

# **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**

OCD

PENGAD 800-631-6989

Exhibit 1-  
44



# **Lightning Dock Geothermal No. 1 (GHT-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

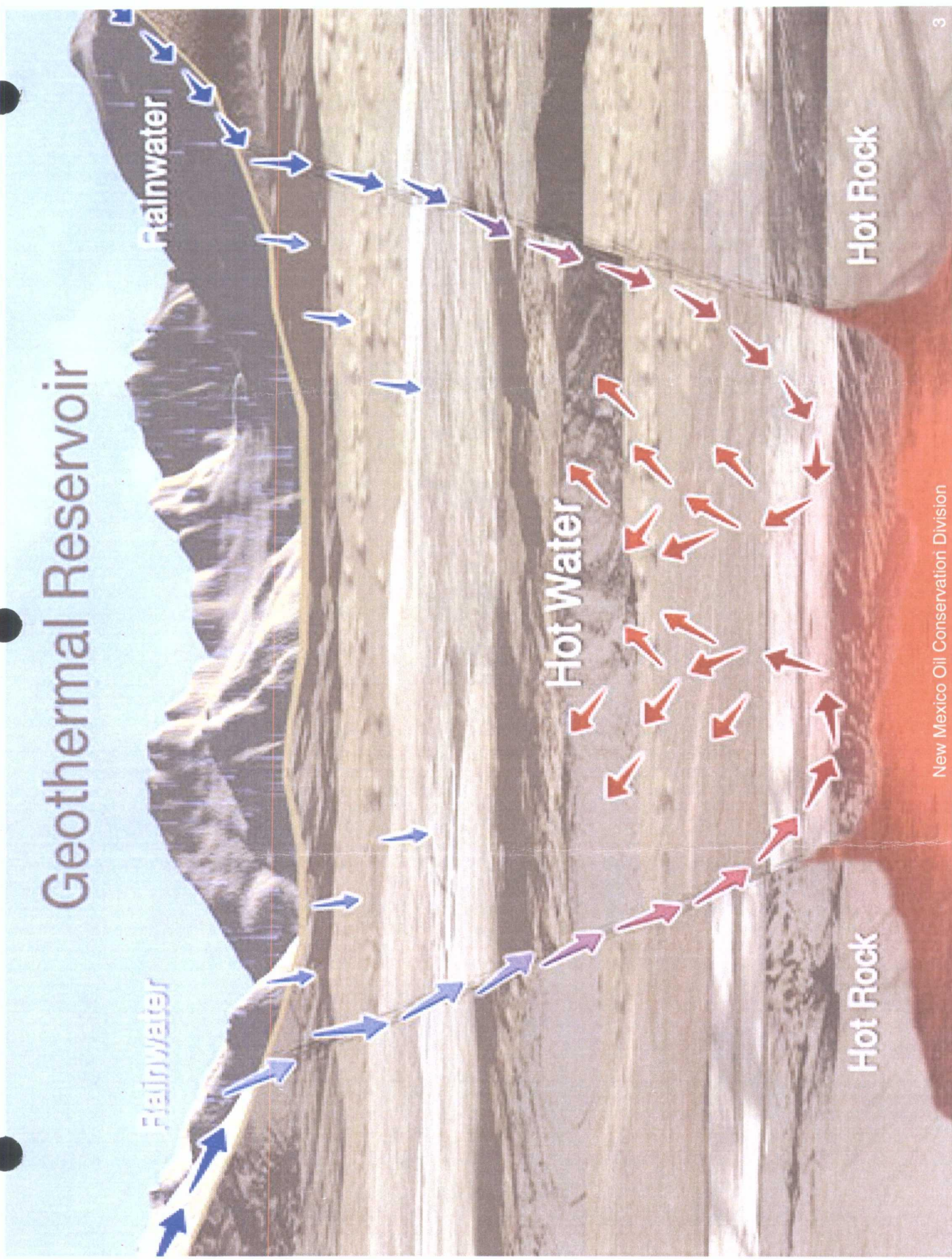
Rainwater

Rainwater

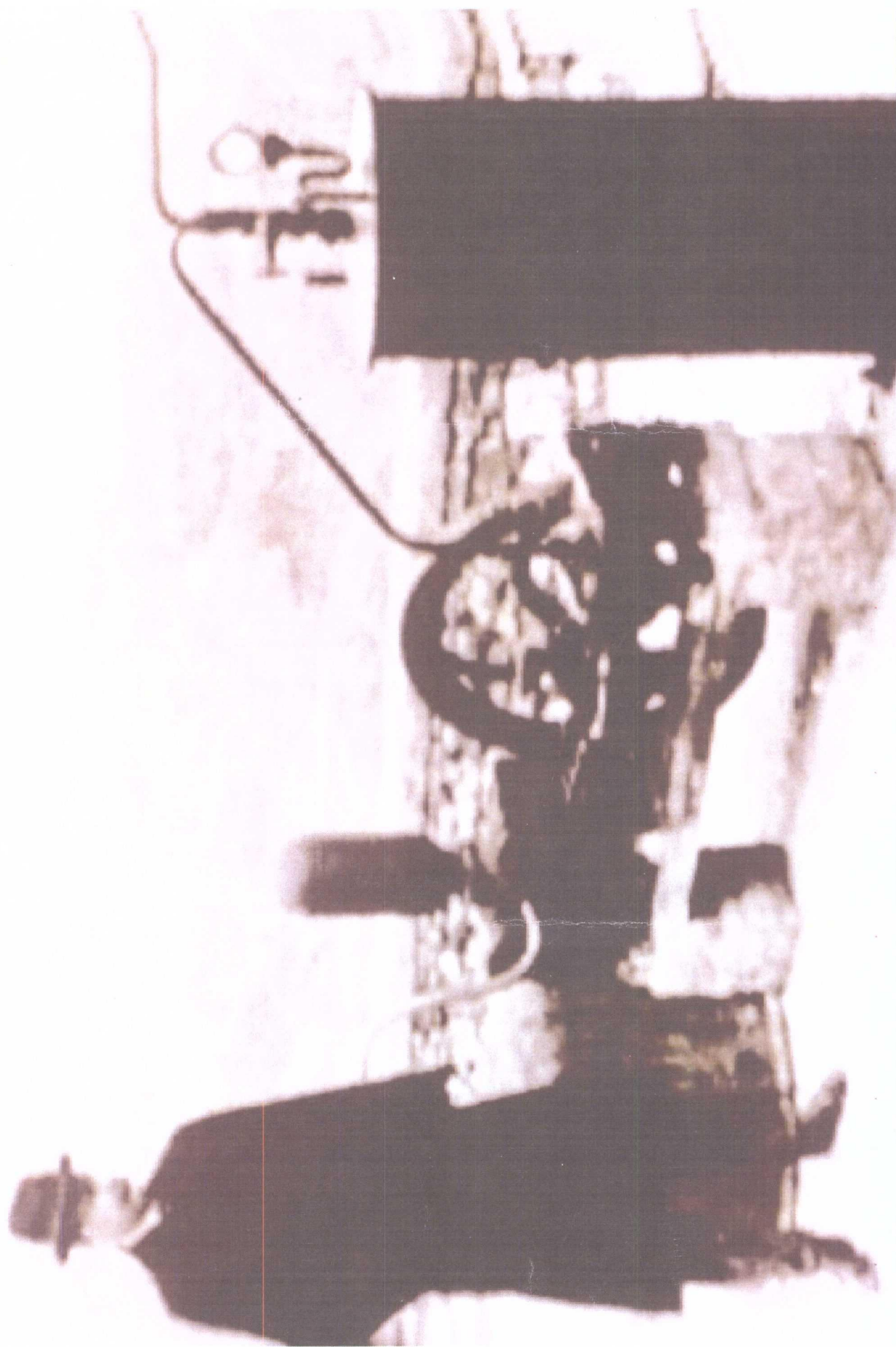
