GTLT - 2

NMSU PG-3-LRG
UL:P 22-23S-02E
Dona Ana County

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

Form G-104
Adopted 10/1/74

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SANTA FE

File

CERTIFICATE OF COMPLIANCE AND AUTHORIZATION TO PRODUCE GEOTHERMAL RESOURCES

OWNER OR OPERATOR
Name New Mexico State University
Address Box 3445 NMSU, Las Cruces, NM 88003

TYPE OF WELL
Geothermal Producer [ ] Low-Temperature Thermal [X] Injection/Disposal [ ]

REASON FOR FILING
New Well [X] Recompletion [ ]
Change in Ownership [ ] Designation of Purchaser [ ]
Other (Please Explain) [ ]

DESCRIPTION OF WELL
Lease Name NMSU-PG-3-LRG Well No. 520 Name of Reservoir NMSU
Kind of Lease (Fee, Fed. or State) Private Lease Number N/A

LOCATION
Unit Letter P ; 4825 feet from the North line and
80 feet from the East line of
Section 22 Township 23S Range 2E
County Dona Ana

TYPE OF PRODUCT
Dry Steam [ ] Steam and Water [ ] Low Temp. Thermal Water [X]

DESIGNATION OF PURCHASER OF PRODUCT
Name of Purchaser None Self-use
Address of Purchaser
Product Will Be Used For

CERTIFICATE OF COMPLIANCE

I hereby certify that all rules and regulations concerning geothermal resources wells in the State of New Mexico, as promulgated by the Oil Conservation Commission of New Mexico, have been complied with, with respect to the subject well, and that the information given above is true and complete to the best of my knowledge and belief.

Signed Roy A. Cunniff Roy A. Cunniff Position Project Director Date 1 Nov. 1981

Approved Carl Ulvog Position SENIOR PETROLEUM GEOLOGIST Date 12/8/81

Form G-105
Adopted 10/1/74

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

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DEC 07 1981
OIL CONSERVATION DIVISION
SANTA FE

GEOTHERMAL RESOURCES WELL LOG

Operator New Mexico State University

Address Box 3445 NMSU, Las Cruces, NM 88003

Reservoir NMSU

Lease Name NMSU-PG-3-LRG Well No. 520 Unit Letter P

Location: 80 feet from the East line and
4825 feet from the North line Section 22

Township 23S Range _____ County Dona Ana

FORMATIONS PENETRATED BY WELL

DEPTH TO		Thickness	Drilled or Cored	Recovery	DESCRIPTION
Top of Formation	Bottom of Formation				
270	860	1200 or more	Drilled		Fractured rhyolite (Pennsylvanian). Entire deposit appears to be alluvial deposits.

Attach Additional Sheets if Necessary

All applicable logs and reports are included in the Technical Completion Report, attached.

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 Roy A. Cunniff Position Project Director Date 1 Nov. 1981

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

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SANTA FE

Form G-106
Adopted 10/1/74

GEOTHERMAL RESOURCES WELL SUMMARY REPORT

Operator New Mexico State University Address Box 3445 NMSU, Las Cruces, NM 88003

Lease Name NMSU-PG-3-LRG Well No. 520

Unit Letter P Sec. 22 Twp. 23S Rge 2E

Reservoir NMSU County Dona Ana

Commenced drilling 7 January 1981

Completed drilling 27 January 1981

Total depth ____ Plugged depth ____

Junk ____

GEOLOGICAL MARKERS	DEPTH
Santa Fe	870

Commenced producing January 1982 (Date)

Geologic age at total depth: Recent Quatenary

Date	Static test Shut-in well head		Production Test Data								
			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
-22-81	150°F	0	150,000	146	150psig	N/A		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
18"	10"	34.71		New	Seamless	N/A	2' above GL	ground surface		Inspection

PERFORATED CASING

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

Roscoe moss shutter type, from 750 to 860 feet of depth.

