

**GTLT - \_\_\_\_\_ 2 \_\_\_\_\_**

**NMSU PG-4**

**UL:M 23-23S-02E**

**Dona Ana County**

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APPLICATION FOR PERMIT TO DRILL, DEEPEN,  
OR PLUG BACK--GEOTHERMAL RESOURCES WELL

5. Indicate Type of Lease  
STATE  FEE

5.a State Lease No.  
N/A



7. Unit Agreement Name  
N/A

8. Farm or Lease Name  
N/A

9. Well No.  
NMSU PG-4

10. Field and Pool, or Wildcat  
NMSU



12. County  
Dona Ana

1a. Type of Work: Drill  Deepen  Plug Back

b. Type of Well: Geothermal Producer  Temp Observation   
Low-Temp Thermal  Injection/Disposal

2. Name of Operator  
New Mexico State University

3. Address of Operator  
Box 3545, New Mexico State University

4. Location of Well UNIT LETTER M LOCATED 400 FEET FROM THE West LINE  
AND 300 FEET FROM THE South LINE OF SEC. 23 TWP. 23S RGE. 2E NMPM



19. Proposed Depth: 2000  
19A. Formation: Santa Fe/Paleozoic  
20. Rotary or C.T.: Rotary

21. Elevations (Show whether DF, RT, etc.)  
4340 feet above M.S.L.  
21A. Kind & Status Plug. Bond  
Bond # 6358013  
21B. Drilling Contractor  
T.B.D.  
22. Approx. Date Work will start  
o/a 1 Oct. 1984

Grindell & Rollins  
PROPOSED CASING AND CEMENT PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	SACKS OF CEMENT	EST. TOP
20 3/4 inch	18 5/8 OD	103 LB/FT	300'	120	G.L.
17 1/2 inch	16 OD	63 LB/FT	1650'	410	G.L.
12 3/4 inch	8 7/8 OD	28 LB/FT	2000'	N/A	

This well is to be drilled after NMSU DT-3 has been drilled and tested. Planned well site is within 200 feet of the DT-3 location; hence subsurface formations are expected to be quite similar.

After the surface casing is set and cemented to 300 feet of depth, the hole will be drilled to T.D. of 1650. 16-inch O.D. casing will then be bottomed, and cemented in place with a drillable cement plug in the bottom. A smaller hole will then be drilled to target horizon (2000 feet + 300 feet), and completed as open hole with a perforated liner hung in the hole, overlapping from 1600 to 1650 feet of depth.

APPROVAL VALID FOR 180 DAYS  
PERMIT EXPIRES 12-11-84  
UNLESS DRILLING UNDERWAY  
OIL CONSERVATION COMMISSION TO BE NOTIFIED  
WITHIN 24 HOURS OF BEGINNING OPERATIONS

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. Give blowout preventer program, if any.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Signed Calvin D. Black Title Director, Physical Plant, NMSU Date 12 June 1984

(This space for State Use)  
APPROVED BY Carl W. Hoog TITLE DISTRICT SUPERVISOR DATE 6-14-84  
CONDITIONS OF APPROVAL, IF ANY:

GEOTHERMAL RESOURCES WELL LOCATION AND ACREAGE DEDICATION PLAT

All distances must be from the outer boundaries of the Section.

Operator New Mexico State University		Lease NMSU land		Well No. NMSU PG-4
Unit Letter M	Section 23	Township 23S	Range 2E	County Dona Ana

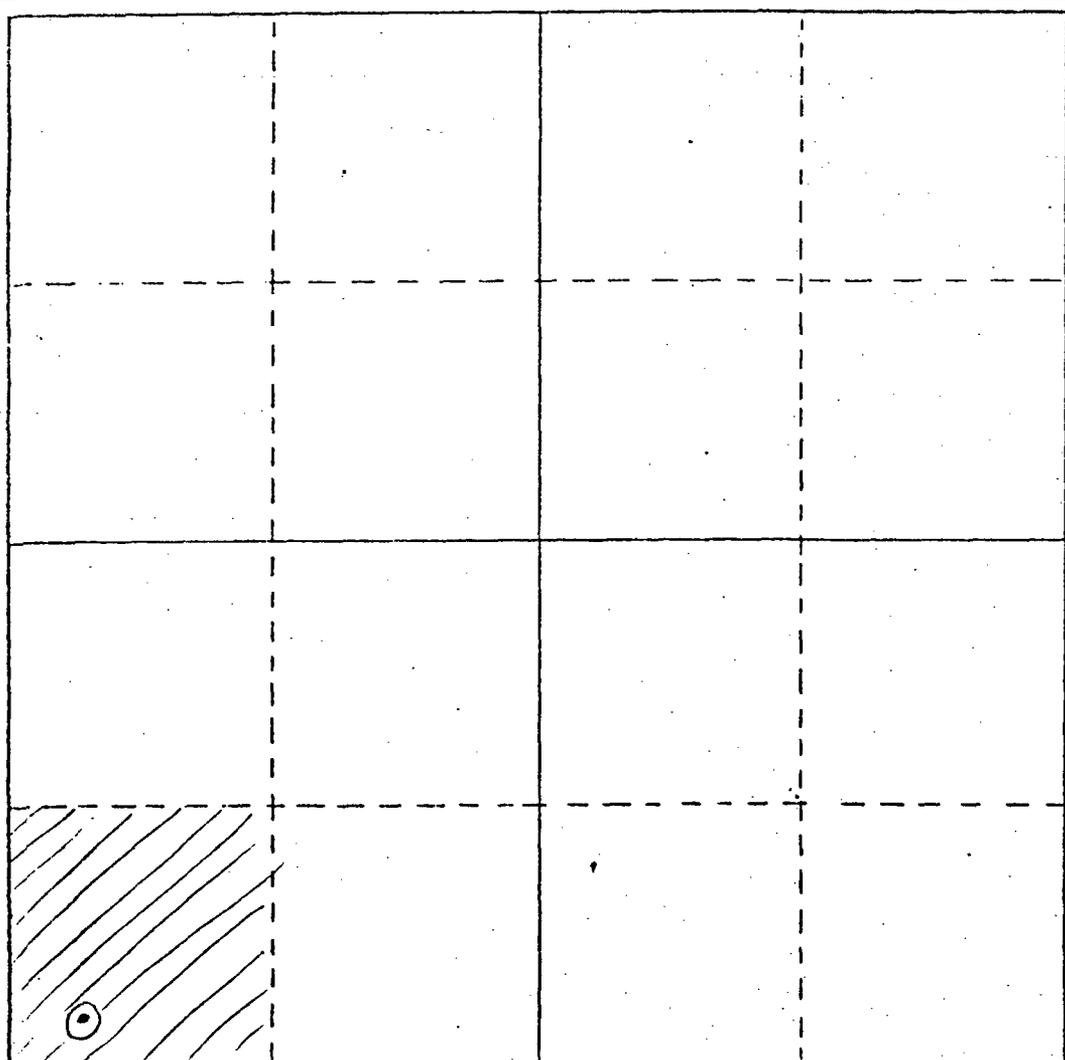
Actual Footage Location of Well:  
400 feet from the West line and 300 feet from the South line

Ground Level Elev. 4340	Producing Formation Santa Fe/Paleozoic	Pool New Mexico State University	Dedicated Acreage: 40 Acres
----------------------------	---	-------------------------------------	--------------------------------

- Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.
- If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).
- If more than one lease of different ownership 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 N/A

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 Division.



