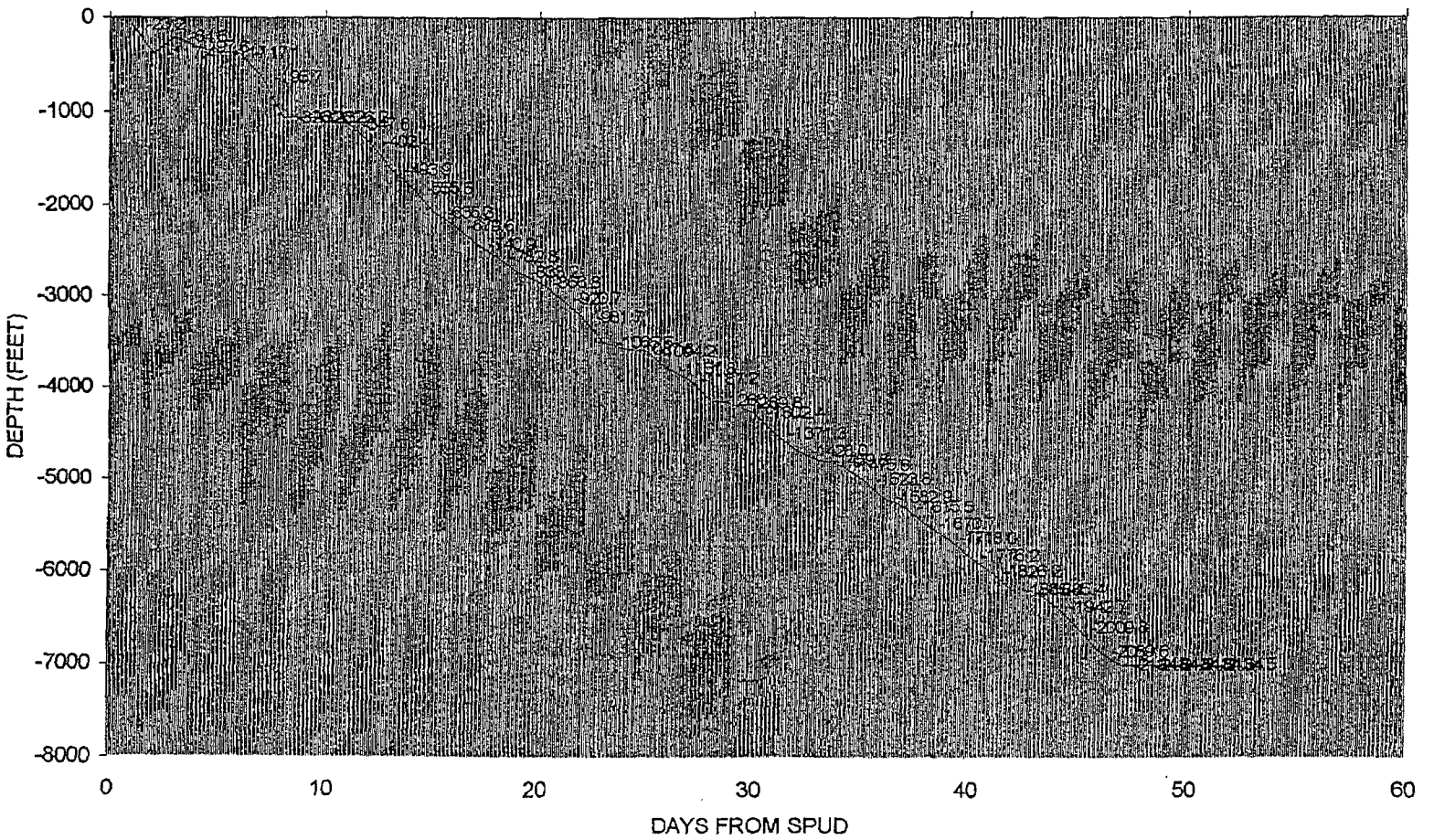
GENERAL LITHOLOGY



WELL TFD-55-7
DRILLING RATE



WELL TFD-55-7
DRILLING HISTORY



STEAM RESERVE CORPORATION STEAM RESERVE CORPORATION STEAM RESERVE CORPORATION STEAM RESERVE CORPORATION STEAM RESERVE SRC CORPORATION

MEMORANDUM

SUBJECT: Well History TFD Animas 55-7
Hidalgo County, New Mexico (5644A).

DATE: June 13, 1985

TO: H. J. Olson

cc: H. D. Pilkington
J. E. Deymonaz

FROM: Michael Connelly

12/17-12/27/84	Willbros rig #1 began mobilization from Lovington, NM on 12/17. It began arriving on the site on 12/19 and finished arriving without incident on 12/27.
12/27-12/29/34	Rigged up and spudded the well at 8 p.m. on 12/29. Well was spudded with a Grant 26" hole opener to center punch the hole. Drilled from 47' to 71'.
12/30/84-1/2/85	Hole opener was pulled and a 17.5" bit was used to drill the hole to a depth of 385'. The 26" hole opener was then picked up and the hole opened to a depth of 212' before the hole opener had to be pulled. A HTC 26" bit was used to finish opening the hole to 385'.
1/2/85	9 joints of 20" 94 lbs. H-40 seamless casing, BT & C, R-3 were run with the float shoe set at 360.28'. Halliburton then pumped 760 sacks of class H cement with 40% silica (SSA-1) plus 2% CaCl.
1/3/85	CIP at 3:30 a.m. WOC 8.5 hrs. and nippled up on 20" Hydril.
1/4-1/5/85	Drilled 17.5" hole from 385' to 1070'. 100 bbls of mud lost at 695' and losing approximately 6 bbls of mud/hr from 695' to 1070'.
1/6/85	Ran 27 joints of 13 3/8" 61 lbs K-55 seamless casing, BT&C, R-3. Set casing shoe at 1050' and float collar at 972'. Halliburton pumped 780 sacks of class H cement with 40% silica (SSA-1) plus 8 lbs of perlite/sack. CIP at 7 p.m. Good cement returns and circulation throughout job.

A wholly owned subsidiary of AMAX Exploration, Inc.

[illegible] GOLDEN COLORADO 80401 • (303) 234-9020 • TELEX: 45-558

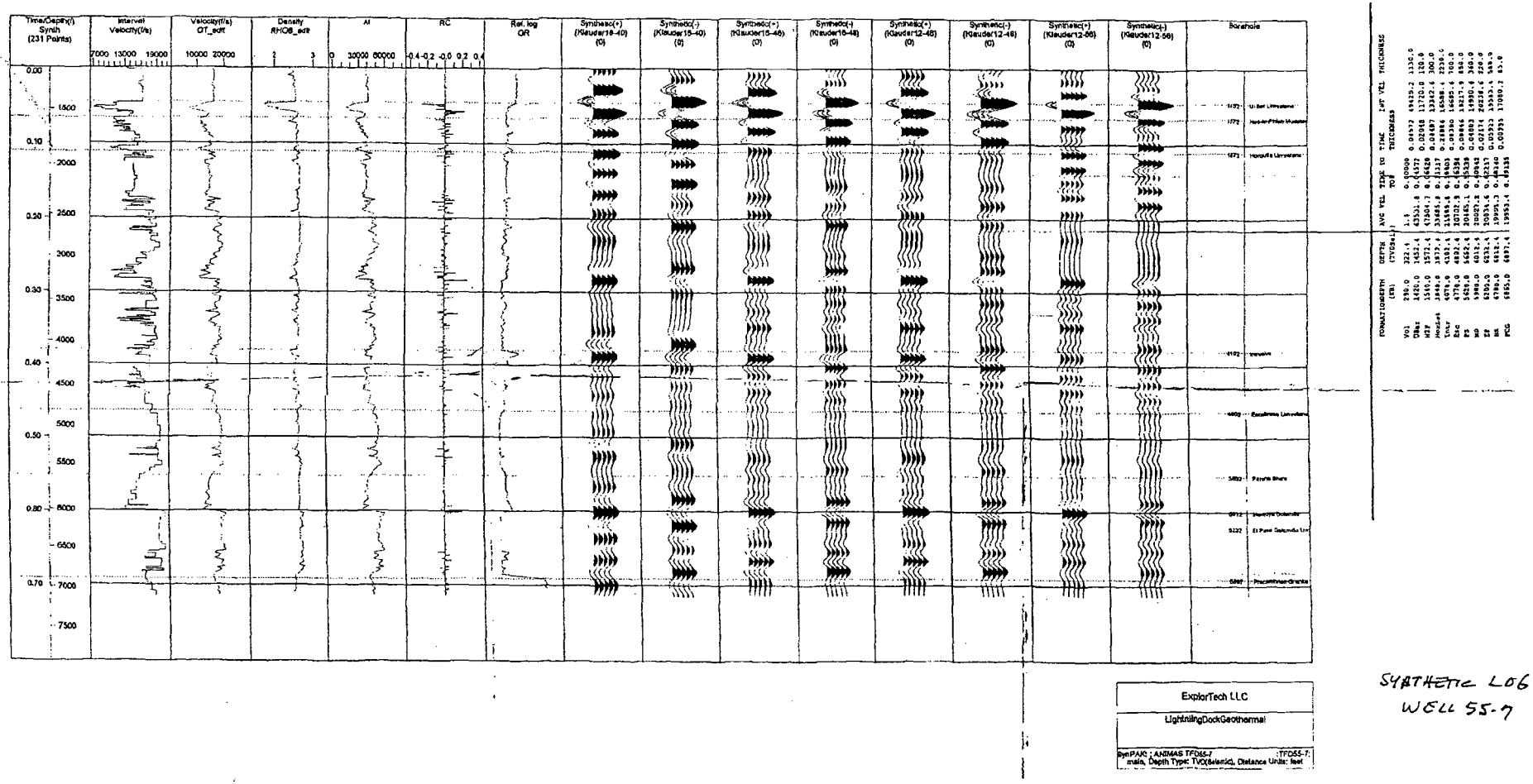
MEMORANDUM

1/7/85	WOC and nipple up on 13 3/8" wellhead. Test BOP - slow but o.k.
1/8-1/21/85	Drilled 12.25" hole from 1070' to 3568'. Twisted off at 11 p.m. at a depth of 3568'. Able to screw back into a few joints before having to call HOMCO to have a fishing crew sent down.
1/22/85	Fishing was successful at 5:30 p.m. Drilled from 3568' to 3589'.
1/23-1/26/85	Drilled from 3589' to 4165'. Lost 45 bbls at 4065'. Twisted off at 8 p.m. at a depth of 4165'. Had to call HOMCO for a fishing crew again.
1/27/85	Fishing was successful at 1 p.m. Drilled from 4165' to 4272'.
1/28-1/31/85	Drilled from 4272' to 4840' when lead collar washed out. POH, replace collar, RIH.
2/1-2/8/85	Drilled from 4840' to 6184'.
2/9/85	Ran SRC Kuster time-temperature survey. B.H. temperature was 285°F. Two time-temperature surveys were run over a period of 24 hrs.
2/10-2/13/85	Drilled from 6184' to TD of 7001'.
2/14/85	Schlumberger ran the following logs: gama, neutron density, 4 arm caliber with fracture interpretation log, SP, dual induction, sonic, and temperature.
2/15/85	Rig down wellhead and lay down pipe.
2/16/85	Run 90 joints of 2 7/8" tubing. Approximately 3018' shut in well for observation.
2/17-2/18-85	Rig down Willbros #1. Release rig at midnight on February 18, 1985.

MEMORANDUM

3/4/85	Temperature survey/Spafford probe to 2624' inside 2 7/8" tubing.
3/5-3/8/85	Pulling unit brought in pull tubing - install landing nipple; run 6919' of 2 7/8" tubing with sliding sleeves @ 6889', 4385', 2373' and 1381'. Release pulling rig - shut in well for observation.
4/3/85	Temperature survey/Spafford probe to 2000' inside 2 7/8" tubing. Temperature survey/Kuster test to 6919' inside 2 7/8" tubing. Shut in well for observation.

SYNTHETIC
CUSS 213
4-25 SZ-7
4-25 SZ-7



FORMATION	DEPTH (ft)	DEPTH (TVD ft)	AVG VEL	TIME TO	TIME THICKNESS	INT VEL	THICKNESS
Vol	290.0	322.4	1.1	0.00000	0.00000	19439.2	1130.0
Dbaz	1420.0	1452.4	43531.8	0.04572	0.04572	11720.0	120.0
MIF	1540.0	1572.4	47304.7	0.06628	0.02056	13120.0	360.0
Hoqbet	1900.0	1932.4	33685.8	0.11137	0.04509	16588.4	2230.0
Thkr	4071.0	4103.4	21898.6	0.16403	0.05266	16685.4	700.0
Esc	4771.0	4803.4	20732.9	0.18336	0.01933	19217.9	850.0
Ep	5621.0	5653.4	20025.1	0.20162	0.01826	19930.4	360.0
MD	5981.0	6013.4	20027.2	0.20968	0.00803	19990.4	340.0
Ef	6321.0	6353.4	20034.6	0.21717	0.00749	20239.6	220.0
Ms	6781.0	6813.4	19995.3	0.22640	0.00923	19995.3	460.0
PCG	6895.0	6897.4	19953.4	0.00335	0.00095	11980.7	91.6

Borehole	
1172	Ui Bet Limestone
1772	Hoqubet Mudstone
1972	Hoqubet Limestone
4102	Thrustin
4800	Escalante Limestone
5852	Pahute Shale
6012	Joanna Dolomite
6232	El Paso Dolomite Unit
6897	Precambrian Granite

ExplorTech LLC

LightningDockGeothermal

SynPAK ; ANIMAS TFD55-7 :TFD55-7:
main, Depth Type: TVD(Seismic), Distance Units: feet

SYNTHETIC LOG
WELL 55-7

— Roy

February 17, 1986

Mr. Ronald C. Barr
Yankee Petroleum
P. O. Box 1566
Tulsa, Oklahoma 74101

RE: TFD 55-7 Wellhead Equipment and Tubing
Animas (33007) Prospect, New Mexico

Dear Ron:

I enjoyed seeing you at the GRC Topical Meeting on Small Scale Power Plants and Power Plant Projects last week in Reno, and hope that you received as much from the meetings as I did.

As you mentioned an interest in the possibility of purchasing some of the wellhead equipment used on the TFD 55-7 well at the Animas prospect, New Mexico, I am enclosing an inventory list of the equipment belonging to the Limited Partnership. All of this equipment is currently stored at the wellsite on Dale Burgett's property. If you are interested in making a bid on any or all of the equipment, please send your offer to me at SRC's office in Golden.

I would like to wish you much success in the development of your Steamboat Springs discovery with Chevron and hope that you will be able to put something together for the further development of the Animas prospect.

Sincerely,

H. J. Olson

HJO/11:6123A

cc: W. Dolan
W. Lodder
E. D. Trower

RECEIVED 2-20-86

INTER-OFFICE MEMORANDUM

SUBJECT: Animas, NM Production Wellhead Equipment(5896A) DATE: October 16, 1985

cc: H. J. Olson
S. E. Fisher
J. J. King

TO: Files

FROM: J. E. Deymonaz

Attached are a schematic and inventory list of wellhead equipment on Animas well 55-7. I was not able to personally inventory the equipment at Animas therefore the equipment configeration and inventory was determined from photos and supplier invoices.

All prices given are from supplier invoices and do not include transportation, servicing, or taxes which may have been charged. Names in parentheses indicate suppliers.

J. E. Deymonaz

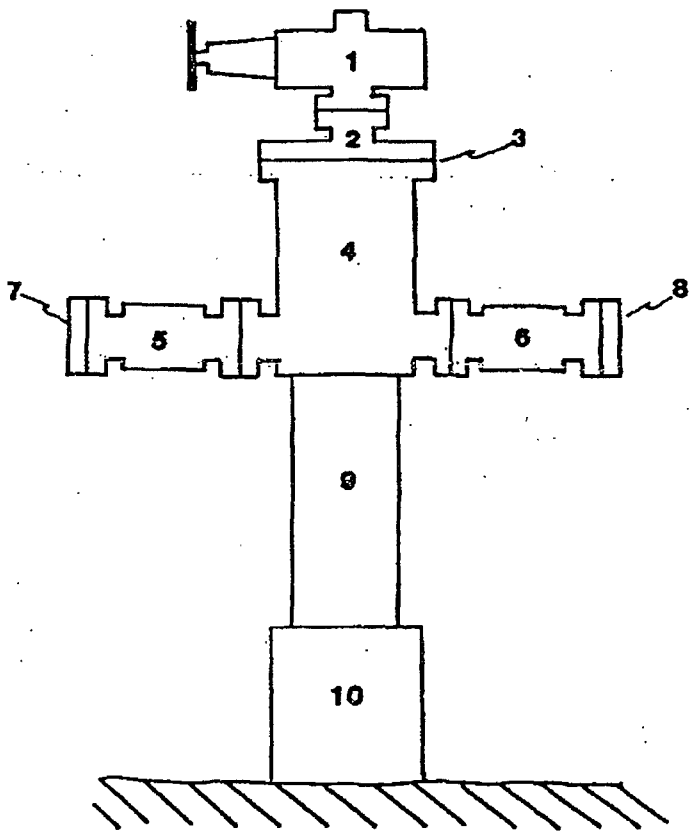
JED/c

attachments

ANIMAS, NEW MEXICO
55-7
WELLHEAD ASSEMBLY

Source: J. Deymonaz

Date: 10-5-85



ANIMAS 55-7
WELLHEAD EQUIPMENT

1.	3" Barton ? valve w/ 2 7/8" RD S/N 7136-1 (Shaffer)		$1,345.00
2.	13 5/8" x 7 1/16" 3M adapter spool (Shaffer)		$4,292.00
3.	7 1/16" x 2 7/8" 8 RD 3M adapter (Shaffer)		$634.00
4.	13 5/8" x 13 3/8" csg head w/ 2- 3" ext. flanges (Shaffer)		$1,950.00
5.	3" Barton R-31 valves S/N ? (Shaffer)		$1,728.00
6.	3" Barton R-31 valves S/N ? (Shaffer)	11,901	$1,728.00
7.	3" companion flange (Shaffer)		$112.00
8.	3" companion flange (Shaffer)		$112.00
9.	13 3/8" surface casing		NA
10.	20" casing		NA

13 5/8" Barton 5-57 valve (Shaffer) laying on pad near 55-7		$12,975.00
13 5/8" x 12 1/4" adapter flange (Shaffer) laying on pad near 55-7		$1,782.00
20- 1 3/8" x 10 1/4" studs w/ nuts @ $8.48 ea.	2,883	$169.60
32- 3/4" x 5 1/4" studs w/ nuts @ 1.29 ea.		$41.28
12- 1 1/8" x 8" studs w/ nuts @ $11.90 ea.		$142.80
20- 1 3/8" x 10 3/4" studs w/ nuts @ $18.00 ea.		$360.00
Misc ring gaskets, not reuseable		$389.40
		$27,760

213 Joints J-55 2 7/8" Tubing (7189 feet)		$19,199.30
4 Baker 2.31 Model L Sliding Sleeve (810-04-4475)		$ 7,068.15
1 Baker 2.25 Model F Seating Nipple (801-50-4480)		$ 477.46
1 Halliburton 2 7/8" Float Shoe		$ 326.31
		$27,071

$54,831

MEMORANDUM

DATE Ocotber 31, 1984

TO: Dick Stamets, Oil Conservation Division

FROM: Micahel Cunningham, Director, OGAD

SUBJECT:

Attached is a copy of all information supplied to us from Amax Exploration, Inc. pertaining to geothermal production.

If I can be of further assistance, please let me know.

MICHAEL A. CUNNINGHAM
Division Director

December 9, 1985

Mr. Ronald Barr
c/o Capri Motor Hotel
2015 Greenwich Street
San Francisco, California 94123

Dear Ron:

As we discussed last Friday, enclosed are copies of the Operating Agreements between Steam Reserve Corporation and Thomas McCants and Dale Burgett covering the greenhouse operations being conducted on Federal Geothermal Lease NM-34790 at Animas.

We look forward to hearing from you and Mr. Grace later this week.

Very truly yours,

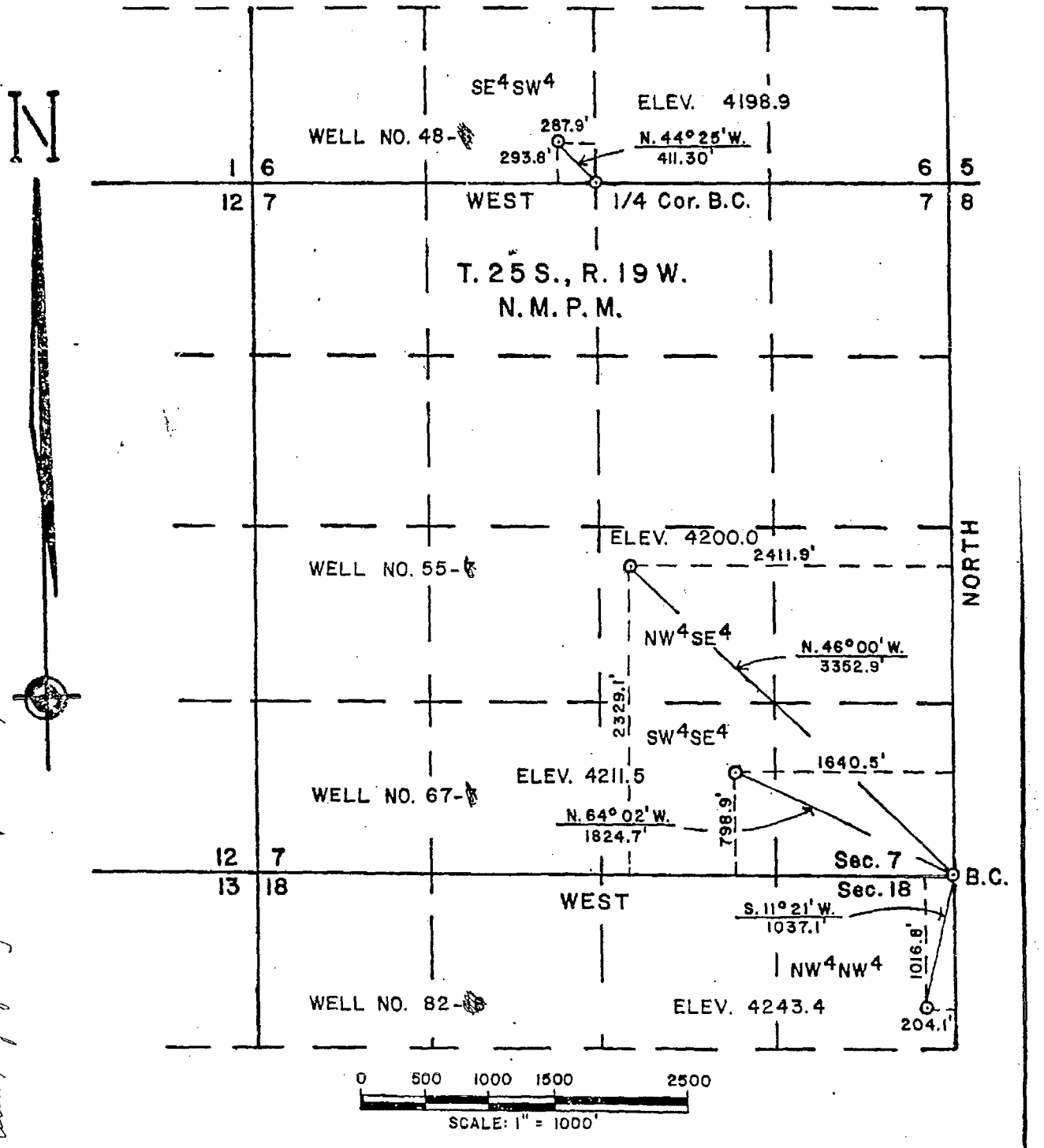
G. L. Bennett

GLB/m
cc w/o enclosures:
W.M. Dolan
H.J. Olson
E.D. Trower

...EXPLORATION, INC. 21

GEOTHERMAL WELLS

SECTIONS 6-7 &18, T.25S., R.19W., N.M.P.M.
HIDALGO COUNTY, NEW MEXICO



Awaiting preparing NSL permit requirements.

LAND SURVEYOR'S CERTIFICATE

This Plat and the information hereon is the result of an actual field survey made by me or under my supervision and meets the accuracy requirements for this survey

REGISTERED LAND SURVEYOR STATE OF

NEW MEXICO OIL CONSERVATION COMMISSION
P. O. BOX 2088 SANTA FE 87501

Form G-102
Adopted 10/1/7

RECEIVED
MAR 04 1983
OIL CONSERVATION DIVISION
SANTA FE

GEOTHERMAL RESOURCES WELL LOCATION AND ACREAGE DEDICATION PLAT

All distances must be from the outer boundaries of the Section

Operator	Lease	Well No.
AMAX Exploration, Inc.	NM-34790 -- Minerals Archie Green -- Surface	55

Unit Letter	Section	Township	Range	County
	7	25S	19W	Hidalgo

Actual Footage Location of Well:
2411.9 feet from the East line and 2329.1 feet from the South line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
4201'			Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

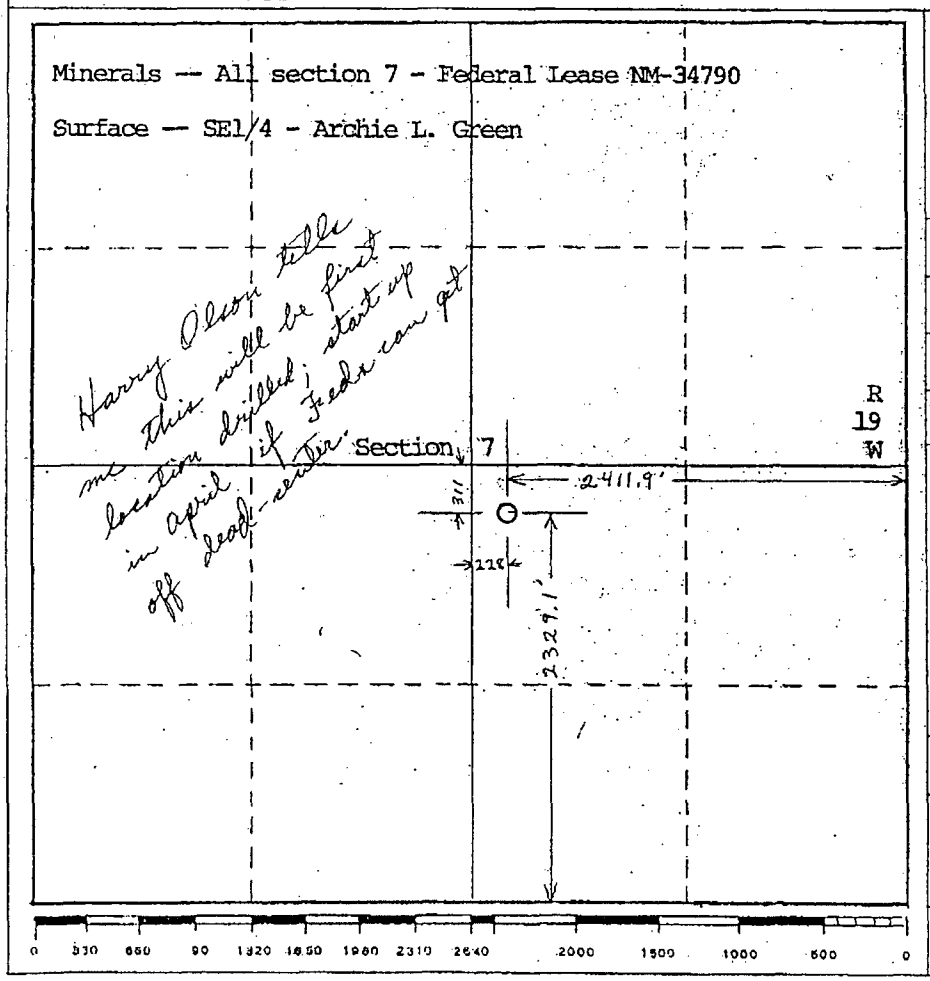
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownersip is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling, etc?

☐ Yes ☒ No If answer is "yes," type of consolidation _____

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.



CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Name: Joyce Emerson

Position: Mgr., Gov't. Relations

Company: AMAX Exploration, Inc.

Date: 2/24/83

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

(see attached)

Date Surveyed

Registered Professional Engineer and/or Land Surveyor

Certificate No.

Schlumberger

BOREHOLE COMPENSATED SONIC

DSI

COMPANY: STEAM RESERVES

WELL: ANIMAS 33-7

FIELD: WILDCAT

COUNTY: WILDAGO

STATE: NEW MEXICO

LOCATION: 2412 FEL
8329 FSL
SEC: 7 TWP: 23S RGE: 19W

PERMANENT DATUM: ELEVATIONS-
ELEV. OF PERM. DATUM: 4209.0 F KB: 4217.6 F
LOG MEASURED FROM: KB DF: 4216.6 F
17.6 F ABOVE PERM. DATUM GL: 4200.0 F
DRLG. MEASURED FROM: KB

DATE: 14 FEB 85
RUN NO: 1

DEPTH-DRILLER: 7001.0 F
DEPTH-LOGGER: 7018.0 F
BTM. LOG INTERVAL: 7006.0 F
TOP LOG INTERVAL: 1053.0 F

CASING-DRILLER: 1050 F
CASING-LOGGER: 1053 F
CASING: 13 3/8

BIT SIZE: 12 1/4

OTHER SERVICES-
DIL
SFT
CNL
HDT
BHC
MRT

PROGRAM
TAPE NO: 26.2
SERVICE
ORDER NO: 420298

TYPE FLUID IN HOLE: FRESH GEL
DENSITY: 9.4 LB/G
VISCOSITY: 41.0 S
PH: 11.0
FLUID LOSS: 7.4 C3
SOURCE OF SAMPLE: TANK
RM: 1.990 OHMM AT 59.0 DEGF
RMF: 1.530 OHMM AT 59.0 DEGF
RMC: 2.160 OHMM AT 59.0 DEGF
SOURCE RMF/RMC: MEAS/MEAS
RM AT BHT: .482 OHMM AT 265. DEGF
RMF AT BHT: .371 OHMM AT 265. DEGF
RMC AT BHT: .524 OHMM AT 265. DEGF

TIME CIRC. STOPPED: 0200
TIME LOGGER ON BTM.: 0900
MAX. REC. TEMP: 265.0 DEGF

LOGGING UNIT NO: 8174
LOGGING UNIT LOC: FARMINGTON
RECORDED BY: MAURER
WITNESSED BY: MR. PILKINGTON

REMARKS)

CREW:VAZZIE,QUINN
CALIPER APPEARS TO BE STICKING

EQUIPMENT NUMBERS-

SGC 3407 SLC 139 SLS 1234

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR SCHEDULE OF STANDARD TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

FILE 11 14-FEB-85 16:55
DATA ACQUIRED 00- -00 00100

TAPE CLEARED

TAPE VERIFIED

LOGGING UNIT LOC: FARMINGTON
RECORDED BY: MAURER
WITNESSED BY: MR. PILKINGTON

REMARKS:

CREW;YAZZIE,QUINN
CALIPER APPEARS TO BE STICKING

EQUIPMENT NUMBERS-

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FILE 11 14-FEB-85 16:55
DATA ACQUIRED 00- -00 00:00

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GR (GAPI)		DT (US/F)	
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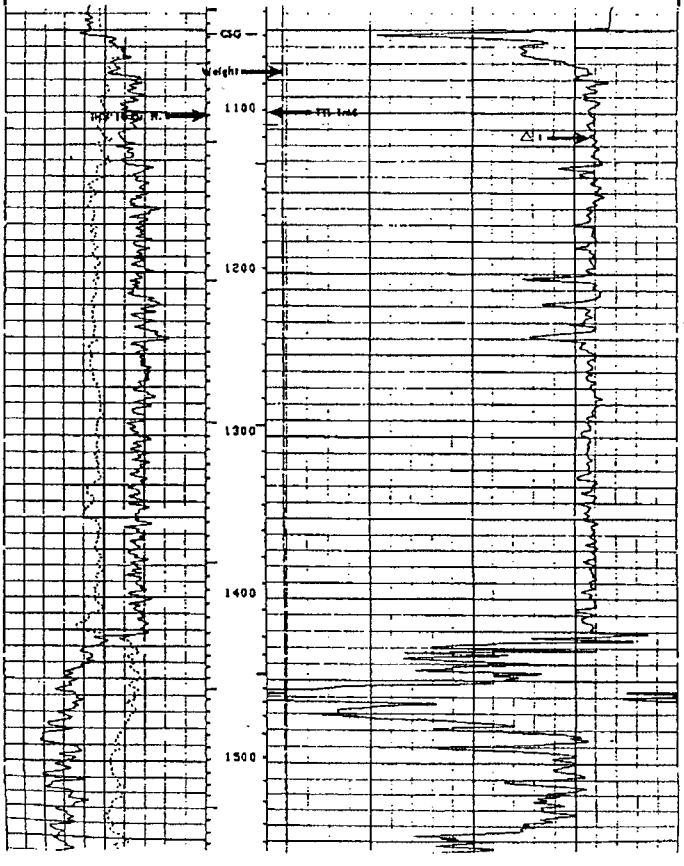