Hot Water

Hot Rock

Hot Rock





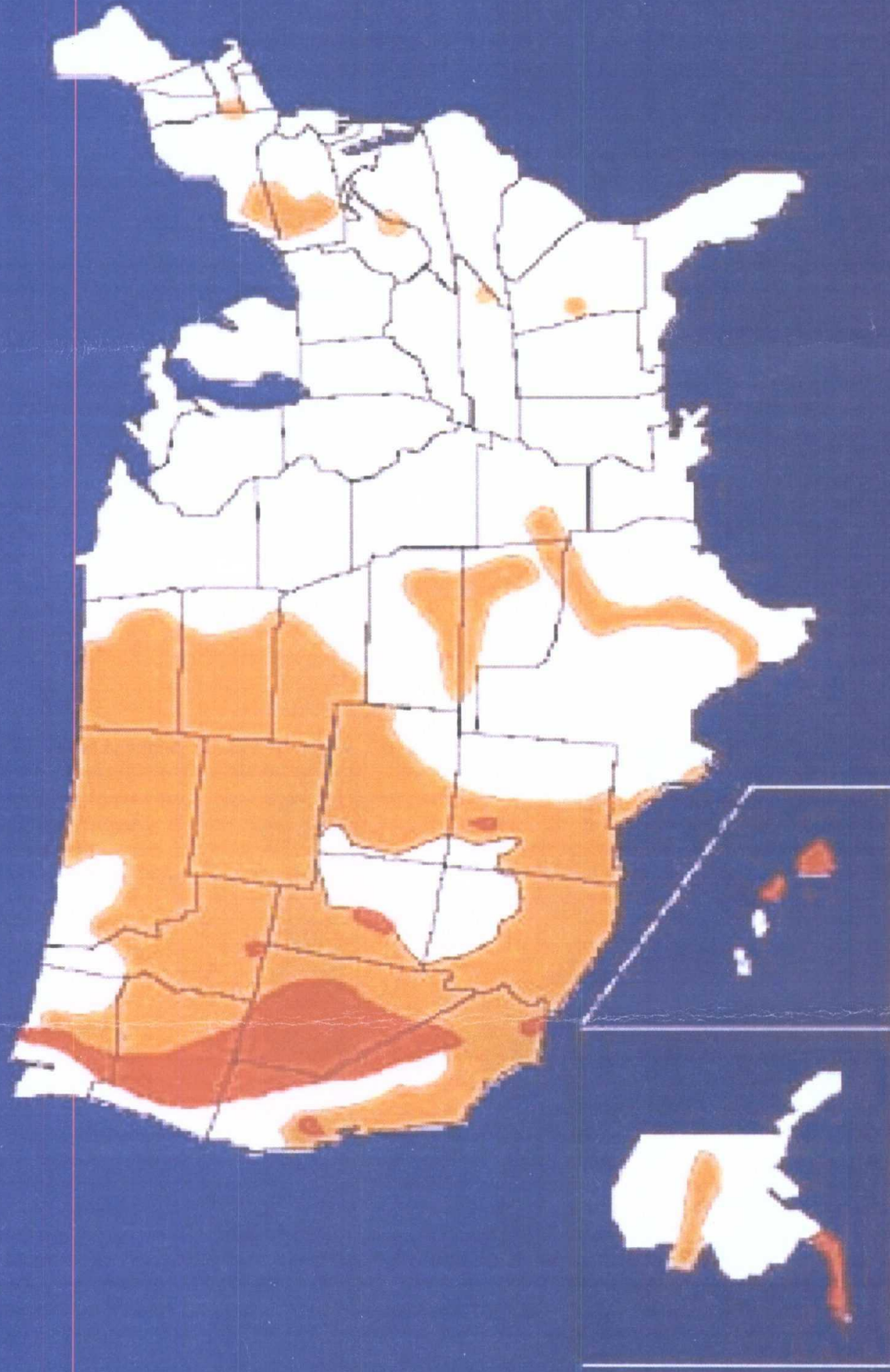


**First Geothermal Power Plant, 1904, Larderello, Italy**

New Mexico Oil Conservation Division



# U.S. Geothermal Potential



Power Plants and Direct Uses



Direct Uses







# 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