CERTIFICATION

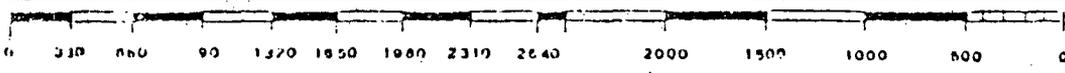
I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Name Calvin D. Black  
 Position Director, Physical Plant  
 Company New Mexico State University  
 Date June 11, 1984

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.

Date Surveyed \_\_\_\_\_  
 Registered Professional Engineer and/or Land Surveyor \_\_\_\_\_

Certificate No. \_\_\_\_\_



8/12/43

# Memo

*From*

CARL UYOG

Chief Geologist

To Roy:

Application for permit to drill this well is coming.

Also I have requested a cancellation for deepening the PG-1 (also known as #521) since PG-4 is really the substitute for deepening. (New hole instead)

PG-4

U nding



STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

TONY ANAYA  
GOVERNOR

July 29, 1983

POST OFFICE BOX 2088  
STATE LAND OFFICE BUILDING  
SANTA FE, NEW MEXICO 87501  
(505) 827-5800

C. D. Black, Director  
Physical Plant Department  
Box 3545  
Las Cruces, New Mexico 88003-3545

Dear Mr. Black:

The Oil Conservation Division has no objection to your proposed disposal of geothermal waters that will be produced during the drilling and testing of your well NMSU-PG-4.

Please notify this office a few days before you test the subject well.

Yours very truly,

JOE D. RAMEY  
Director

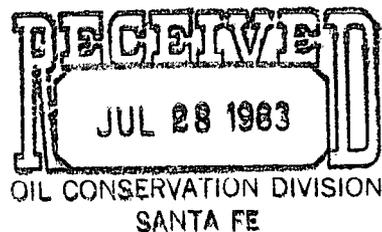
JDR/fd

cc: ✓ Carl Ulvog

PHYSICAL PLANT DEPARTMENT

Box 3545/Las Cruces, New Mexico 88003-3545  
Telephone (505) 646-2101

July 25, 1983



Re: Request for Temporary Surface Disposal  
of Geothermal Water

Mr. Joe D. Ramey, Director  
Oil Conservation Division  
Post Office Box 2088  
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

New Mexico State University requests permission for surface disposal of geothermal water that will be produced during the drilling and testing of proposed geothermal production well NMSU-PG-4.

NMSU proposes to build a dam across a natural arroyo channel that runs beside the well location. The dam would be constructed by excavating within the reserve pit area and building up the dam between two ridges.

The geologic formation on which the well pad and reserve pit will be constructed is a fluvial facies of the Camp Rice formation. It is quite sandy, porous, and permeable. NMSU proposes to allow the produced water to infiltrate back into the Camp Rice formation.

The amount of water that will be produced during drilling is very hard to predict; it will depend upon the spacing and productivity of faults and fractures that intersect the well bore. However, a reasonable upper limit for drilling is 100,000 barrels. Approximately 20,000 barrels will be produced during testing.

Figure 1 that accompanies this letter shows the location for the proposed well. Figure 2 is a sketch of the reserve pit (containment pond) that would be built just to the east of the well.

Since the chemistry of three NMSU production wells and three nearby industry wells is quite similar, it is reasonable to expect that the chemical composition of water from the newly proposed well will not

Mr. Joe D. Ramey, Director

-2-

July 25, 1983

be substantially different. The lab reports for NMSU well PG-1 and for Chaffee's wells 35-25 and 12-24 are attached. Similar species concentrations, ratios of species, and TDS values indicate that all wells tap the same reservoir.

Sincerely,



C. D. Black, Director

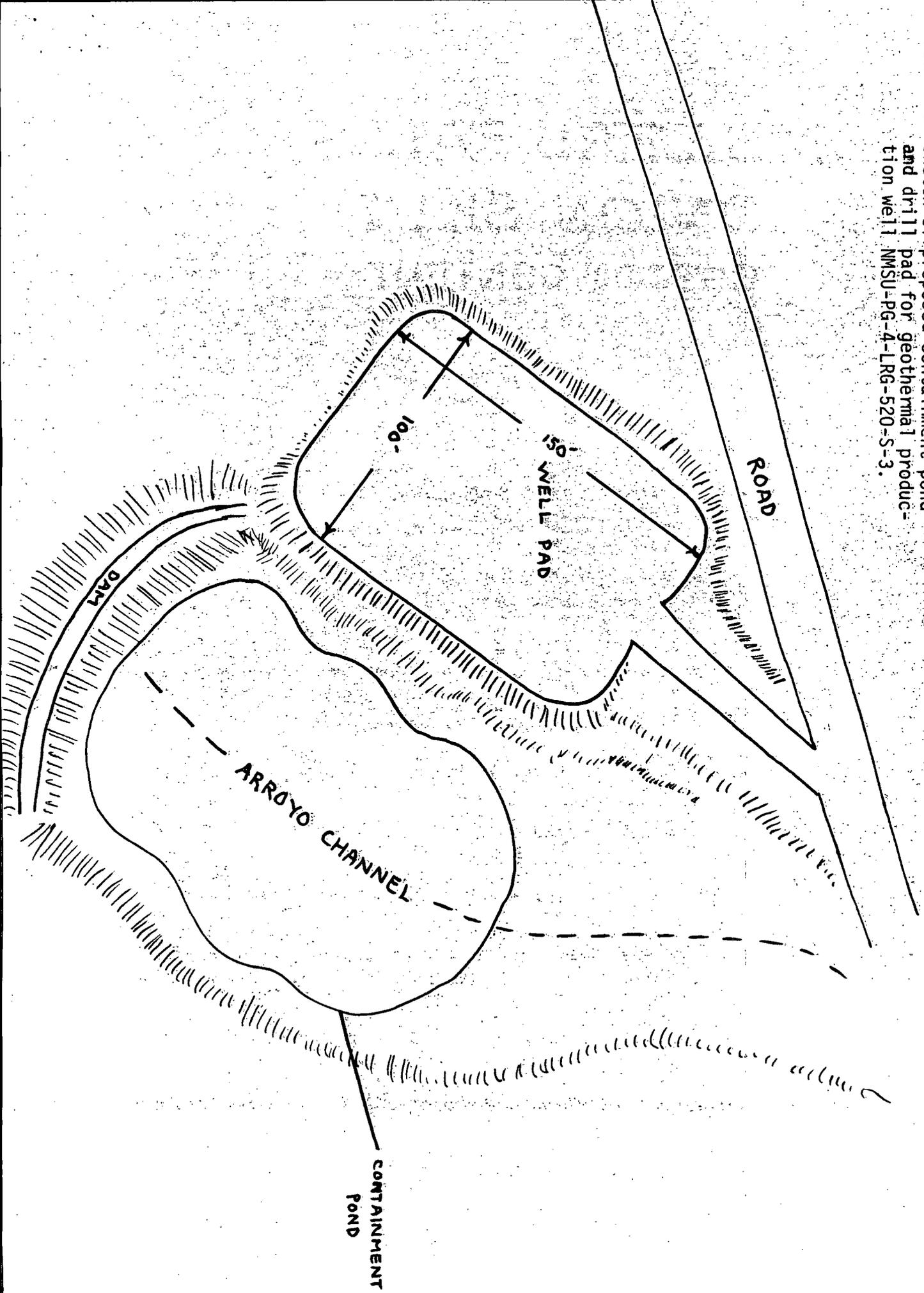
CDB/mm

Enclosures

cc: Roy Cunniff w/encl.  
Owen Lockwood w/encl.



FIGURE 2 sketch of proposed containment pond and drill pad for geothermal production well. MMSU-PG-4-LR6-520-S-3.