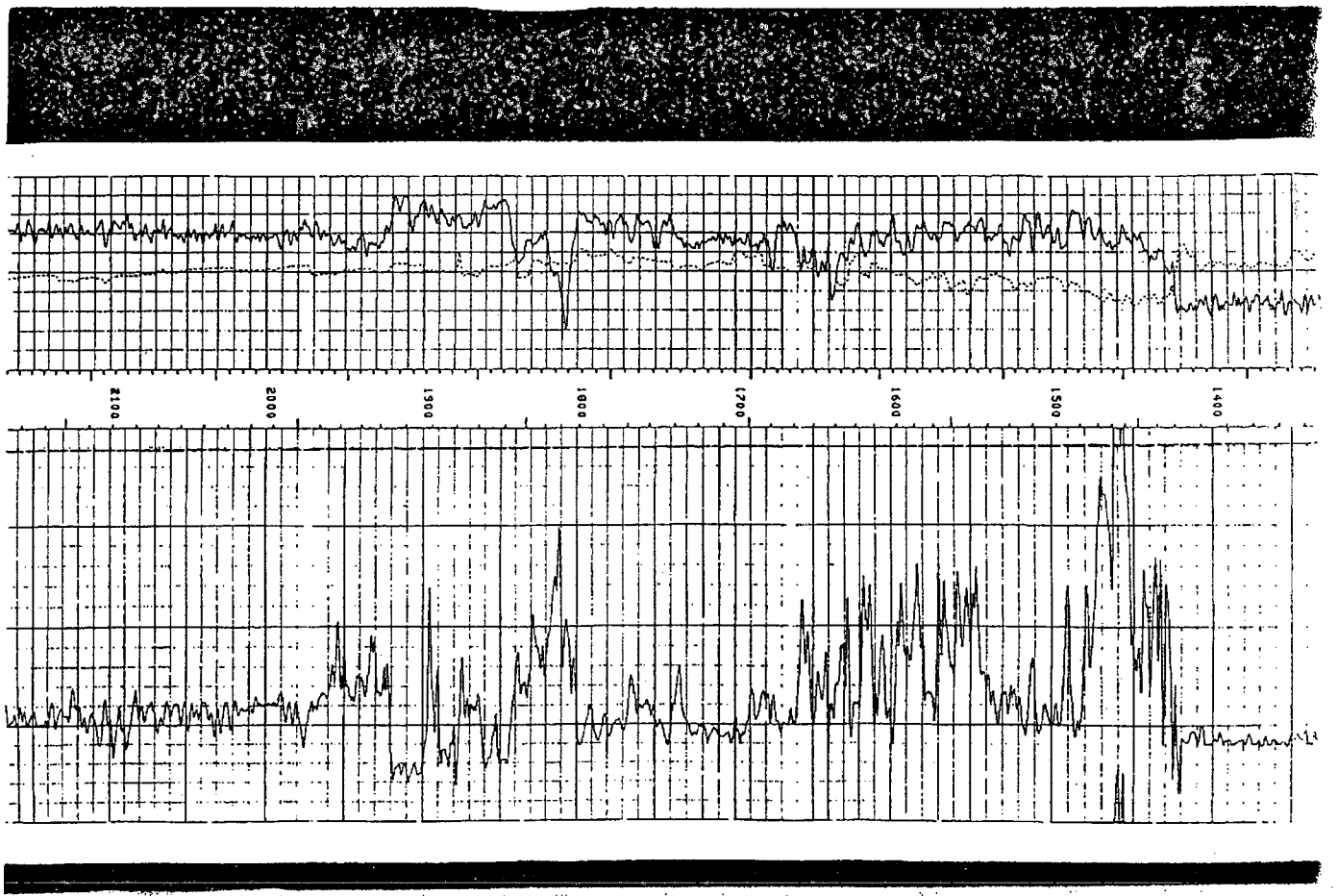

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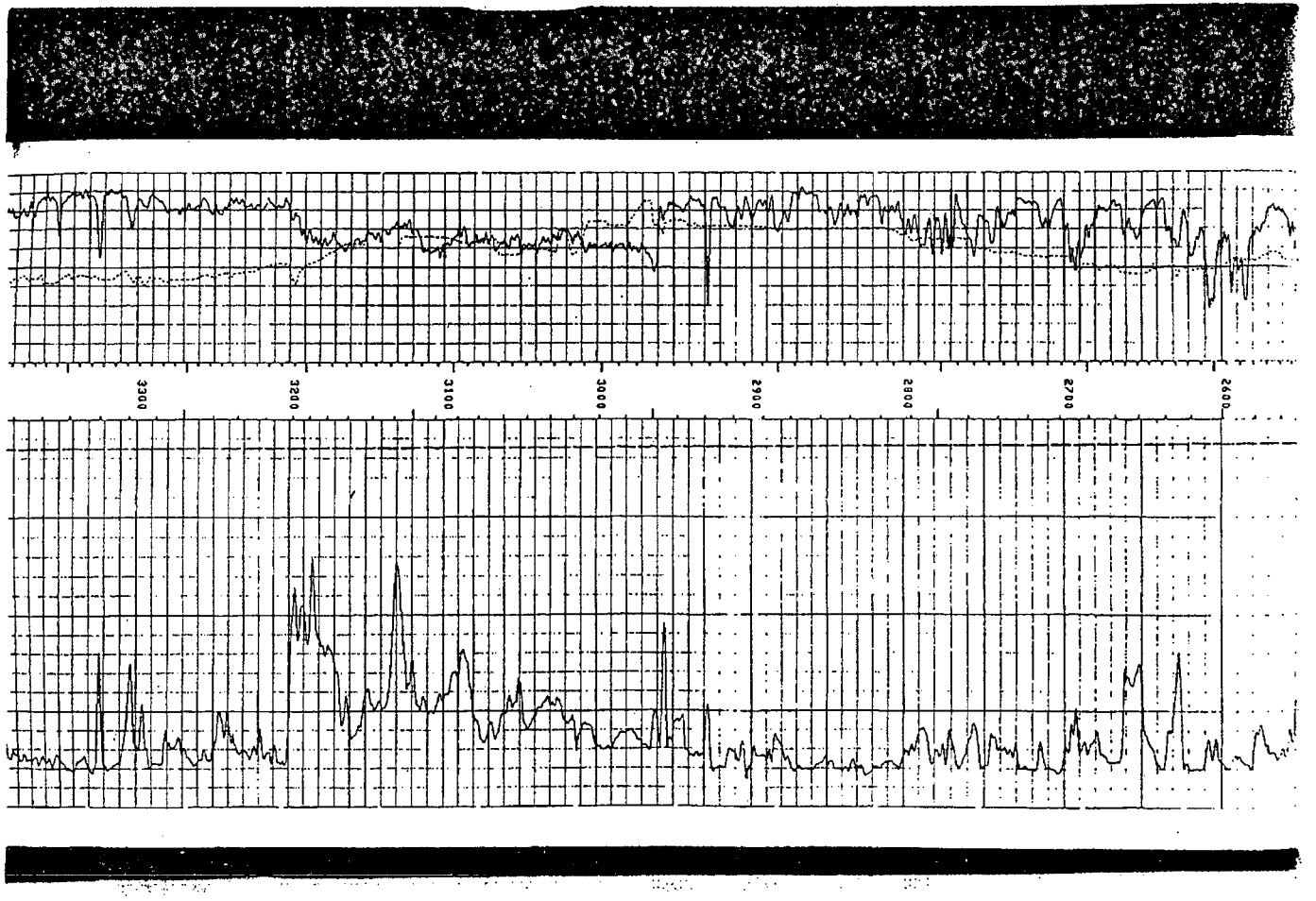
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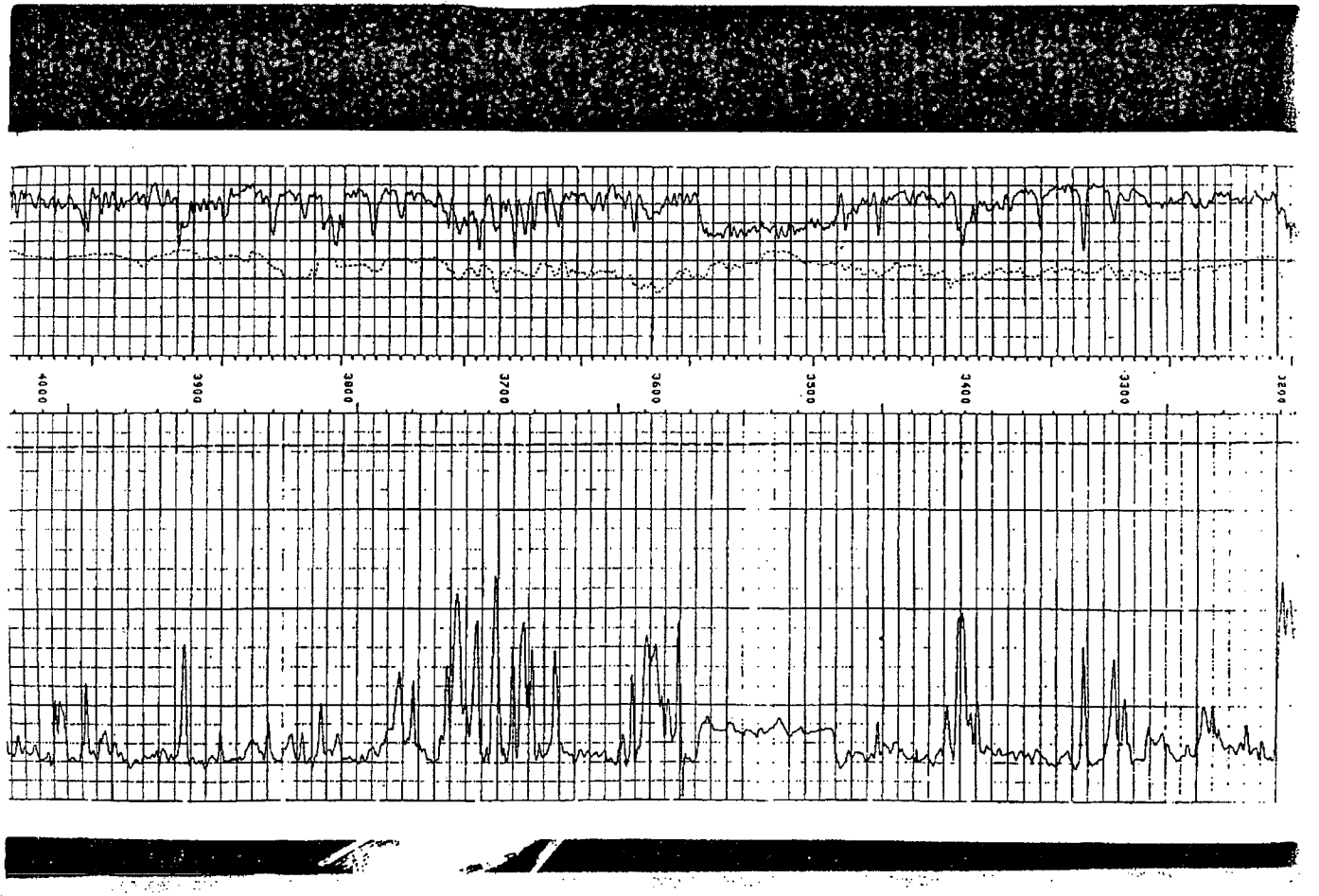
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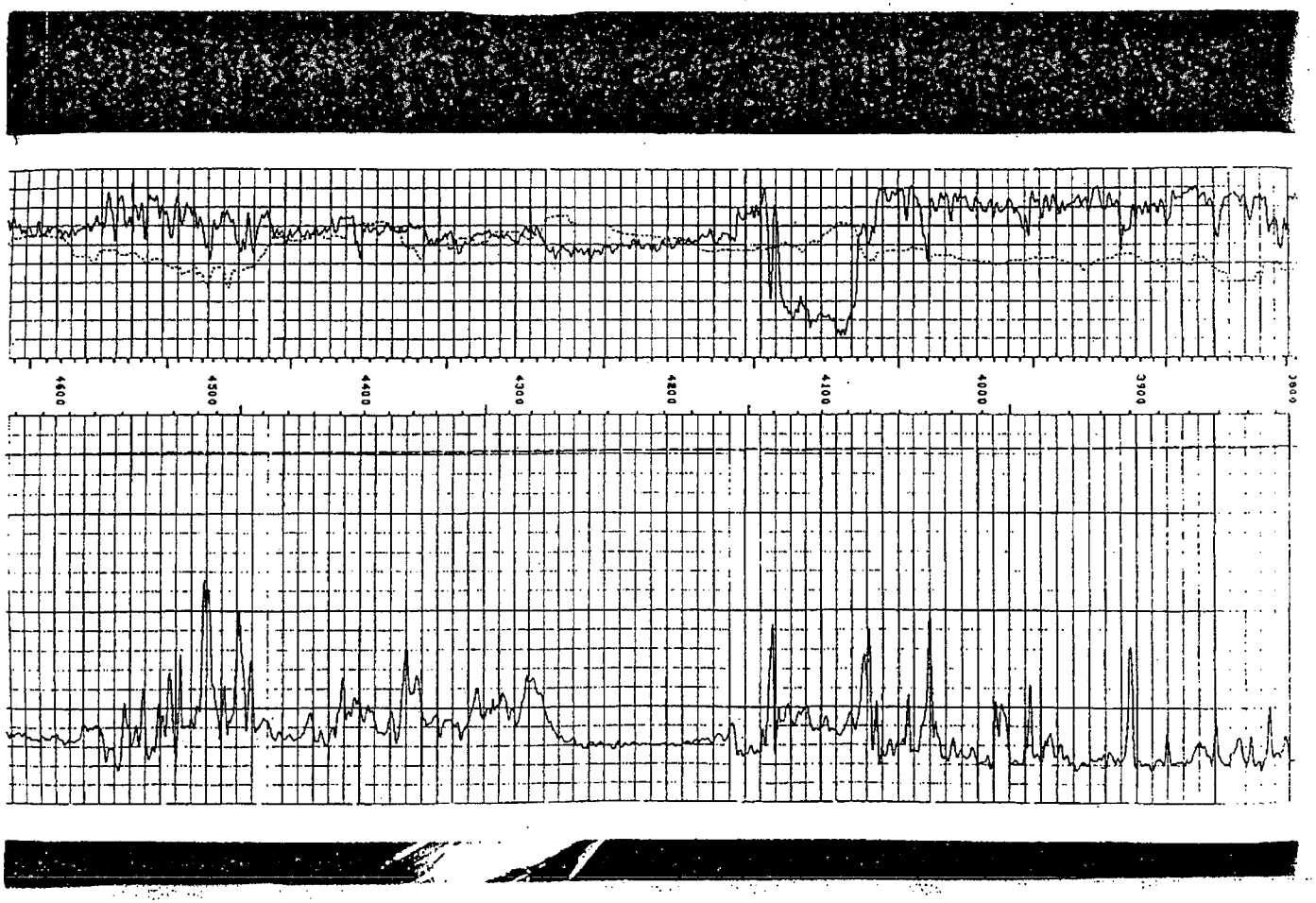
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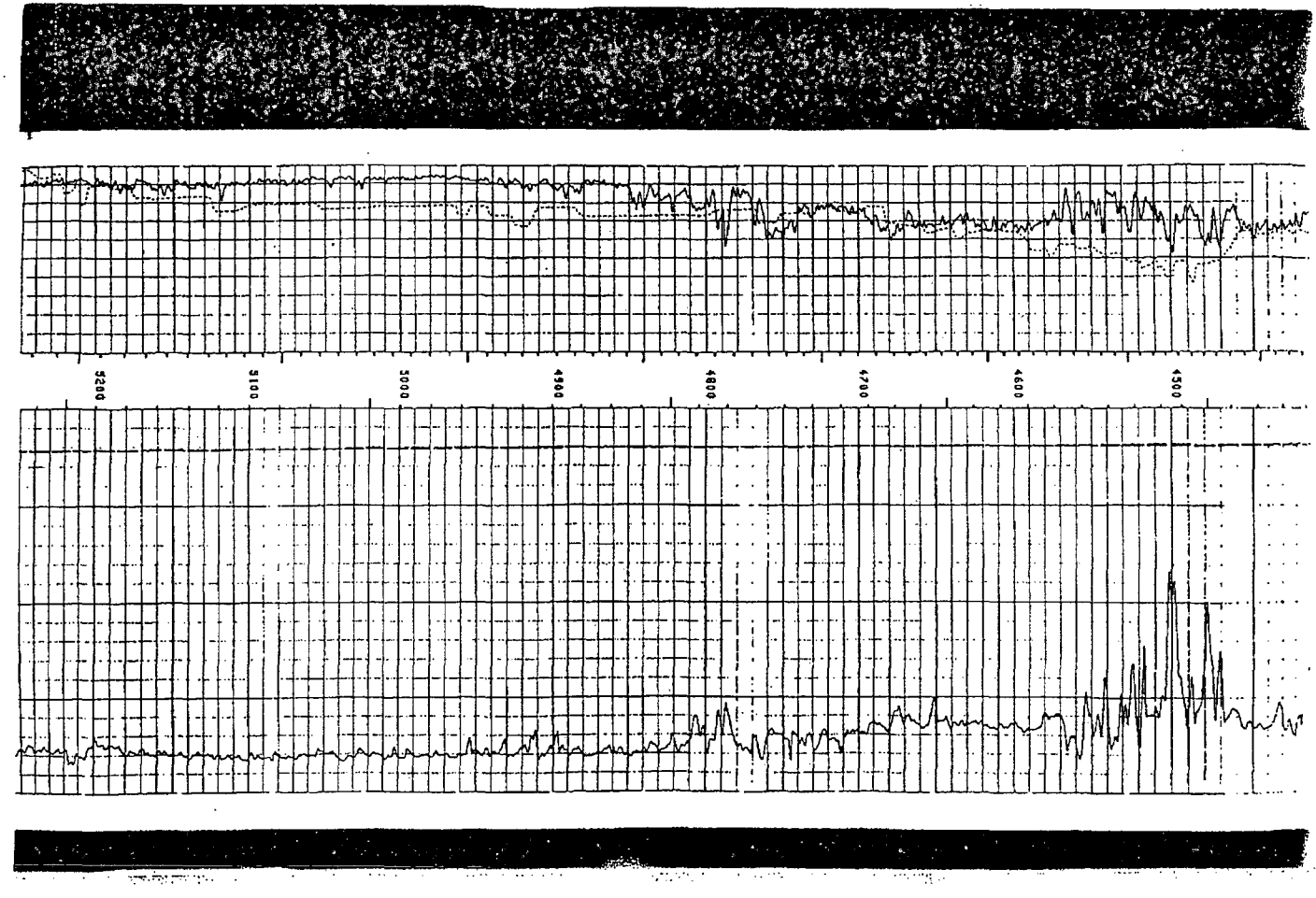
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5000
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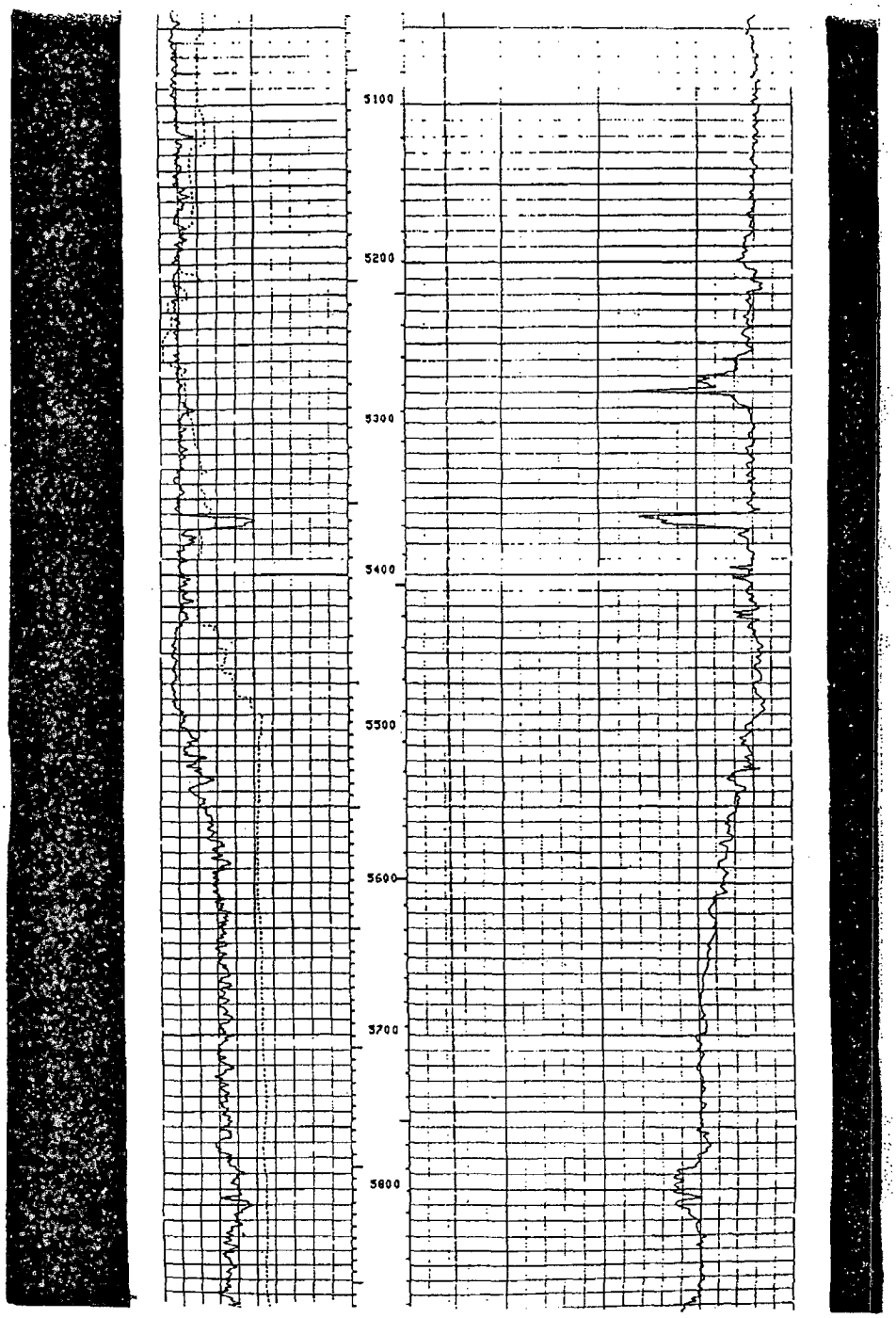
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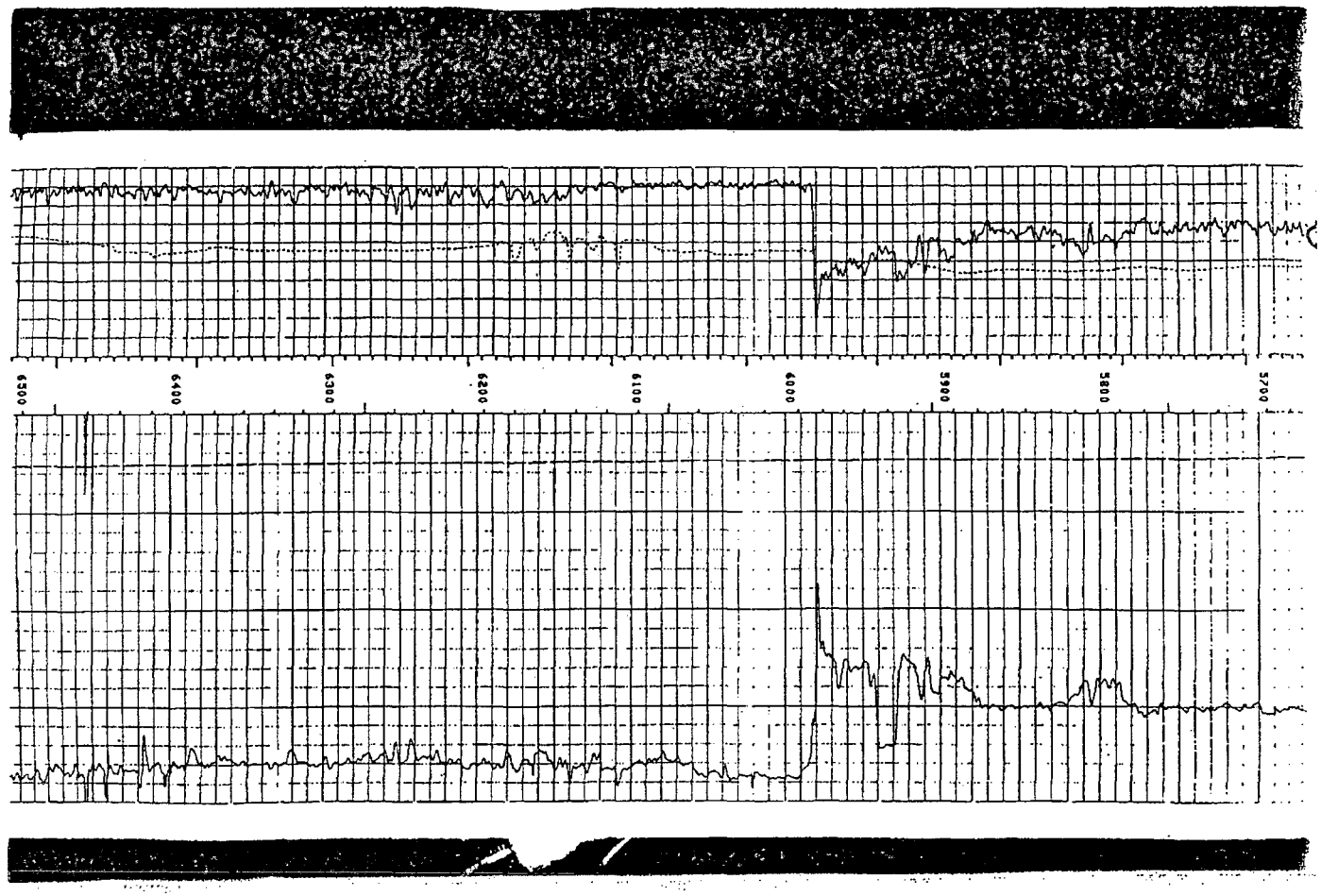
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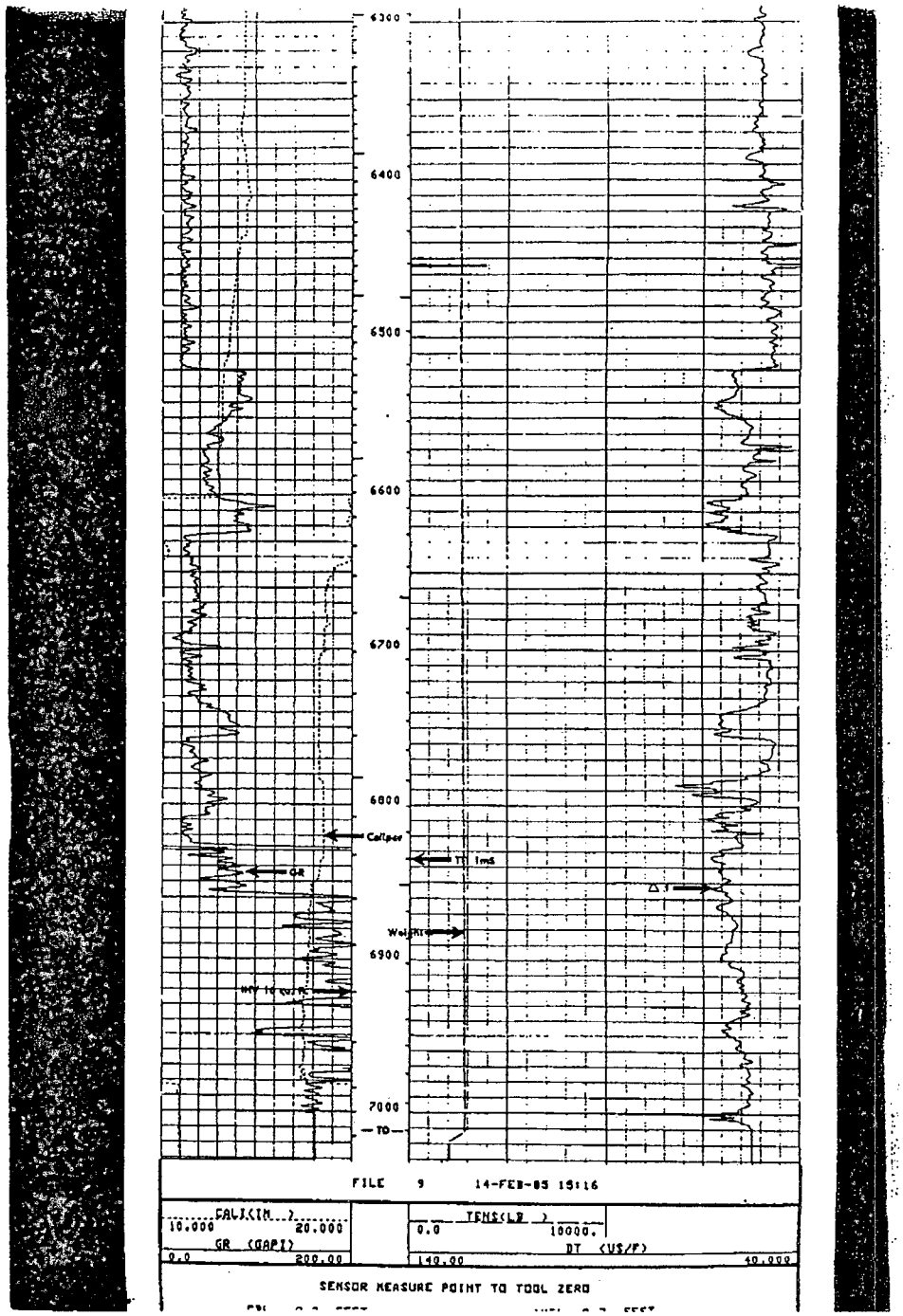
6300
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TD
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FILE 9 14-FEB-85 15:16
CALI(IN...)
10.000 20.000
GR (GAPI)
0.0 200.00
TENS(LB)
0.0 10000.
DT (US/F)
140.00 40.000
SENSOR MEASURE POINT TO TOOL ZERO

EXLOG SMITH — R.F. SMITH CORP. — GEOTHERMAL DATA LOG

COMPANY Steam Passive Corp.
WELL Ani-Az 55-7
FIELD Lightning Dock
COUNTY Hidalgo STATE New Mexico
LOCATION NW ¼ SE ¼ SEC 7 T25S R17W
ELEVATION 4241'+ 19' to KB ☑ or DF ☐ GL ☐
CONTRACTOR/RIG Will Brothers
SPUD DATE 12/29/84 TD DATE 2/14/85
TD 7001' TRUE VERT DEPTH
BOTTOM HOLE LOCATION
WELL STATUS
COMPANY REPRESENTATIVE Otis Fay

LOG INTERVAL
DATE LOGGED 12/29/84 to 2/14/85
DEPTH LOGGED 561' to 7001'
MUD DRILLING 561' 7001'
AIR DRILLING
TEMPERATURE INSTRUMENT TYPE Thermocouple
PRESSURE INSTRUMENT TYPE
GAS TRAP-AGITATOR ELEC ☐ AIR ☑
LOG SCALE 1:600 UNIT NO. 121
LOG PREPARED BY Miguel A. Hernandez
Frank Gonzalez, PA Firebaugh

HOLE SIZE	CASING RECORD
to	30" at 30'
26" to 185'	20" at 160'
17½" to 1073'	13 3/8" at 1073'
to	at
to	at
to	at

ENTRIES-WATER/STEAM

LOST CIRCULATION ZONES

MISC. REMARKS

LITHOLOGY SYMBOLS
Breccia; Tuff and tuff-breccia; Conglom.
Graywacke; Sandstone; Siltstone
Claystone Argillite; Limestone Dolomite; Chert
Solution Deposit; Mineralized Zone; Granitic Rock
Intermed Igneous; Basic Igneous; Peridotite
Acidic Volcanic; Intermed. Volcanic; Basic Volcanic
Porphyry; Serpentine; Schist Gneiss

SECONDARY MINERALS
C = CALCITE
P = PYRITE
E = EPIDOTE

DRILL RATE ft/hr ☑ min/ft ☐ m/hr ☐ min/m ☐
ROCK DENSITY (g/cc)
DEPTH
LITHOLOGY
TEMPERATURE °C ☐ °F ☐ IN — — OUT
PRESSURE KSC ☐ PSI ☐ IN — — OUT
LOSS/GAIN BBLS ☐
H_2S ppm
CO_2 ppm
METHANE ppm
ETHANE ppm
SURVEYS
RESISTIVITY Ω-m
LITHOLOGY DESCRIPTION AND REMARKS

LOSS 0 GAIN
0 H_2S ppm 10
PRESSURE IN 0 CO_2 ppm 1000
PRESSURE OUT 0 METHANE ppm 400
TEMPERATURE 200 0 ETHANE ppm

Note: Secondary minerals expressed in direct percentages, e.g., 1=1% etc; "-" = trace, "+" = greater than 9%.

Note: Set 30" surface conductor @ 30'. Spud in on 12/29/84 w/ 17½" bit & 26" hole opener, begin logging f/ 561'.

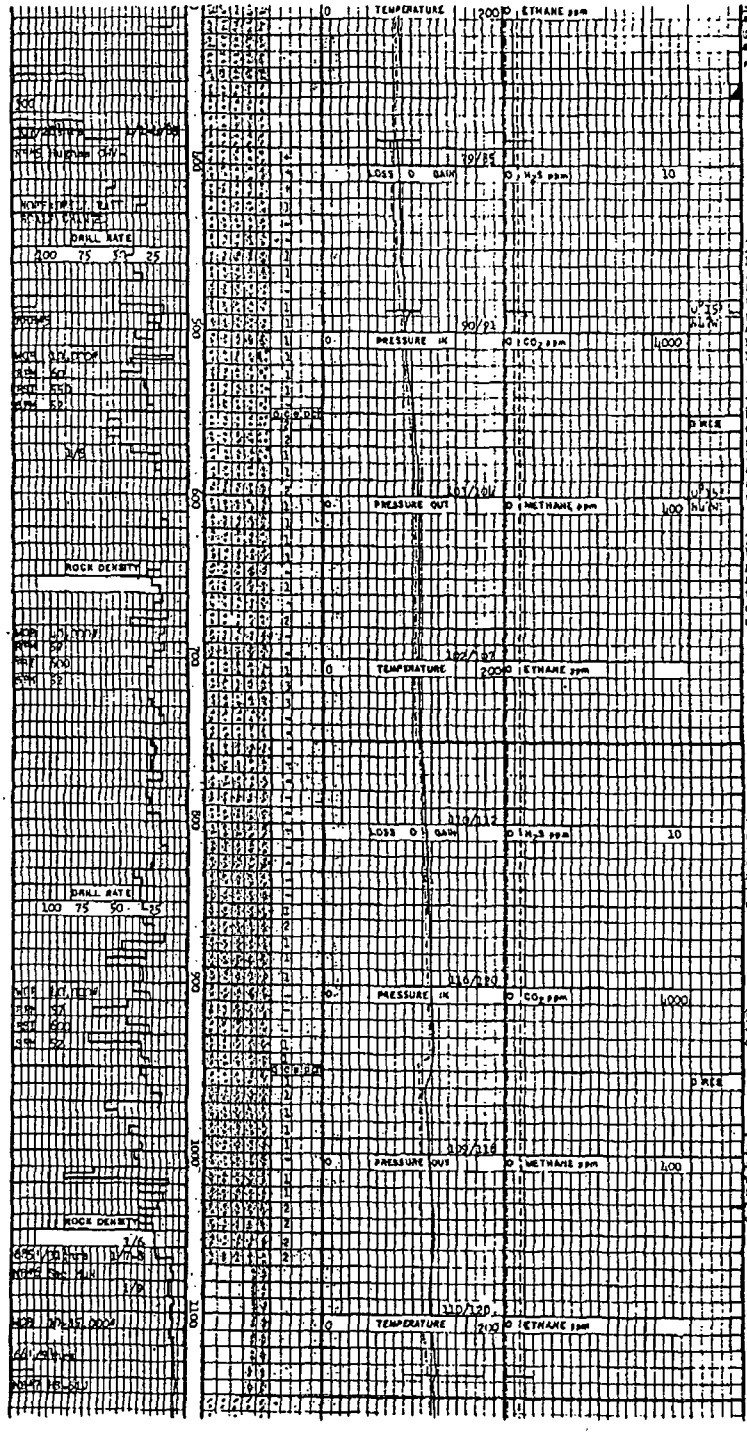
Alluvium: pred orng-yel v prly srtd fn-v crs, pred volcanic clasts (tuffs, ash & andesite) w/ comm-v abdnt wht yel sft clay matrx, r clr qtz, r loc drusy qtz, comm hematite, mnr poss pallosalane.

Lithic Ash Flow Tuff: pred lt-red orng, abdnt rndd clasts, coag-sandy? apparent pore space, fria-v hd, prly-v well consldtd, comm sft clr recrl lining grs, mnr clay

Tuff: red orng, red brn, tan, wht, pred trans w/ comm earthy app, highly silic w/ 10-20% clay, aphan-sucrosic text w/ comm qtz & felds phenos mar-comm rhyolite frags

Tuff: red, red brn, stained appr, tan, wht, comm elongated gr strvg, comm-abdnt silic & lith frag, decr clay content.

Note: Drilled 17½" hole f/ 78' to 185', POH, rig up 26" hole



appr,tan,wht,comm clon-gated gr struc,comm-abdnt silic & lith frag,decr clay content.

Note:Drilled 17½" hole f/ 76' to 385', POH,rig up 26" hole opener & drill out to 365',used bit 3 4 HB@L. POH & set 20" casing @ 360'. Drill ahead w/ 17½" bit.

Tuff:red,org,pink,tan, yell & mnr purp,v hd, pred welded w/ comm flow banding,comm xln text w/ felds & qtz phenos,comm lith frags mnr-comm dissem pyr,dril hem,mnr calc vng,mnr loc intrbd /shipred wht ,silic w/ v fn sucrosic text.

Tuff:red,pink,tan,hd-v hd,pred welded text, comm-abdnt conc & pr w/ rnd-rnd clasts,abdnt lithic frags(ign extr & ign intr)abdnt red clay,tr-mnr clr calc vng.

Tuff:pred red to red-brn,com wht to tan, pred welded lithic frags,com-abdt xln text,mod hd,com frac'd appear,mild ppear,tr-mnr clr calcite.

Note:100 bbl mud loss @ 695'.

W 9.1 V 50 PV 20 YP 14 pH 10 Fil 13 Cl 700 Slds 5%

Tuff:brick red due to stn,sub ang-rnd clasts in clay mtrx,pred welded w/ mnr rhyolite & rl tuff clasts,colors vary,tr calc frac fill, mnr dissem pyr,hnd.

Note:Losing approx 6 bbls/hr drilling fluid f/ 695'.

Tuff:prod cont'd as above w/ incr ign intr clasts.