Pointer 3 23.43° N 108°25'19.02° W

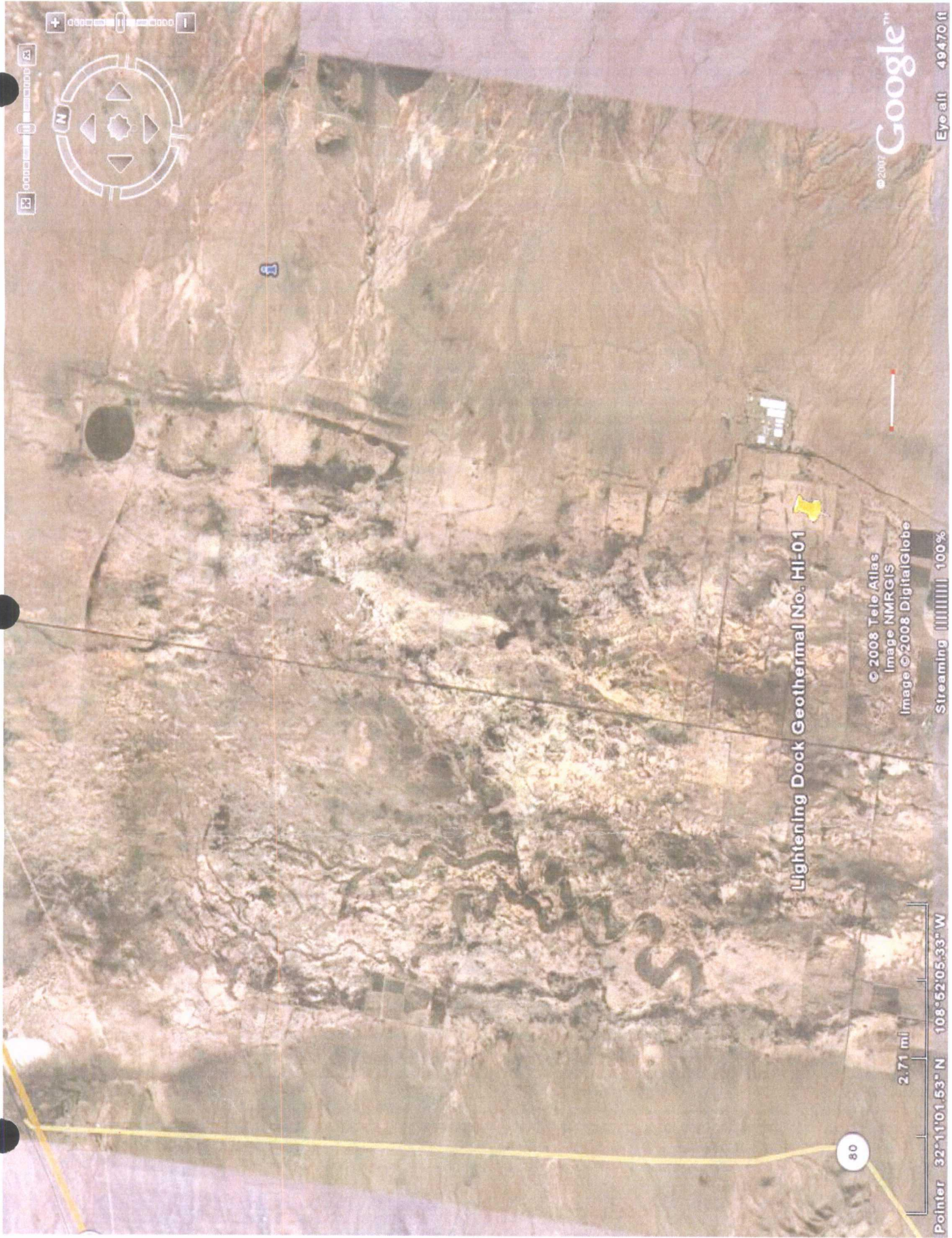
58 mi

© 2008 Tele Atlas  
© 2008 LeadDog Consulting  
Image © 2008 DigitalGlobe  
© 2008 Europa Technologies  
Streaming

Eye 215.46 mi

Google





Lightening Dock Geothermal No. HI-01

© 2008 Tele Atlas  
Image NMRGIS  
Image © 2008 DigitalGlobe

Streaming 100%

© 2007 Google™

Eye alt 49470 ft

2.71 mi  
Pointer 32°11'01.53" N 108°52'05.33" W

80





Lightening Dock Geothermal No. HI-01

Cotton City

338

© 2008 Tele Atlas  
Image NMRGIS  
Image © 2008 DigitalGlobe  
Image © 2008 TerraMetrics  
Streaming 100%