# NEW MEXICO STATE UNIVERSITY

DEPARTMENT OF AGRONOMY

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

## INTER-OFFICE MEMORANDUM

To: George Mitchell *W*  
 From: Andrew Lee Bristol  
 Subject: Geothermal Well Samples

Date: 8-14-80

Sample	μmhos/cm		meq/L							
	E.C.	pH	Na	K	Ca	Mg	Cl	CO <sub>3</sub>	HCO <sub>3</sub>	SO <sub>4</sub>
13A hot	3,060	7.95	20.20	1.40	7.87	2.48	16.16	0	10.20	6.09
27A hot	3,110	7.79	21.00	1.50	7.45	2.42	16.35	0	10.22	6.08
27 cool	3,110	7.36	20.89	1.48	7.77	2.44	16.66	0	10.04	5.93

*1,000 6.0-8.5*

Sample	<i>1,000</i>		mg/L							
	TDS	NO <sub>3</sub> -N	Na	K	Ca	Mg	Cl	CO <sub>3</sub>	HCO <sub>3</sub>	SO <sub>4</sub>
13A hot	1950	.03	464.4	54.7	157.7	30.1	572.9	0	622.4	292.5
27A hot	1988	.02	482.3	58.6	149.3	29.4	579.6	0	623.6	292.0
27 cool	2000	.02	480.2	57.9	155.7	29.7	590.6	0	612.6	285.0

*10.0 200 1000 75-200 125 250 350 700 250*

Sample	mg/L										
	Fe	Mn	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	Cu
13A hot	.78	.11	.002	<.4	<.005	<.05	<.005	.0003	.002	<.05	<.10
27A hot	.43	.05	.004	<.4	<.005	<.05	<.005	.0005	.002	<.05	<.10
27 cool	.38	.06	.002	<.4	<.005	<.05	<.005	<.0002	.002	<.05	<.10

*.3 .05 .05 1.0 .01 <.05 .05 .002 .01 .05*

Sample	mg/L							Hardness	Alkalinity
	P	B	Zn	SiO <sub>2</sub>	F				
13A hot	.05	.17	.02	81.5	1.27		467	510	
27A hot		.16	<.02	90.0	1.31		494	511	
27 cool		.16	<.02	92.0	1.12		456	502	

*2.0 250 30-500*

PB-1 well

*CO<sub>2</sub> content as free gas 200 cc/liter  
 H<sub>2</sub>S content - not measurable  
 but faintly detectable  
 by nose.*

pH at sampling 6.8

NEW MEXICO OIL CONSERVATION COMMISSION  
P. O. Box 2088, Santa Fe 87501

GEOHERMAL RESOURCES WELL LOG

Operator New Mexico State University  
 Address Box 3548, NMSU, Las Cruces, NM 88003  
 Reservoir New Mexico State University  
 Lease Name Physical Plant Department Well No. NMSU PG-4 Unit Letter M  
 Location: 330 feet from the West line and 600 feet from the South line Section 23  
 Township 23S Range 2E County Dona Ana

FORMATIONS PENETRATED BY WELL

DEPTH TO		Thickness	Drilled or Cored	Recovery	DESCRIPTION
Top of Formation	Bottom of Formation				
10 feet	960 feet	950 feet	drilled	100%	Santa Fe Group alluvial fill
960 feet	985 feet	27 feet	drilled	None	Suspected solution cavern
985 feet		2 feet	drilled	None	Suspected Paleozoic bedrock
987 feet	1,012 feet	25 feet	drilled	None	Suspected bedrock fault

Attach Additional Sheets if Necessary

All applicable logs and data are included in the Technical Completion Report, NMSU Geothermal Exploratory Well, DT-3, June, 1986.

This form must be accompanied by copies of electric logs, directional surveys, physical or chemical logs, water analyses, tests, and temperature surveys (See Rule 205).

CERTIFICATION

I hereby certify that the information given above and the data and material attached hereto are true and complete to the best of my knowledge and belief.

Signed  Position Director  
C. D. Black Physical Plant Dept. Date \_\_\_\_\_

NEW MEXICO OIL CONSERVATION COMMISSION  
P. O. Box 2088, Santa Fe 87501

GEOTHERMAL RESOURCES WELL SUMMARY REPORT

Operator New Mexico State University Address Box 3548, NMSU, Las Cruces, NM 88003  
 Lease Name Physical Plant Department Well No. NMSU - PG-4  
 Unit Letter M Sec. 23 Twp. 23S Rge 2E  
 Reservoir NMSU County Dona Ana

Commenced drilling October 19, 1984 GEOLOGICAL MARKERS DEPTH  
 Completed drilling April 26, 1986 Santa Fe Group 0-960 # feet  
 Total depth 1,015 Plugged depth \_\_\_\_\_ Paleozoic (?) 960-987 (?) feet  
 Junk \_\_\_\_\_  
 Commenced producing August 26, 1986 Geologic age at total depth: Paleozoic  
 (Date)

Date	Static test		Production Test Data								
	Shut-in well head		Total Mass Flow Data					Separator Data			
	Temp. °F	Pres. Psig.	Lbs/Hr	Temp. °F	Pres. Psig.	Enthalpy	Orifice	Water cuft/Hr	Steam Lbs/Hr	Pres. Psig.	Temp. °F
8/27/86	147.6	0	1,000,000	146					NOT APPLICABLE		

CASING RECORD (Present Hole)

Size of Hole	Size of Casing	Weight of Csg/ft.	Grade of Casing	New or Used	Seamless or Lapweld	Depth of Shoe	Top of Casing	Number of Sacks Cement	Top of Cement	Cement Top Determined By
17 1/2	14	54.57	K-55	U	Seamless	688	1 ft. above GL	180	GL	Inspection
12 1/2	8 5/8	23.36	K-55	N	Seamless	706 ft.	658 ft.	32	659 ft.	Tagged
7 7/8	5 9/16	14.62	K-55	N	Seamless	None	972	NA	NA	NA

PERFORATED CASING

(Size, top, bottom, perforated intervals, size and spacing of perforation and method.)

Slotted liner 8 5/8"OD from 735 to 985 feet; slotted liner 5 9/16"OD from 974 to 1,015 feet

Was analysis of effluent made? Yes Electrical log depths 974 Temperature log depths 975

CERTIFICATION

I hereby certify that the information given above and the data and material attached hereto are true and complete to the best of my knowledge and belief.

Signed  Position Director Physical Plant Dept. Date \_\_\_\_\_  
 C.D. Black



NEW MEXICO OIL CONSERVATION COMMISSION  
 P. O. Box 2088, Santa Fe 87501

GEOTHERMAL RESOURCES WELL HISTORY

Operator New Mexico State University Address Box 3545,  
 New Mexico State University 88003-3548  
 Lease Name Physical Plant Department Well No. NMSU PG-4  
 Unit Letter M Sec. 23 Twp. 23S Rge. 2E  
 Reservoir New Mexico State University County Dona Ana

It is of the greatest importance to have a complete history of the well. Use this form to report a full account of all important operations during the drilling and testing of the well or during re-drilling, altering of casing, plugging, or abandonment with the dates thereof. Be sure to include such items as hole size, formation test details, amounts of cement used, top and bottom of plugs, perforation details, sidetracked junk, bailing tests, shooting, and initial production data and zone temperature. (Attach additional sheets if necessary.)