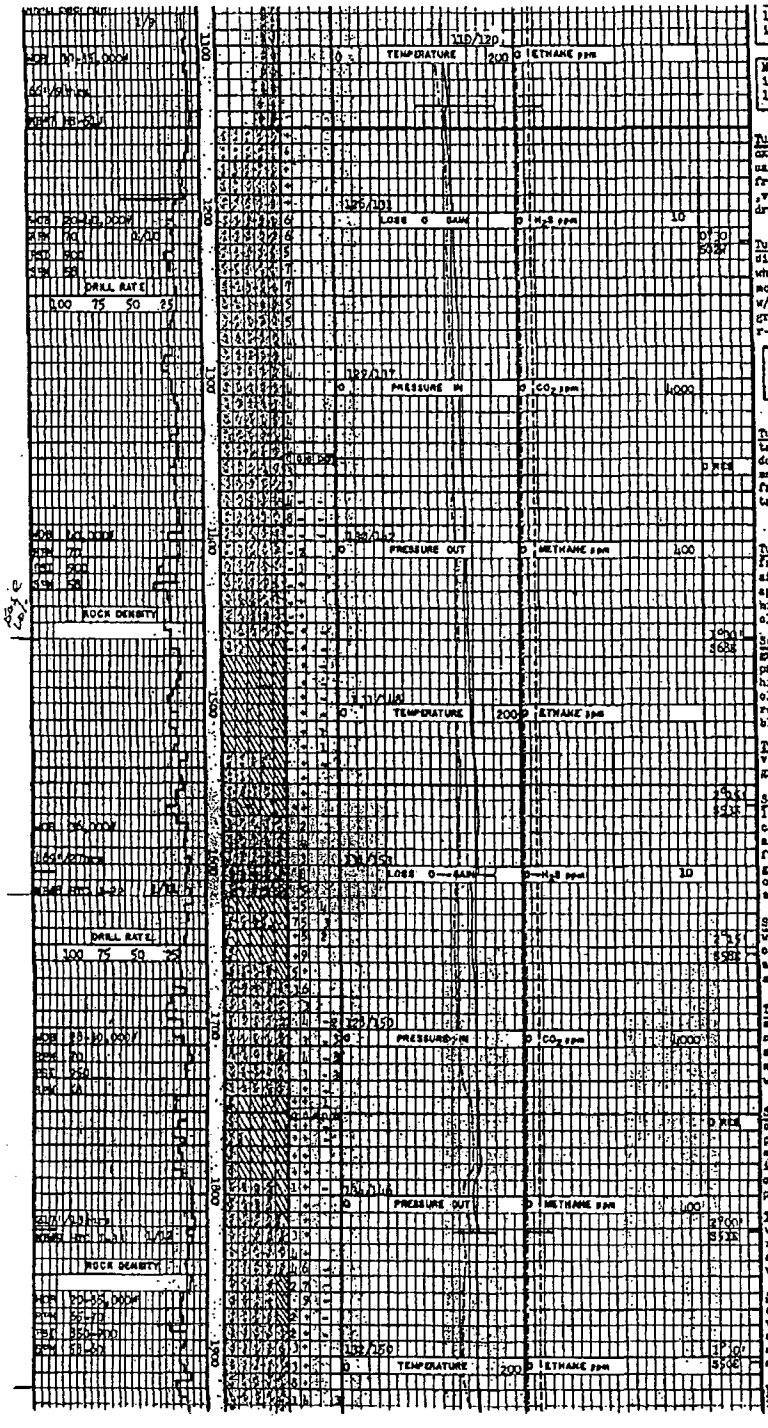
Note:Temp drop due add H_2O to build volume.

Tuff:red brn-red,mild appr,cong-sandy appr, abdnt lithic frags(tuff welded & xln,ash,ign intr & r breccia),tr-mnr calc frac fill,r clr qtz,tr-mnr hem.

Note:Drilled 17½" hole to 1070', set 13 3/8" casing @ 1070'. Begin Drilling 12¼" hole.

Note:Basement present in cuttings f/ 1080'-1150'.

Tuff: pred red,mnr brn,



1070'. Begin Drilling 12¼" hole.

Note:cement present in cuttings f/ 1080'-1150'.

Tuff: pred red,mar brn, gold appr,pred gong-mandy appr,abdnt lith frags w/ mar brsse app ,v highly silicic w/ r drusy qtz,comm mag.

Tuff:pred red brn,oxidized appearance,mar wht,tan,fn gr xln text, mod silicic,decr silica w/ depth,sft-mod hd, granular appr,comm mag, r-tr calcite.

W 9.1 V 40 PV 14 YP 7 pH 9.5 Fil 10.4 Cl 600 Slds 4%

Tuff:red-brn,gry,wht, tan,granular appr,cont decr silica,r sft-sft-mar hd,comm-abdnt lith frags,comm mag,tr pyr tr-comm poss kaolin.

Tuff:lt grn gry-red brn fris,highly calcic,com sft blk marl,comm slty appr(lt gry grn),loc highly alt w/ v abdnt clay.

Solution Deposit:lt-med gry,pred sacc appr, pred calcium carbonate, highly frac w/ v abdnt clr-wht calc vng,loc rexln appr,loc comm blk sft marl.

Tuff:v highly altered, v highly calcic,red grn,abdnt clay,sft

Solution Deposit:@ 1570' pred clr qtz w/ calc frac fill,abdnt sft blk marl,highly fractured. Tuff:red-lt grn-brn,highly altrd & oxid appr,sandy-slty appr-w/ abdnt clay.

Solution Deposit:clr-wht-lt tan,pred qtz w/ calc,highly frac,loc abdnt sft blk marl,loc abdnt pyr vng.

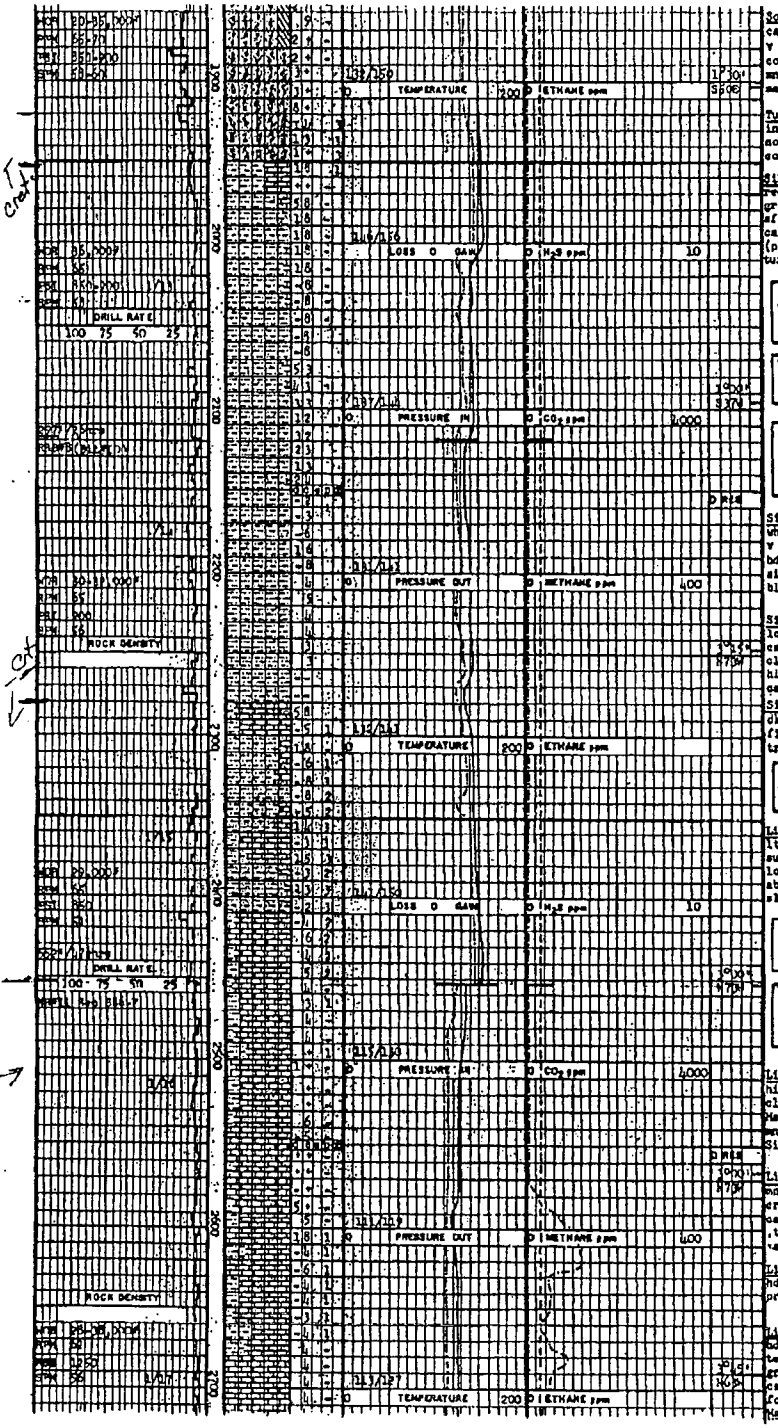
Tuff:wht w/ grn mottled appr,pred xln text w/ mar poss felds phenos, sft-hd,comm-abdnt calc micro vng,abdnt mag w/ wht marl aureoles.

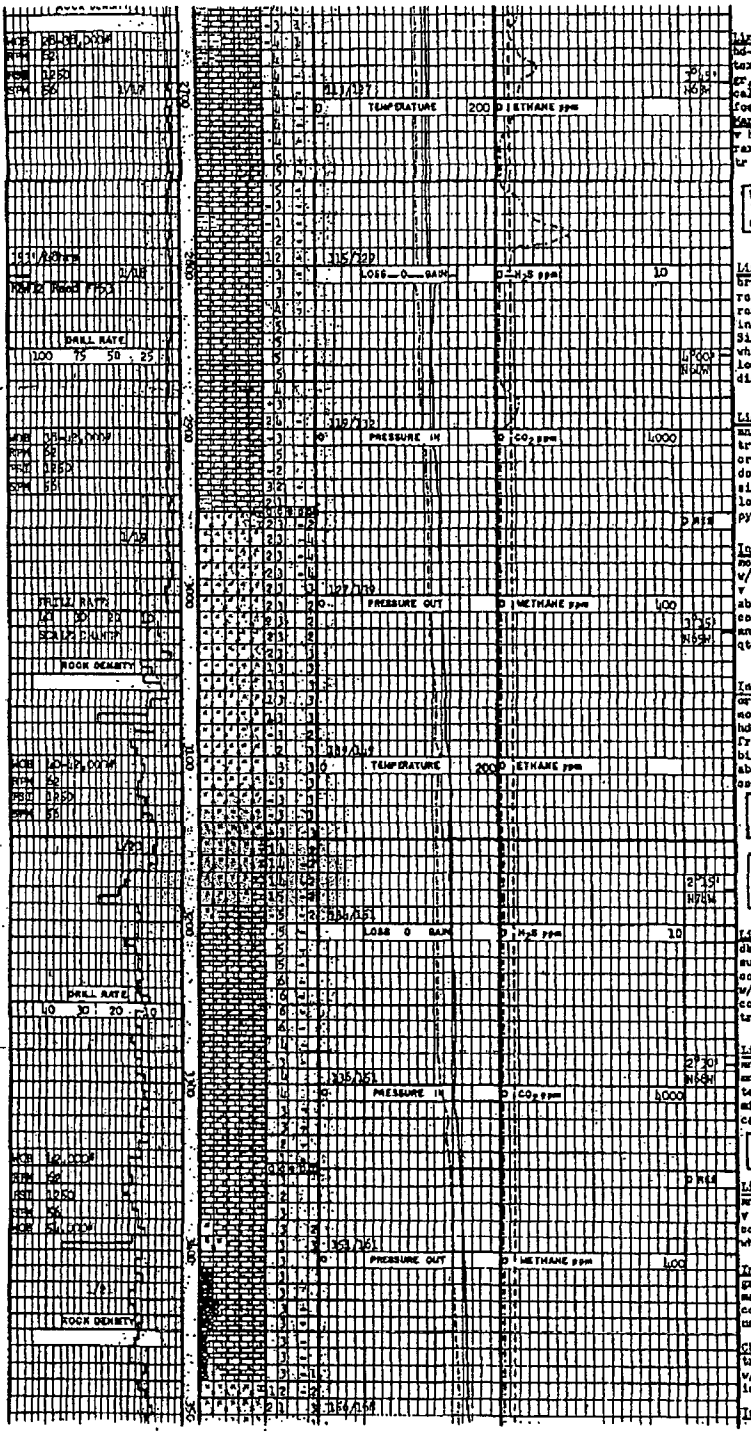
Solution Deposit:Pred calc w/ abdnt clr qtz, pred tan,rexln appr w/ mar calc frac fill, intercalated wht-clr cryptocln silica,r-tr poss foram?.

Tuff:variable color, wht,grn,red,brn,pred xln,mar pumiceous appear,com sandy appear v calcareous,r-tr pyr.

Solution Deposit:pred calc w/abdt clr qtz, v fn-fn gr calcite w/ com clr calcite x-tals, mar-com blk marl(poss magnetite),tr-mar pyr.

Tuff:gry brn,gd welding xln text,abdnt nl-


DRILL RATE
ROCK DENSITY
TEMPERATURE
PRESSURE IN
PRESSURE OUT
LOSS 0 GAIN
ETHANE ppm
METHANE ppm
H2S ppm
CO2 ppm
Solution Deposit: prod calc w/abdt clr qtz, v fn-fn gr calcite w/ com clr calcite x-tals, mar-com blk marl(poss magnetite), tr-mar pyr.
Tuff: gry brn, gd welding xln text, abdt sl-mod alt felds phenos, comm alt mica, mar f-...
Siltstone: pred gry, tr red, mod hd-hd, v fn-fn gr, abdt slay, loc mod sft blk marl, highly calcic, loc highly silic (poss frac fill), comm tuff frags poss slough.
Note: Temp variation due dump pits & add H2O to keep drlng fluid conditioned.
W 9.4 V 38 PV 16 YP 5 pH 11.5 Fil 8.4 Cl 770 Slds 6%
Note: Dumped pits during trip. Temp drop due to adding water & new mud to build volume.
Siltstone: pred gry, mar wht, pred fn gr w/ mar v fn gr, fria-v sft-mod hd, v calcic, pred fis-sile, comm-abdt sft blk marl.
Siltstone: pred gry w/ loc abdt wht due calc cmt, v fn-fn gr, mar clay tr poss kaol, v highly calcic w/ abdt calc vng.
Siltstone: pred blk, mar dk gry brn, mod hd sl fissile, highly calcic, tr silic frac fill.
Note: lost 85 bbls drlng fluid f/ 2275 spot LCM pill.
Limestone: f/2290'-2360' lt-dk brn, pred rexln sucrosic text, hd-v hd, loc abdt microfossils, abdt wht-clr calc vng, sl silic.
W 9.1 V 38 PV 12 YP 4 pH 11 Fil 10 Cl 500 Slds 3%
Note: POH, chng bit & BHA to decrease angle, rig up mud cooler.
Limestone: lt-dk brn, v highly frac, tr-mar bioclasts, loc slty-sandy marl, grades & intbds w/ mar highly calcic sft Siltstone.
Limestone: pred lt tan, mar dk brn, loc v abdt cryptoxln lt blu silica w/ v abdt bioclasts, tr carbonized plant material.
Limestone: pred dk brn, hd-v hd due sl silic, pred slty.
Limestone: med-dk gry, hd-v hd, pred sucrosic text, loc rexln fn-med gr, com-abdt wht-clr calc vng, loc tr microfossils, tr pyr, assoc w/ marl; lt brn-lt gry sl-



Limestone:med-dk gry, hd-v hd,pred sucrosic text,loc rexln fa-med gr,com-abdnt wht-clr calc vng,loc tr microfossils,tr pyr,assoc w/ Marl;lt brn-lt gry,sl-v hd,com mottled,com rexln,abdnt calc vn;, tr pyrite.

W 9.1 V 46 PV 15
YP 7 pH 10 Fil 6
Cl 370 Slds 4%

Limestone:pred lt-med brn,mnr dk gry w/ sucrosic text,sl-v hd,com rexln,comm mottled,loc intbdd w/ mnr Marl & Siltstone,comm-abdnt wht calc vng,tr clr, loc tr microfossils,tr disem pyrite.

Limestone:lt brn-brn, mnr dk brn,hd-v hd due tr-loc v abdnt lt brn cryptoxln silica w/ dolo rhombs as inclusions,loc highly frac, loc comm bioclasts,tr pyr vng.

Intrusive Dike:interm-med,lt pnk-lt gry matt w/ grn & wht,hd-v hd, v fa-fa gr grndmass w/ abdnt feld phenos,mnr-comm chlrtzd hnblnd, mnr calc,mnr mag,tr qtz,loc tr pyr.

Intrusive Dike:pred lt orng pcss due Fe stn, matt w/ grn & wht,pred hd,aphan grndmass w/ fresh-alt plag & alt bio & tr musc phenos, abdnt subhdrl-euh mag, comm wht/clr calc vng.

Note:Temp incr due insufficient cooling by mud cooler.

W 9.h V 44 PV 17
YP 6 pH 10.5 Fil 6.4 Cl 600 Slds 4%

Limestone:lt-med brn, dk gry,hd-v hd,pred sucrosic text,com rexln com mottled,loc intbdd w/mnr marl & siltstn, com-abdnt wht calc vng, tr dism pyrite.

Limestone:pred lt tan, mnr dk brn-blk,pred hd, mnr v hd,pred sucrosic text,rexln,loc abdnt microfossils,comm wht calc vng,tr pyr.

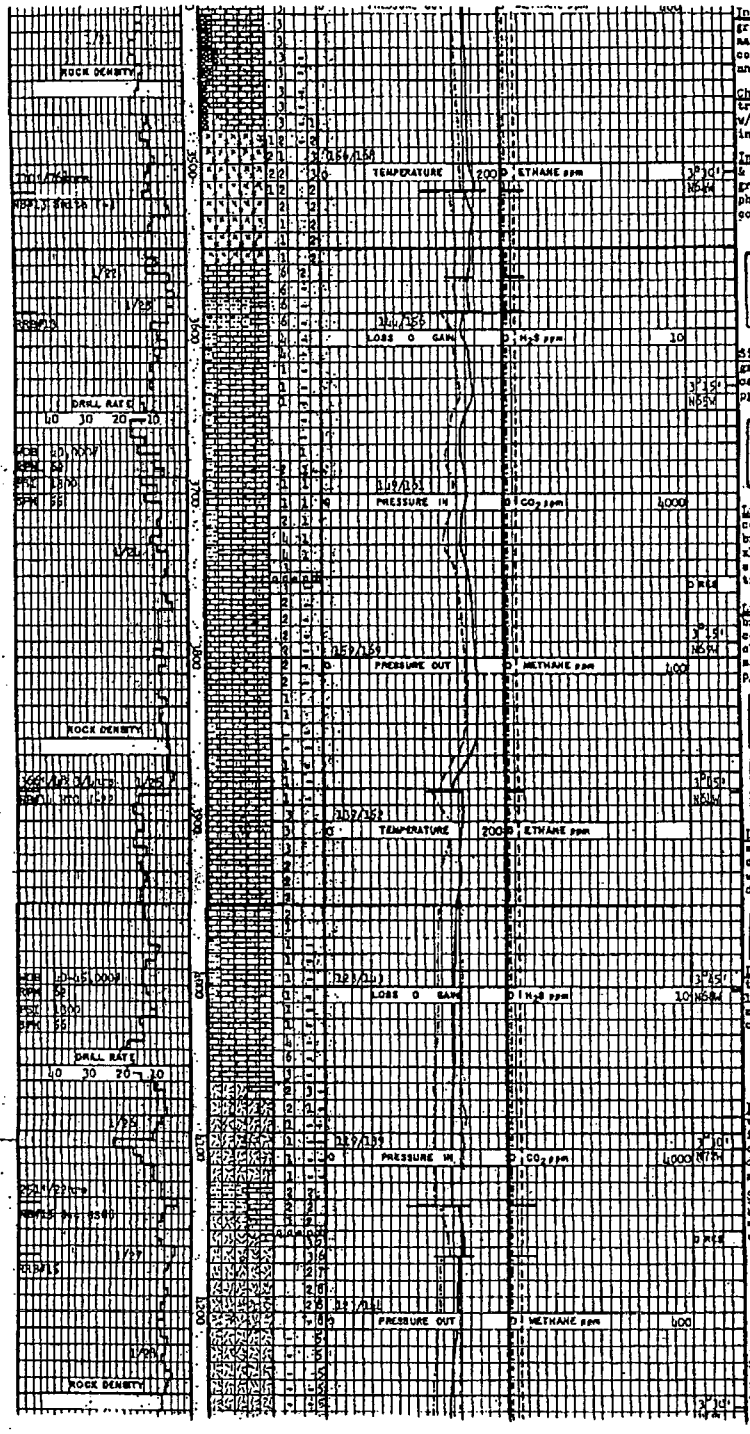
Note:Temp incr due mud cooler down.

Limestone:pred lt brn, mnr blk & sl silty,hd-v hd due loc sl silic, comm bioclasts,comm wht-clr calc vng.

Intrusive Dike:med-dk grn,hd-v hd,aphan grndmass w/abdnt feld phen, comm chlor,mnr calc, mnr mag,tr pyrite.

Chert:lt-med brn,v hd, translucent,loc frac w/calc microvng,tr pyr, intbdd w/lmstn a/a.

Intrusive Dike:gry.grn,



Intrusive Dike;med-dk grn,hd-v hd,aphan grndmass w/abdnt feld phen, comm chlor,mnr calc, mnr mag,tr pyrite.

Chert;lt-med brn,v hd, translucent,loc frac w/calc microvng,tr pyr, intbdd w/lmstn a/a.

Intrusive Dike;gry,grn & wht,hd-v hd,aphan grndmass w/abdnt feld phenos,comm chlor,mnr-comm mag,mnr calc vng.

Note:twist off at 3568', twisted off 10 stnds & 1 sngl f/kelly,fishing, POH w/fish,RIH.

Siltstone;dk gry,v fn gr,blocky,sft,v calcareous,tr-mnr disa pyr.

Note:temp changes due to erratic efficiency of mud cooler.

Limestone;med brn w/ comm fusilinids,tan-lt brn comm mottled & rexln,intbdd w/calc siltstn,mnr-comm calc vng, tr pyrite.

Limestone;lt tan-lt brn,el-v hd,comm matt, comm rexln,mnr-loc com clr & wht calc vng,loc mnr fusilinids,tr disa pyrite.

W 9.4 V 39 PV 11 YP 5 pH 11.5 Fil 6.6 Cl 500 Slds 5%

Note:temp decrease due to mud cooler on.

Limestone;tan-lt brn, med hd,comm rexln,loc comm fusilinids,tr-mnr wht & clr calc vng,r disa mag,loc r pyr.

W 9.1 V 41 PV 18 YP 11 pH 11 Fil 6.8 Cl 600 Slds 6%

Limestone;lt brn-grn, tan,med hd,loc brittle, loc sft,comm rexln,abdt microfossils,tr wht vn calcite,r-tr fn gr pyr.

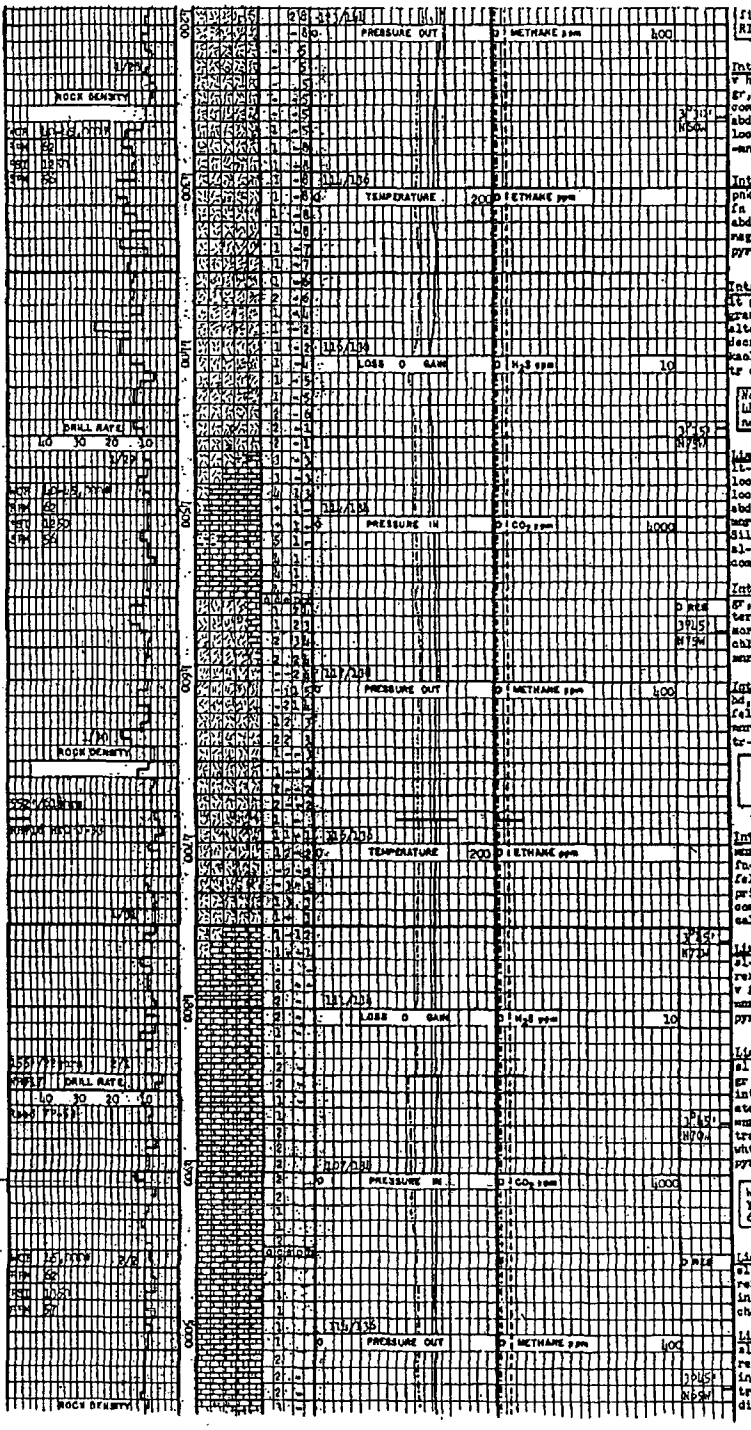
Note:45 bbl mud loss @ 4060'.

Intrusive Dike;wht-pnk, v hd,silicified,splitic,pred qtz & feld,tr chlor,tr disa mag,r disa pyr,tr-mnr calc microvng.

Siltstone;dk gry,v fn gr,pred massive w/ loc microlams,mod-v hd, calcic,tr disa pyr.

Note:twist off @ 4165',twisted off 29 stnds f/kelly, fishing,POH w/fish, RIH w/bit #15.

Intrusive;wht-pnk,hd-v hd,granitic,fn-med gr,pred qtz & k-feld, comm-abdt chlor,comm-abdt mag,loc comm hablo



fishing,POH w/fish, RIH w/bit #15.

Intrusive:wht-pnk,hd-v hd,granitic,fn-med gr,pred qtz & k-feld, comm-abdt chlor,comm-abdt mag,loc open hnbld loc anr biot,tr pyr,tr-anr calc vng.

Intrusive:wht-lt gry-pnk,hd,granitic,v fn-fn gr,pred qtz & feld, abdnt chlor,anr-comm mag,tr-anr calc vng,tr pyr,tr kaolin.

Intrusive:pred wht,anr lt gry-pnk,hd,decr granitic appr w/incr altered appr,v fn gr, decr hd w/loc sft comm kaolin,decr chlorite, tr diss pyr.

Note:temp drop @ 11,400' due to adding new mud.

Limestone:lt-med brn, lt-dk gry,sl-mod hd, loc silty,comm rexln, loc comm foss,comm-v abdnt calc vng,tr-loc anr pyr,intbdd w/ Siltstone:med-dk gry, sl-mod hd,calcareous, comm-abdnt calc,tr pyr.

Intrusive:gry-gry,fn gr,hd,grn color & altered appr pass montmorillonite,comm fn gr chlorite,anr-comm pyr, anr magnetite.

Intrusive:med gry/grn, hd,fn gr,pred qtz & feld,anr-comm chlor, anr mag,tr-comm epidote tr-anr calc,tr pyr.

W 9.4 V 32 PV 9
YP 3 pH 11.0 Fil
7 Cl 600 Slds 1%

Intrusive:pred gry, anr wht-lt gry,hd,v fn-fn gr,pred qtz & feld w/anr-comm grn, prismatic epidote, comm magnetite,tr calcite,tr pyr.

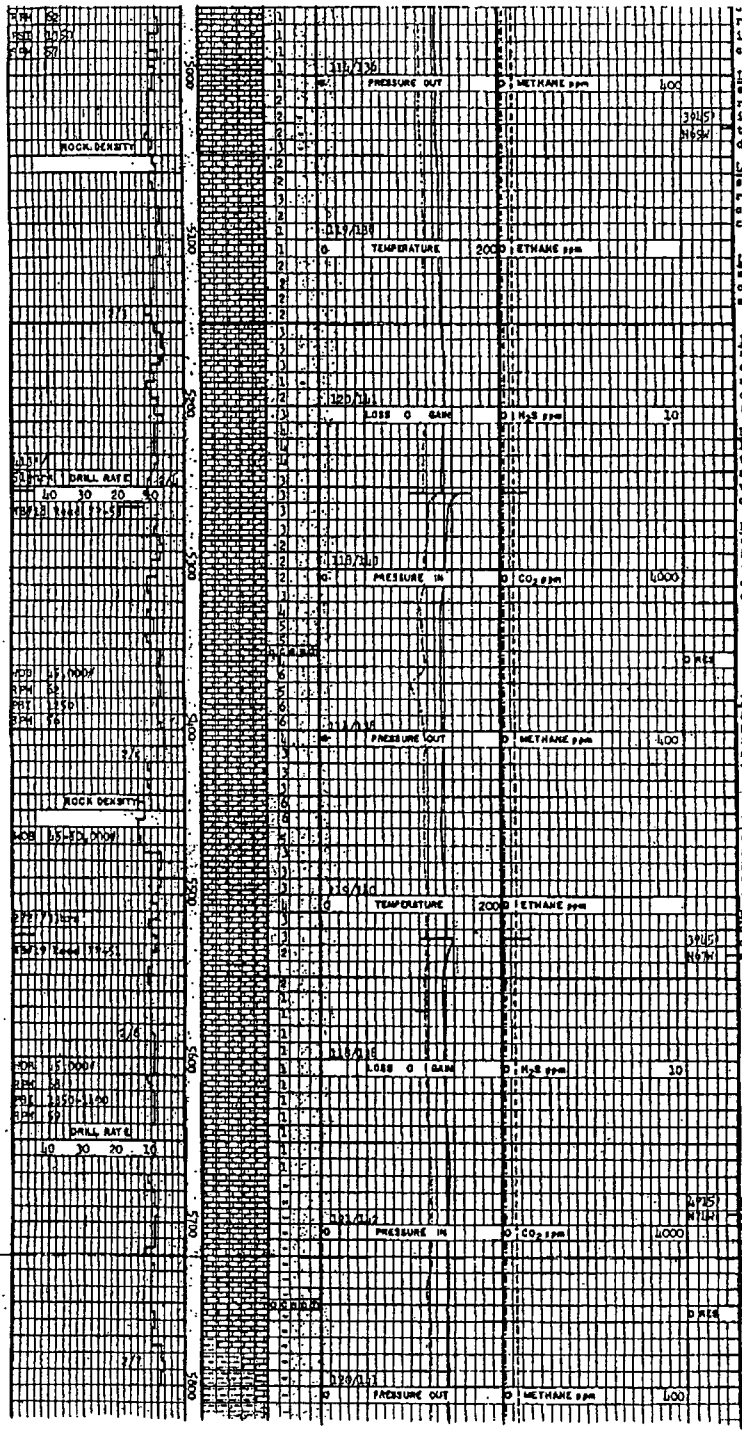
Limestone:lt-med gry, sl-mod hd,loc friable, rexln,marblized,pred v fn-fn gr,anr med gr, anr calc vng,r-tr diss pyrite.

Limestone:lt gry-wht, sl hd,brittle,v fn-fn gr matrix w/comm-abdt intraclasts(rnd-elongate),loc sft-friable, anr-comm lt brn-gry translucent chert,anr wht calc vng,r-tr diss pyr.

W 9.3 V 37 PV 12
YP 7 pH 11.0 Fil
6.8 Cl 500 Slds 4%

Limestone:wht-lt gry, sl-mod hd,comm brittle, rexln,comm intraclasts, intbdd w/anr lt gry chert,tr-anr calc vng.

Limestone:wht-lt gry, sl-mod hd,comm brittle, rexln,comm intraclasts, intbdd w/tr lt gry cht, tr-anr calc vng,r-tr diss pyr.



rexln,coms intraclasts, intbdd w/mnr lt gry chert,tr-mnr calc vng.

Limestone:wht-lt gry, sl-mod hd,coms brittle, rexln,coms intraclasts, intbdd w/tr lt gry cht, tr-mnr calc vng,r-tr dism pyr.

Limestone:wht-lt gry, sl hd,coms brittle, rexln,coms-abdt intraclasts,loc v sft,tr-mnr calc vng.

Limestone:lt-dk gry, mottled,mod hd-v hd, coms brittle,rexln,tr-mnr wht calc vng.

Limestone:lt-dk gry, mottled,mod hd-v hd, coms brittle,rexln,tr-mnr calc vng,tr intbdd chert,r pyr,r fossil (prob bivalve).

Limestone:pred wht,mnr lt gry,mod hd,loc brittle,microxln,loc silty appr,mnr-coms wht calc vng,tr intbdd lt brn chert.

Limestone:brn w/ mnr dk brn,pred hd-loc v hd,microxln,mass appr, tr lt brn translucent cryptoxln silica,coms calc vng.

Note:jet shaker pit @ 5359'.Temp in drop @ 5370' due to adding new mud.

Limestone:pred brn-dk gry,mnr lt gry,hd-v hd, pred mass appr,coms fract'd appr,cryptoxln, coms-abdt calc frac vng.

Limestone:pred wht w/ mnr-coms gry brn,hd, granular rexln text, pred sl dolomitic,loc dolo rhombs vis,coms-abdnt calc vng,r pyr.

Limestone:lt-dk gry,w/ coms-abdt wht interbdd dolomite,sl hd-v hd, mass appr,mnr vn calc.

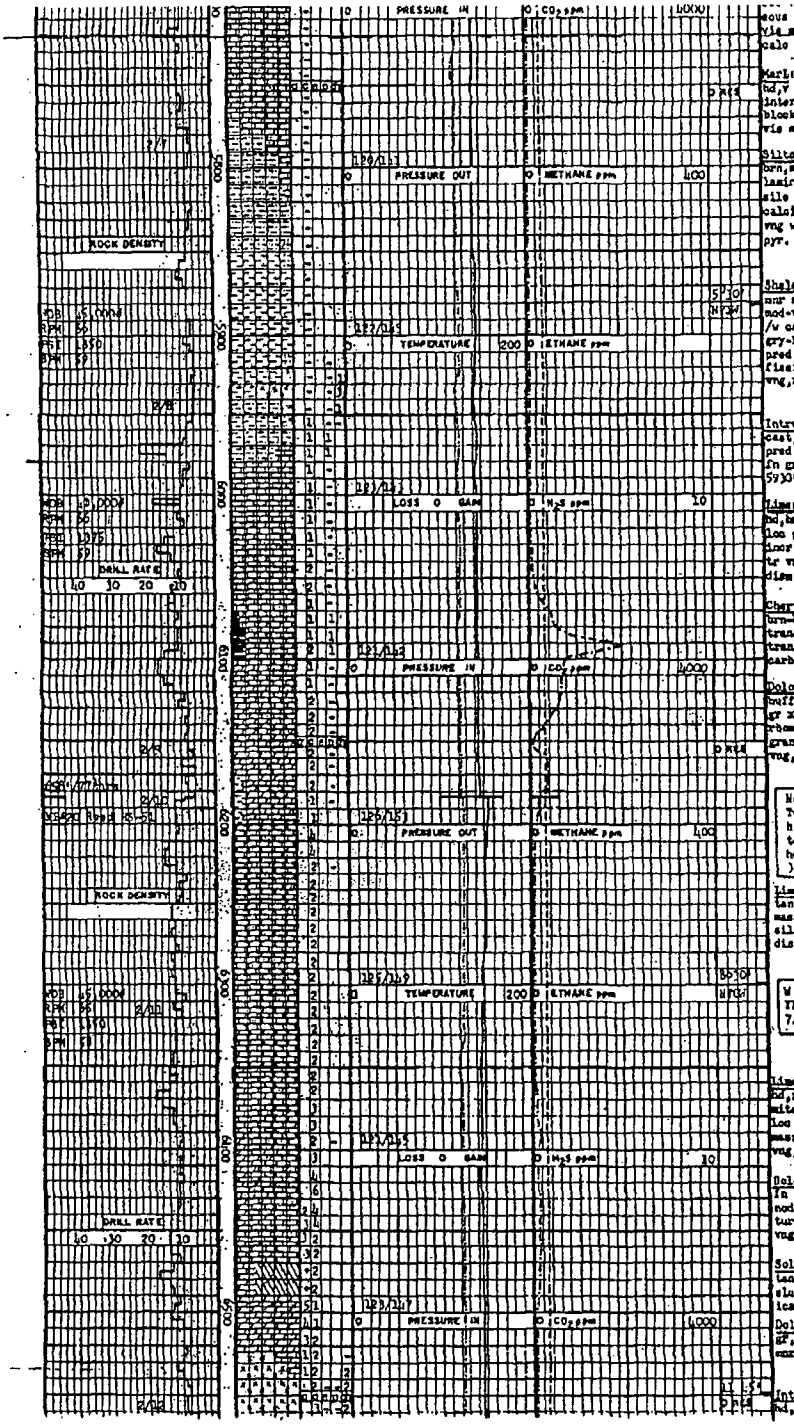
Marl:gry,sft-mod hd, mnr hd,highly calcic, sl-highly silty w/ mnr gran text,loc mnr clay mnr calc vng,r disem pyr.