Was analysis of effluent made? Yes Electrical log depths 942 depth Temperature log depths 860 feet

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 Roy A. Cunniff Position Project Director Date 1 Nov. 1981

Form G-107
Adopted 10/1/74

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

GEOTHERMAL RESOURCES WELL HISTORY

Operator New Mexico State University Address Box 3445 NMSU, Las Cruces, NM 88003
Lease Name NMSU-PG-3-LRG Well No. 520
Unit Letter P Sec. 27 Twp. 23S Rge 2E
Reservoir NMSU 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	
01-07-81	Started drilling.
01-27-81	Completed drilling, set screen and casing.
01-28-81	Commenced 48 hour pump test with contractor-operated pump. 200 gpm @ 145°F. Water initially had large amounts of sand and mud. Subsequently became very clean.
06-22-81	Using rented TRW-REDA pump, set at 700 feet of depth, flow rate was 250 gpm @ 146°F. Pump subsequently was lowered to 750 feet, and second flow test was conducted. Flow was 275 gpm, later improved to 307 gpm @ 146°F. Water analysis showed 2000 ppm TDS, and dissolved CO_2 at 220 cc/liter. Traces of N_2, methane, and other gases. Pump provided 200 psig back pressure @ flow rate of 250 gpm.
07-22-81	Well was connected to gas separator/surge tank complex 1150 feet south, using 4" insulated AC pipeline. Subsequently gas separation tests using pump pressure head, produced separation of CO_2 at rate of 125 cc/liter.

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 Roy A. Cunniff Position Project Director Date 1 Nov. 1981

Form G-101
Adopted 10/1/74

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

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OIL CONSERVATION DIVISION
SANTA FE

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

5. Indicate Type of Lease: STATE ☐ FEE ☐
5.a State Lease No.:

1a. Type of Work: Drill ☒ Deepen ☐ Plug Back ☐
b. Type of Well: Geothermal Producer ☐ Low-Temp Thermal ☒ Temp Observation ☐ Injection/Disposal ☐
7. Unit Agreement Name:
8. Farm or Lease Name: NMSU
2. Name of Operator: New Mexico State University, Physical Plant Department
9. Well No.: NMSU-PG-3
3. Address of Operator: New Mexico State University, P.O. Box 3445, Las Cruces, New Mexico 88003
10. Field and Pool, or Wildcat: NMSU Property
4. Location of Well: UNIT LETTER ~~K~~ P LOCATED 80 FEET FROM THE East LINE AND 4825 FEET FROM THE North LINE OF SEC. 22 TWP. 23S RGE. 2E NMPM
12. County: Dona Ana

19. Proposed Depth	19A. Formation	20. Rotary or C.T.
850-1000 ft.	Santa Fe	Rotary

21. Elevations (Show whether DF, RT, etc.)	21A. Kind & Status Plug. Bond	21B. Drilling Contractor	22. Approx. Date Work will start
Approx. 4200 ft.		Cole Drilling Company	

PROPOSED CASING AND CEMENT PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	SACKS OF CEMENT	EST. TOP
17"	10-3/4"	--	--	--	--

This is the proposed location of the second production well (NMSU-PG-3), which will be used for the NMSU Geothermal Project.

7/28/81 #change to NMSU-PG-3-LRG #520

APPROVAL VALID FOR 90 DAYS
PERMIT EXPIRES 3-23-81
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 M F Whalen Martin F. Whalen Title Director, Physical Plant Dept. NMSU Date

(This space for State Use)

APPROVED BY Carl Ulvog TITLE SENIOR PETROLEUM GEOLOGIST DATE 12/23/80

CONDITIONS OF APPROVAL, IF ANY:

NEW MEXICO OIL CONSERVATION COMMISSION
P. O. BOX 2088 SANTA FE 87501

Form G-102
Adopted 10/1/74

GEOTHERMAL RESOURCES WELL LOCATION AND ACREAGE DEDICATION PLAT

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

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OIL CONSERVATION DIVISION
SANTA FE

Operator	Lease	Well No.
New Mexico State University	NMSU	NMSU-PG-3

Unit Letter	Section	Township	Range	County
~~K~~ P	22	23S	2E	Dona Ana

Actual Footage Location of Well:
80 feet from the East line and 4825 feet from the North line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
Approx. 4200 ft.	Santa Fe	NMSU Property	Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