Date	
19 Oct 84	Exploration well DT-3 spudded. Driller was Stewart Drilling. Borehole was 17½-inch to 688 feet. (Note: For convenience this depth, and other depths cited, are referred to the KB on the L&M rig used for continuation drilling.)
22 Oct 84	Set surface casing to 688 feet using 14-inch OD, 0.375-inch wall thickness, 54.57 pounds per foot. Cement annulus from 688 feet to surface using 180 sacks of cement.
29 Oct 84	Drilled plug at 688 feet and opened hole to 970± feet using 12¼-inch bit. Lost circulation zone at 970± feet could not be sealed using 9,375 pounds of LCM (bentonite, gel, DRISPAC, cotton seed hulls, shredded paper, Dick's Well Seal).
3 Nov 84	Intermediate casing string 8 5/8-inch was landed at 984± feet. String consisted of steel casing 0.25-inch wall thickness, 22.36 pounds per foot from 680 to 984± feet. Interval of casing from 735 to 982 feet perforated with 40 slots per foot 0.06 inches by 3 inches.
4 Nov 84	Annulus between 8 5/8-inch casing and 12¼-inch borehole was filled with Colorado silica gravel, grade 6 by 9, 40 sacks from 706 to 984 feet. Interval from 680 to 706 feet was filled with cement placed by 1-inch tremie pipe, 20 sacks. Driller dropped the tremie, and 52 feet broke off and was left in hole.
27 Nov - 3 Dec 84	Fishing efforts were able to retrieve 42 feet of the missing tremie pipe. Remaining 10 feet was not recovered, and is believed to be in the annulus between 14-inch and 8 5/8-inch casing below 680 feet.
26 Apr 86	Re-drilling operations commenced, using L&M Drilling Co. Intermediate casing 8 5/8-inch set from 680 feet to surface. From 985 to 1,015 feet, a 7 7/8-inch drill hole encountered major lost circulation zone from 987 to 1,012 feet. Using air and polymer, this zone produced 1,000+ gpm of 147 °F hot water during 18 hours of drilling operations.

CERTIFICATION

I hereby certify that the information given above and the data and material attached hereto are true and complete to the best of my knowledge and belief.

Signed  Position Director, Physical Plant Date \_\_\_\_\_  
 Calvin D. Black

NEW MEXICO OIL CONSERVATION COMMISSION  
 P. O. Box 2088, Santa Fe 87501

GEOTHERMAL RESOURCES WELL HISTORY

Operator New Mexico State University Address Box 3545,  
 New Mexico State University 88003-3548  
 Lease Name Physical Plant Department Well No. NMSU PG-4  
 Unit Letter M Sec. 23 Twp. 23S Rge. 2E  
 Reservoir New Mexico State University County Dona Ana

It is of the greatest importance to have a complete history of the well. Use this form to report a full account of all important operations during the drilling and testing of the well or during re-drilling, altering of casing, plugging, or abandonment with the dates thereof. Be sure to include such items as hole size, formation test details, amounts of cement used, top and bottom of plugs, perforation details, sidetracked junk, bailing tests, shooting, and initial production data and zone temperature. (Attach additional sheets if necessary.)

Date	
27-28 Apr 86	An 8-hour air-lift drill stem test was conducted, using a Schlumberger (Johnston FLO-PATROL) down hole tool. Flow rate was held at 1,000 gpm for 0.5 hrs, and then set at 750 gpm remainder of test. Reservoir pressure increased steadily throughout the test, and the reservoir reached complete equilibrium within 30 seconds after flow stop. Calculated value for formation permeability is 13.5 Darcys, with a reservoir volume of at least 10,774 acre feet. Production temperature will be 147 °F at 1,000 gpm from a dynamic pumping level of 360 feet of depth.
28 Apr 86	Open borehole completed by landing 43 feet of 5½-inch slotted liner at 1,015 feet. Top of liner is at 972 feet. Liner has slots 0.06 by 3½-inch, with open area of 12 square inches per foot of pipe.
28 Apr 86	Cement was placed in annulus between 8 5/8-inch and 14-inch to 659 feet horizon using 1-inch tremie pipe. Subsequent efforts to tag cement horizon caused 60 feet of tremie to unthread and drop in hole. Intermediate casing 8 5/8-inch was removed above 658 feet.
19 May 86	Well designated NMSU PG-4.
19-20 Aug 86	Step-flow test to be conducted using flow rate between 600 and 1200 gpm. Contractor will be Western Pump and Supply, using a 12-inch pump with a 400 HP diesel motor. Test duration will be at least 24 hours.

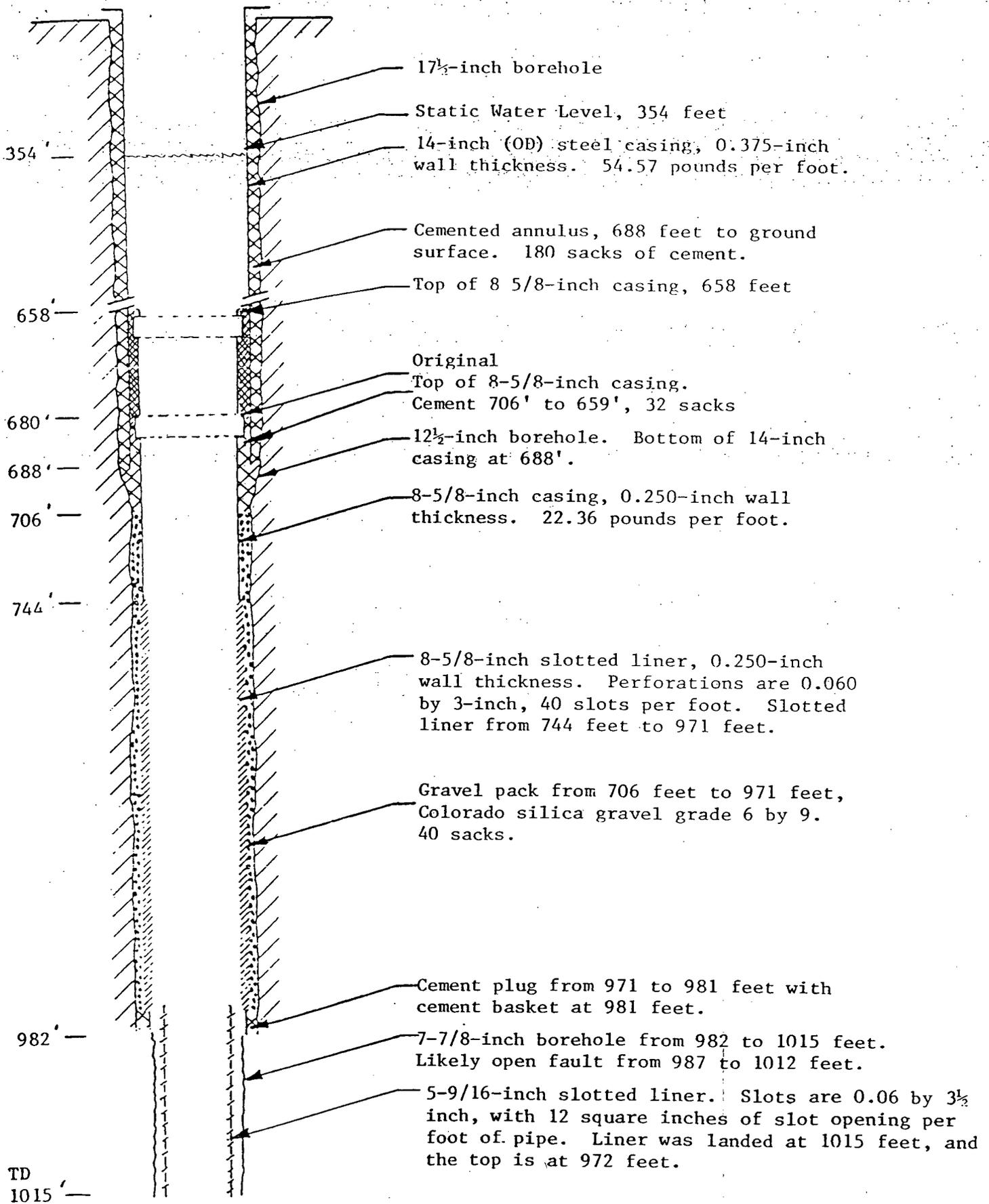
Attachments

- A. Schematic, Final Well Configuration, PG-4
- B. Temperature Surveys
- C. Water Analyses