W 9.3 V 40 PV 13
YP 8 pH 10.5 Fil
6.6 Cl 500 Slds 4%

Marl:med-dk gry,sft-mod hd,mnr v hd,interbdd v fn-fn gr calcareous silt & clay,w/ loc vis microlams,tr wht calc vng.

Marl:med-dk gry,sft-sl hd,v fn-fn gr,coms-abdt interbdd silt & clay, blocky,loc fissile w/ vis microlams.

Siltstone:pred med gry brn,mod hd,pred v well laminated w/ coms fissile appr,sl-v highly



eous silt & clay,w/ loc vis microlams,tr wht calc vng.

Marl:med-dk gry,sft-sl hd,v fn-fn gr,comm-abdt interbdd silt & clay, blocky,loc fissile w/ vis microlams.

Siltstone:pred med gry brn,mod hd,pred v well laminated w/ comm fissile appr,sl-v highly calcic,tr calc micro-vng w/ r v fn dissem pyr.

Shale:pred dk gry-blk, mnr med gry,v fn gr, mod-v hd,mod calcareous /v calc cmt,abdt dk gry-blk organic matter, pred blocky w/comm fissile appr,tr calc vng,r disn pyr.

Intrudt igneous:lt gra cast,pred hd mnr sft, pred porph text,abunt fn gr mag,sl calcic,f/ 5930'-5960'.

Limestone:med-dk gry,sl hd,brittle,sl dolomitic loc granular appr w/ incr interbdd silica, tr vn calcite,r-tr f gr disn pyr.

Chert:pred lt gry,mnr brn-blk,v hd & angular, translucent w/mnr v transparent,comm-abdt carbonate inclusions.

Dolomite:wht-lt brn, touff,mod hd-hd,fn-med gr xln,w/comm vis rhombs,loc comm ora granular masses,tr calc vng,tr disn pyr.

Note:Run two time Temp survey for ten hours each. Projected maximum hotjoe hole temp @ 290°F-)-7°F.

Limestone:lt gry-lt tan,hd,pred roxln text mass appr,loc tr fossils,mnr calc vng,r-tr dissem pyr.

W 9.4 V 38 PV 14 YP 4 pH 11.0 Fil 7.2 Cl 800 Slds 5%

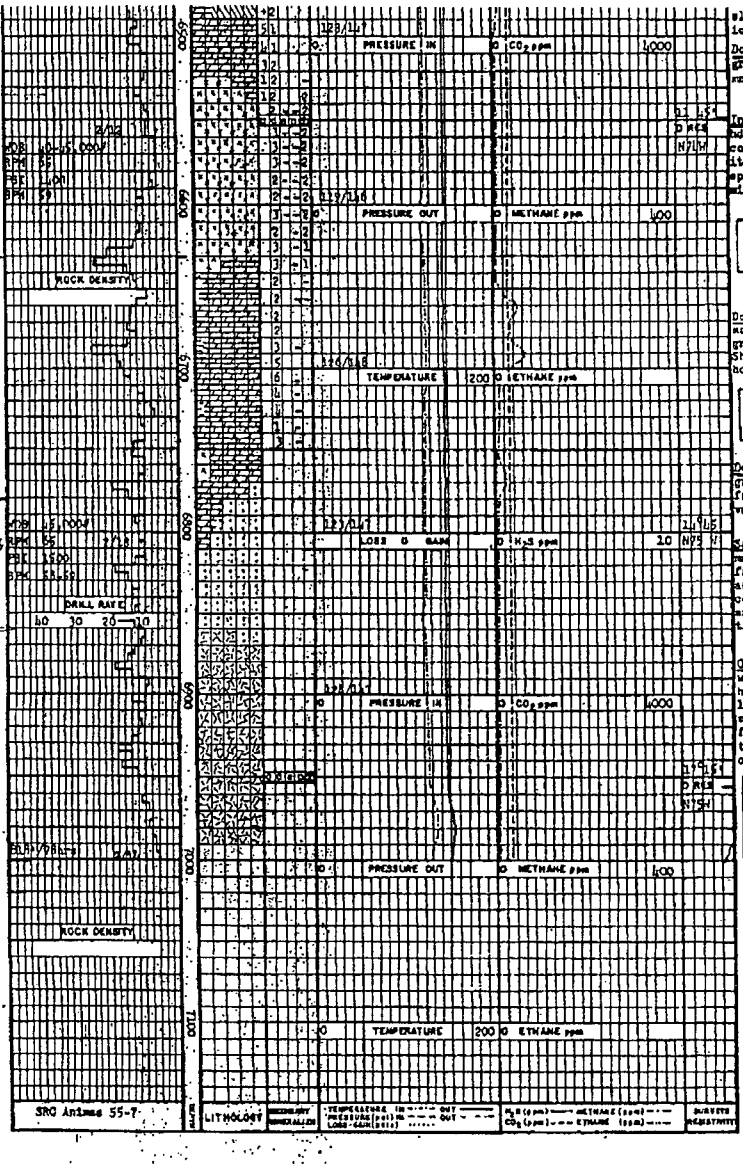
Limestone:lt gry,mod hd,roxln w/incr dolomite,pred cryptoxln w/ loc granular dolomite, massive appr,mnr calc vng,r disn pyr.

Dolomite:pred lt gry, fn gr,roxln gran text, mod hd,loc mod fractured w/ sudat calc vng.

Solution Deposit:lt tan-comm wht,pred translucent,cryptoxln silica,highly fractured.

Dolomite:pred wht,med gr,roxln gran text,hd, mnr calc vng.

Intrusive:lt-med grn, hd,fn gr,altered appr,



elucent,cryptoxln silica,highly fractured.

Dolomite:pred wht,med gy,rexln gran text,hd, mnr calc vng.

Intrusive:lt-med gra, hd,fn gr,altered appr, comm-abdt diss magnetite,comm chlor,tr-mnr epidote,tr-mnr calc microvng,tr diss pyr.

W 9.4 V 41 PV 18
YP 6 pH 11.0 Fil
7.4 Cl 800 Slds 5%

Dolomite:gry-lt gry, mod hd-hd,pred rexln gran text,intbdd w/ mnr Shale:pred blk,sft-mod hd,pred sl fissile.

Note:Mnr clough vis in samples f/ 6730' iposs f/ 1800'.

Dolomite:lt-med gry,hd granular text,fn gr,sl fractured w/ comm calc vng,tr disem pyr.

Sandstone:pred clr-wht, mnr gry/grn cast,pred fn gr w/mnr med gr,sub-ang-rd,pred qtz w/loc comm arkosic,mod-well srtd,mnr-comm chlorite, tr vn calc,tr diss pyr.

Granite:lt pink w/ mnr wht-lt grn,pred v hd, hypidiomorphic text, loc mod fractured w/ mnr kaol & chlor frac fill,tr calc,r pyr,loc tr hem fresh subhdrl-oxid.

Note:Temp incr due mud cooler malfunction.

Total Depth 7001'. Run Schlumberger E logs.

EXLOG/SMITH

Schlumberger

DUAL INDUCTION - SFL

COMPANY:	STEAM RESERVES	OTHER SERVICES-	
WELL:	ANIMAS 35-7		
FIELD:	WILDCAT		
COUNTY:	HILDAGO		
STATE:	NEW MEXICO		
LOCATION:	2412 FEL		
	2289 FSL		
SEC:	7 TWP: 25S RGE: 19W		
PERMANENT DATUM:	ELEVATIONS-	PROGRAM	
ELEV. DF PERM. DATUM:	4209.0 F KB: 4217.6 F	TAPE NO: 26.2	
LOG MEASURED FROM:	KB DF: 4216.6 F	SERVICE ORDER NO: 420898	
17.6 F ABOVE PERM. DATUM	GL: 4209.0 F		
DRLG. MEASURED FROM:	KB		
DATE:	14 FEB 85		
RUN NO:	1		
DEPTH-DRILLER:	7901.0 F		
DEPTH-LOGGER:	7902.0 F		
BTM. LOG INTERVAL:	7902.0 F		
TOP LOG INTERVAL:	1853.0 F		
CASING-DRILLER:	1850 F		
CASING-LOGGER:	1853 F		
CASING:	13 3/8		
BIT SIZE:	12 1/4		

TYPE FLUID IN HOLE: FRESH GEL
DENSITY: 9.4 LB/G
VISCOSITY: 41.0 S
PH: 11.0
FLUID LOSS: 7.4 C3
SOURCE OF SAMPLE: TANK
RM: 1.990 OHMM AT 99.0 DEGF
RMF: 1.530 OHMM AT 99.0 DEGF
RMC: 2.160 OHMM AT 99.0 DEGF
SOURCE RMF/RMC: MEAS/MEAS
RM AT BHT: .474 OHMM AT 270. DEGF
RMF AT BHT: .364 OHMM AT 270. DEGF
RMC AT BHT: .514 OHMM AT 270. DEGF

TIME CIRC. STOPPED: 0200
TIME LOGGER ON BTM.: 0900

MAX. REC. TEMP: 270.0 DEGF

LOGGING UNIT NO: 8174
LOGGING UNIT LOC: FARMINGTON
RECORDED BY: MAUNER
WITNESSED BY: MR. PILKINGTON

REMARKS:

CREW:VAZZIE,QUINN
SONDE ERRORS SET DOWNHOLE

EQUIPMENT NUMBERS-

DIC 58 DIS 1398 SGC 3407

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

FILE 5 14-FEB-85 09:58
DATA ACQUIRED 00- -00 00:00

RMF AT BHT: .364 OHMM AT 270. DEGF
RMC AT BHT: .514 OHMM AT 270. DEGF

TIME CIRC. STOPPED: 0200
TIME LOGGER ON BTM.: 0900

MAX. REC. TEMP: 270.0 DEGF

LOGGING UNIT NO: 8174
LOGGING UNIT LOC: FARMINGTON
RECORDED BY: MAURER
WITNESSED BY: MR. PILKINGTON

REMARKS:

CREW,YAZZIE,QUINN
SONDE ERRORS SET DOWNHOLE

EQUIPMENT NUMBERS-

DIC 88 DIS 1598 SGC 3407

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

FILE 5 14-FEB-85 09:56
DATA ACQUIRED 00- -00 00:00

AFTER SURVEY TOOL CHECK SUMMARY

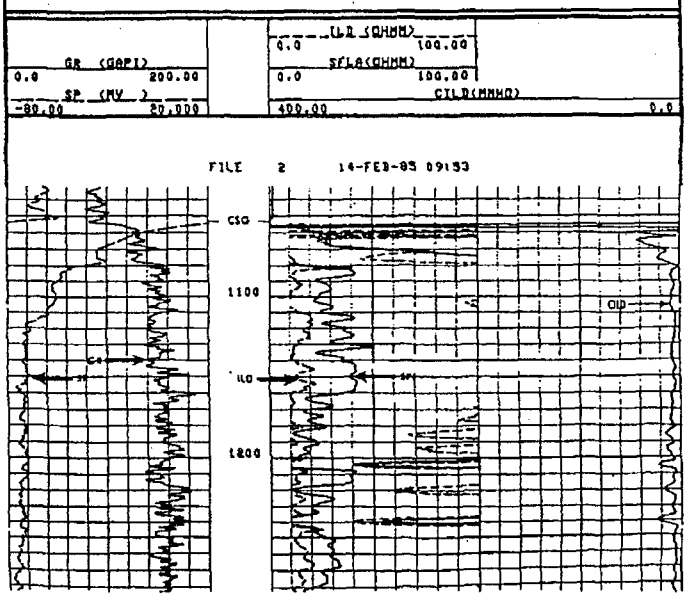
PERFORMED: 85/02/14
PROGRAM FILE: DILOR (VERSION 26.2 00/00/00)

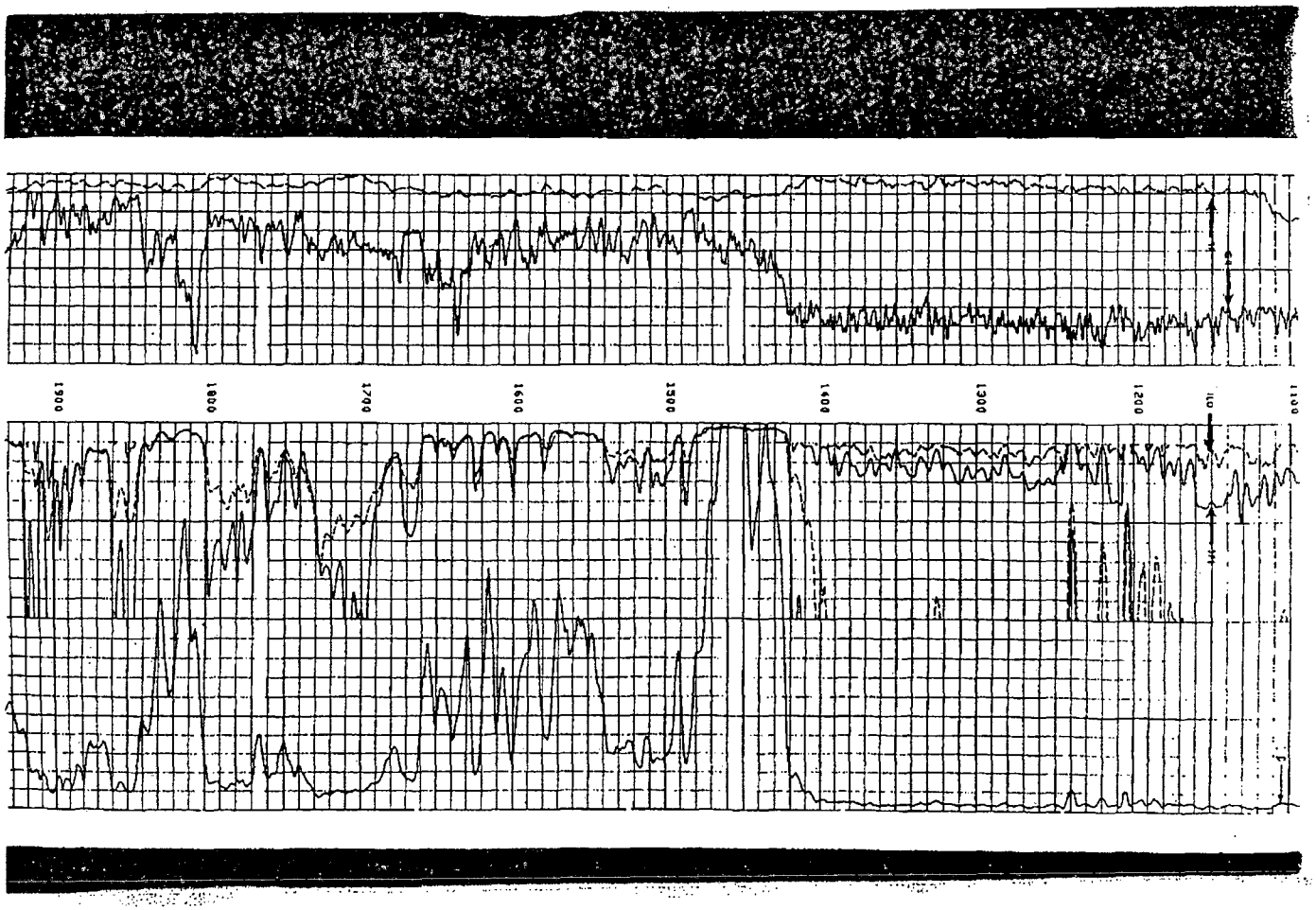
DITD TOOL CHECK

	ZERO		PLUS		
	BEFORE	AFTER	BEFORE	AFTER	UNITS
ILD	0.0	.1	508.2	500.4	MMHO
ILM	0.0	-.4	501.1	501.9	MMHO
SFL	0.0	-.2	500.0	497.6	MMHO

ILD SONDE ERROR CORRECTION : 4.0 MMHO
ILM SONDE ERROR CORRECTION : 3.0 MMHO

FILE 4 14-FEB-85 09:56

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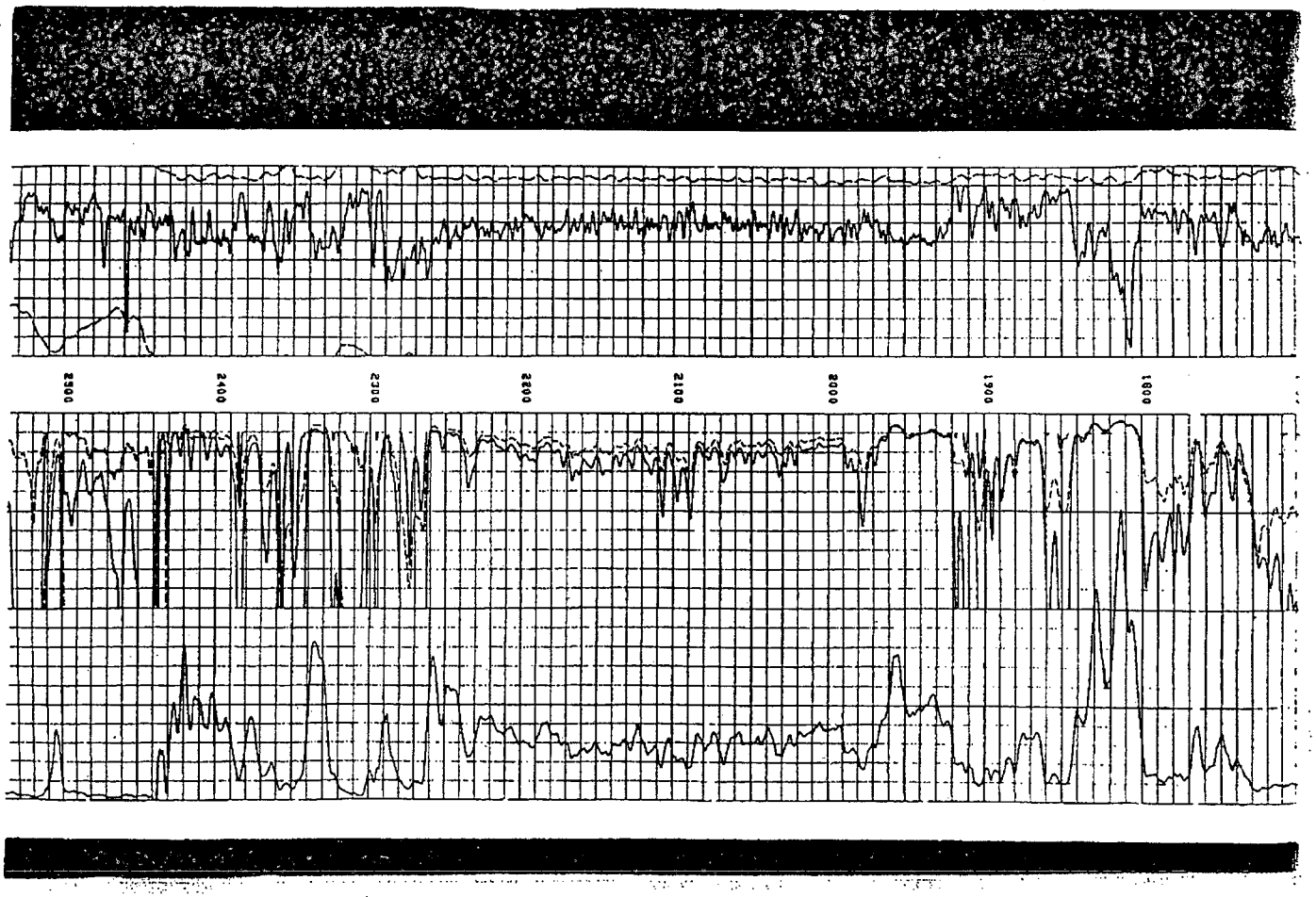
1700
1600
1500
1400
1300
1200
1100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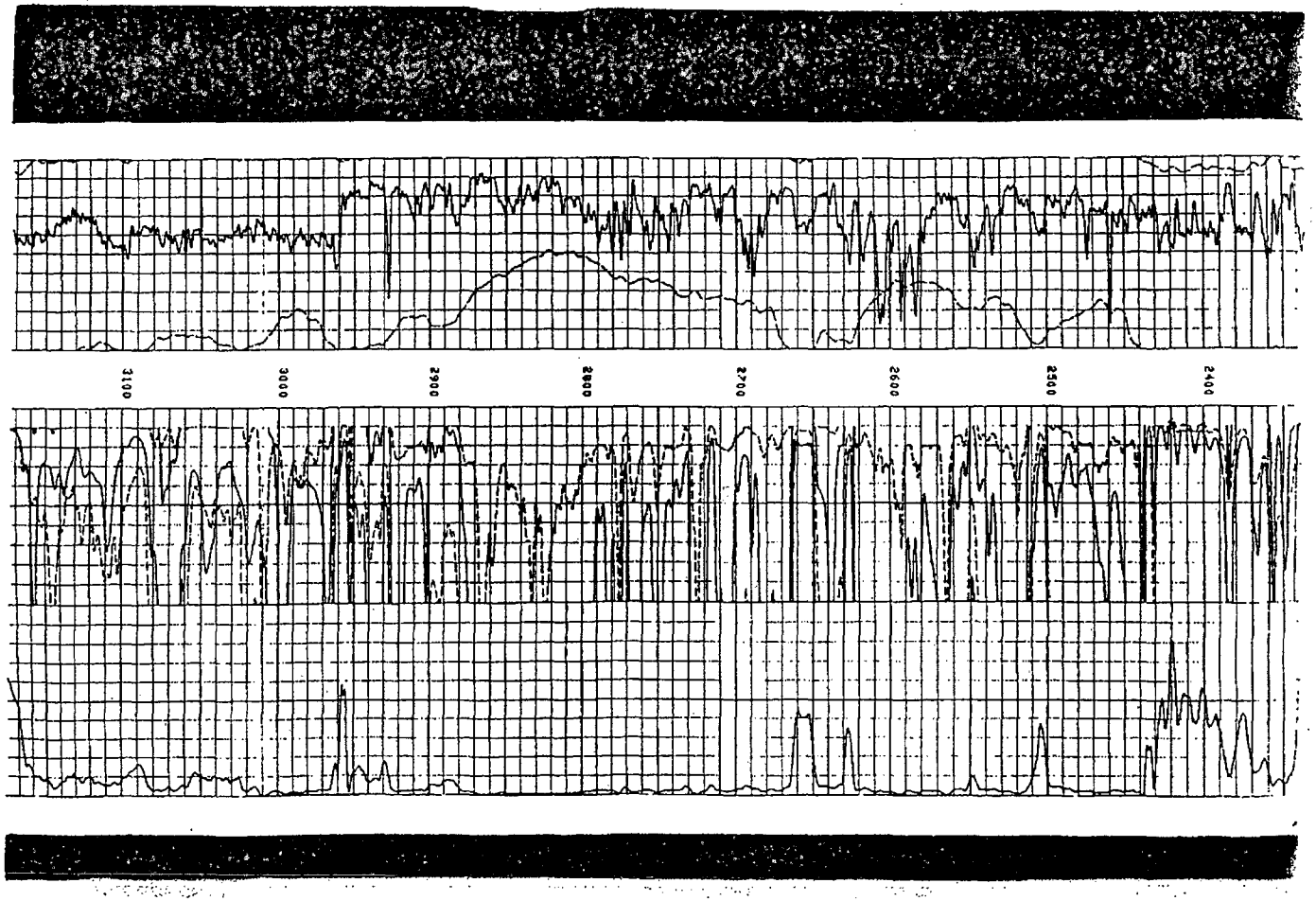
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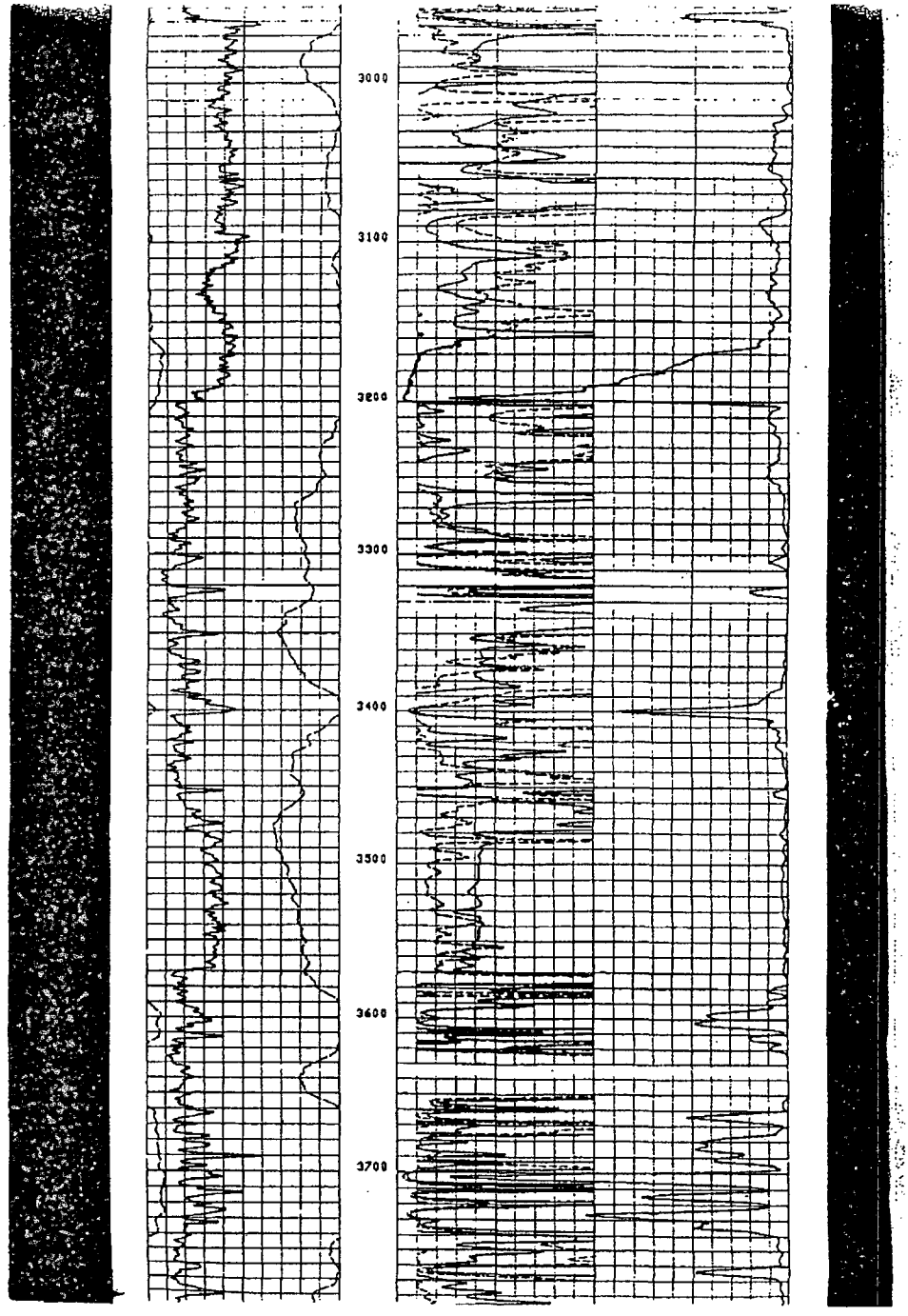
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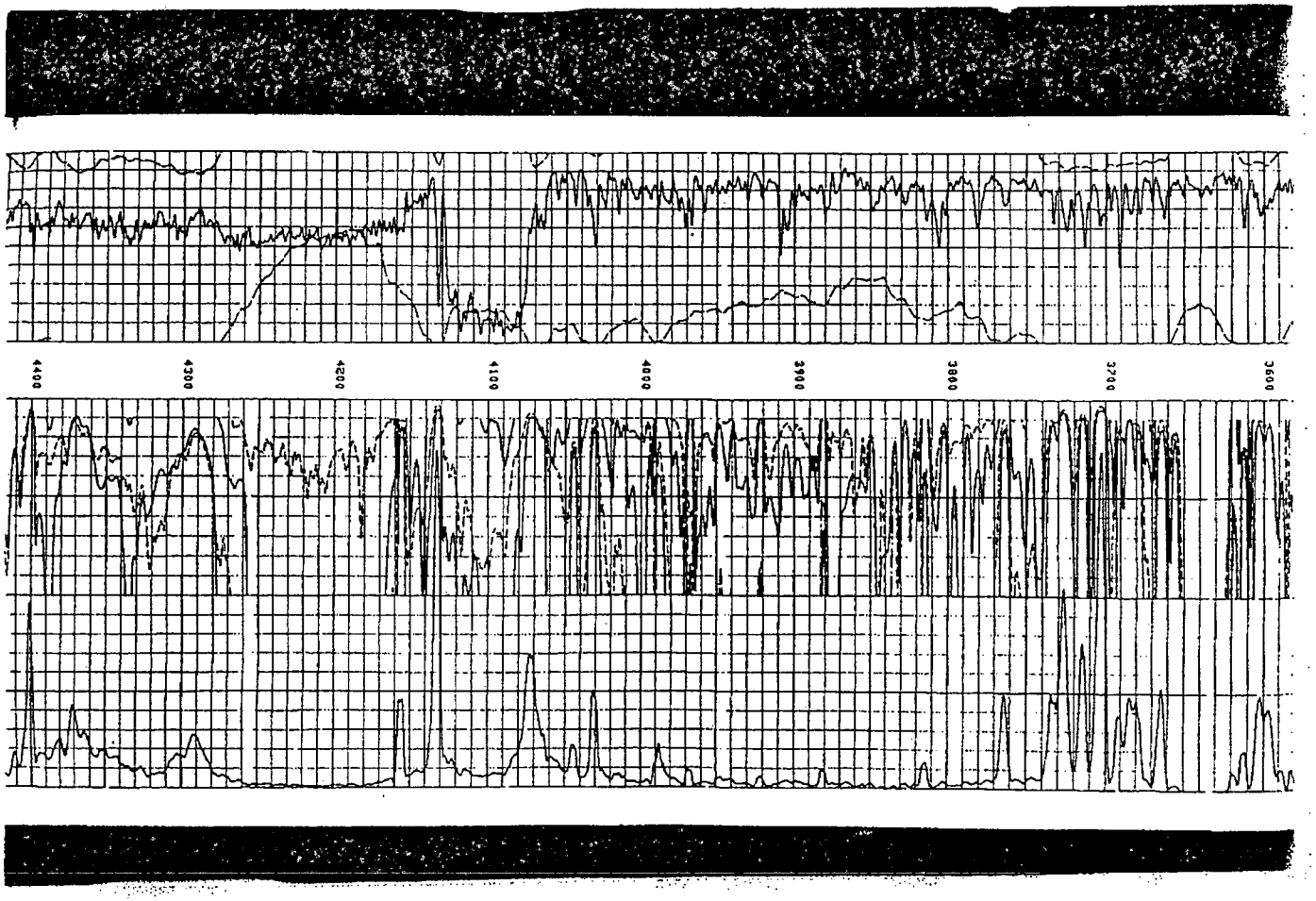
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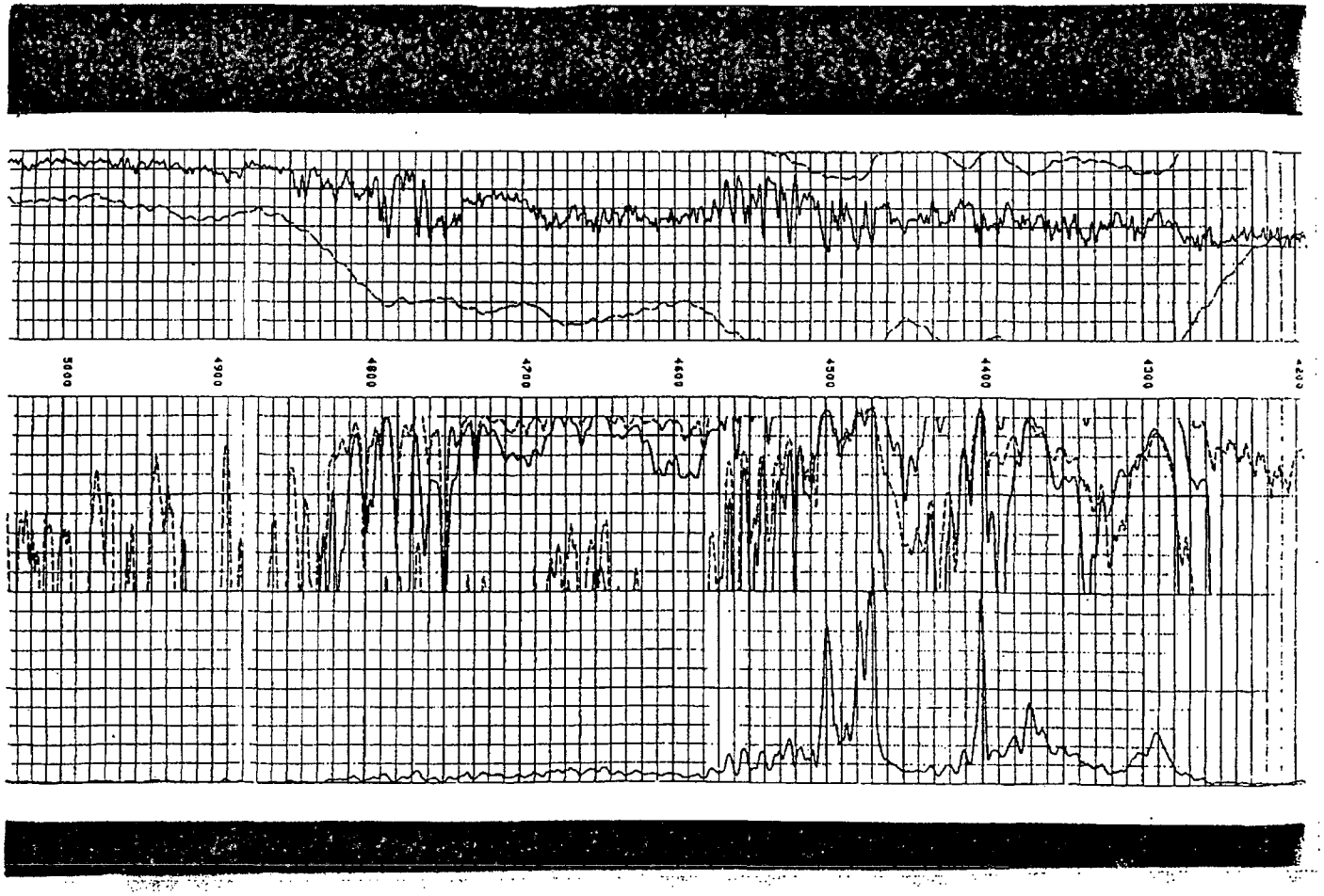
3700
3600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4400
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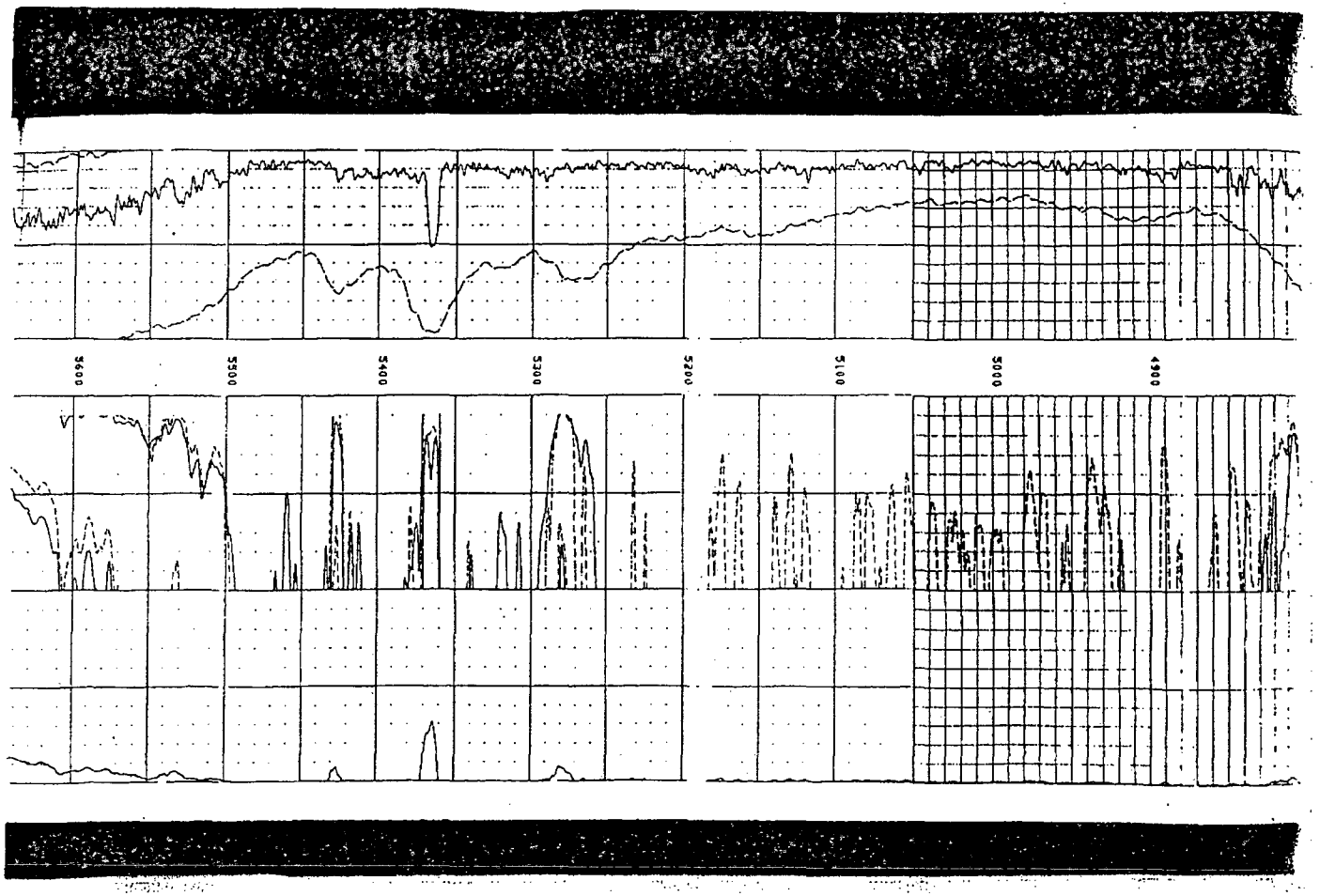
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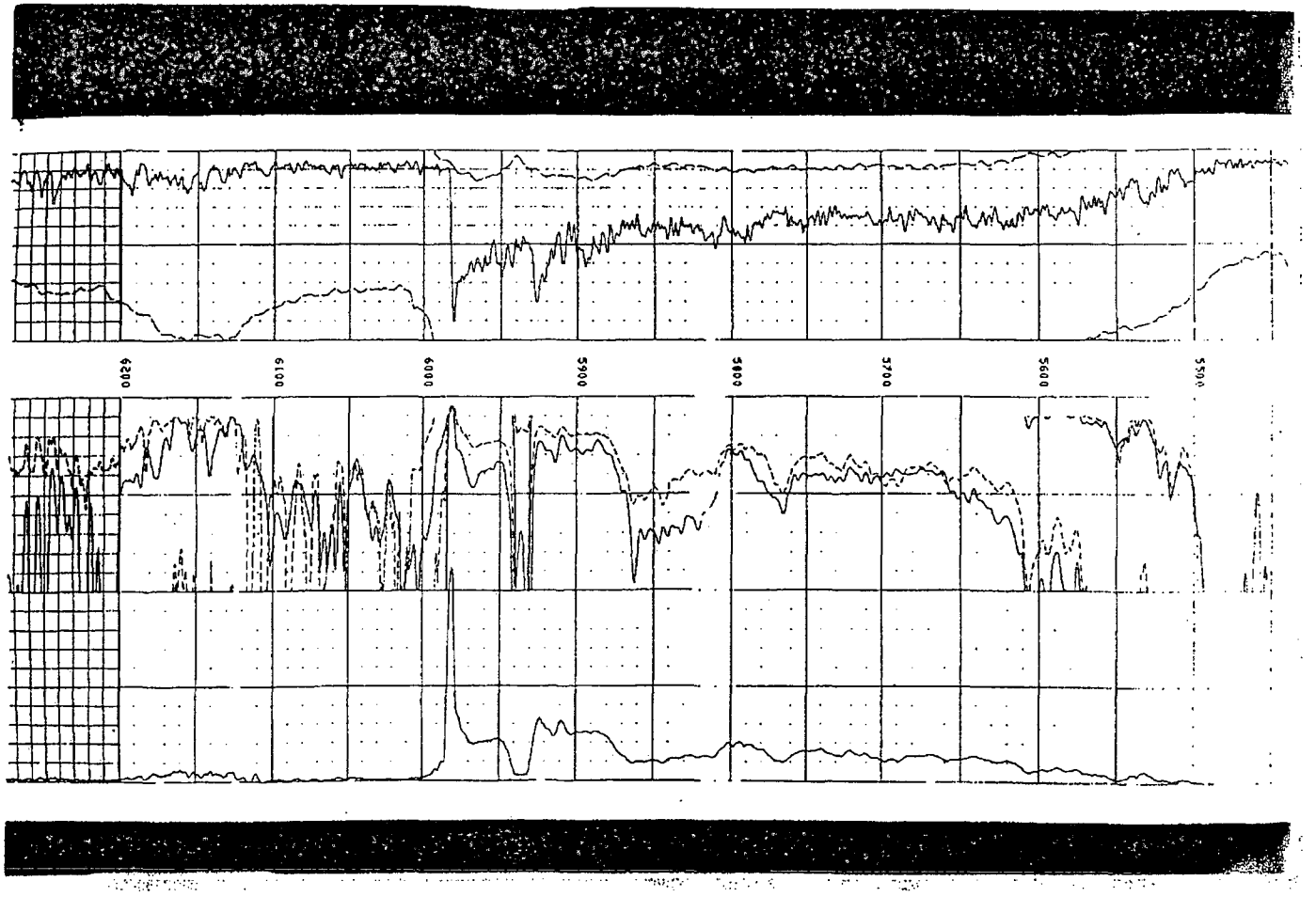
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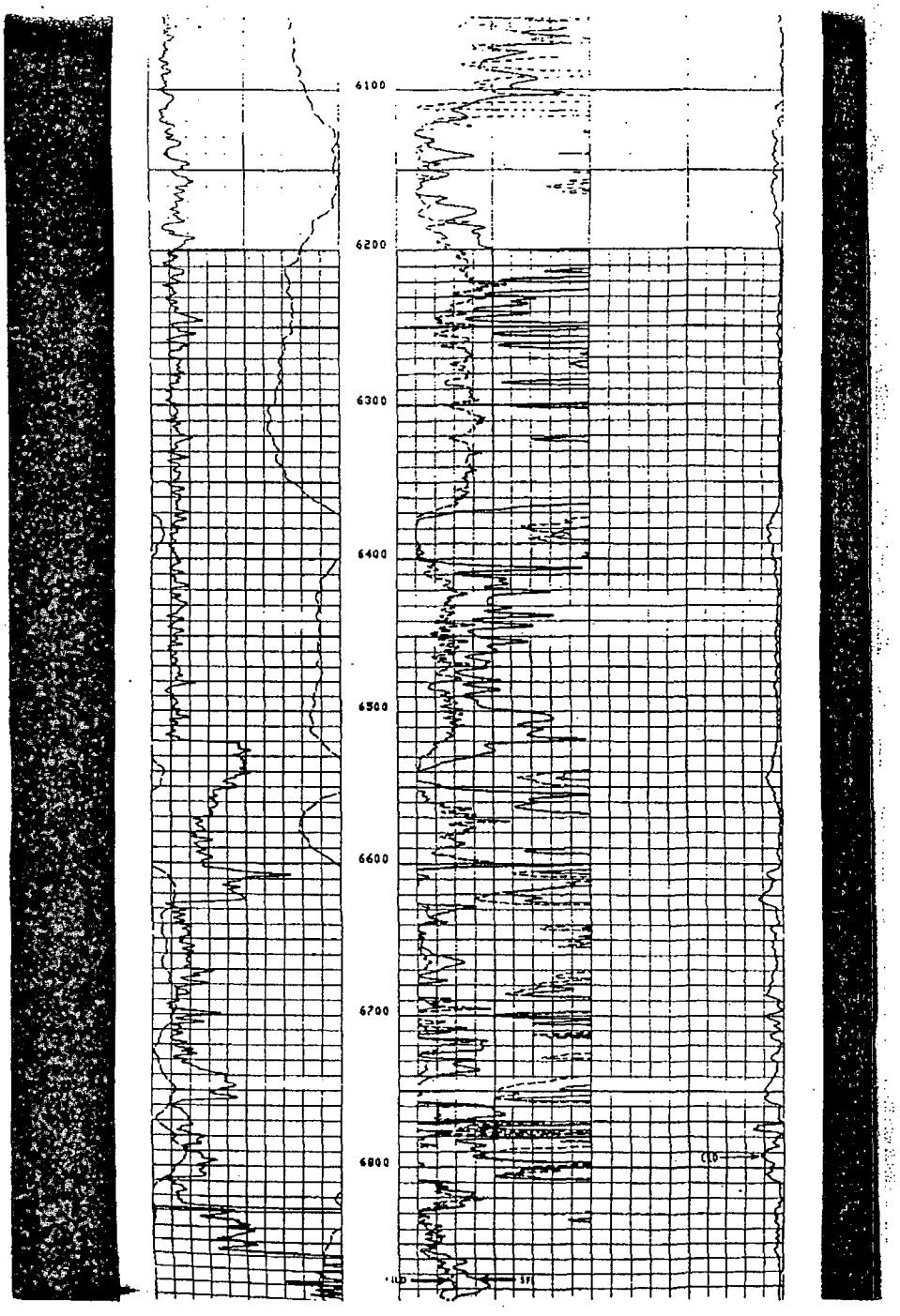
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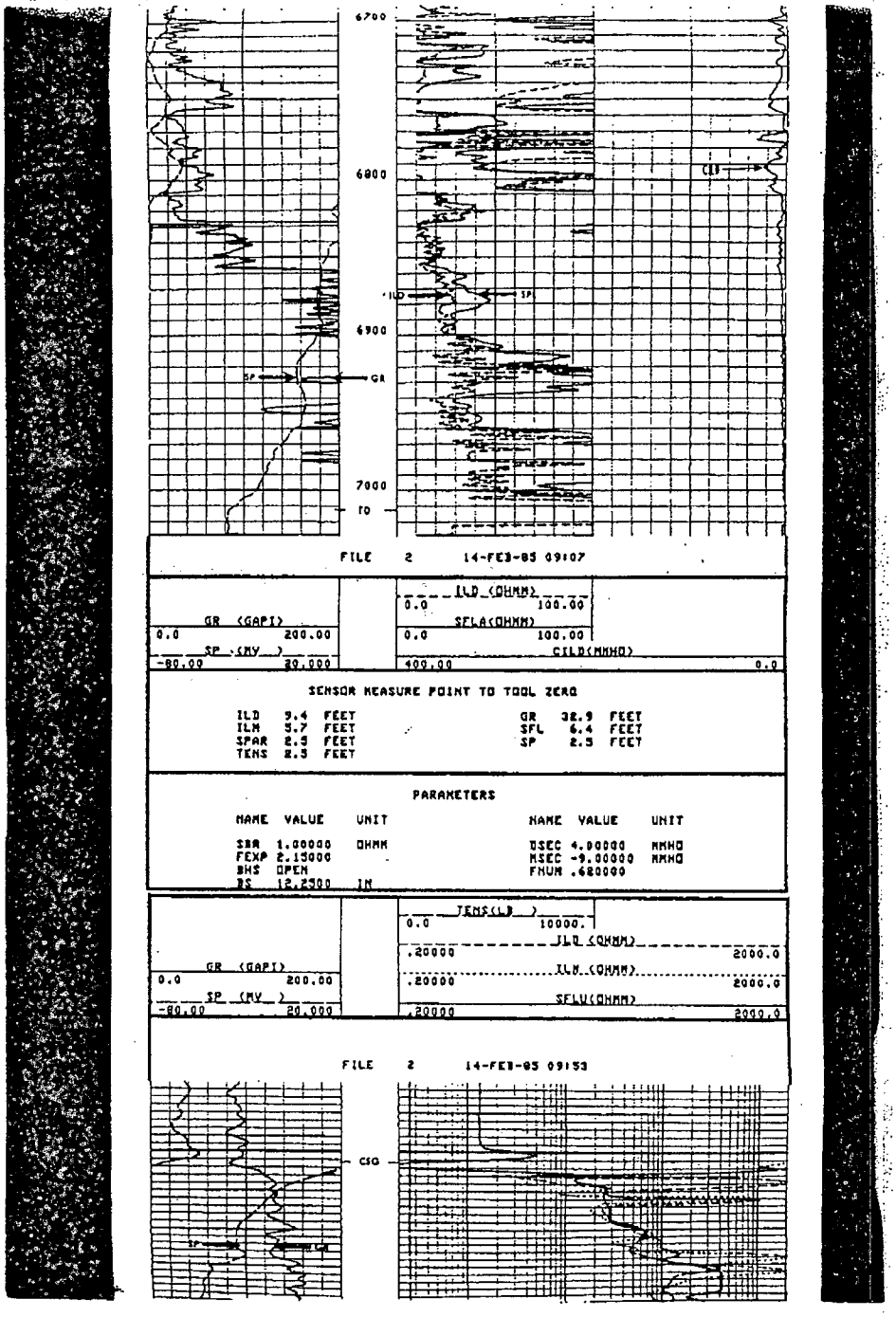
6800