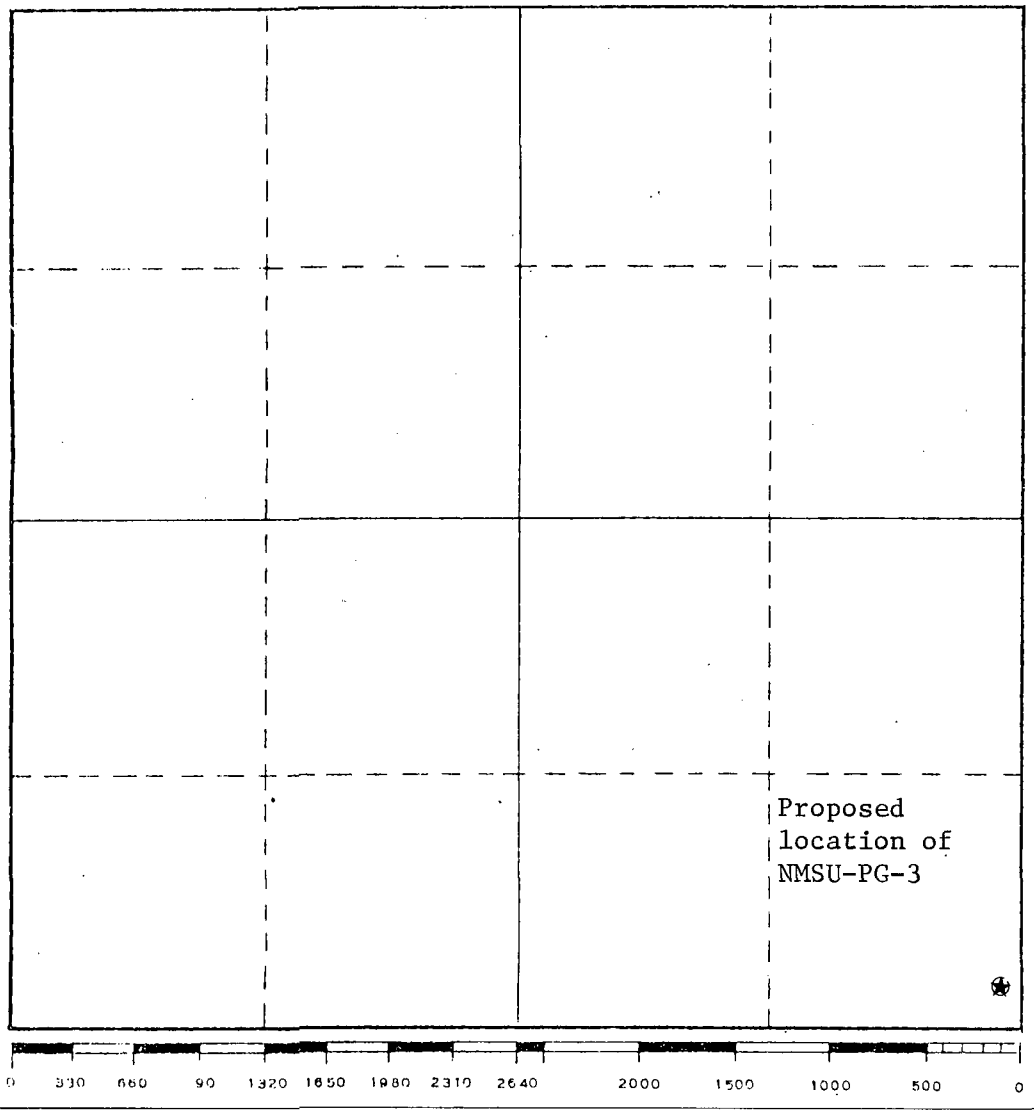
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

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 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 Commission.



CERTIFICATION

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

M. F. Whalen

Name: Martin F. Whalen

Position: Director, Physical Plant Dept.

Company: NMSU

Date:

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

TONEY ANAYA
GOVERNOR

July 13, 1983

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

New Mexico State University
Physical Plant Dept.
P.O. Box 3545
Las Cruces, NM 88003

Attention: C. D. Black

Dear Mr. Black:

Monthly reports of production (G-108) and injection (G-110) of geothermal fluid submitted by your office continue to confuse and/or complicate our required record keeping and data processing.

For example, the June 20, 1983, reports show two different locations and conditions of Well No. 521, whereas the well number is a unique identification for a single individual location. The parenthesized number (520) immediately below the lowermost 521, suggest that you are attempting to eliminate the well which was initially permitted and drilled as PG-3, later changed to Well No. 520. (See attached.) This would pose an insolvable problem for our data processing department.

The injection report (Form G-110) for June 20, 1983, refers to a Well No. 3648. There is no record in this office of such a well. Presumably the well referred to (P-21-23S-2E) is in reality Well No. 4, sometimes known as the "Old Golf Course Well". However, that location is not in Unit P. (See attached.)

It would be appreciated if some way can be found to eliminate the confusion resulting from the above.

Very truly yours,

Carl Ulvog

CARL ULVOG
Geothermal Supervisor

CU/dp

Attachments.