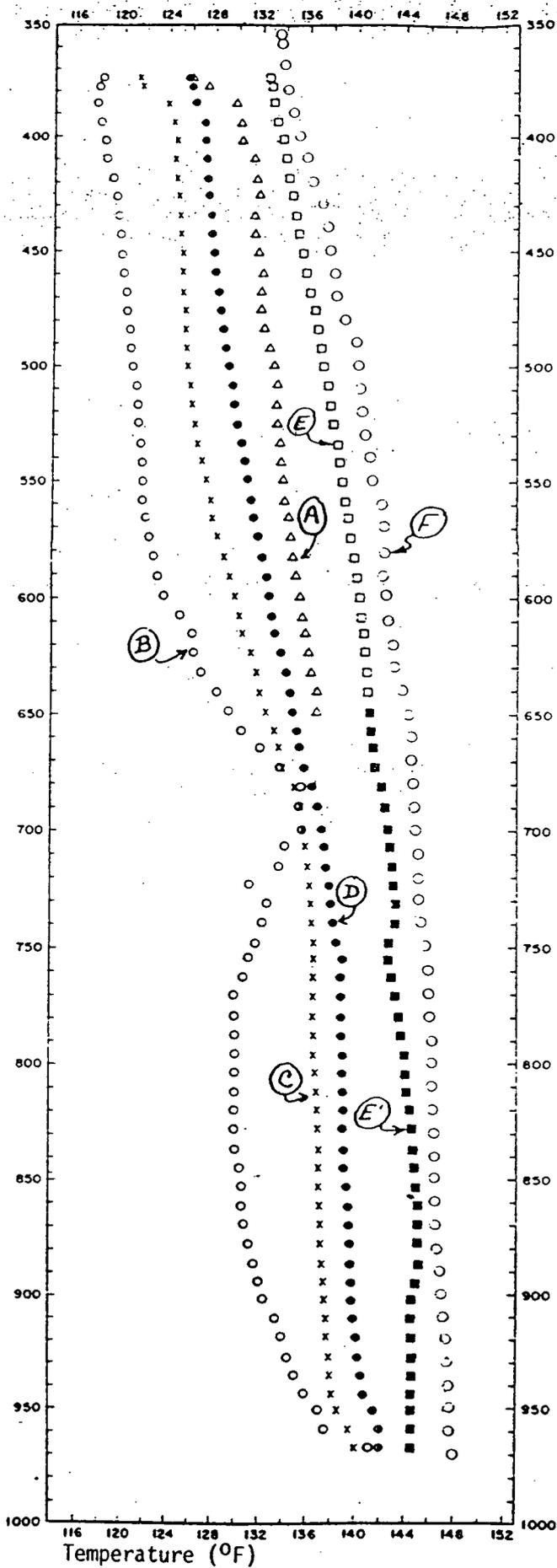
CERTIFICATION

I hereby certify that the information given above and the data and material attached hereto are true and complete to the best of my knowledge and belief.

Signed  Position Director, Physical Plant Date \_\_\_\_\_  
 Calvin D. Black



FINAL WELL CONFIGURATION, NMSU DT-3/P6-4



Logging Dates:

- A - 10/26/84 Mud-Filled Surface Casing
- B - 10/30/84 } Lost Circulation
- C - 10/31/84 } Open Hole
- D - 11/1/84 } Cased well
- E - 12/4/84 } Cased well
- E' - 12/7/84 } Cased well
- F - 4/28/86 TD 1,012'

Depth (feet)

Composite Temperature Logs DT-3 / PG-4

Temperature (°F)

CHEMICAL ANALYSIS OF DISSOLVED SOLIDS (mg/l)

NMSU Geothermal Wells

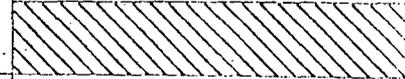
	PG-1	PG-3	<u>GD-2</u> (468 <sup>l</sup> )	<u>GD-2</u> (840 <sup>l</sup> )	<u>DT-3/PG-4</u> (Group I) (During Drilling)	<u>DT-3/PG-4</u> (Group II-1) (During Flow Test)	<u>DT-3/PG-4</u> (Group II-4)
pH	6.30	6.25	7.65	7.80	6.72	7.70	7.56
µmhos	3110	3120	3120	2680	2800	2720	2,790
TDS	2010	1981	1948	1787	1818	1695	1,854
NA	488	488	428	386	428	430.9	449.1
K	54	52	44	35	74	59.0	48.8
Ca	143	141	130	15	132	102.9	107.4
Mg	18.6	18.8	36.0	36.6	32.1	31.4	32.6
Cl	584	546	574	40	570	528.3	528.3
CO <sub>3</sub>	0	0	0	0	0	0	0
HCO <sub>3</sub>	620	610	422	94	487	462.5	489.4
SO <sub>3</sub>	250	240	315	80	251	232.4	289.2
Fe	2.8	5.0	1.28	00	0.22	0.05	<0.05
Mn	0.11	0.11	0.09	13	1.22	<0.02	<0.02
Hardness	NA	NA	NA	NA	460	386	402
Alkalinity	NA	NA	NA	NA	399	379	401
As	<0.004	<0.004	<0.001	0.001	<0.001	0.007	0.006
Ba	0.04	0.04	0.08	0.09	0.07	0.07	0.08
Cd	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cr	<0.05	<0.05	<0.02	<0.02	<0.05	<0.02	<0.002
Pb	<0.005	<0.005	0.005	0.005	<0.005	<0.005	<0.005
Hg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se	<0.002	<0.002	<0.001	0.001	<0.001	<0.001	<0.001
Ag	<0.05	<0.05	0.05	0.05	<0.05	0.02	<0.02
NO <sub>3</sub> -N	0.03	0.02	0.01	0.02	<0.01	0.05	0.03
F	1.27	NA	1.29	0.55	1.78	2.00	2.08

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U.S.G.S.	1
Operator	1
Land Office	

APPLICATION FOR PERMIT TO DRILL, DEEPEN,  
OR PLUG BACK--GEOTHERMAL RESOURCES WELL

5. Indicate Type of Lease  
STATE  FEE

5.a State Lease No.  
N/A



1a. Type of Work Drill  Deepen  Plug Back   
b. Type of Well Geothermal Producer  Temp Observation   
Low-Temp Thermal  Injection/Disposal

7. Unit Agreement Name  
N/A

8. Farm or Lease Name  
N/A

2. Name of Operator  
New Mexico State University, Physical Plant Department

9. Well No.  
NMSU GD-3

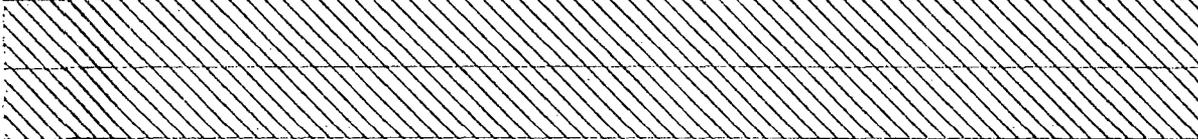
3. Address of Operator  
Box 3545, New Mexico State University