6700
6800
6900
7000
TD
ILD
SP
GR
CSG
FILE 2 14-FEB-85 09:07
GR (GAPI)
0.0 200.00
SP (MV)
-80.00 20.000
ILD (OHMM)
0.0 100.00
SFLA(OHMM)
0.0 100.00
CILD(MMHO)
400.00 0.0
SENSOR MEASURE POINT TO TOOL ZERO
ILD 9.4 FEET
ILM 5.7 FEET
SPAR 2.5 FEET
TENS 2.5 FEET
GR 32.9 FEET
SFL 6.4 FEET
SP 2.5 FEET
PARAMETERS
NAME VALUE UNIT
SBR 1.00000 OHMM
FEXP 2.15000
BHS OPEN
BS 12.2500 IN
NAME VALUE UNIT
USEC 4.00000 MMHO
MSEC -9.00000 MMHO
FNUM .620000
TENS(LB)
0.0 10000.
ILD (OHMM)
.20000 2000.0
ILM (OHMM)
.20000 2000.0
SFLU(OHMM)
.20000 2000.0
FILE 2 14-FEB-85 09:53

January 2, 1985

REC'D JAN 8 - 1985

Oliver Grace
Grace Geothermal Corporation
400 Jericho Turnpike
Jericho, New York 11753

Re: TFD 55-7 - NM-34790
Animas (33007) Prospect
Hidalgo County, New Mexico

Dear Mr. Grace:

As I mentioned in our conversation last week, I am enclosing a copy of SRC's AFE for Test for Discovery (TFD) Well 55-7, which was spudded-in at the Animas prospect, Hidalgo County, New Mexico, December 29, 1984, as well as copies of the daily report through Tuesday, January 1, 1985. In the future, copies of the daily report will be sent to you weekly so that the reports reach your desk on Monday or Tuesday of the following week.

Best regards.

Sincerely,

STEAM RESERVE CORPORATION

Harry J. Olson

cc: C. W. Berge
H. D. Pilkington
G. Bennett/A. Clement
E. Dale Trower

Enclosures

HJO:srp

STERLING GRACE & CO., INC.

JAN 11 1985

RECEIVED OCT 21 1985

Steam Reserve Corporation

GEOTHERMAL BRANCH

uthority for Expenditure

ount Requested	Joint Operators	Date	AFE No.
		11/20/84	

st. Comp. Date	Est. Spud Date	Expenditure Budgeted
/24/84	Mobilization 12/17/84 Spud 12/27/84	X Yes Year 1984 No Partially (Explain Below)

ease No.	Property Name	Well Number	Total Depth
	Surface - Dale Burgett Mineral - Federal, NM 34790	TFD 55-7	8000 feet

ospect Name	Well Classification	
nimas	Test for Discovery (TFD)	
G R A/Area	County	State
ightning Dock	Hidalgo	New Mexico

ication

W-SE Section 7, Township 25 South, Range 19 West

ITANGIBLE	Completed Costs	Dry Hole Costs	Comments/Description
Land & Environ.			
Environ. Studies	1,000.		
Location Prep.	15,000		
Permitting			
Reclamation	5,000.		
Surveying	1,000.		
Pits, Sumps, Roads	10,000.		
Surface Damages			
Other (Bonds)			
	(32,000.)		
Drilling Rig			
Rig Modification			
Mobilization	115,000.		
Footage			

TANGIBLE	Completed Costs	Dry Hole Costs
Drill Pipe		
Drill Pipe		

June 14, 1985

REC'D JUN 24 1985

Mr. C. W. Berge
Grace Geothermal Corporation
970 E. 4800 S. Suite #2
Salt Lake City, Utah 84117

Re: Well History of TFD-55-7
Review and Evaluation of TFD 55-7
Animas (33007) Prospect,
Hidalgo County, New Mexico

Dear Bill:

Enclosed are copies of the memos "Well History of TFD 55-7" and "Review and Evaluation of TFD 55-7", Animas prospect, Hidalgo County, New Mexico by Mike Connelly.

Figure 4 of the Review and Evaluation memo shows expenditures of only $1,282,000. This number does not include site preparation, road construction, and other related charges incurred prior to rig mobilization.

If you should need any other information please give me a call.

Best regards.

Sincerely,

STEAM RESERVE CORPORATION

Harry J. Olson

H. J. Olson
Vice President and Operations Manager

HJO/c

cc: Grace Geothermal Corp.
Jericho, NY

INTER-OFFICE MEMORANDUM

SUBJECT: Review and Evaluation of TFD 55-7, Animas Property, Hidalgo Co., NM (5646A).

DATE: June 13, 1985

cc: H. D. Pilkington
J. E. Deymonaz

TO: H. J. Olson

FROM: Michael Connelly

GENERAL:

Animas TFD well 55-7 was spudded at 8 p.m. on December 29, 1984, fulfilling SRC's contractural obligation with Grace Geothermal Corporation to spud before January 1, 1985. The hole was bottomed in Precambrain/granite at a depth of 7001 feet at 11:30 p.m. on February 13, 1985 without encountering high temperatures or large fluid entry zones. The drill rig was on site 47 days from spud-in to TD (Fig. 1). Actual drilling time was 742.75 hours. This represents a total of 28.57 days of drilling. The time difference represents trips to change bits, deviation surveys, fishing, logging and setting casing. This averages to a penetration rate of approximately 10 ft/hr, not counting 41 hours opening the hole. Penetration rate below the intermediate casing varied from 3-35 ft/hr, and averaged 8-10 ft/hr.

The drilling was completed within budget at a cost of approximately $1,448,119. Minor adjustments in these costs may still be necessary.

A percentage breakdown of costs are shown on Figure 2. The well is currently "in suspension" and well costs do not include any abandonment charges.

Generalized Lithology (ft)

0- 145	Alluvium - Light brown to tan, very poorly sorted, subangular to subrounded, predominantly volcanic clasts (tuffs, ash and andesite), contains a soft weathered clay matrix, locally drusy quartz, some hematitie and possibly manganese oxide.

Generalized Lithology (ft)

145-1460	Rhyolitic lithic tuff - Light brown to tan to orange to red, subangular tuff and welded tuff clasts, often brick red due to iron staining, certain horizons are extremely silicified, often contains abundant calcite and clay, commonly contains a trace of magnetite and/or pyrite.
1460-1990	Interbedded lithic tuffs and solution deposits - White to light gray to dark gray, solution deposits are predominantly calcium carbonate, highly fractured with abundant clear to white calcite veining and locally abundant pyrite veining. The tuffs are red to light greenish-brown, often silicified with feldspars and micas altering to clay. This marks the base of the Tertiary section and the top of the Paleozoic section.
1990-2960	Interbedded limestones and siltstones - Light to dark-brown to black, sucrosic texture, hard to very hard, locally silty in places, locally highly fractured with abundant calcite veining, often contains abundant bioclasts and microfossils, pyritic in places.
2960-3200	Intrusive dike - White to light red, mottled green and white, hard with aphanitic groundmass, with freshly altered plagioclase and biotite and muscovite, abundant subeuhedral magnetite, with white to clear calcite veining. Biotite and hornblende commonly altered to chlorite, locally contains a trace of pyrite.
3200-4060	Limestone and small intrusive dikes - Light to medium brown, dark gray, hard to very hard with sucrosic texture commonly recrystallized, interbedded with siltstone, locally abundant microfossils, commonly abundant white calcite veining with a trace of pyrite. 3400 to 3480' section has been silicified into chert. From 3480' to 3560' there is an intrusive dike that has been chloritized.

4060-4760	Intrusive dike and limestone - White to pink, very hard, silicified, aplitic predominantly quartz and feldspar, dissiminated pyrite, propylitically altered, common to abundant chlorite and magnetite, locally minor biotite, trace of pyrite and kaolin, minor calcite veining. Small bed of limestone occurs at 4470' to 4550'; it is light to medium brown, light to dark gray, locally silty, commonly recrystallized, contains fossils, abundant calcite veining with a trace of pyrite.
4760-5780	Limestone - White to light gray to dark gray, hard, brittle, very fine to fine grain matrix with abundant intraclasts, locally soft and friable, minor light brown chert, minor calcite veining, locally dolomite rhombs are visible.
5780-5960	Siltstone and Shale - Siltstone is medium gray brown, moderately hard, well laminated with a fissile appearance, slightly to highly calcic, trace of calcite microveining, rare, very fine grained pyrite. Shale is dark gray to black, very fine grained with calcite cement, dark gray to black organic matter, predominantly blocky with a trace of calcite veining and rare disseminated pyrite.
5960-6530	Limestone and dolomite - Medium to dark gray, white, tan, hard brittle, locally granular in appearance, cherty with interbedded silica, trace of disseminated pyrite, trace of microfossils, minor calcite veining. At 6470' to 6490' solution deposit, tan to white cryptocrystalline highly fractured.
6530-6630	Intrusive - Light to medium green, hard, fine grained, altered appearance common to abundant disseminated magnetite, common chlorite, trace epidote, minor calcite, microveining, trace of disseminated pyrite.
6630-6800	Dolomite and shale - Light gray to gray moderately hard, recrystallized granular texture fractured with trace of disseminated pyrite. Shale is black, soft to moderately hard and slightly fissile.

6800-6860	Sandstone - Clear to white with a minor gray green cast, fine to medium grained quartz subangular to round, moderately well sorted, minor chlorite, trace vein calcite, trace of disseminated pyrite. Probably the Bliss sandstone.
6860-7001	Granite - Light pink, white to light green, hard, hypidiomorphic texture, moderately fractured with minor kaolin and chlorite fracture fill, trace of calcite and hematite, rare pyrite. PRECAMBRIAN BASEMENT.

RESULTS OF DRILLING AND LOGGING:

Drilling

The target area for this hole was a Basin and Range westward dipping fault located to the east of the drill hole. This fault is located approximately .5 miles to the west of the drill site, and is a subsidiary to the major range front fault forming the Animas Valley. No major faulting was intersected while drilling. There were, however, minor drilling breaks at 220', 270', 345', 550', 680', 880', 920', 940', 1020', 1190', 1430', 1580', 1690', 1880', 3075', 4095', 4470', 5970', 6650', and 6680'. Hole deviation does not correlate with these drilling breaks. A plan map and vertical cross-section of the well is shown in Figure 3. The last survey was taken at 6956'. The vertical depth of the well is approximately 6,972 feet. The vertical drift angle was fairly constant between 1031' and 5536', varying between 0.5° and 3.75°. From 5536 feet to TD, the drift angle increases from 3.75° to 16.24°. The angle increases because the bottomhole assembly was made more flexible rather than due to structural or lithologic effects.

Temperature logs

Figure 4 shows the results of the temperature surveys including mud in and mud out temperatures. The highest temperature recorded is 326°F at 6919' feet on the April 3, Kuster time-temperature survey. Bottom hole temperatures for the Schlumberger survey are 238°F. The April 3, Kuster survey temperature gradient projects to 350°F at 8700-9600 feet. However, if this temperature is corrected to the Spafford probe measurements taken on the same date the thermal gradient projects to 350°F at 9400-10650 feet. The highest geothermal gradient below the

13 3/8" casing is between 1030' and 1300', where it averages between 100°-110°C/km. The thermal gradient turns isothermal from 1300' to 2400'. Below 2400' it averages between 15° and 30°C/km. The difference between the March 4, Spafford probe survey and the April 3rd survey is due to the probes not being equillibrated with each other and/or the hole recovering from the thermal shock of drilling. The gradient maximum and roll over at about 1250' relates to three small fracture zones between 1200' and 1250' which are probably water bearing.

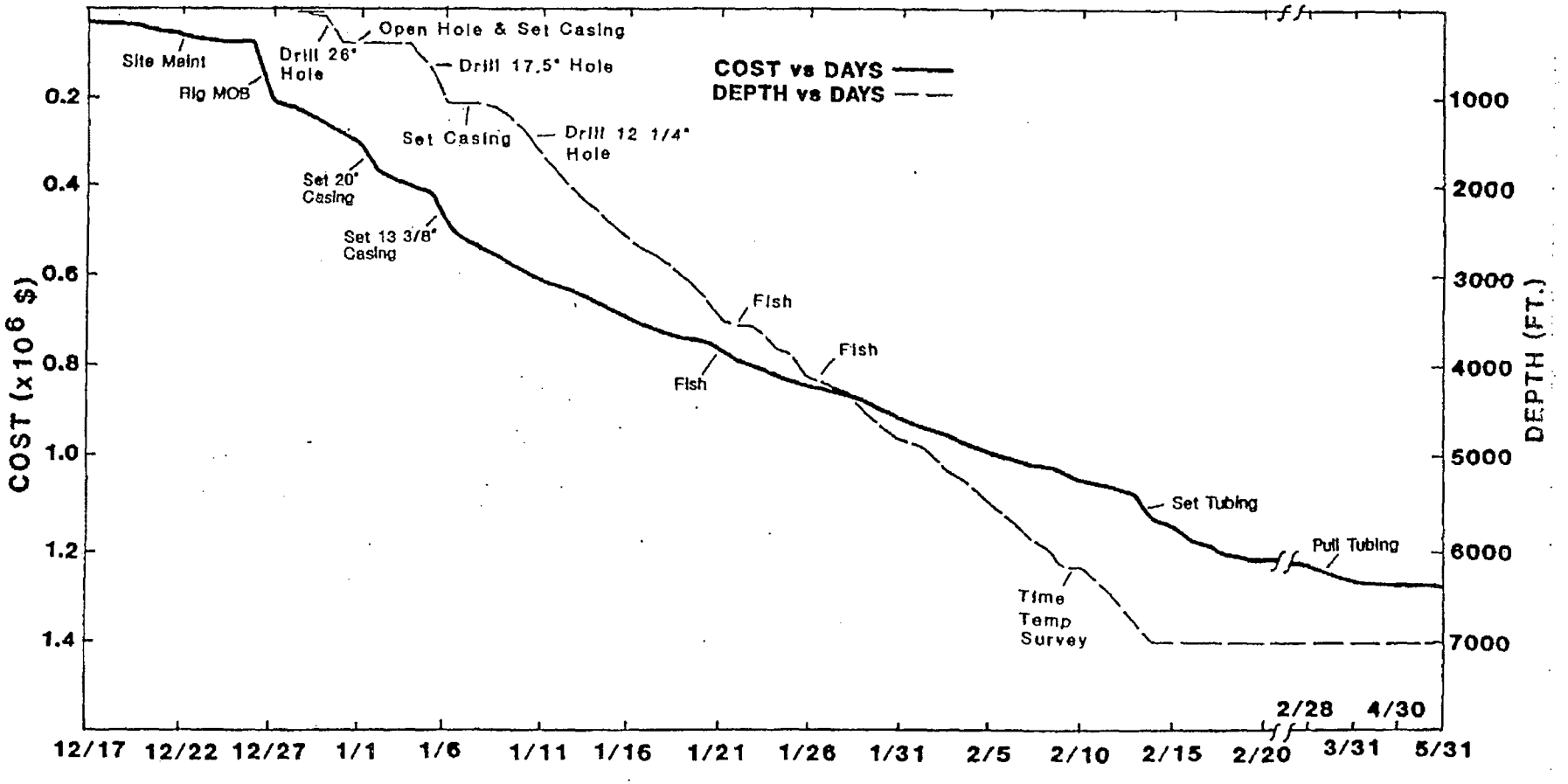


Figure 1. Animas TFD 55-7 Cost-Depth-Time Diagram

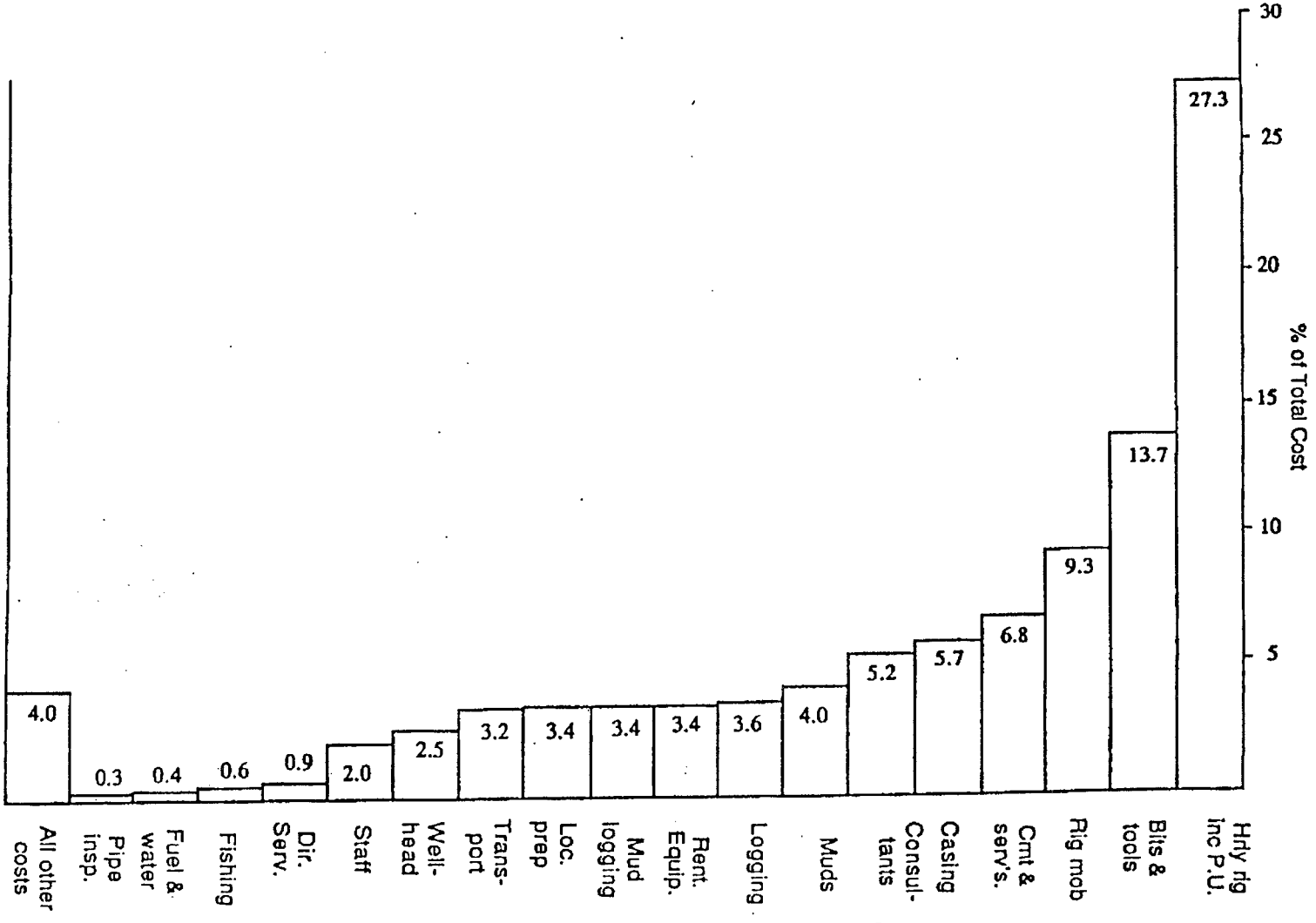
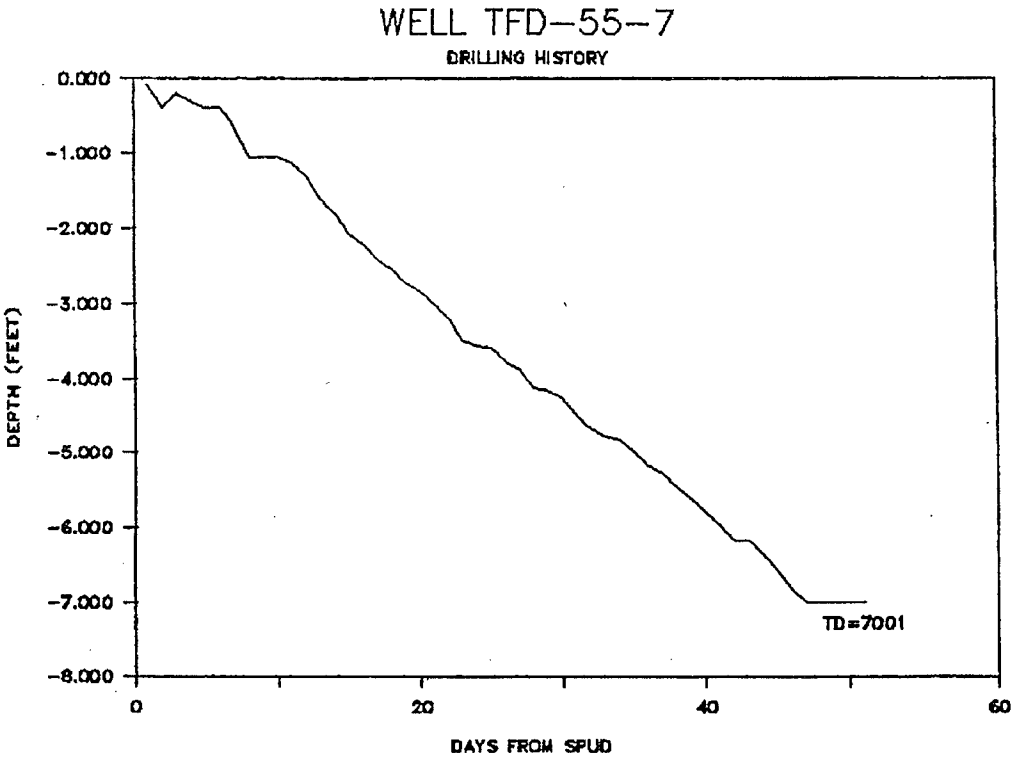
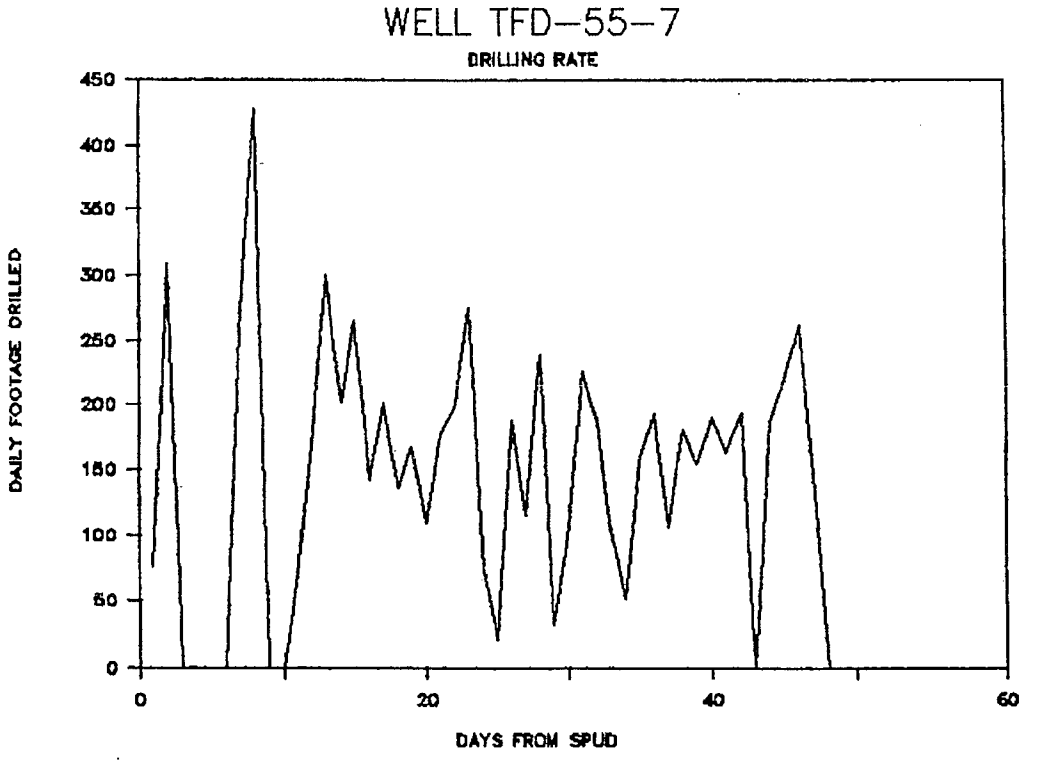


Figure 2. Animas TFD 55-7 Activity Percent Cost

WELL TFD 55-7
Lightning Dock KGRA
Animas Valley, Hidalgo Co., NM

DAY	DATE	DEPTH	FOOTAGE	REMARKS	GENERAL LITHOLOGY
1	29-Dec-84	76	76		Alluvium
2	30-Dec-84	385	309	Drill pilot hole	Volcanics
3	31-Dec-84	212	0	Ream hole for casing	
4	01-Jan-85	320	0	Ream hole for casing	
5	02-Jan-85	384	0	Set 20-in. casing	
6	03-Jan-85	384	0	at 360 feet	
7	04-Jan-85	642	258		Volcanics
8	05-Jan-85	1070	428		|
9	06-Jan-85	1070	0	Set 13-3/8-in. casing	|
10	07-Jan-85	1070	0	at 1050 feet	|
11	08-Jan-85	1140	70		|
12	09-Jan-85	1320	180		|
13	10-Jan-85	1620	300		|
14	11-Jan-85	1822	202		|
15	12-Jan-85	2087	265		Interbedded
16	13-Jan-85	2229	142		limestone and
17	14-Jan-85	2430	201		siltstone
18	15-Jan-85	2566	136		|
19	16-Jan-85	2733	167		|
20	17-Jan-85	2843	110		|
21	18-Jan-85	3020	177		|---dike---
22	19-Jan-85	3220	200		Limestone
23	20-Jan-85	3495	275		|
24	21-Jan-85	3568	73		|
25	22-Jan-85	3589	21		|
26	23-Jan-85	3778	189		|
27	24-Jan-85	3894	116		|
28	25-Jan-85	4133	239		|
29	26-Jan-85	4165	32		|---dike---
30	27-Jan-85	4272	107		|
31	28-Jan-85	4498	226		|
32	29-Jan-85	4684	186		|
33	30-Jan-85	4788	104		|---dike---
34	31-Jan-85	4840	52		|
35	01-Feb-85	4998	158		|
36	02-Feb-85	5192	194		|
37	03-Feb-85	5299	107		|
38	04-Feb-85	5480	181		|
39	05-Feb-85	5635	155		Siltstone
40	06-Feb-85	5826	191		Shale
41	07-Feb-85	5990	164		Limestone
42	08-Feb-85	6184	194		|
43	09-Feb-85	6184	0	Logging	|
44	10-Feb-85	6372	188		|
45	11-Feb-85	6592	220		Dolomite, shale
46	12-Feb-85	6854	262		Granite
47	13-Feb-85	7001	147	TD	|
48	14-Feb-85	7001	0	Logging	
49	15-Feb-85	7001	0	Logging	
50	16-Feb-85	7001	0	Logging	
51	17-Feb-85	7001	0	Rig down	


WELL TFD-55-7
DRILLING HISTORY
0.000
-1.000
-2.000
-3.000
-4.000
-5.000
-6.000
-7.000
-8.000
DEPTH (FEET)
TD=7001
0
20
40
60
DAYS FROM SPUD


WELL TFD-55-7
DRILLING RATE
450
400
350
300
250
200
150
100
50
0
DAILY FOOTAGE DRILLED
0
20
40
60
DAYS FROM SPUD

MEMORANDUM

SUBJECT: Well History TFD Animas 55-7
Hidalgo County, New Mexico (5644A).