Google™

Eye Alt 9992 ft

Pointer 33° 5' 26.00" N 108° 5' 25.65" W





Lightening Deck Geothermal No. Ht-01

338

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Streaming 100%

Google™  
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Eye alt 20382 ft

Pointer 32°04'46.88" N 108°52'33.13" W  
5904 ft





Lightening Dock Geothermal No. HI-01



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Image NMRGIS

Image ©2008 DigitalGlobe  
Streaming 100%

Pointer 3 8°27.77' N 108°50'23.31" W

1209 ft

Elevation 3872 ft

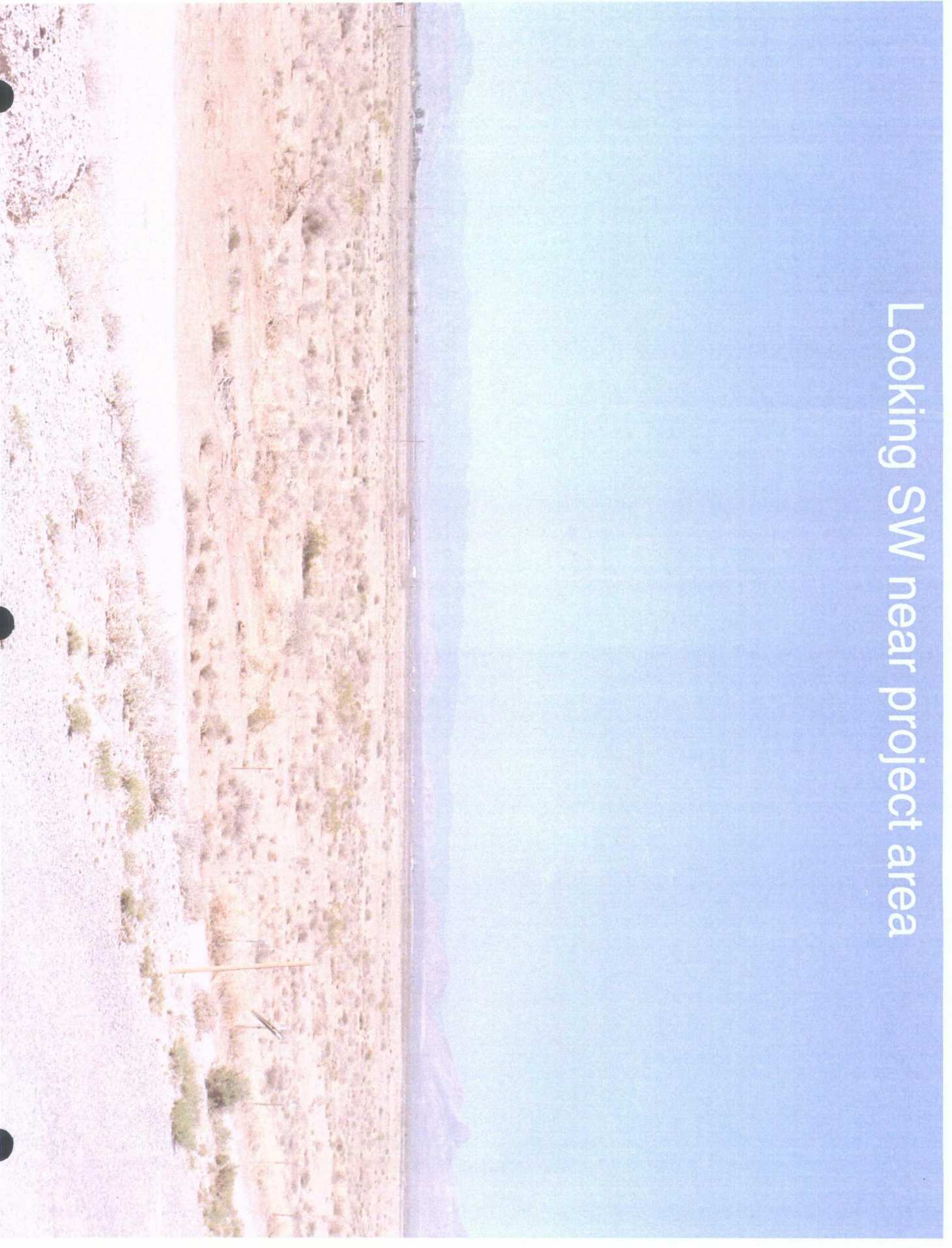


Looking E-SE toward nursery





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 (NMMPM). 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





Location of water-trip of project area









# 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  
“Title 19, 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.