10. Field and Pool, or Wildcat  
NMSU

4. Location of Well UNIT LETTER M LOCATED 650 FEET FROM THE West LINE  
AND 450 FEET FROM THE southLINE OF SEC. 23 TWP. 235 RGE. 2E NMPM



12. County  
Dona Ana



19. Proposed Depth 400	19A. Formation Santa Fe	20. Rotary or C.T. Rotary
---------------------------	----------------------------	------------------------------

21. Elevations (Show whether DF, RT, etc.) 4230 feet above M.S.L.	21A. Kind & Status Plug. Bond Bond # 6358013	21B. Drilling Contractor T.B.D.	22. Approx. Date Work will start o/a 1 December, 1984
--	---	------------------------------------	--

Grindell & Rollings  
PROPOSED CASING AND CEMENT PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	SACKS OF CEMENT	EST. TOP
12 3/4 inch	6 5/8 inch	19 LB.	350 feet	180	G.L.
12 3/4 inch	6 5/8 inch	14 LB.	400 feet	N/A	N/A

This well is to be drilled after NMSU DT-3 has verified subsurface formations and water quality. Water table is assumed to be a 250-275 feet of depth, and quality is strongly expected to be identical with the other NMSU and private sector geothermal wells drilled within a 2-mile radius to the North, South, East, and West of this location. This well will be used for disposal operation for the planned geothermal greenhouse.

The hole will be drilled with a slim bit (5 3/4-inch) to acquire geophysical logs. This slim hole will be reamed out to 12 3/8-inch. The screen and casing will be landed at 400 feet T.D., and a gravel pack set from 400 to 350 feet. A 10-foot sand pack will then be installed, and the casing cemented from 340 feet to ground level with a tremie line.

APPROVAL VALID FOR 180 DAYS  
PERMIT EXPIRES 12-11-84  
UNLESS DRILLING UNDERWAY

OIL CONSERVATION COMMISSION TO BE NOTIFIED  
WITHIN 24 HOURS OF BEGINNING OPERATIONS

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. Give blowout preventer program, if any.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Signed Calvin D. Black Title Director, Physical Plant, NMSU Date 12 June 1984

(This space for State Use)

APPROVED BY Carl Ulvog TITLE DISTRICT SUPERVISOR DATE 6-14-84

GEOTHERMAL RESOURCES WELL LOCATION AND ACREAGE DEDICATION PLAT

All distances must be from the outer boundaries of the Section.

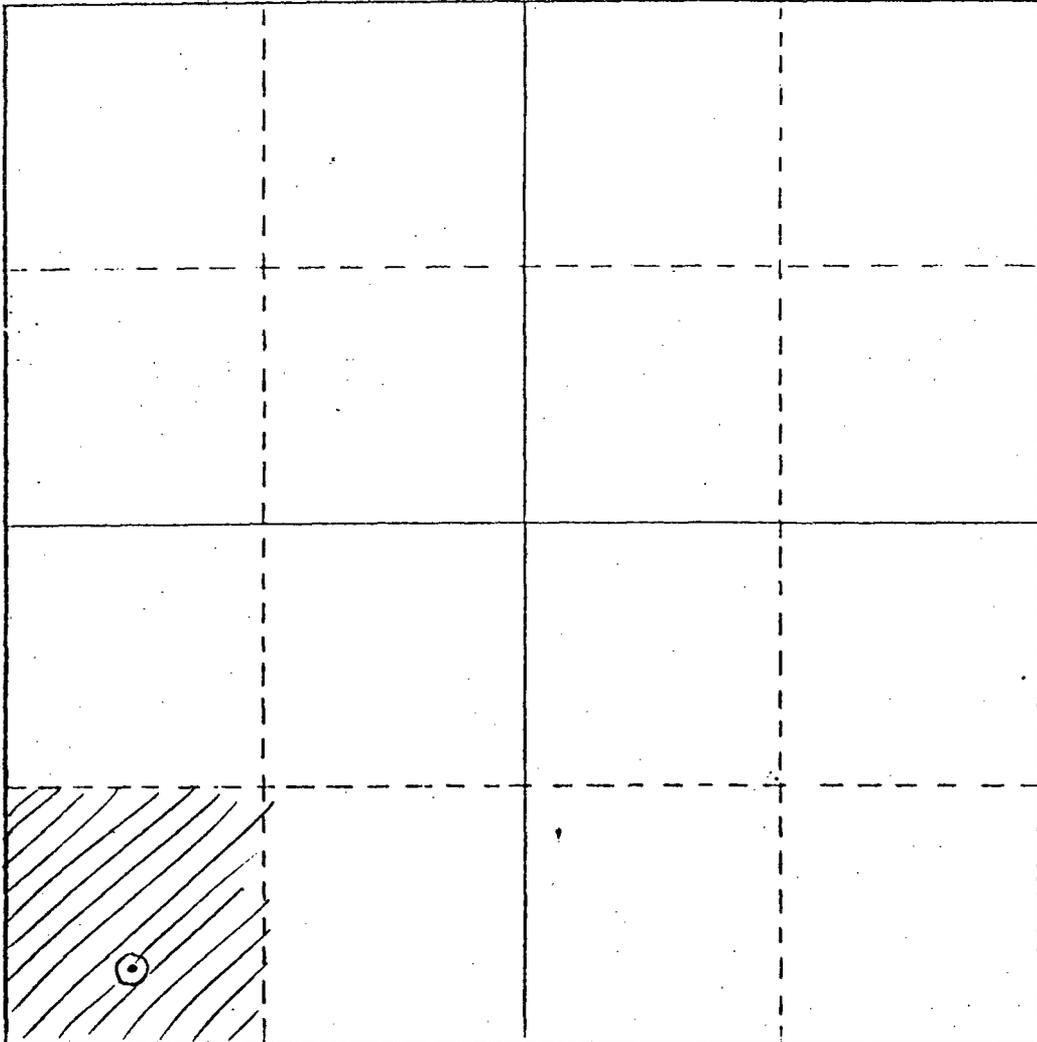
Operator New Mexico State University		Lease N/A		Well No. NMSU GD-3	
Unit Letter M	Section 23	Township 23S	Range 2E	County Dona Ana	
Actual Footage Location of Well: 450 feet feet from the South line and 650 feet from the West line					
Ground Level Elev. 4230 feet M.S.L.	Producing Formation Santa Fe		Pool NMSU	Dedicated Acreage: 40 Acres	

- Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.
- If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).
- 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 N/A

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) N/A

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 Division.



CERTIFICATION

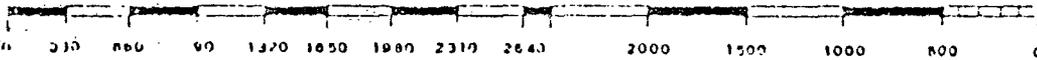
I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Name Calvin D. Black  
 Position Director, Physical Plant  
 Company New Mexico State University  
 Date 12 June 1984

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.

Date Surveyed \_\_\_\_\_  
 Registered Professional Engineer and/or Land Surveyor \_\_\_\_\_

Certificate No. \_\_\_\_\_





STATE OF NEW MEXICO  
**ENERGY AND MINERALS DEPARTMENT**  
 OIL CONSERVATION DIVISION

TONY ANAYA  
 GOVERNOR

November 10, 1986

POST OFFICE BOX 2088  
 STATE LAND OFFICE BUILDING  
 SANTA FE, NEW MEXICO 87501-2088  
 (505) 827-5800

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

Mr. C. D. Black, Director  
 Physical Plant Department  
 New Mexico State University  
 Box 3545  
 Las Cruces, New Mexico 88003

Re: Discharge Plan (GW-38)  
 New Mexico State University  
 NMSU Geothermal Well PG-4  
 Las Cruces, Dona Ana County

Dear Mr. Black:

Under the provisions of the Water Quality Control Commission (WQCC), the filing of a discharge plan is required for surface disposal of geothermal water produced from the NMSU Geothermal Well PG-4, located in Section 23, Township 23 South, Range 2 East, Dona Ana County, New Mexico. This well is also referred to as DT3 in your submittal. The discharge plan, defined in Section 1-101.P of the WQCC Regulations, should cover all discharges of effluent or leachate at the plant site or adjacent to the plant site. A copy of the regulations is enclosed for your convenience.