DATE: June 13, 1985

TO: H. J. Olson

cc: H. D. Pilkington
J. E. Deymonaz

FROM: Michael Connelly MC

12/17-12/27/84	Willbros rig #1 began mobilization from Lovington, NM on 12/17. It began arriving on the site on 12/19 and finished arriving without incident on 12/27.
12/27-12/29/84	Rigged up and spudded the well at 8 p.m. on 12/29. Well was spudded with a Grant 26" hole opener to center punch the hole. Drilled from 47' to 71'.
12/30/84-1/2/85	Hole opener was pulled and a 17.5" bit was used to drill the hole to a depth of 385'. The 26" hole opener was then picked up and the hole opened to a depth of 212' before the hole opener had to be pulled. A HTC 26" bit was used to finish opening the hole to 385'.
1/2/85	9 joints of 20" 94 lbs. H-40 seamless casing, BT & C, R-3 were run with the float shoe set at 360.28'. Halliburton then pumped 760 sacks of class H cement with 40% silica (SSA-1) plus 2% CaCl.
1/3/85	CIP at 3:30 a.m. WOC 8.5 hrs. and nippled up on 20" Hydril.
1/4-1/5/85	Drilled 17.5" hole from 385' to 1070'. 100 bbls of mud lost at 695' and losing approximately 6 bbls of mud/hr from 695' to 1070'.
1/6/85	Ran 27 joints of 13 3/8" 61 lbs K-55 seamless casing, BT&C, R-3. Set casing shoe at 1050' and float collar at 972'. Halliburton pumped 780 sacks of class H cement with 40% silica (SSA-1) plus 8 lbs of perlite/sack. CIP at 7 p.m. Good cement returns and circulation throughout job.

1/7/85	WOC and nipple up on 13 3/8" wellhead. Test BOP - slow but o.k.
1/8-1/21/85	Drilled 12.25" hole from 1070' to 3568'. Twisted off at 11 p.m. at a depth of 3568'. Able to screw back into a few joints before having to call HOMCO to have a fishing crew sent down.
1/22/85	Fishing was successful at 5:30 p.m. Drilled from 3568' to 3589'.
1/23-1/26/85	Drilled from 3589' to 4165'. Lost 45 bbls at 4065'. Twisted off at 8 p.m. at a depth of 4165'. Had to call HOMCO for a fishing crew again.
1/27/85	Fishing was successful at 1 p.m. Drilled from 4165' to 4272'.
1/28-1/31/85	Drilled from 4272' to 4840' when lead collar washed out. POH, replace collar, RIH.
2/1-2/8/85	Drilled from 4840' to 6184'.
2/9/85	Ran SRC Kuster time-temperature survey. B.H. temperature was 285°F. Two time-temperature surveys were run over a period of 24 hrs.
2/10-2/13/85	Drilled from 6184' to TD of 7001'.
2/14/85	Schlumberger ran the following logs: gama, neutron density, 4 arm caliber with fracture interpretation log, SP, dual induction, sonic, and temperature.
2/15/85	Rig down wellhead and lay down pipe.
2/16/85	Run 90 joints of 2 7/8" tubing. Approximately 3018' shut in well for observation.
2/17-2/18-85	Rig down Willbros #1. Release rig at midnight on February 18, 1985.

MEMORANDUM

3/4/85	Temperature survey/Spafford probe to 2624' inside 2 7/8" tubing.
3/5-3/8/85	Pulling unit brought in pull tubing - install landing nipple; run 6919' of 2 7/8" tubing with sliding sleeves @ 6889', 4385', 2373' and 1381'. Release pulling rig - shut in well for observation.
4/3/85	Temperature survey/Spafford probe to 2000' inside 2 7/8" tubing. Temperature survey/Kuster test to 6919' inside 2 7/8" tubing. Shut in well for observation.

INTER-OFFICE MEMORANDUM

SUBJECT: Review and Evaluation of TFD 55-7, Animas Property, Hidalgo Co., NM (5646A).

DATE: June 13, 1985

cc: H. D. Pilkington
J. E. Deymonaz

TO: H. J. Olson

FROM: Michael Connelly MC

GENERAL:

Animas TFD well 55-7 was spudded at 8 p.m. on December 29, 1984, fulfilling SRC's contractural obligation with Grace Geothermal Corporation to spud before January 1, 1985. The hole was bottomed in Precambrain/granite at a depth of 7001 feet at 11:30 p.m. on February 13, 1985 without encountering high temperatures or large fluid entry zones. The drill rig was on site 47 days from spud-in to TD (Fig. 1). Actual drilling time was 742.75 hours. This represents a total of 28.57 days of drilling. The time difference represents trips to change bits, deviation surveys, fishing, logging and setting casing. This averages to a penetration rate of approximately 10 ft/hr, not counting 41 hours opening the hole. Penetration rate below the intermediate casing varied from 3-35 ft/hr, and averaged 8-10 ft/hr.

The drilling was completed within budget at a cost of approximately $1,448,119. Minor adjustments in these costs may still be necessary.

A percentage breakdown of costs are shown on Figure 2. The well is currently "in suspension" and well costs do not include any abandonment charges.

Generalized Lithology (ft)

0- 145	Alluvium - Light brown to tan, very poorly sorted, subangular to subrounded, predominantly volcanic clasts (tuffs, ash and andesite), contains a soft weathered clay matrix, locally drusy quartz, some hematitie and possibly manganese oxide.

Generalized Lithology (ft)

145-1460	Rhyolitic lithic tuff - Light brown to tan to orange to red, subangular tuff and welded tuff clasts, often brick red due to iron staining, certain horizons are extremely silicified, often contains abundant calcite and clay, commonly contains a trace of magnetite and/or pyrite.
1460-1990	Interbedded lithic tuffs and solution deposits - White to light gray to dark gray, solution deposits are predominantly calcium carbonate, highly fractured with abundant clear to white calcite veining and locally abundant pyrite veining. The tuffs are red to light greenish-brown, often silicified with feldspars and micas altering to clay. This marks the base of the Tertiary section and the top of the Paleozoic section.
1990-2960	Interbedded limestones and siltstones - Light to dark-brown to black, sucrosic texture, hard to very hard, locally silty in places, locally highly fractured with abundant calcite veining, often contains abundant bioclasts and microfossils, pyritic in places.
2960-3200	Intrusive dike - White to light red, mottled green and white, hard with aphanitic groundmass, with freshly altered plagioclase and biotite and muscovite, abundant subeuhedral magnetite, with white to clear calcite veining. Biotite and hornblende commonly altered to chlorite, locally contains a trace of pyrite.
3200-4060	Limestone and small intrusive dikes - Light to medium brown, dark gray, hard to very hard with sucrosic texture commonly recrystallized, interbedded with siltstone, locally abundant microfossils, commonly abundant white calcite veining with a trace of pyrite. 3400 to 3480' section has been silicified into chert. From 3480' to 3560' there is an intrusive dike that has been chloritized.

4060-4760	Intrusive dike and limestone - White to pink, very hard, silicified, aplitic predominantly quartz and feldspar, dissiminated pyrite, propylitically altered, common to abundant chlorite and magnetite, locally minor biotite, trace of pyrite and kaolin, minor calcite veining. Small bed of limestone occurs at 4470' to 4550'; it is light to medium brown, light to dark gray, locally silty, commonly recrystallized, contains fossils, abundant calcite veining with a trace of pyrite.
4760-5780	Limestone - White to light gray to dark gray, hard, brittle, very fine to fine grain matrix with abundant intraclasts, locally soft and friable, minor light brown chert, minor calcite veining, locally dolomite rhombs are visible.
5780-5960	Siltstone and Shale - Siltstone is medium gray brown, moderately hard, well laminated with a fissile appearance, slightly to highly calcic, trace of calcite microveining, rare, very fine grained pyrite. Shale is dark gray to black, very fine grained with calcite cement, dark gray to black organic matter, predominantly blocky with a trace of calcite veining and rare disseminated pyrite.
5960-6530	Limestone and dolomite - Medium to dark gray, white, tan, hard brittle, locally granular in appearance, cherty with interbedded silica, trace of disseminated pyrite, trace of microfossils, minor calcite veining. At 6470' to 6490' solution deposit, tan to white cryptocrystalline highly fractured.
6530-6630	Intrusive - Light to medium green, hard, fine grained, altered appearance common to abundant disseminated magnetite, common chlorite, trace epidote, minor calcite, microveining, trace of disseminated pyrite.
6630-6800	Dolomite and shale - Light gray to gray moderately hard, recrystallized granular texture fractured with trace of disseminated pyrite. Shale is black, soft to moderately hard and slightly fissile.

6800-6860	Sandstone - Clear to white with a minor gray green cast, fine to medium grained quartz subangular to round, moderately well sorted, minor chlorite, trace vein calcite, trace of disseminated pyrite. Probably the Bliss sandstone.
6860-7001	Granite - Light pink, white to light green, hard, hypidiomorphic texture, moderately fractured with minor kaolin and chlorite fracture fill, trace of calcite and hematite, rare pyrite. PRECAMBRIAN BASEMENT.

RESULTS OF DRILLING AND LOGGING:

Drilling

The target area for this hole was a Basin and Range westward dipping fault located to the east of the drill hole. This fault is located approximately .5 miles to the west of the drill site, and is a subsidiary to the major range front fault forming the Animas Valley. No major faulting was intersected while drilling. There were, however, minor drilling breaks at 220', 270', 345', 550', 680', 880', 920', 940', 1020', 1190', 1430', 1580', 1690', 1880', 3075', 4095', 4470', 5970', 6650', and 6680'. Hole deviation does not correlate with these drilling breaks. A plan map and vertical cross-section of the well is shown in Figure 3. The last survey was taken at 6956'. The vertical depth of the well is approximately 6,972 feet. The vertical drift angle was fairly constant between 1031' and 5536', varying between 0.5° and 3.75°. From 5536 feet to TD, the drift angle increases from 3.75° to 16.24°. The angle increases because the bottomhole assembly was made more flexible rather than due to structural or lithologic effects.

Temperature logs

Figure 4 shows the results of the temperature surveys including mud in and mud out temperatures. The highest temperature recorded is 326°F at 6919' feet on the April 3, Kuster time-temperature survey. Bottom hole temperatures for the Schlumberger survey are 238°F. The April 3, Kuster survey temperature gradient projects to 350°F at 8700-9600 feet. However, if this temperature is corrected to the Spafford probe measurements taken on the same date the thermal gradient projects to 350°F at 9400-10650 feet. The highest geothermal gradient below the

13 3/8" casing is between 1030' and 1300', where it averages between 100°-110°C/km. The thermal gradient turns isothermal from 1300' to 2400'. Below 2400' it averages between 15° and 30°C/km. The difference between the March 4, Spafford probe survey and the April 3rd survey is due to the probes not being equillibrated with each other and/or the hole recovering from the thermal shock of drilling. The gradient maximum and roll over at about 1250' relates to three small fracture zones between 1200' and 1250' which are probably water bearing.

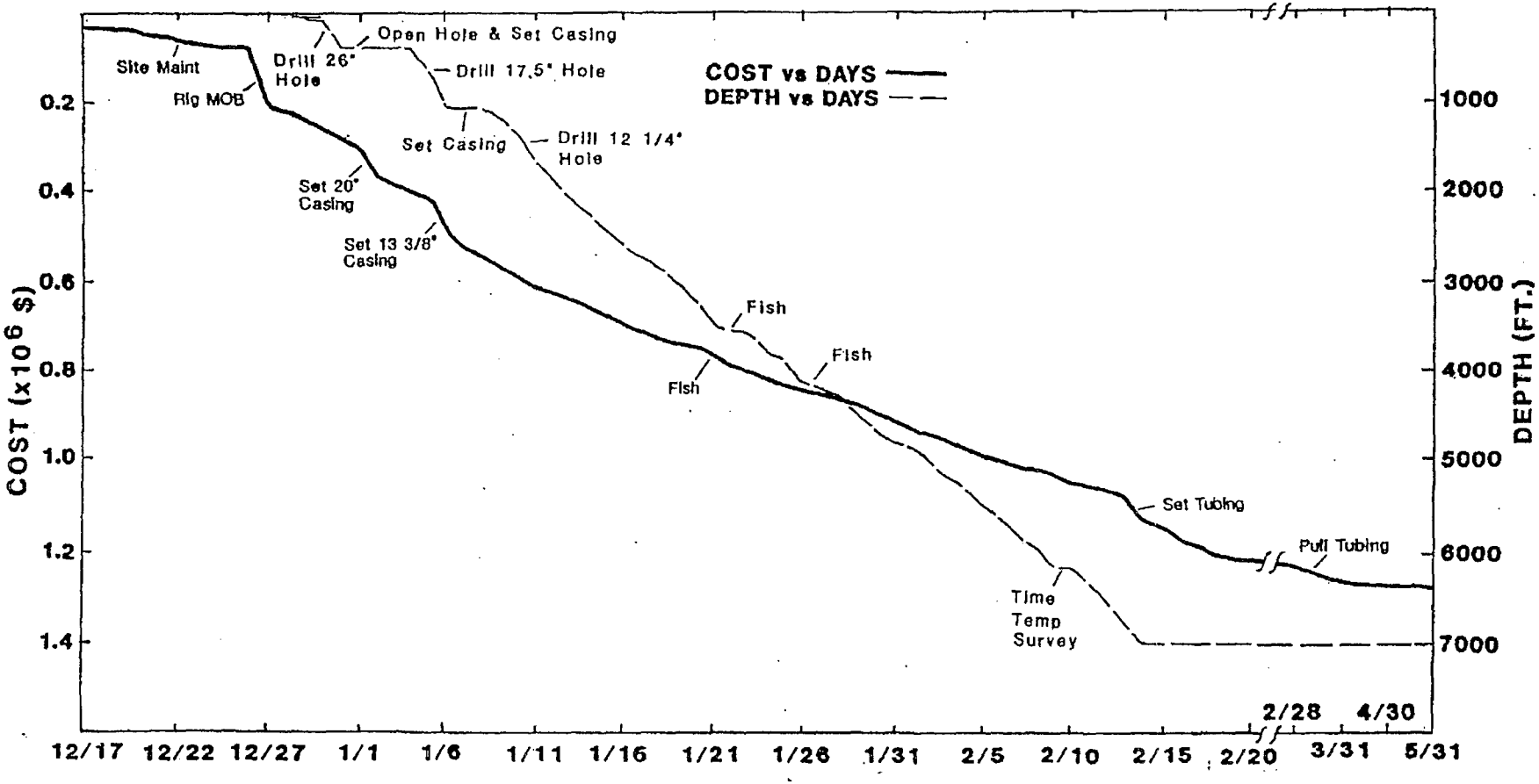


Figure 1. Animas TFD 55-7 Cost-Depth-Time Diagram

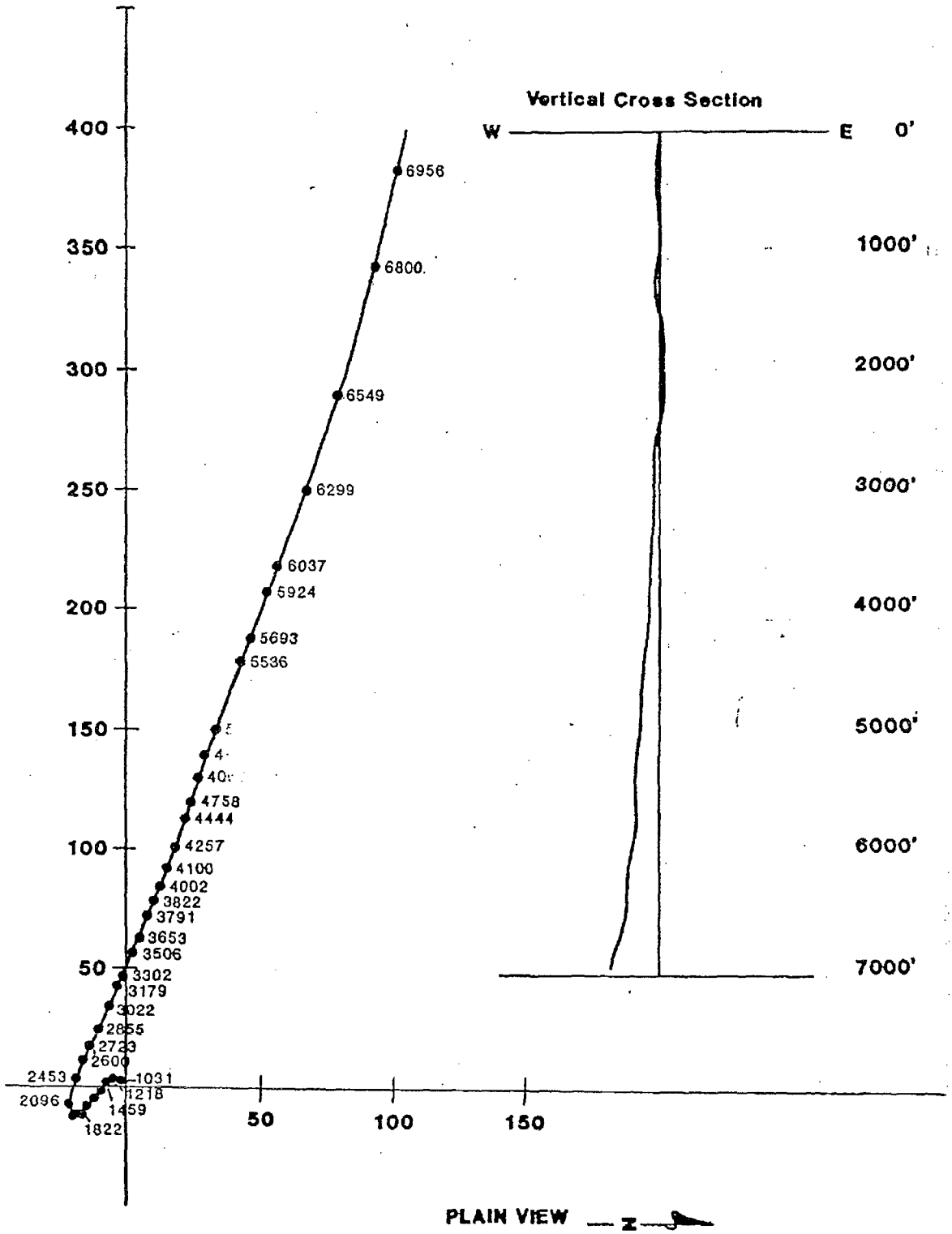


Figure 3. Animas TFD 55-7 Plan View and Vertical Cross Section

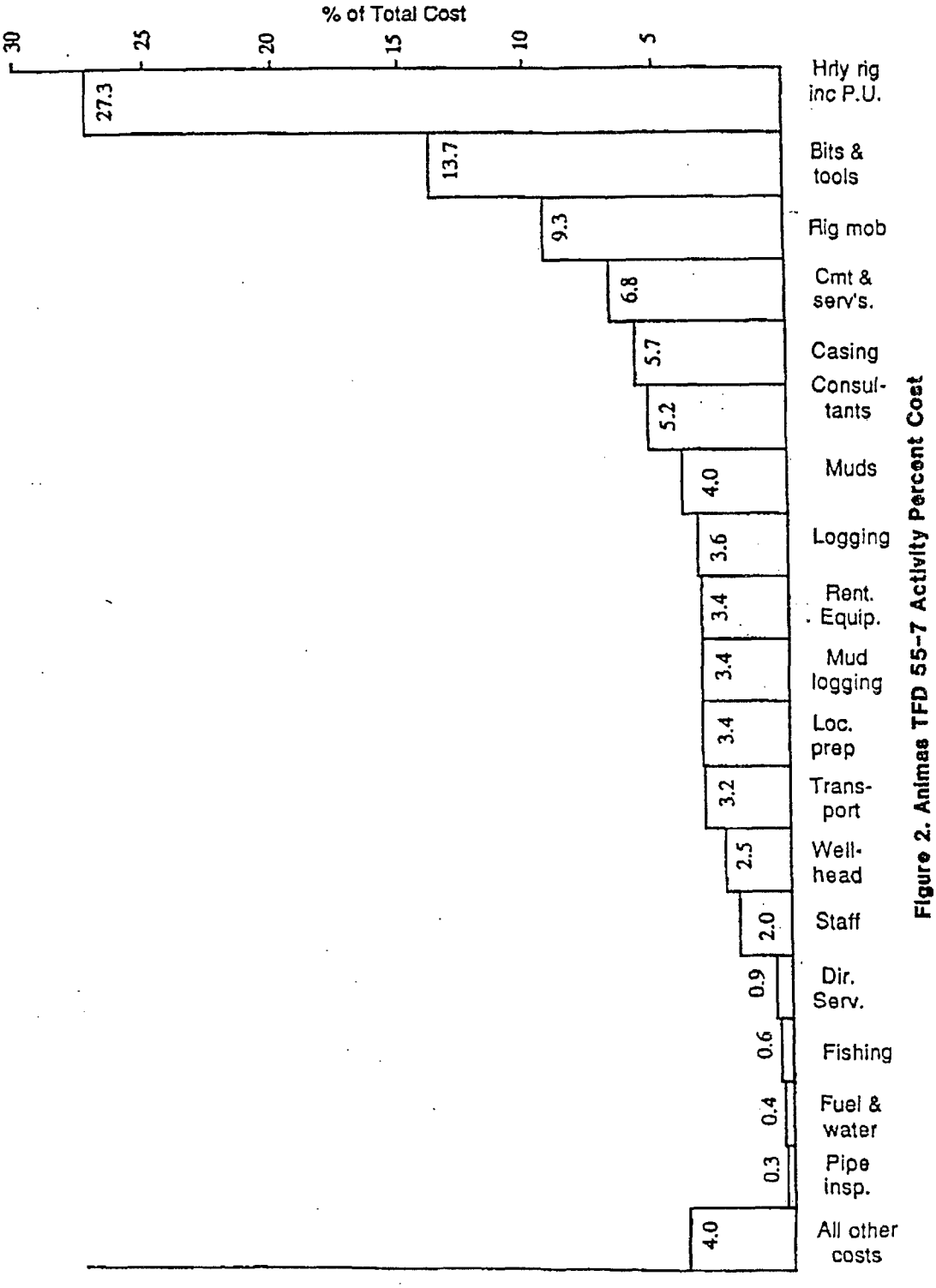


Figure 2. Animas TFD 55-7 Activity Percent Cost

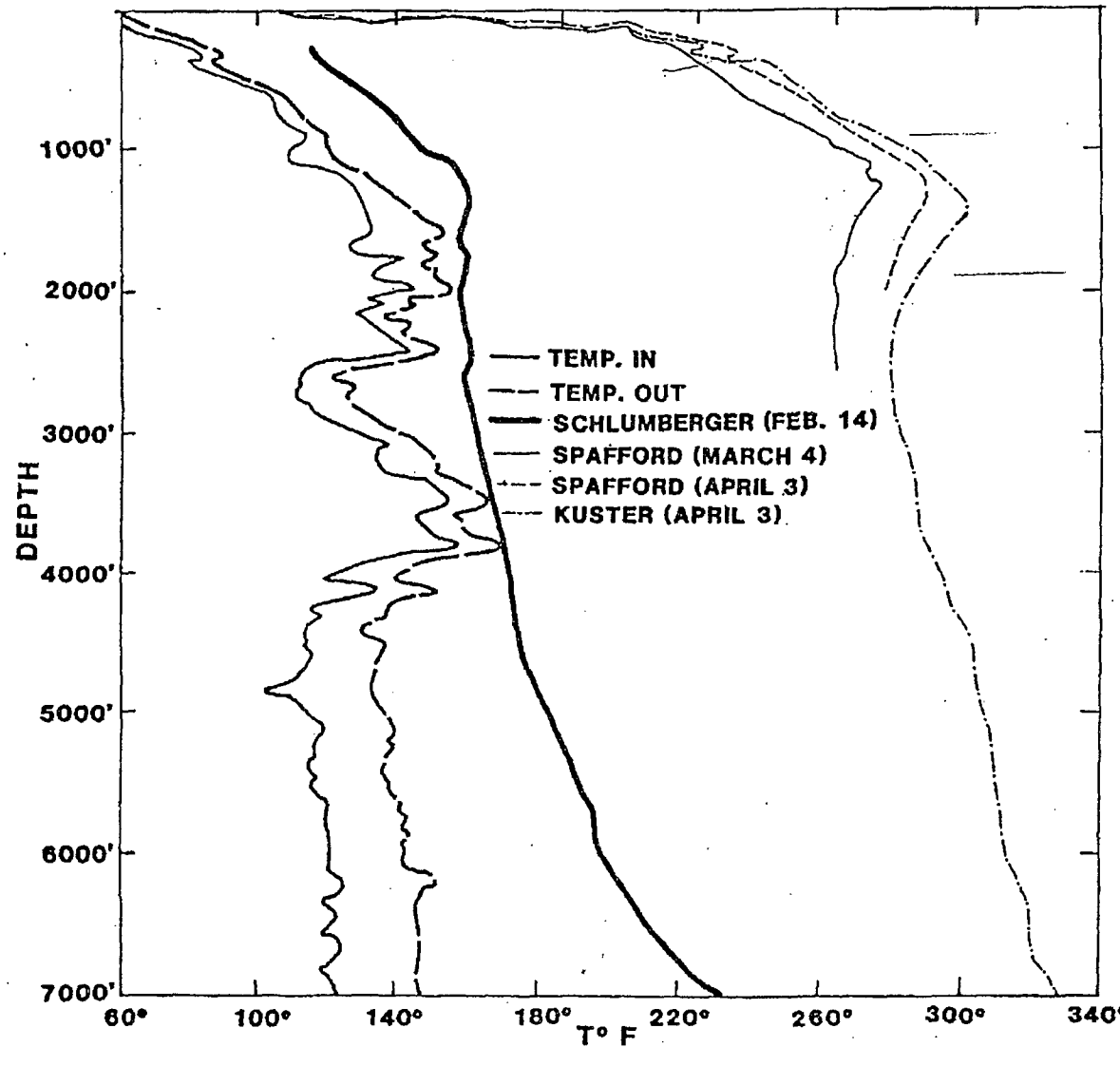


Figure 4. Animas TFD 55-7 Temperature Surveys

EXLOG SMITH GEOTHERMAL DIVISION — R.F. SMITH CORP. — GEOTHERMAL DATA LOG

COMPANY Steam Reserve Corp.
WELL Anivas #5-7
FIELD Lightning Dock
COUNTY Hidalgo STATE New Mexico
LOCATION NW ¼ SE SEC 7 T25S R19W
ELEVATION 4201'+ 19' to KB ☒ DF ☐ GL ☐
CONTRACTOR/RIG Will Brothers
SPUD DATE 12/29/84 TD DATE 2/11/85
TD 7001' TRUE VERT DEPTH
BOTTOM HOLE LOCATION
WELL STATUS
COMPANY REPRESENTATIVE Otis Day

LOG INTERVAL
DATE LOGGED 12/29/84 to 2/11/85
DEPTH LOGGED 56' to 7001'
MUD DRILLING 56' 7001'
AIR DRILLING
TEMPERATURE INSTRUMENT TYPE T-thermocouple
PRESSURE INSTRUMENT TYPE
GAS TRAP-AGITATOR ELEC ☐ AIR ☒
LOG SCALE 1:600 UNIT NO. 321
LOG PREPARED BY Manuel A. HernAndez
Frank Gonzalez, Ed Zifcheck

HOLE SIZE / CASING RECORD
— to — / 30" at 30'
26" to 385' / 20" at 360'
17½" to 1072' / 13 3/8" at 1070'
— to — / — at —
— to — / — at —
— to — / — at —

ENTRIES-WATER/STEAM

■ = TESTED ZONES

LOST CIRCULATION ZONES

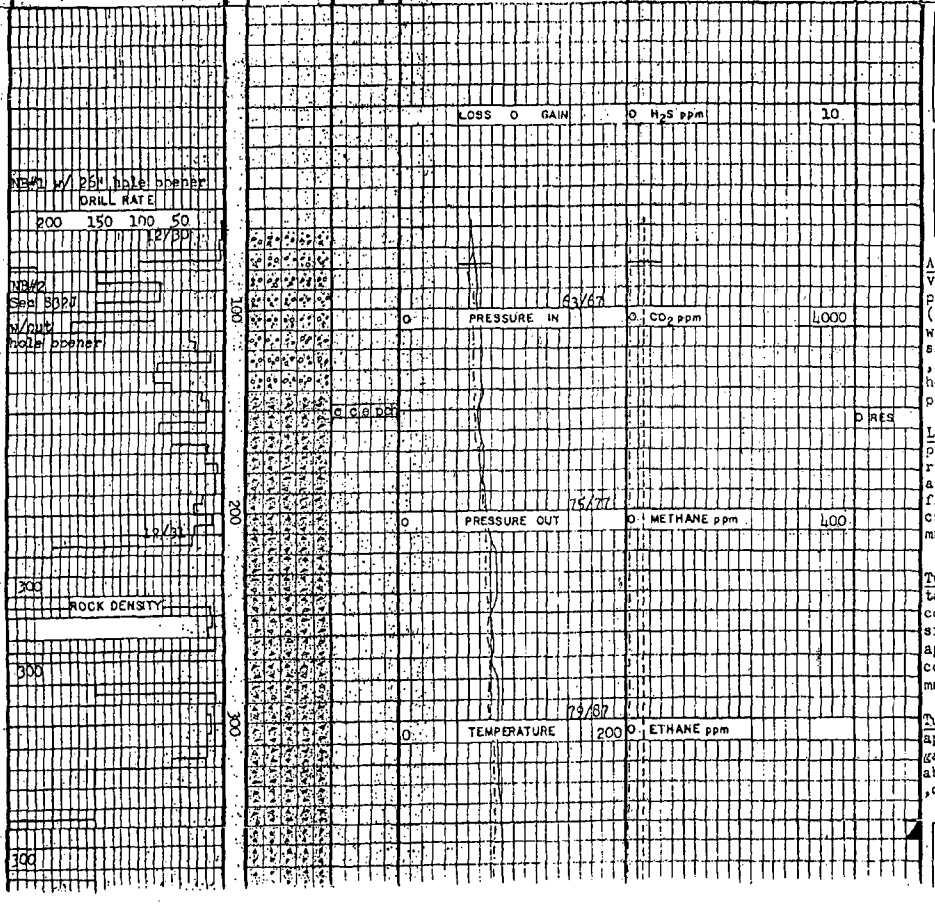
MISC. REMARKS

LITHOLOGY SYMBOLS
Breccia; Tuff and tuff-breccia; Conglom.
Graywacke; Sandstone; Siltstone
Claystone Argillite; Limestone Dolomite; Chert
Solution Deposit; Mineralized Zone; Granitic Rock
Intermed Igneous; Basic Igneous; Peridotite
Acidic Volcanic; Intermed. Volcanic; Basic Volcanic
Porphyry; Serpentine; Schist Gneiss

SECONDARY MINERALS
Q = QUARTZ; C = CALCITE; P = PYRITE; E = EPIDOTE
clr chlorite

NB NEW BIT; RRB RE-RUN BIT; CB CORE BIT; WOB WEIGHT ON BIT; RPM REVS PER MINUTE; SPM STROKES PER MINUTE; CFM CUBIC FT PER MINUTE; NR NO RETURNS; C CARBIDE TEST; LAT LOGGED AFTER TRIP; BHT BOTTOM HOLE TEMPERATURE; TC TIME SINCE CIRCULATION
W MUD DENSITY #/gal; V FUNNEL VISCOSITY; PV PLASTIC VISCOSITY; YP YIELD POINT; F FILTRATE API; FC FILTER CAKE; SOL SOLIDS- %; SD SAND CONTENT- %; S SALINITY- PPM Cl; CA CALCIUM- PPM Ca; RM MUD RESISTIVITY
WIRELINE LOG RUN; CASING SHOE; WATER/STEAM ENTRY; CORED INTERVAL; NO RECOVERY; ORIFICE/FLOW TEST

DRILL RATE ft/hr ☒ min/ft ☐ m/hr ☐ min/m ☐
ROCK DENSITY (g/cc)
DEPTH
LITHOLOGY
SECONDARY MINERALS
TEMPERATURE °C ☐ °F ☒ IN — OUT —
PRESSURE KSC ☐ PSI ☐ IN — OUT —
LOSS/GAIN M³ ☐ BBLS ☐
H_2S ppm
CO_2 ppm
METHANE ppm
ETHANE ppm
SURVEYS
RESISTIVITY Ω-M
LITHOLOGY DESCRIPTION AND REMARKS



Note: Secondary minerals expressed in direct percentages, e.g., 1=1% etc; "~" = trace, "+" = greater than 9%.