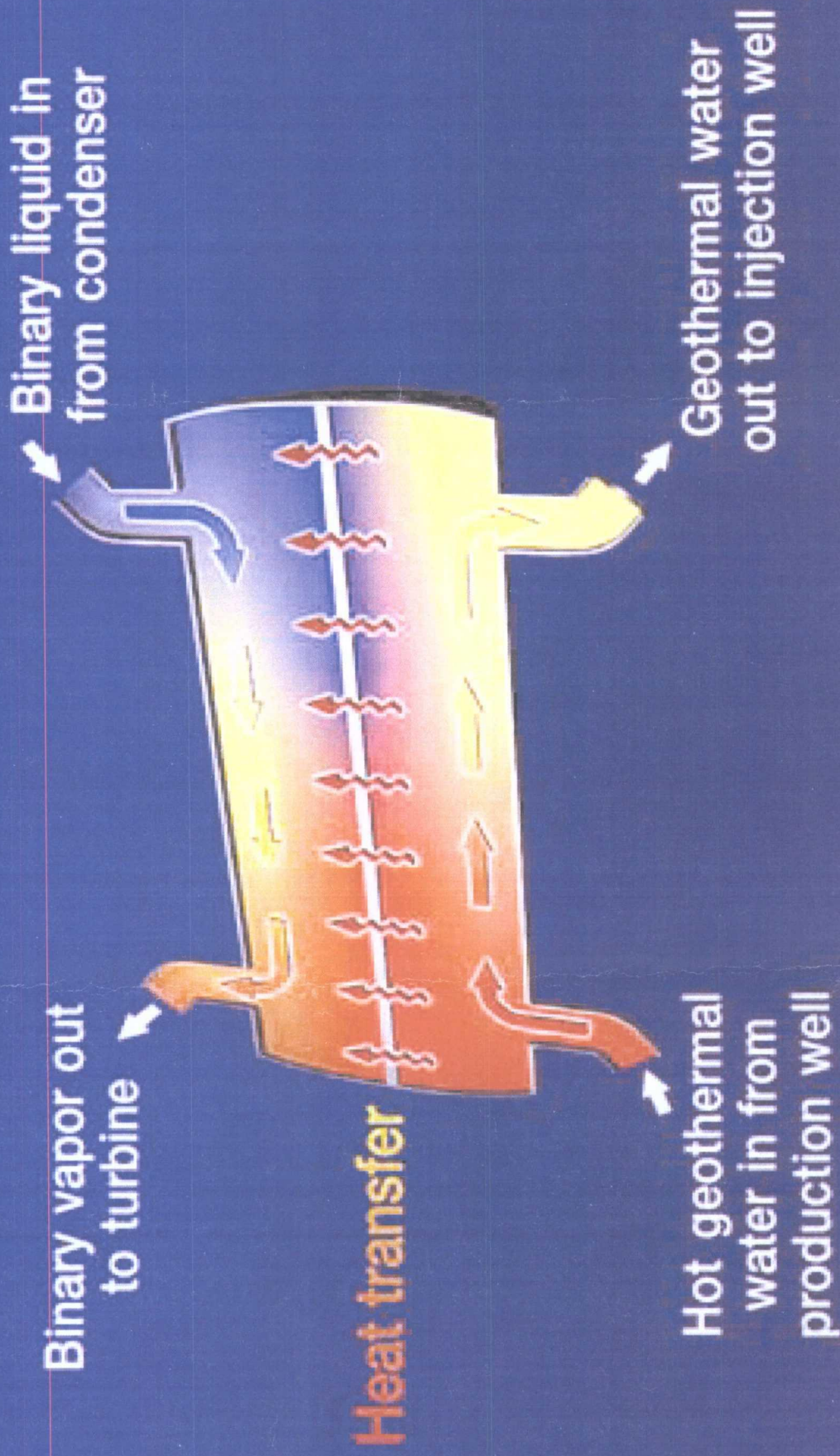


## SCOPE OF PROJECT

- 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







**NOTES**

1. FOR EQUIPMENT, SEE EQUIPMENT LIST
2. PROJECT DURATION 100-000 = 30711-00
3. THIS IS AN UNMANNED SITE WITHOUT PERMANENT WATER OR RECREATION FACILITIES



[illegible]















# 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 WQSSs 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.







# 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**

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**Go to: “OCD Online, Imaging,  
Administrative Order.... (GHT-1)”**