We are currently reviewing the submitted discharge plan for the referenced well. The plan submittal, dated October 16, 1986, was received by the OCD on October 20, 1986. The following comments and requests for additional information are based on our review of the data provided in the plan:

I. General Information

- A. With your response to our request for information, please include the following affirmation and signature in the format below to complete the application:

"I hereby certify that I am familiar with the information contained in and submitted with the discharge plan application and that such information is true, accurate, and complete to the best of my knowledge and belief."

\_\_\_\_\_

(Signature)

\_\_\_\_\_

(Date)

\_\_\_\_\_

(Printed Name of Person Signing)

\_\_\_\_\_

(Title)

II. Plant Processes

- A. Will any additions or commingling with any other waste stream occur before disposal in the unlined pit?
- B. Provide analyses of any additives to the geothermal water which will be used prior to disposal.
- C. List all fluids and solids that will be disposed of in the unlined pit.
- D. Will any other liquid waste be generated from the greenhouse operations? What will be the disposition of this waste effluent?

III. Site Characteristics

- A. Is the reserve pit the intended disposal pit? If so, are any modifications to the reserve pit planned before its use as the disposal pit? What will be the minimum freeboard maintained during disposal?

Please be advised that any discharge from this facility without prior approval from OCD would be in violation of the regulations. Before discharging, you must have either a discharge plan approved by the OCD or temporary permission to discharge without an approved discharge plan pursuant to Section 3-106.B. Temporary permission can only be granted for good cause shown by you and can only be for a non-renewable period of not more than 120 days. Public notice will be issued the week of November 10 and the following 30 days are required for public comment.

If there are any questions on this matter, please feel free to call Dave Boyer or Jami Bailey at (505) 827-5884, as they have the assigned responsibility for review of this discharge plan.

Sincerely,



R. L. STAMETS  
Director

RLS:JB:dp

cc: Roy Johnson, OCD

NEW MEXICO OIL CONSERVATION COMMISSION  
P. O. Box 2088, Santa Fe 87501

GEOTHERMAL RESOURCES WELL LOG

Operator New Mexico State University  
 Address Box 3548, NMSU, Las Cruces, NM 88003  
 Reservoir New Mexico State University  
 Lease Name Physical Plant Department Well No. NMSU PG-4 Unit Letter M  
 Location: 330 feet from the West line and 600 feet from the South line Section 23  
 Township 23S Range 2E County Dona Ana

FORMATIONS PENETRATED BY WELL

DEPTH TO		Thickness	Drilled or Cored	Recovery	DESCRIPTION
Top of Formation	Bottom of Formation				
10 feet	960 feet	950 feet	drilled	100%	Santa Fe Group alluvial fill
960 feet	985 feet	27 feet	drilled	None	Suspected solution cavern
985 feet		2 feet	drilled	None	Suspected Paleozoic bedrock
987 feet	1,012 feet	25 feet	drilled	None	Suspected bedrock fault

Attach Additional Sheets if Necessary

All applicable logs and data are included in the Technical Completion Report, NMSU Geothermal Exploratory Well, DT-3, June, 1986.

This form must be accompanied by copies of electric logs, directional surveys, physical or chemical logs, water analyses, tests, and temperature surveys (See Rule 205).

CERTIFICATION

I hereby certify that the information given above and the data and material attached hereto are true and complete to the best of my knowledge and belief.

Signed  Position Director Physical Plant Dept. Date \_\_\_\_\_  
 C. D. Black

NEW MEXICO OIL CONSERVATION COMMISSION  
P. O. Box 2088, Santa Fe 87501

GEOHERMAL RESOURCES WELL LOG

Operator New Mexico State University  
 Address Box 3548, NMSU, Las Cruces, NM 88003  
 Reservoir New Mexico State University  
 Lease Name Physical Plant Department Well No. NMSU PG-4 Unit Letter M  
 Location: 330 feet from the West line and 600 feet from the South line Section 23  
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Signed  Position Director Physical Plant Dept. Date \_\_\_\_\_  
 C. D. Black

NEW MEXICO OIL CONSERVATION COMMISSION  
P. O. Box 2088, Santa Fe 87501

GEOHERMAL RESOURCES WELL SUMMARY REPORT

Operator New Mexico State University Address Box 3548, NMSU, Las Cruces, NM 88003  
 Lease Name Physical Plant Department Well No. NMSU - PG-4  
 Unit Letter M Sec. 23 Twp. 23S Rge 2E  
 Reservoir NMSU County Dona Ana

Commenced drilling October 19, 1984 GEOLOGICAL MARKERS DEPTH  
 Completed drilling April 26, 1986 Santa Fe Group 0-960 # feet  
 Total depth 1,015 Plugged depth \_\_\_\_\_ Paleozoic (?) 960-987 (?) feet  
 Junk \_\_\_\_\_  
 Commenced producing August 26, 1986 Geologic age at total depth: Paleozoic  
 (Date)

Date	Static test		Production Test Data								
	Shut-in well head		Total Mass Flow Data					Separator Data			
	Temp. °F	Pres. Psig.	Lbs/Hr	Temp. °F	Pres. Psig.	Enthalpy	Orifice	Water cuft/Hr	Steam Lbs/Hr	Pres. Psig.	Temp. °F
8/27/86	147.6	0	1,000,000	146				NOT APPLICABLE			

CASING RECORD (Present Hole)

Size of Hole	Size of Casing	Weight of Csg/ft.	Grade of Casing	New or Used	Seamless or Lapweld	Depth of Shoe	Top of Casing	Number of Sacks Cement	Top of Cement	Cement Top Determined By
7 1/2	14	54.57	K-55	U	Seamless	688	1 ft. above GL	180	GL	Inspection
2 1/2	8 5/8	23.36	K-55	N	Seamless	706 ft.	658 ft.	32	659 ft.	Tagged
7 7/8	5 9/16	14.62	K-55	N	Seamless	None	972	NA	NA	NA

PERFORATED CASING

(Size, top, bottom, perforated intervals, size and spacing of perforation and method.)

Slotted liner 8 5/8"OD from 735 to 985 feet; slotted liner 5 9/16"OD from 974 to 1,015 feet

Was analysis of effluent made? Yes Electrical log depths 974 Temperature log depths 975

CERTIFICATION

I hereby certify that the information given above and the data and material attached hereto are true and complete to the best of my knowledge and belief.

Signed  Position Director  
C.-D. Black Physical Plant Dept. Date \_\_\_\_\_

NEW MEXICO OIL CONSERVATION COMMISSION  
P. O. Box 2088, Santa Fe 87501

GEOHERMAL RESOURCES WELL SUMMARY REPORT

Operator New Mexico State University Address Box 3548, NMSU, Las Cruces, NM 88003  
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 Reservoir NMSU County Dona Ana

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10/27/86	147.6	0	1,000,000	146				NOT APPLICABLE			

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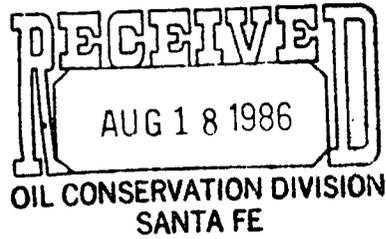
CERTIFICATION

I hereby certify that the information given above and the data and material attached hereto are true and complete to the best of my knowledge and belief.