Note: Set 30" surface conductor @ 30'. Spud in on 12/29/84 w/ 17½" bit & 26" hole opener, begin logging f/56'.

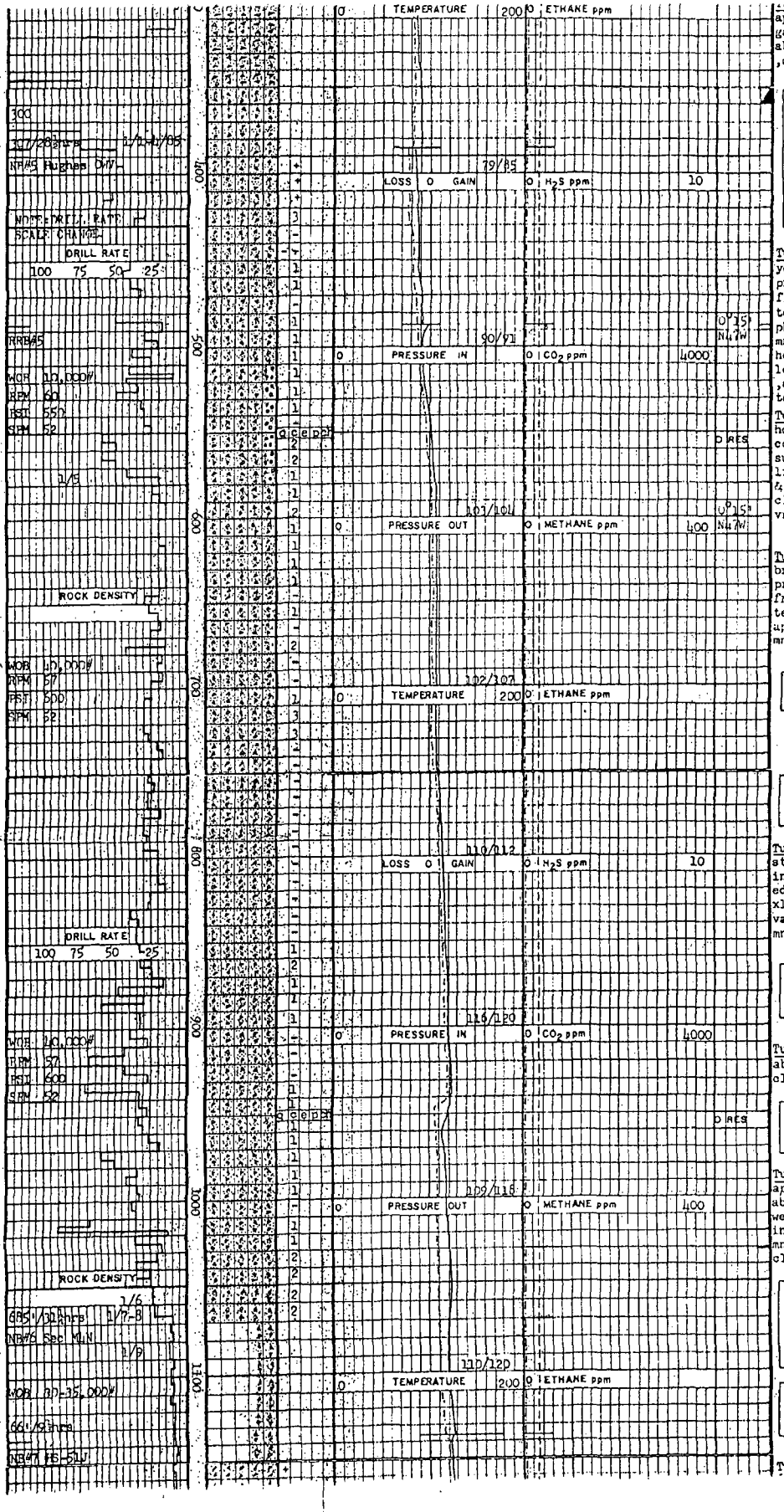
Alluvium: pred orng-yel v prly srtd fn-v crs, pred volcanic clasts (tuffs, ash & andesite) w/ comm-v abdnt wht yel sft clay mtrx, r clr qtz, r loc drusy qtz; comm hematite, mnr poss psilomelane.

Lithic Ash Flow Tuff?: pred lt-red orng, abdnt rndd clasts, cong-sandy? apparent pore space, fria-v hd; prly-v well cnsldtd; comm sft clr mnrl lining grs, mnr clay

Tuff: red orng, red brn, tan, wht, pred trans w/ comm earthy app, highly silic w/ 10-20% clay, aphan-sucrosic text w/ comm qtz & felds phenos mnr-comm rhyolite frags

Tuff: red, red brn, staine appr, tan, wht, comm elongated gr struc, comm-abdnt silic & lith frag, decr clay content.

Note: Drilled 17½" hole f/ 78' to 385', POH, riz up 26" hole



appr,tan,wht,comm elongated gr struc,comm-abdnt silic & lith frag,decr clay content.

Note:Drilled 17½" hole f/ 78' to 385', POH,rig up 26" hole opener & drill out to 385';used bit #3 & NB#4. POH & set 20" casing @ 360'. Drill ahead w/ 17½" bit.

Tuff:red,orng,pink,brn,yell & mnr purp,v hd, pred welded w/ comm flow banding,comm xln text w/ felds & qtz phenos,comm lith frags, mnr-comm dissem subhdrl hem,mnr calc vng,mnr loc inthdd Ash:pred wht ,silic w/ v fn sucrose text.

Tuff:red,pink,tan,hd-v hd,pred welded text; comm-abdnt cong appr w/ subrnd-rnd clasts,abdnt lithic frags(igns extr & igns intr)abdnt red clay,tr-mnr clr calc vng.

Tuff:pred red to red-brn,com wht to tan, pred welded lithic frags,com-abdt xln text,mod hd,com frac'd appear,oxid appear,tr-mnr clr calcite.

Note:100 bbl mud loss @ 695'.

W 9.1 V 50 PV 20 YP 14 pH 10 Fil 13 Cl 700 Slds 5%

Tuff:brick red due Fe stn,sub ang-rnd clasts in clay mtrx,pred welded w/ mnr rhyolite & xl tuff clasts,colors vary,tr calc frac fill, mnr dissem subhdrl hem.

Note:Losing approx 6 bbls/hr drilling fluid f/ 695'.

Tuff:prcd cont'd as above w/ incr igns intr clasts.

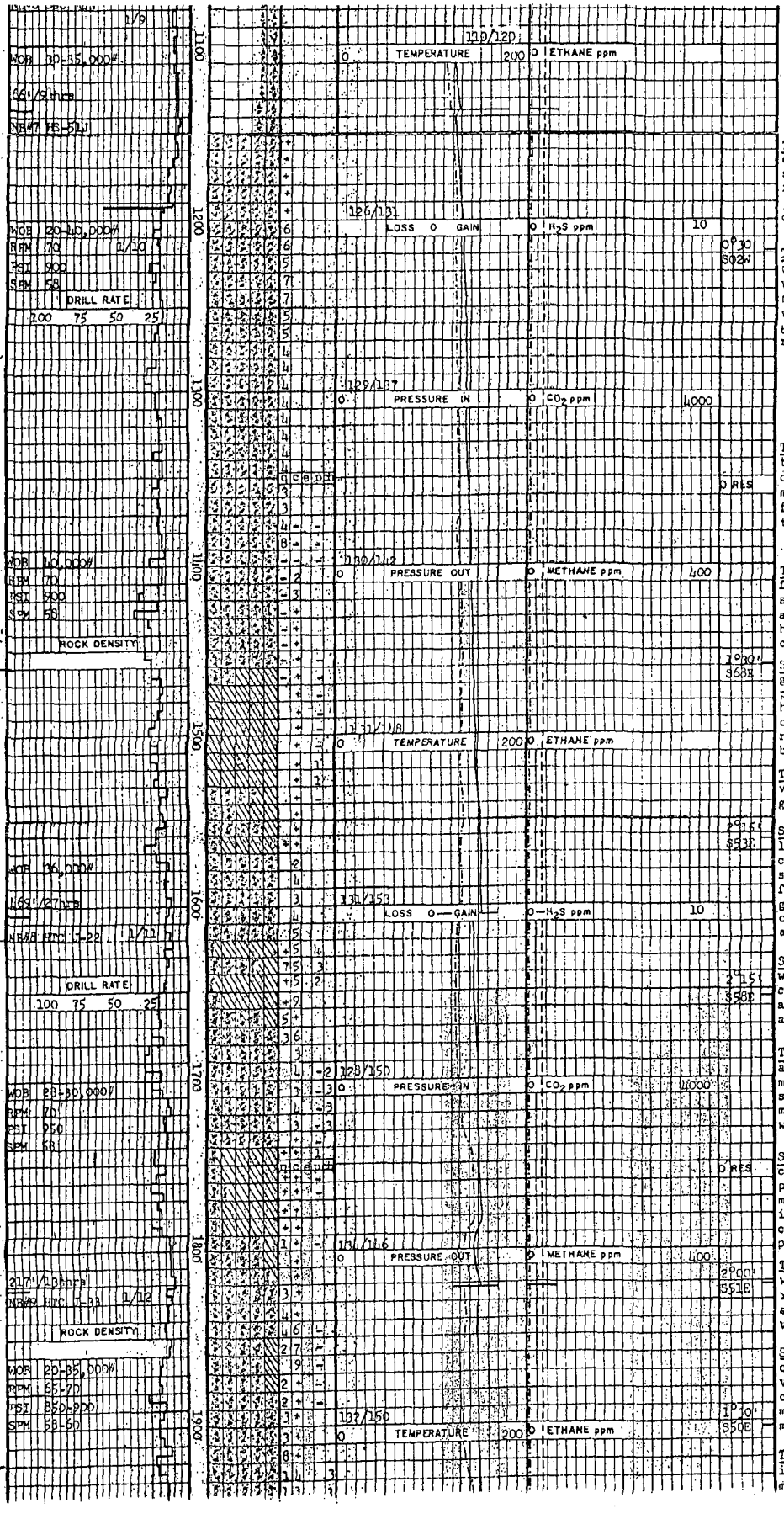
Note:Temp drop due add H_2O to build volume.

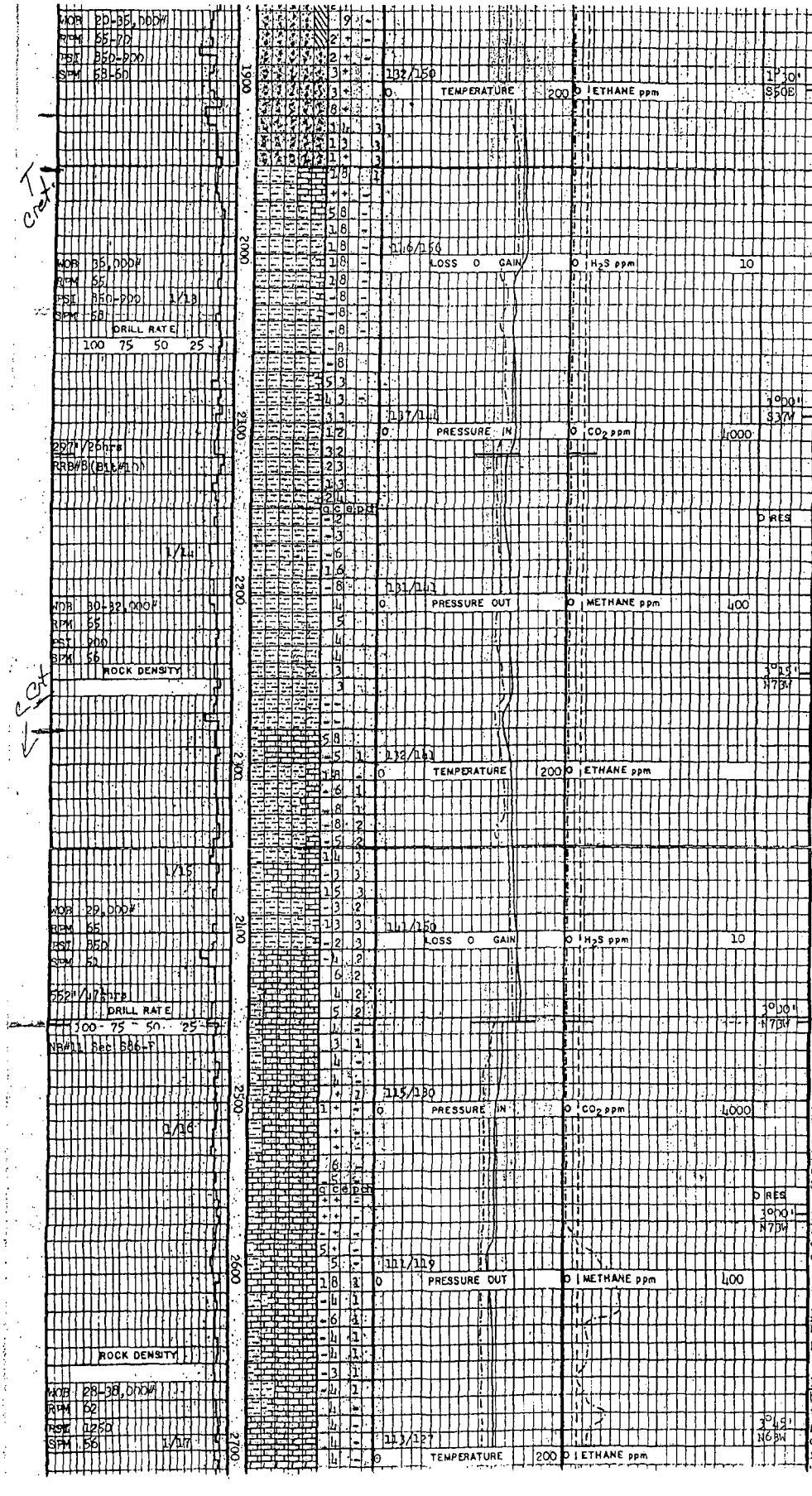
Tuff:red brn-red,oxid appr,cong-sandy appr, abdnt lithic frags(tuff welded & xln,ash,igns intr & r breccia),tr-mnr calc frac fill,r clr qtz,tr-mnr hem.

Note:Drilled 17½" hole to 1070',set 13 3/8" casing @ 1070'. Begin Drilling 12¼" hole.

Note:cement present in cuttings f/ 1080-1150'.

Tuff: pred red,mnr brn,


1070': Begin Drilling 12¼" hole.
Note: cement present in cuttings f/ 1080-1150'.
Tuff: pred red,mnr brn, oxid appr,pred cong-sandy appr,abdnt lith frags w/ mnr brecc app ,v highly silicic w/ r drusy qtz,comm mag.
Tuff:pred red brn,oxidized appearance,mnr wht,tan,fn gr xln text, mod silicic,decr silica w/ depth,sft-mod hd, granular appr,comm mag, r-tr calcite.
W 9.1 V 40 PV 14 YP 7 pH 9.5 Fil 10.4 Cl 600 Slds 4%
Tuff:red-brn,gry,wht, tan,granular appr,cont decr silica,v sft-sft-mnr hd,comm-abdnt lith frags,comm mag,tr pyr tr-comm poss kaolin.
Tuff:lt grn gry-red brn fria,highly calcic,com sft blk mnrl,comm slty appr(lt gry grn),loc highly alt w/ v abdnt clay.
Solution Deposit:lt-red gry,pred mass appr, pred calcium carbonate, highly frac w/ v abdnt clr-wht calc vng,loc rexln appr,loc comm blk sft mnrl.
Tuff:v highly altered, v highly calcic,red grn,abdnt clay,sft
Solution Deposit:@ 1570' pred clr qtz w/ calc frac fill,abdnt sft blk mnrl,highly fractured. Tuff:red-lt grn-brn,highly altrd & oxid appr,sandy-slty appr-w/ abdnt clay.
Solution Deposit:clr-wht-lt tan,pred qtz w/ calc,highly frac,loc abdnt sft blk mnrl,loc abdnt pyr vng.
Tuff:wht w/ grn mottled appr,pred xln text w/ mnr poss felds phenos, sft-hd,comm-abdnt calc micro vng,abdnt mag w/ wht mnrl aureoles.
Solution Deposit:Pred calc w/ abdnt clr qtz, pred tan,rexln appr w/ mnr calc frac fill, intercalated wht-clr cryptoxln silica,r-tr poss forams?.
Tuff:variable color, wht,grn,red,brn,pred xln,mnr pumaceous appear,com sandy appear v calcareous,r-tr pyr.
Solution Deposit:pred calc w/abdt clr qtz, v fn-fn gr calcite w/ com clr calcite x-tals, mnr-com blk mnrl(poss magnetite),tr-mnr pyr.
Tuff:gry brn,gd welding xln text,abdnt sl-mod alt felds phenos



Solution Deposit: pred calc w/abdt clr qtz, v fn-fn gr calcite w/ com clr calcite x-tals, mnr-com blk mnrl (poss magnetite), tr-mnr pyr.

Tuff: gry brn, gd welding xln text, abdnt sl-mod alt felds phenos, comm alt mica, mnr lith.

Siltstone: pred gry, tr red, mod hd-hd, v fn-fn gr, abdnt clay, loc abdt sft blk mnrl, highly calcic, loc highly silic (poss frac fill), comm tuff frags poss slough.

Note: Temp variation due dump pits & add H_2O to keep drlng fluid conditioned.

W 9.4 V 38 PV 16 YP 5 pH 11.5 Fil 8.4 Cl 770 Slds 6%

Note: Dumped pits during trip. Temp drop due to adding water & new mud to build volume.

Siltstone: pred gry, mnr wht, pred fn gr w/ mnr v fn gr, fria-v sft-mod hd, v calcic, pred fissile, comm-abdnt sft blk mnrl.

Siltstone: pred gry w/ loc abdnt wht due calc cmnt, v fn-fn gr, mnr clay tr poss kaol, v highly calcic w/ abdnt calc vng.

Siltstone: pred blk, mnr dk gry brn, mod hd sl fissile, highly calcic, tr silic frac fill.

Note: lost 85 bbls drlng fluid f/ 2275 spot LCM pill.

Limestone: f/2290'-2360' lt-dk brn, pred rexln sucrosic text, hd-v hd, loc abdnt microfossils, abdnt wht-clr calc vng, sl silic.

W 9.1 V 38 PV 12 YP 4 pH 11 Fil 10 Cl 500 Slds 3%

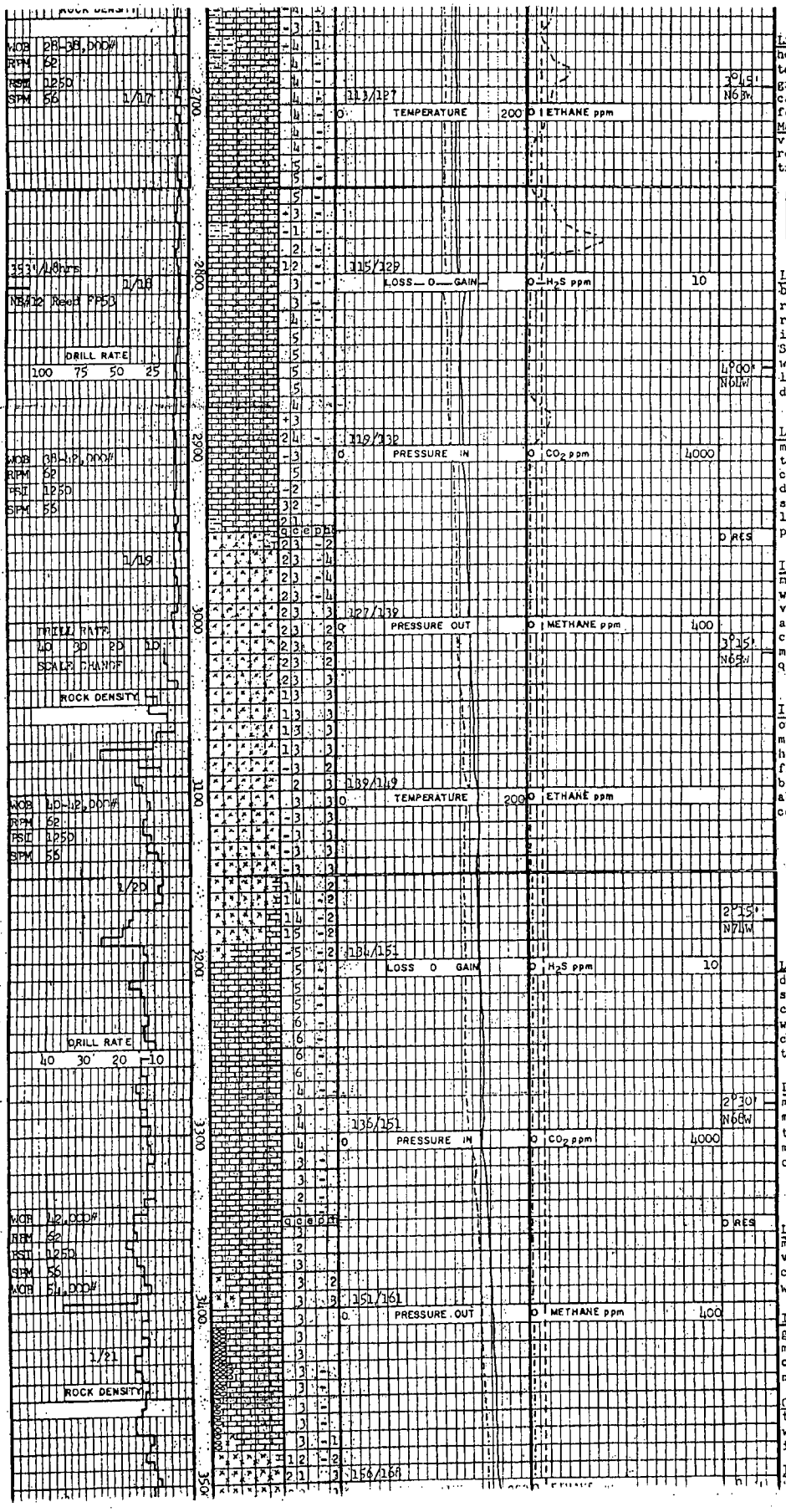
Note: POH, chng bit & BHA to decrease angle, rig up mud cooler.

Limestone: lt-dk brn, v highly frac, tr-mnr bioclasts, loc slty-sandy Marl, grades & intbds w/ mnr highly calcic sft Siltstone.

Limestone: pred lt tan, mnr dk brn, loc v abdnt cryptoxln lt blu silica w/ v abdnt bioclasts, tr carbonized plant material.

Limestone: pred dk brn, hd-v hd due sl silic, pred slty.

Limestone: mod-dk gry, hd-v hd, pred sucrosic text, loc rexln fn-med gr, com-abdnt wht-clr calc vng, loc tr microfossils, tr pyr, assoc w/



Limestone:med-dk gry, hd-v hd,pred sucrosic text,loc rexln fn-med gr,com-abdnt wht-clr calc vng,loc tr microfossils,tr pyr,assoc w/ Marl:lt brn-lt gry,sl-v hd,com mottled,com rexln,abdnt calc vng, tr pyrite.

W 9.1 V 46 PV 15 YP 7 pH 10 Fil 6 Cl 370 Slds 4%

Limestone:pred lt-med brn,mnr dk gry w/ sucrosic text,sl-v hd,com rexln,comm mottled,loc intbdd w/ mnr Marl & Siltstone,comm-abdnt wht calc vng,tr clr, loc tr microfossils,tr dissem pyrite.

Limestone:lt brn-brn, mnr dk brn,hd-v hd due tr-loc v abdnt lt brn cryptoxln silica w/ dolo rhombs as inclusions,loc highly frac, loc comm bioclasts,tr pyr vng.

Intrusive Dike:interm-med,lt pnk-lt gry mott w/ grn & wht,hd-v hd, v fn-fn gr grndmass w/ abdnt feld phenos,mnr-comm chlrtzd hnblnd, mnr calc,mnr mag,tr qtz,loc tr pyr.

Intrusive Dike:pred lt orng poss due Fe stn, mott w/ grn & wht,pred hd,aphan grndmass w/ fresh-alt plag & alt bio & tr musc phenos, abdnt subhdrl-euh mag, comm wht/clr calc vng.

Note:Temp incr due inefficient cooling by mud cooler.

W 9.4 V 44 PV 17 YP 6 pH 10.5 Fil 6.4 Cl 600 Slds 6%

Limestone:lt-med brn, dk gry,hd-v hd;pred sucrosic text,com rexln com mottled,loc intbdd w/mnr marl & sltstn, com-abdnt wht calc vng, tr dism pyrite.

Limestone:pred lt tan, mnr dk brn-blk,pred hd, mnr v hd,pred sucrosic text,rexln,loc abdnt microfossils,comm wht calc vng,tr pyr.

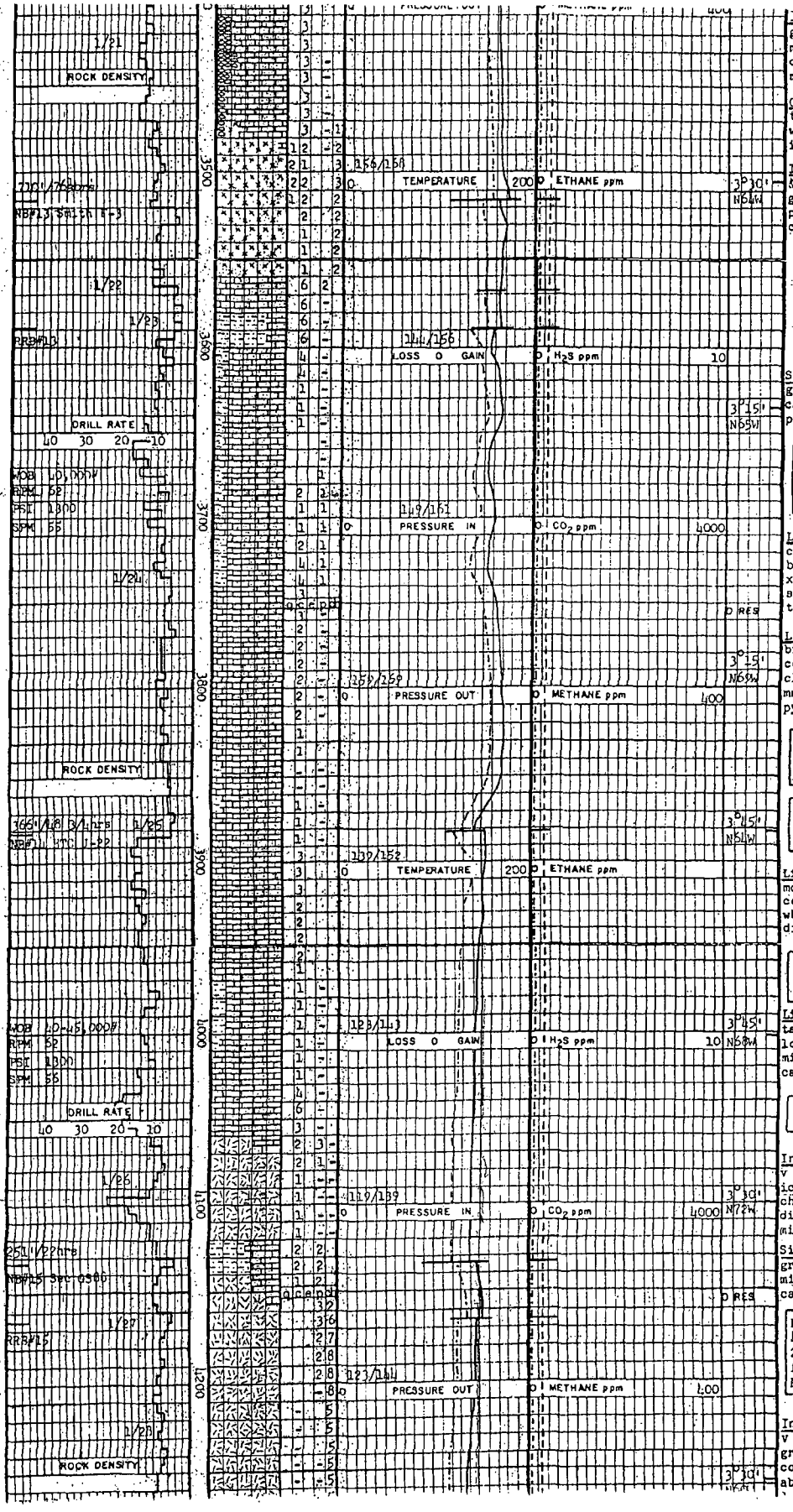
Note:Temp incr due mud cooler down.

Limestone:pred lt brn, mnr blk & sl slty,hd-v hd due loc sl silic, comm bioclasts,comm wht-clr calc vng.

Intrusive Dike:med-dk grn,hd-v hd,aphan grndmass w/abdnt feld phen, comm chlor,mnr calc, mnr mag,tr pyrite.

Chert:lt-med brn,v hd, transluscent,loc frac w/calc microvng,tr pyr, intbdd w/lmstn a/a.

Intrusive Dike:gry,grn,



Intrusive Dike: med-dk grn, hd-v hd, aphan grndmass w/abdnt feld phen, comm chlor, mnr calc, mnr mag, tr pyrite.

Chert: lt-med brn, v hd, translucent, loc frac w/calc microvng, tr pyr, intbdd w/lmstn a/a.

Intrusive Dike: gry, grn, & wht, hd-v hd, aphan grndmass w/abdnt feld phenos, com chlor, mnr-comm mag, mnr calc vng.

Note: twist off at 3568', twisted off 10 stnds & 1 sngl f/kelly, fishing, POH w/fish, RIH.

Siltstone: dk gry, v fn gr, blocky, sft, v calcareous, tr-mnr dism pyr.

Note: temp changes due to erratic efficiency of mud cooler.

Limestone: med brn w/ comm fusilinids, tan-lt brn comm mottled & rexln, intbdd w/calc slt-stn, mnr-comm calc vng, tr pyrite.

Limestone: lt tan-lt brn, sl-v hd, comm mott, comm rexln, mnr-loc com clr & wht calc vng, loc mnr fusilinids, tr dism pyrite.

W 9.4 V 39 PV 11
YP 5 pH 11.5 Fil 6.6 Cl 500 Slds 5%

Note: temp decrease due to mud cooler on.

Limestone: tan-lt brn, mod hd, comm rexln, loc comm fusilinids, tr-mnr wht & clr calc vng, r dism mag, loc r pyr.

W 9.3 V 41 PV 18
YP 11 pH 11 Fil 6.8 Cl 600 Slds 4%

Limestone: lt brn-grn, tan, mod hd, loc brittle, loc sft, comm rexln, abdt microfossils, tr wht vn calcite, r-tr fn gr pyr.

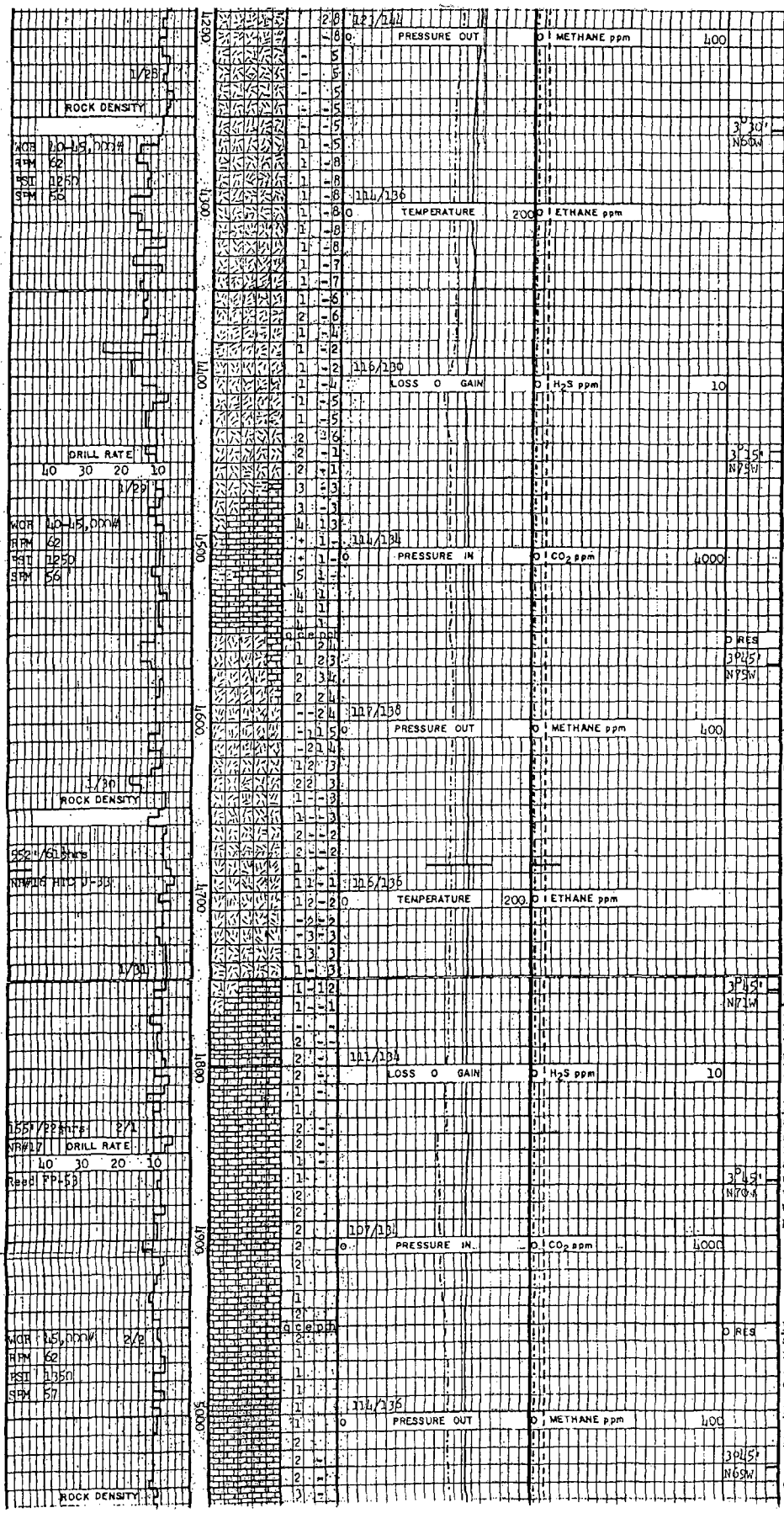
Note: 45 bbl mud loss @ 4060'.

Intusive Dike: wht-pnk, v hd, silicified, aplitic, pred qtz & feld, tr chlor, tr dism mag, r dism pyr, tr-mnr calc microvng.

Siltstone: dk gry, v fn gr, pred massive w/ loc microlams, mod-v hd, calcic, tr dism pyr.

Note: twist off @ 4165', twisted off 29 stnds f/kelly, fishing, POH w/fish, RIH w/bit #15.

Intrusive: wht-pnk, hd-v hd, granitic, fn-med gr, pred qtz & k-feld, comm-abdt chlor, comm-abdt mag, loc comm hnblde



fishing, POH w/fish, RIH w/bit #15.

Intrusive: wht-pnk, hd-v hd, granitic, fn-med gr, pred qtz & k-feld, comm-abdt chlor, comm-abdt mag, loc comm hnbld loc mnr biot, tr pyr, tr -mnr calc vng.

Intrusive: wht-lt grn-pnk, hd, granitic, v fn-fn gr, pred qtz & feld, abdnt chlor, mnr-comm mag, tr-mnr calc vng, tr pyr, tr kaolin.

Intrusive: pred wht, mnr lt grn-pnk, hd, decr granitic appr w/incr altered appr, v fn gr, decr hd w/loc sft comm kaolin, decr chlorite, tr dism pyr.

Note: temp drop @ 4400' due to adding new mud.

Limestone: lt-med brn, lt-dk gry, sl-mod hd, loc silty, comm rexln, loc comm foss, comm-v abdnt calc vng, tr-loc mnr pyr, intbdd w/ Siltstone: med-dk gry, sl-mod hd, calcareous, comm-abdnt calc, tr pyr.

Intrusive: grn-gry, fn gr, hd, grn color & altered appr poss montmorillonite, comm fn gr chlorite, mnr-comm pyr, mnr magnetite.

Intrusive: med gry/grn, hd, fn gr, pred qtz & feld, mnr-comm chlor, mnr mag, tr-comm epidote tr-mnr calc, tr pyr.

W 9.4 V 32 PV 9
YP 3 pH 11.0 Fil
7 Cl 600 Slds 4%

Intrusive: pred grn, mnr wht-lt gry, hd, v fn-fn gr, pred qtz & feld w/mnr-comm grn, prismatic epidote, comm magnetite, tr calcite, tr pyr.

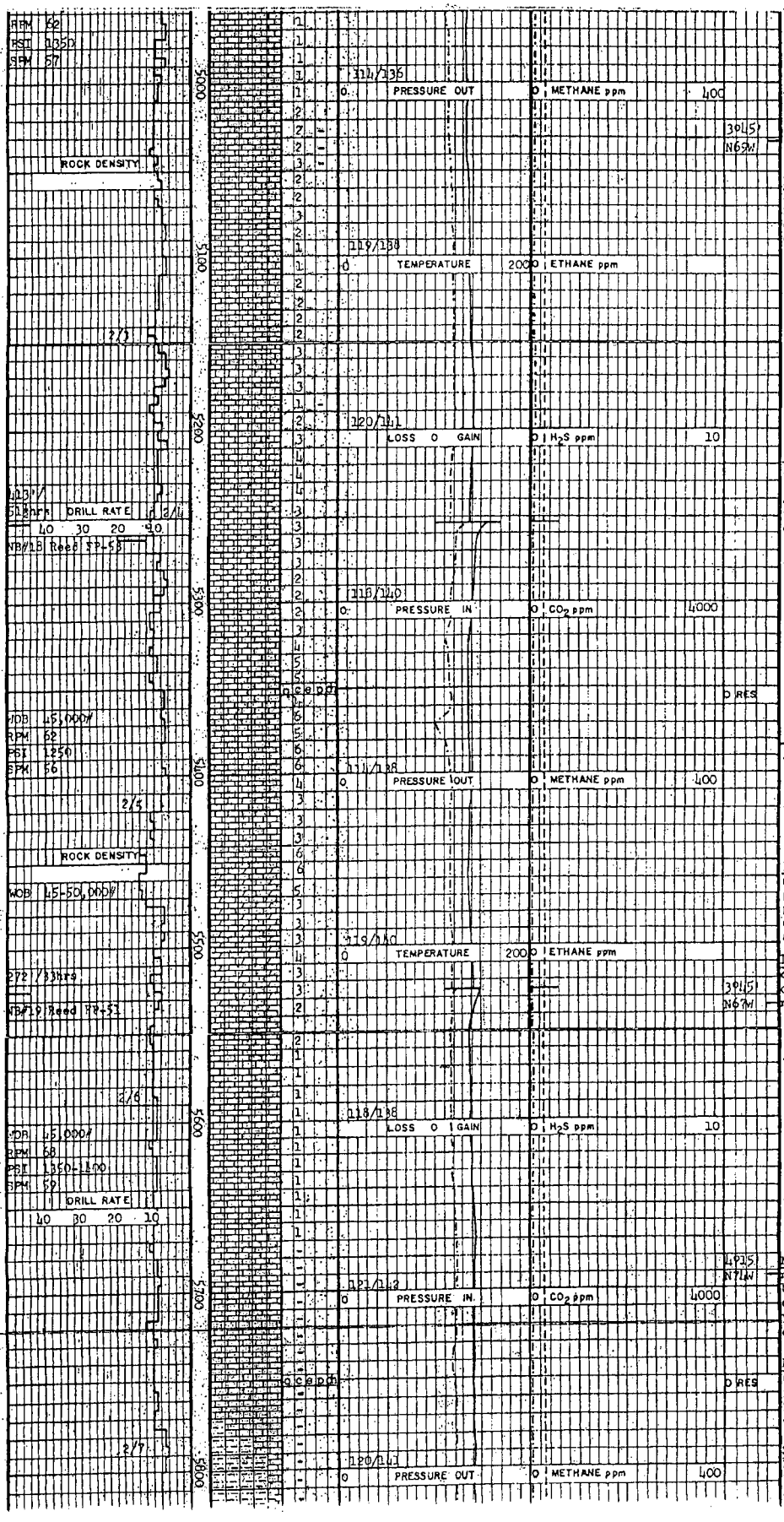
Limestone: lt-med gry, sl-mod hd, loc friable, rexln, marblized, pred v fn-fn gr, mnr med gr, mnr calc vng, r-tr dism pyrite.

Limestone: lt gry-wht, sl hd, brittle, v fn-fn gr matrix w/comm-abdt intraclasts (rnd-elongate), loc sft-friable, mnr-comm lt brn-gry transluscent chert, mnr wht calc vng, r-tr dism pyr.

W 9.3 V 37 PV 12
YP 7 pH 11.0 Fil
6.8 Cl 500 Slds 4%

Limestone: wht-lt gry, sl-mod hd, comm brittle, rexln, comm intraclasts, intbdd w/mnr lt gry chert, tr-mnr calc vng.

Limestone: wht-lt gry, sl-mod hd, comm brittle, rexln, comm intraclasts, intbdd w/tr lt gry cht, tr-mnr calc vng, r-tr dism pyr.



sl-mod hd,comm brittle, rexln,comm intraclasts, intbdd w/mnr lt gry chert,tr-mnr calc vng.

Limestone:wht-lt gry, sl-mod hd,comm brittle, rexln,comm intraclasts, intbdd w/tr lt gry cht, tr-mnr calc vng,r-tr dism pyr.

Limestone:wht-lt gry, sl hd,comm brittle, rexln,comm-abdt intraclasts,loc v sft,tr-mnr calc vng.

Limestone:lt-dk gry, mottled,mod hd-v hd, comm brittle,rexln,tr-mnr wht calc vng.

Limestone:lt-dk gry, mottled,mod hd-v hd, comm brittle,rexln,tr-mnr calc vng,tr intbdd chert,r pyr,r fossil (prob bivalve).

Limestone:pred wht,mnr lt gry,mod hd,loc brittle,microxln,loc silty appr,mnr-comm wht calc vng,tr intbdd lt brn chert.

Limestone:brn w/ mnr dk brn,pred hd-loc v hd,microxln,mass appr, tr lt brn translucent cryptoxln silica,comm calc vng.

Note:jet shaker pit @ 5359',Temp in drop @ 5370' due to adding new mud.

Limestone:pred brn-dk gry,mnr lt gry,hd-v hd, pred mass appr,comm frac'd appr,cryptoxln, comm-abdt calc frac vng.

Limestone:pred wht w/ mnr-comm gry brn,hd, granular rexln text, pred sl dolomitic,loc dolo rhombs vis,comm-abdnt calc vng,r pyr.

Limestone:lt-dk gry,w/ comm-abdt wht interbdd dolomite,sl hd-v hd, mass appr,mnr vn calc.

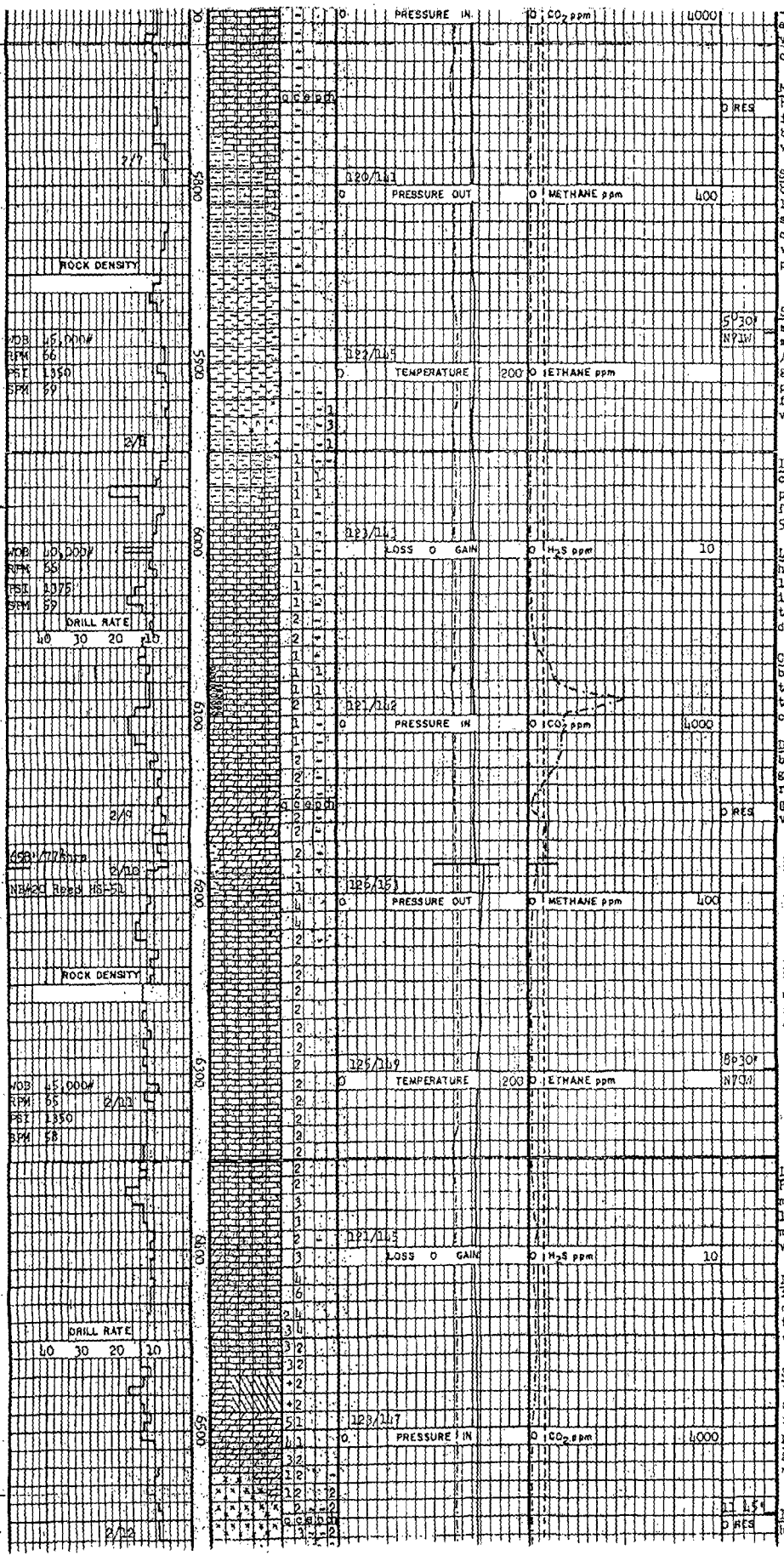
Marl:gry,sft-mod hd, mnr hd,highly calcic, sl-highly silty w/ mnr gran text,loc mnr clay mnr calc vng,r disem pyr.

W 9.3 V 40 PV 13
YP 4 pH 10.5 Fil
6.6 Cl 500 Slds 4%

Marl:med-dk gry,sft-mod hd,mnr v hd,interbdd v fn-fn gr calcareous silt & clay,w/ loc vis microlams,tr wht calc vng.

Marl:med-dk gry,sft-sl hd,v fn-fn gr,comm-abdt interbdd silt & clay, blocky,loc fissile w/ vis microlams.

Siltstone:pred med gry brn,mod hd,pred v well laminated w/ comm fissile appr sl-v highly



ecous silt & clay,w/ loc vis microlams,tr wht calc vng.

Marl:med-dk gry,sft-sl hd,V fn-fn gr,comm-abdt interbdd silt & clay, blocky,loc fissile w/ vis microlams.

Siltstone:pred med gry brn,mod hd,pred v well laminated w/ comm fissile appr,sl-v highly calcic,tr calc microvng w/ r v fn dissem pyr.

Shale:pred dk gry-blk, mnr med gry,v fn gr, mod-v hd,mod calcareous /w calc cmt,abdt dk gry-blk organic matter, pred blocky w/comm fissile appr,tr calc vng,r dism pyr.

Intrmdt igneous:lt grn cast,pred hd mnr sft, pred porph text,abdnt fn gr mag,sl calcic,f/ 5930'-5960'.

Limestone:med-dk gry,sl hd,brittle,sl dolomitic, loc granular appr w/ incr interbdd silica, tr vn calcite,r-tr f gr dism pyr.

Chert:pred lt gry,mnr brn-blk,v hd & angular, translucent w/mnr v transparent,comm-abdt carbonate inclusions.

Dolomite:wht-lt brn, buff,mod hd-hd,fn-med gr xln,w/comm vis rhombs,loc comm crs granular masses,tr calc vng,tr dism pyr.

Note:Run two time Temp survey for ten hours each. Projected maximum bottom hole temp @ 290°F-300°F.

Limestone:lt gry-lt tan,hd,pred rexln text mass appr,loc tr fossils,mnr calc vng,r-tr dissem pyr.

W 9.4 V 38 PV 14 YP 4 pH 11.0 Fil 7.2 Cl 800 Slds 5%

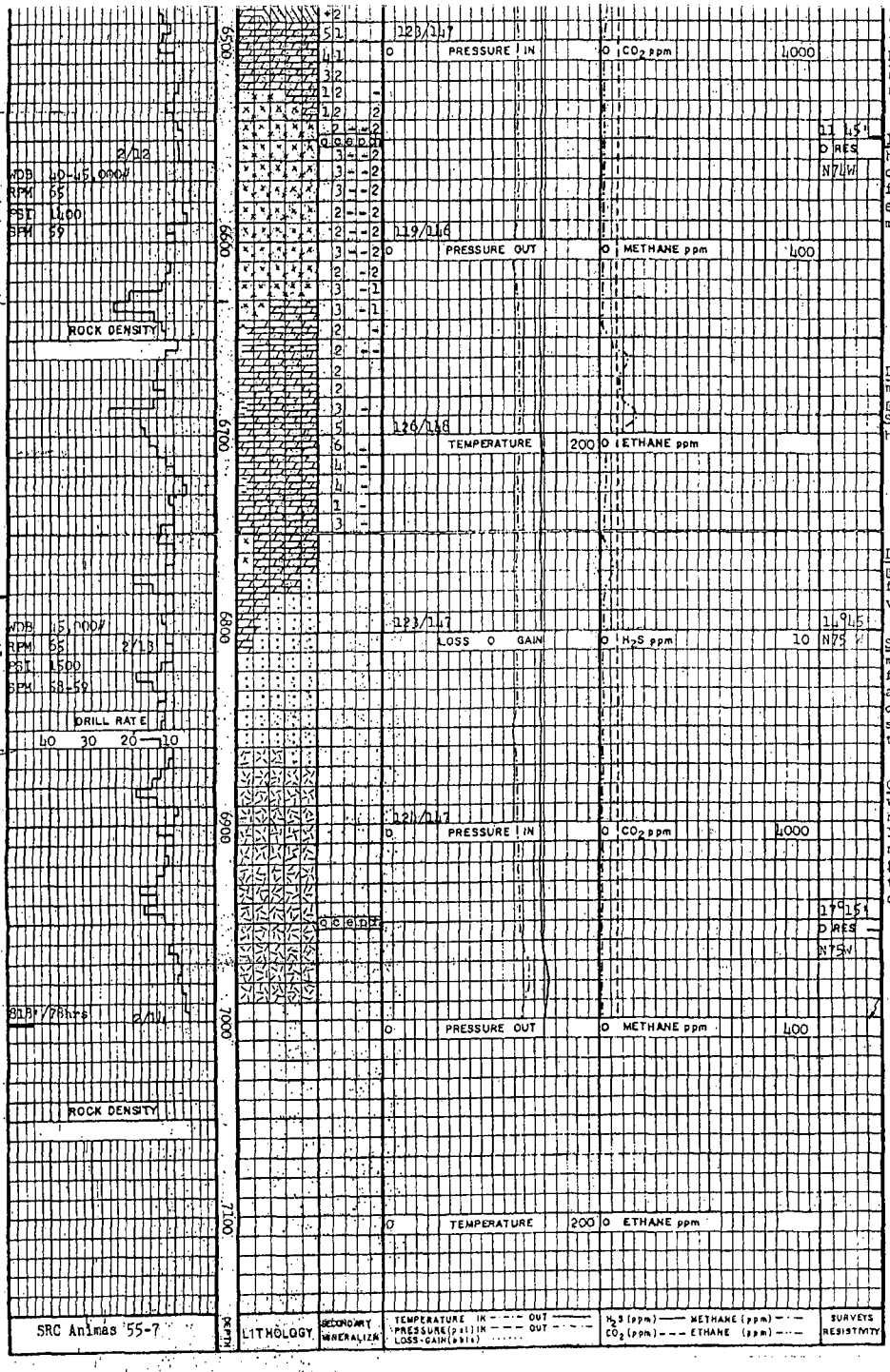
Limestone:lt gry,mod hd,rexln w/incr dolomite,pred cryptoxln w/ loc granular dolomite, massive appr,mnr calc vng,r dism pyr.

Dolomite:pred lt gry, fn gr,rexln gran text, mod hd,loc mod fractured w/ abdnt calc vng.

Solution Deposit:lt tan-comm wht,pred translucent,cryptoxln silica,highly fractured.

Dolomite:pred wht,med gr,rexln gran text,hd, mnr calc vng.

Intrusive:lt-med grn, hd,fn gr,altered appr,



slucent,cryptoxln silica,highly fractured.

Dolomite:pred wht,med gr,rexln gran text,hd, mnr calc vng.

Intrusive:lt-med grn, hd,fn gr,altered appr, comm-abdt dism magnetite,comm chlor,tr-mnr epidote,tr-mnr calc microvng,tr dism pyr.

W 9.4 V 41 PV 18
YP 6 pH 11.0 Fil 7.4 Cl 800 Slds 5%.

Dolomite:gry-lt gry, mod hd-hd,pred rexln gran text,intbdd w/ mnr Shale:pred blk,sft-mod hd,pred sl fissile.

Note:Mnr slough vis in samples f/ 6730' ;poss f/ 1800'.

Dolomite:lt-med gry,hd granular text,fn gr,sl fractured w/ comm calc vng,tr dissem pyr.

Sandstone:pred clr-wht, mnr gry/grn cast,pred fn gr w/mnr med gr,sub-ang-rd,pred qtz w/loc comm arkosic,mod-well srtd,mnr-comm chlorite, tr vn calc,tr dism pyr.

Granite:lt pink w/ mnr wht-lt grn,pred v hd, hypidiomorphic text, loc mod fractured w/ mnr kaol & chlor frac fill,tr calc,r pyr,loc tr hem fresh subhdrl-oxid.

Note:Temp incr due mud cooler malfunction.

Total Depth 7001'. Run Schlumberger E logs.

REMARKS - LITHOLOGY
EXLOG/SMITH PAGE 18

Last copy 7-55-7

ATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

Owner of well Rosette, Inc. Owner's Well No. A-36-AB-EXPL(6)

Street or Post Office Address Box 265-A

City and State Animas, NM 88020

was drilled under Permit No. A-36-AB-EXPL(6) and is located in the:

a. NW ¼ NW ¼ SE ¼ ¼ of Section 7 Township 25 S Range 19 W N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in _____ County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

Drilling Contractor Dale Burgett License No. WD-248

ress Box 265-A, Animas, NM 88020

MODIFIED
ling Began 9/1/97 Completed 9/15/97 Type tools Rotary Size of hole 17½ in.

ation of land surface or _____ at well is 4230 ft. Total depth of well 1400 ft.

npleted well is ☒ shallow ☐ artesian. Depth to water upon completion of well 1100 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
1100	1250	150	VaLLEY Fill/Volcanic Rock	1500

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
13 3/8	54	8	-0-	1051	1051	Texas Shoe	None	

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
-0-	1051	17½		circulated to surface	Halliburton Pump

Section 5. PLUGGING RECORD

ugging Contractor _____

ddress _____

ugging Method _____

ate Well Plugged _____

ugging approved by: _____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

ate Received August 12, 1997 Quad _____ FWL _____ FSL _____

A-36-AB-EXPL(6) Use Exploratory Location No. 25.19.7.411

			See Attached Record

Section 7. REMARKS AND ADDITIONAL INFORMATION

he undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above escribed hole.

Driller

ISTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office f the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is rilled, repaired, or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

Formation tops for Well 55-7. These data are based on Thompson (1986).

Depth (ft)	Formation	Age
0	Valley fill	Quaternary/Tertiary
290	Volcanic rocks	Tertiary 1400'
1,422	U-Bar Formation (?)	Late Cretaceous
1,539	Hell-to-Finish Formation (?)	-
1,842	Horquilla Formation	Permian-Pennsylvanian
4,075	Igneous intrusive	Tertiary
4,770	Escabrosa Formation	Mississippian
5,609	Percha Shale	Devonian
5,982	Montoya Formation	Ordovician
6,201	El Paso Formation	Ordovician
6,781	Bliss Sandstone	Cambrian/Ordovician
6,858	Granite	Precambrian

old hole

PROOF OF COMPLETION OF WE...

Permit No. A-36-AB-EXPL(6)

1. Name of Water Right Owner Rosette, Inc.
   Mailing address Box 265-A
   City and State Animas, NM 88020

2. Permit is for supplemental well (supplemental well, change location of well) from Shallow (artesian or shallow) ground water.

3. Description of well:
   Located in the NW ¼ NW ¼ SE ¼, of Sec. 7 Twp. 25S Rge. 19W N.M.P.M., or Tract No. ____ of Map No. ____ of the ____ District; total depth 1400 feet; is well cased Yes; outside diameter of top casing (or hole, if uncased), 13-3/8 inches; if artesian, is well equipped with gate valve ____; date drilled 9/1 19 97; Name of driller Everett Dale Burgett.

4. Record of Pumping Test, if made (to be supplied by person or firm making test); Name and address of person making test, Everett Dale Burgett, Box 265-A, Animas, NM 88020; date of test 3/3 19 98; depth to water before test, 71 feet Below (above, below) land surface, and pumping level during test, 210 feet; length of test, 24 hours; average discharge, 475 G.P.M.; specific capacity of well, ____ gals./min. per foot of drawdown.
   Not Calculated

5. Permanent Pump Equipment:
   (a) Description of pump: Make Simflo; Type Turbin; size of discharge 6 inches; if turbine type, give size of column, 6 inches; diameter of bowls 8" inches; number of bowls 10; length of suction pipe -0- feet; total length of column, bowls and suction pipe 270 feet; if centrifugal type, give size of pump ____ inches; if other type, describe Electric Driven 50 HP; rated capacity of pump (if known), 600 G.P.M., at 2100 rev. per min., from a depth of 300 feet.

   (b) Description of power plant: Make US; Type Hollow Shaft; rated horsepower (if available) 50; type of drive connection to pump Direct (direct, gearhead, or belt).

   (c) Actual discharge of pump, 475 G.P.M., at 1800 rev. per min., from a depth of 210 feet; Date of test 3/3 19 98.

6. If reservoir is used, give approximate size: length 125' feet; width 125'; depth 8'.

7. If above well replaced an old well to be plugged or abandoned, fill out the following: the well abandoned is located in the ____ ¼ ____ ¼ ____ ¼ of Sec. ____, Twp. ____, Rge. ____.

   Describe plugging method ____
   Name of plugging contractor ____

8. Well Record filed with State Engineer's Office yes (Yes or No).

I, Everett D. Burgett, affirm that the foregoing statements are true to the best of my knowledge and belief and that I am the Agent (sole, partial, agent for, etc.,) owner and holder of said water right.

Rosette, Inc., Permittee

By: Everett Burgett

STATEMENT OF STATE ENGINEER'S REPRESENTATIVE

I hereby certify that I have inspected the above well and find it constructed in accordance with the conditions of the permit. Note any exceptions ____

Well was producing ____ gpm against a ____ head of ____ feet at ____ rpm. (measured) (estimated)

Old well has been ____ (plugged) (capped) (retained for other rights).

By: ____
Title: ____
Date: ____

AFFIDAVIT OF PUBLICATION

Copy

STATE OF NEW MEXICO)
COUNTY OF HIDALGO))SS.

Jack Walz, being first duly sworn, says that he or she is the manager of the LORDSBURG LIBERAL, a weekly newspaper of general circulation, published in the City of Lordsburg, Hidalgo County, New Mexico, and has been such during the time herein under mentioned, and that the advertisement headed

Rosette Inc. Engineer Legal

a copy of which is herein attached, was printed and published in every copy of each issue of said newspaper for a period of 3 consecutive weeks to wit:
First publication 9/19 19 97 Last Publication 10/3 19 97

Publication fee $ $299.52

Jack A. Walz
Manager

STATE OF NEW MEXICO)
COUNTY OF HIDALGO))SS.

Subscribed and sworn before me September 19, 1997.

Deborah K. Haines
Notary Public

My commission expires 10/29/2000

Legal Notice Legal Notice Legal Notice

STATE ENGINEER LEGAL

NOTICE is hereby given that on July 18, 1997, Rosette, Inc., Box 265-A, Animas, New Mexico 88020, filed six applications, A-36-AB-S-15 through A-36-AB-S-20 with the STATE ENGINEER for permits for supplemental wells in the Animas Underground Water Basin by using wells drilled under Exploratory permits A-36-AB-EXPL(1) through A-36-AB-EXPL(6) located as follows:

SUBDIVISION	SECTION	TOWNSHIP	RANGE	CASING SIZE	DEPTH
SW1/4SE1/4SE1/4	6	25 S.	19W, NMPM	8 5/8"	440'
SE1/4SE1/4SE1/4	6	25 S.	19W, NMPM	12 3/4"	562'
SW1/4SE1/4SE1/4	6	25 S.	19W, NMPM	8 5/8"	440'
SW1/4SE1/4SE1/4	6	25 S.	19W. NMPM	10 3/4"	400'
SW1/4SE1/4SE1/4	6	25 S.	19W. NMPM	12 3/4"	375'
NW1/4NW1/4SE1/4	7	25 S.	19W. NMPM	13 3/8"	1400'

To supplement the continued diversion of an amount of water not to exceed 3 acre-feet per annum that shall not cause a consumptive use in excess of 1.6 acre-feet per acre per annum for geothermal, greenhouse irrigation, irrigation and related purposes from the following wells:

WELL	SUBDIVISION	SECTION	TOWNSHIP	RANGE
A-13	SE1/4NW1/4NE1/4	13	25 S.	20 W. NMPM
A-13-S	SE1/4NW1/4NE1/4	13	25 S.	20 W. NMPM
A-13-S-2	NW1/4NE1/4NE1/4	13	25 S.	20 W. NMPM
A-13-S-3	SW1/4NW1/4NE1/4	13	25 S.	20 W. NMPM
A-51	NE1/4SW1/4NW1/4	14	25 S.	20 W. NMPM
A-53	SE1/4SE1/4NE1/4	10	25 S.	20 W. NMPM
A-53-S	SE1/4SE1/4NE1/4	10	25 S.	20 W. NMPM
A-54	SW1/4SW1/4NE1/4	10	25 S.	20 W. NMPM
A-36-A	SE1/4SW1/4NE1/4	7	25 S.	19 W. NMPM
A-36-B	SE1/4SW1/4NE1/4	7	25 S.	19 W. NMPM
A-36-AB-S	SW1/4SW1/4NE1/4	7	25 S.	19 W. NMPM
A-36-AB-S-2	NW1/4NE1/4SE1/4	7	25 S.	19 W. NMPM
A-26-AB-S-3	SW1/4SW1/4NE1/4	7	25 S.	19 W. NMPM
A-36-AB-S-4	SE1/4SW1/4NE1/4	7	25 S.	19 W. NMPM
A-36-AB-S-5	SW1/4SW1/4NE1/4	7	25 S.	19 W. NMPM
A-36-AB-S-6	NW1/4NW1/4SE1/4	7	25 S.	19 W. NMPM
A-36-AB-S-7	NE1/4NW1/4SE1/4	7	25 S.	19 W. NMPM
A-36-AB-S-8	NE1/4NW1/4SE1/4	7	25 S.	19 W. NMPM
A-36-AB-S-10	NW1/4SW1/4NW1/4	12	25 S.	20 W. NMPM
A-36-AB-S-11	NW1/4SW1/4NW1/4	12	25 S.	20 W. NMPM
A-36-AB-S-12	SW1/4SW1/4NE1/4	7	25 S.	19 W. NMPM
A-36-AB-S-13	SE1/4SE1/4NW1/4	7	25 S.	19 W. NMPM
A-36-AB-S-14	NW1/4SW1/4NW1/4	12	25 S.	20 W. NMPM
A-64	NE1/4SE1/4SW1/4	7	25 S.	19 W. NMPM
A-65-A	SE1/4SE1/4SW1/4	7	25 S.	19 W. NMPM
A-65-A-S	SE1/4SW1/4NW1/4	7	25 S.	19 W. NMPM

The amount of water from all wells shall not exceed 3013.404 acre-feet per annum on 1004.468 acres of land and greenhouse area located:

SUBDIVISION	SECTION	TOWNSHIP	RANGE	ACREAGE
NW1/4, Pt. W1/2N1/2SW1/4	14	25 S.	20 W. NMPM	
Part S1/2	14	25 S.	20 W. NMPM	
Part N1/2N1/2	23	25 S.	20 W. NMPM	449.796
Pt. SW1/4NE1/4	13	25 S.	20 W. NMPM	
Pt. E1/2SE1/4NE1/4	13	25 S.	20 W. NMPM	
West Part SE1/4NE1/4	13	25 S.	20 W. NMPM	
Lot 2, West Part SW1/4NW1/4	18	25 S.	19 W. NMPM	
Lot 2, East Part SW1/4NW1/4	18	25 S.	19 W. NMPM	117.92
West Part SE1/4NE1/4	12	25 S.	20 W. NMPM	
West Part NE1/4SE1/4	12	25 S.	20 W. NMPM	
West Part SE1/4SE1/4	12	25 S.	20 W. NMPM	
South Part N1/2NE1/4	13	25 S.	20 W. NMPM	
South part SE1/4NE1/4	12	25 S.	20 W. NMPM	
E1/2SE1/4	12	25 S.	20 W. NMPM	
South part S1/2S1/2SW1/4SE1/4	12	25 S.	20 W. NMPM	
N1/2NE1/4	13	25 S.	20 W. NMPM	
W1/2SW1/4	7	25 S.	19 W. NMPM	
NW1/4NW1/4	18	25 S.	19 W. NMPM	
West Part W1/2W1/2NE1/4NW1/4	18	25 S.	19 W. NMPM	260.00
SW1/4NW1/4 (Lot 2)	7	25 S.	19 W. NMPM	
West Part W1/2SE1/4NW1/4	7	25 S.	19 W. NMPM	
East Part Se1/4NW1/4	7	25 S.	19 W. NMPM	
E1/2SW1/4	7	25 S.	19 W. NMPM	176.752

Any person, firm or corporation or other entity objecting that the granting of the application will be detrimental to the objector's water right shall have standing to file objections or protests. Any person, firm or corporation or other entity objecting that the granting of the application will be contrary to the conservation of water within the state or detrimental to the public welfare of the state and showing that the objector will be substantially and specifically affected by the granting of the application shall have standing to file objections or protests. Provided, however, that the State of New Mexico or any of its branches, agencies, departments, boards, instrumentalities or institutions and all political subdivisions of the state and their agencies, instrumentalities and institutions shall have standing to file objections or protests. The objections or protest shall be in writing and shall set forth specific reasons why the application should not be approved and must be filed in triplicate with the State Engineer, District 3, PO Box 844, Deming, New Mexico 88031, not later than ten (10) days after the date of the last publication of this Notice. Valid objections or protests must be legible, signed and include a complete mailing address. The State Engineer will evaluate the application for impairment to existing water rights, public welfare of the state and conservation of water within the state if no valid objection or protest is filed.

s19/o3c
288 Lines

Permit No. A-36-AB-EXPL(6)

1. Name of Water Right Owner Rosette, Inc.
   Mailing address Box 265-A
   City and State Animas, NM 88020

2. Permit is for supplemental well (supplemental well, change location of well) from Shallow (artesian or shallow) ground water.

3. Description of well:
   Located in the NW ¼ NW ¼ SE ¼, of Sec. 7 Twp. 25S Rge. 19W N.M.P.M., or Tract No. ____ of Map No. ____ of the ____ District; total depth 1400 feet; is well cased yes; outside diameter of top casing (or hole, if uncased), 13 3/8 inches; if artesian, is well equipped with gate valve ____; date drilled 9/1 19 97; Name of driller Everett Dale Burgett.

4. Record of Pumping Test, if made (to be supplied by person or firm making test); Name and address of person making test, Everett Dale Burgett, Box 265-A, Animas, NM 88020; date of test 3/3 19 98; depth to water before test, 71 feet Below (above, below) land surface, and pumping level during test, 210 feet; length of test, 24 hours; average discharge, 475 G.P.M.; specific capacity of well, ____ gals./min. per foot of drawdown.
   Not Calculated

5. Permanent Pump Equipment:
   (a) Description of pump: Make Simflo; Type Turbin; size of discharge 6 inches; if turbine type, give size of column, 6 inches; diameter of bowls 8" inches; number of bowls 10; length of suction pipe -0- feet; total length of column, bowls and suction pipe 270 feet; if centrifugal type, give size of pump ____ inches; if other type, describe Electric Driven 50 HP; rated capacity of pump (if known), 600 G.P.M., at 2100 rev. per min., from a depth of 300 feet.

   (b) Description of power plant: Make US; Type Hollow Shaft; rated horsepower (if available) 50; type of drive connection to pump Direct (direct, gearhead, or belt).

   (c) Actual discharge of pump, 475 G.P.M., at 1800 rev. per min., from a depth of 210 feet; Date of test 3/3 19 98.

6. If reservoir is used, give approximate size: length 125' feet; width 125'; depth 8'.

7. If above well replaced an old well to be plugged or abandoned, fill out the following: the well abandoned is located in the ____ ¼ ____ ¼ ____ ¼ of Sec. ____, Twp. ____, Rge. ____.

   Describe plugging method ____
   Name of plugging contractor ____

8. Well Record filed with State Engineer's Office yes (Yes or No).

I, Everett D. Burgett, affirm that the foregoing statements are true to the best of my knowledge and belief and that I am the Agent (sole, partial, agent for, etc.,) owner and holder of said water right.

Rosette, Inc., Permittee

By: [signature]

STATEMENT OF STATE ENGINEER'S REPRESENTATIVE

I hereby certify that I have inspected the above well and find it constructed in accordance with the conditions of the permit. Note any exceptions ____

Well was producing ____ gpm against a ____ head of ____ feet at ____ rpm.
(measured) (estimated)

Old well has been ____
(plugged) (capped) (retained for other rights)

By: ____
Title: ____
Date: ____

IMPORTANT—READ INSTRUCTIONS ON BACK BEFORE FILLING OUT THIS FORM

APPLICATION FOR PERMIT

FOR EXPLORATORY, OBSERVATION, AND MONITORING WELL

Date Received July 18, 1997 File No. A-36-AB-EXPL(6)

1. Name of applicant Rosette, Inc.
   Mailing address Box 265-A
   City and State Animas, NM 88020

2. Source of water supply shallow water aquifer located in Animas Valley
   (artesian or shallow water aquifer) (name of underground basin)

3. The well is to be located in the NW ¼ NW ¼ SE ¼, Section 7 Township 25S
   Range 19W N.M.P.M., or Tract No. of Map No. of the District,
   on land owned by Rosette, Inc.

4. Description of well: name of driller Everett D. Burgett
   Outside Diameter of casing 13 3/8 inches; Approximate depth to be drilled 1400 feet;
   TNC :

Subdivision	Section	Township	Range	Acres	Owner
NW4NW4SE4	7	25S	19W		Rosette, Inc.

7. Additional statements or explanations
   Application is made to drill out a plugged well drilled and plugged by Steam Reserve Corporation in 1985 (see attached well records(2/14/85) and plugging plan dated 11/1/85, 12/11/85 and 12/12/85) This well was originally drilled for the exploration of steam. The temperatures were not high enough and, therefore, plugged. Water was found at a level of 1100 feet.

   Rosette, Inc., wants to use the well as a supplemental well to all well mentioned in Attachment #1. Application for a supplemental well will be submitted is well proves to provide adequate water supply. Rosette, Inc. proposes to drill down to 1400.

I, Dale Burgett, affirm that the foregoing statements are true to the best of my knowledge and belief and that development shall not commence until approval of the permit has been obtained.

Rosette INC, Permittee,

By: Dale Burgett
President

Subscribed and sworn to before me this 19th day of July, A.D., 19 97

My commission expires 11/04/98

Nancy Rodriguez
Notary Public

97 JUL 21 AM 10 10

Number of this permit A-36-AB-EXPL(6)

ACTION OF STATE ENGINEER

After notice pursuant to statute and by authority vested in me, this application is approved provided it is not exercised to the detriment of any others having existing rights; further provided that all rules and regulations of the State Engineer pertaining to the drilling of Shallow wells be complied with; ~~XXXX