Signed  Position Director Physical Plant Dept. Date \_\_\_\_\_  
 C.D. Black

PHYSICAL PLANT DEPARTMENT

Box 3545/Las Cruces, New Mexico 88003-3545  
Telephone (505) 646-2101



August 13, 1986

Roy Johnson  
District Supervisor, Geothermal Operations  
Oil Conservation Division  
P. O. Box 2088  
Santa Fe, NM 87501

Dear Mr. Johnson:

In compliance with the letter from Joe Ramey, dated July 29, 1983, please be advised that NMSU will be conducting a mechanically-pumped flow test on NMSU PG-4 on or about August 19, 1986.

Test duration will be 24-48 hours, at flow rates of 600 to 1200 gpm. We anticipate that 3 to 6 acre feet of geothermal water will be disposed into the existing reserve pit at the well site.

Sincerely,

  
C. D. Black  
Physical Plant Director

mmd

cc: Roy Cunniff w/encl.  
Owen Lockwood w/encl.

NO. OF COPIES RECEIVED	
DISTRIBUTION	
File	<input checked="" type="checkbox"/>
N. M. B. M.	
U. S. G. S.	
Operator	
Land Office	

SUNDRY NOTICES AND REPORTS  
ON  
GEOTHERMAL RESOURCES WELLS

5. Indicate Type of Lease  
State  Fee

5.a State Lease No.  
N/A

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit -" (Form G-101) for Such Proposals.)

1. Type of well  
Geothermal Producer  Temp. Observation   
Low-Temp Thermal  Injection/Disposal

7. Unit Agreement Name  
N/A

2. Name of Operator  
New Mexico State University, Physical Plant Department

8. Farm or Lease Name  
N/A

3. Address of Operator  
Box 3545, New Mexico State University 88003

9. Well No.  
NMSU DT-3, LRG 4905

4. Location of Well  
Unit Letter M 330 Feet From The West Line and 600 Feet From  
The South Line, Section 23 Township 23S Range 2E NMPM.

10. Field and Pool, or Wildcat  
NMSU

15. Elevation (Show whether DF, RT, GR, etc.)  
4210 GL ; 4219 RT

12. County  
Dona Ana

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input checked="" type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	PLUG & ABANDONMENT <input type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>		CASING TEST AND CEMENT JOB <input type="checkbox"/>	
OTHER <input type="checkbox"/>		OTHER <input type="checkbox"/>	

17. Describe Proposed or completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 203.

This well was originally spudded on 19 October, 1984, and was completed to an intermediate depth of 974 feet in a lost circulation zone. It was re-entered on 26 April, 1986, and drilling resumed. A major lost circulation zone was encountered from 987 to 1012 feet. After numerous attempts to regain circulation failed, the hole was drilled blind to 1015 feet.

To test the zone, an 8-hour DST was conducted on 27-28 April, and the zone produces at least 1,000 gpm at 147 °F, with minimal drawdown. Because this zone is a major production zone, the well was completed by inserting 43 feet of slotted 5 9/16 inch casing, which landed at 1015 feet. Completed configuration is at Attachment No. 1.

Site was cleared on 30 April, and well is now shut in.

See attached schematic of the completed well.

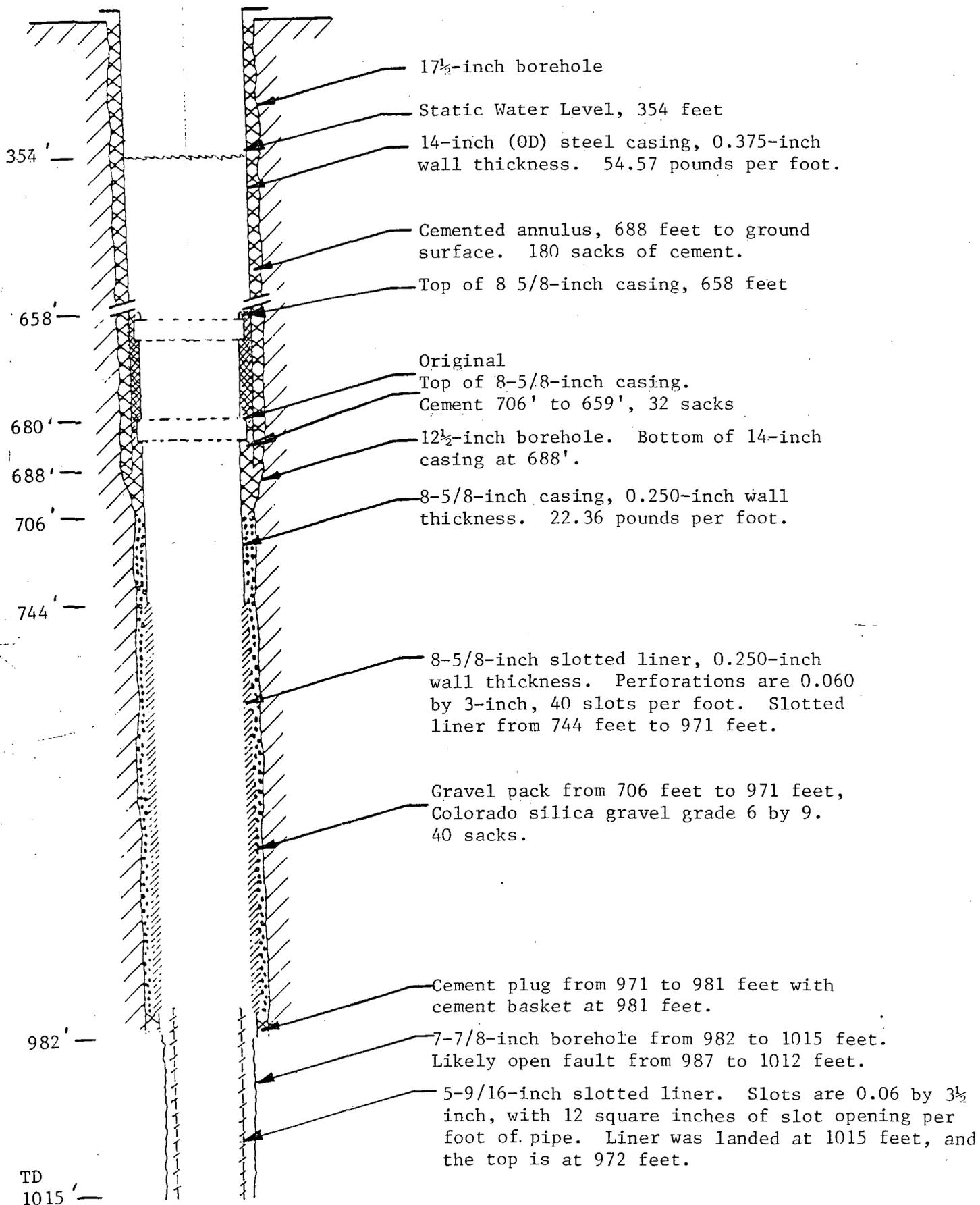
18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED Calvin D. Black TITLE Director, Physical Plant DATE May 15, 1986

APPROVED BY Ray E. Johnson TITLE DISTRICT SUPERVISOR DATE 5-19-86

CONDITIONS OF APPROVAL IF ANY:

(Depths Referenced to KB on L&M Rig)



FINAL WELL CONFIGURATION, NMSU DT-3