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U. S. G. S		
Operator	1	
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NEW MEXICO OIL CONSERVATION COMMISSION
P. O. Box 2088, Santa Fe 87501

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FEB 16 1981
OIL CONSERVATION DIVISION

Form G-103
Adopted 10/1/74

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

5. Indicate Type of Lease: State ☐ Fee ☒
5.a State Lease No.

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

2. Name of Operator
New Mexico State University, Physical Plant Department
8. Farm or Lease Name
NMSU-PG-3-LRG

3. Address of Operator New Mexico State University
P.O. Box 3445, Las Cruces, New Mexico 88003
9. Well No.
520

4. Location of Well
Unit Letter P 80 Feet From The East Line and 4825 Feet From The North Line, Section 22 Township 23S Range 2E NMPM.
10. Field and Pool, or Wildcat
NMSU Property

15. Elevation *(Show whether DF, RT, GR, etc.)*
4210 above MSL
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 ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐		COMMENCE DRILLING OPNS. ☐	PLUG & ABANDONMENT ☐
PULL OR ALTER CASING ☐	CHANGE PLANS ☐	CASING TEST AND CEMENT JOB ☐	
OTHER ☐		OTHER Well completion XX	

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

The well was completed to a depth of 870 feet, with perforations from 750 to 860 feet. Casing is copper-impregnated steel, and the screen is Roscoe-Moss Shutter-type. Casing and screen are 10 inch I.D., with weight of 34.71 lb/foot. Casing was cemented from surface to 730 feet of depth. An 18-inch conductor casing was cemented in a 26-inch hole, for the top 60 feet of the well.

The well was test-pumped for 48 hours, 25-27 January, 1981, at a steady flow of 200 gpm; peak flow of 250 gpm. Water temperature is 145°F.

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

SIGNED Roy A. Cunniff TITLE Director, NMSU Geothermal Proj. DATE 9 February 1981

APPROVED BY Carl Ulvog TITLE SENIOR PETROLEUM GEOLOGIST DATE 2/23/81

CONDITIONS OF APPROVAL, IF ANY:

NEW MEXICO STATE UNIVERSITY
Physical Science Laboratory
BOX 3-PSL, LAS CRUCES, NEW MEXICO 88003
AREA (505) 522-9100 TWX 910-983-0541

February 12, 1981

Mr. Carl Ulvog
Senior Petroleum Geologist
New Mexico Oil Conservation Commission
P.O. Box 2086
Santa Fe, New Mexico 87503

Dear Mr. Ulvog:

Enclosed please find Form G-103 for the new geothermal production well we drilled on NMSU land.

You will note that this well (formerly NMSU-PG-3) has now been identified as Farm or Lease Name NMSU-PG-3-LRG, Number 520. We will convert all our other geothermal wells to this type of system, which identifies the owner and purpose of the well in the well name, and uses the State Engineer's well number.

Sincerely yours,

Roy A. Cunniff
Project Director
NMSU
Geothermal Project

cjs
Enclosure

NEW MEXICO STATE UNIVERSITY
Physical Science Laboratory
BOX 3-PSL, LAS CRUCES, NEW MEXICO 88003
AREA (505) 522-9100 TWX 910-983-0541

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Project Director
NMSU
Geothermal Project

cjs
Enclosure

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Physical Science Laboratory
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Sincerely yours,

Roy A. Cunniff
Project Director
NMSU
Geothermal Project

cjs
Enclosure

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U. S. G. S		
Operator	/	
Land Office		

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

Form G-103
Adopted 10/1/74

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JUL 28 1981
OIL CONSERVATION DIVISION
SANTA FE

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

5. Indicate Type of Lease State [ ] Fee [X]

5.a State Lease No.

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 [X] Injection/Disposal [ ]

7. Unit Agreement Name

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

8. Farm or Lease Name
NMSU-PG-3-LRG

3. Address of Operator New Mexico State University
P.O. Box 3445, Las Cruces, New Mexico 88003

9. Well No.
520

4. Location of Well
Unit Letter P 80 Feet From The East Line and 4825 Feet From The North Line, Section 22 Township 23S Range 2E NMPM.

10. Field and Pool, or Wildcat
NMSU Property

15. Elevation *(Show whether DF, RT, GR, etc.)*
4210 above MSL

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 [ ]	PLUG AND ABANDON [ ]	REMEDIAL WORK [ ]	ALTERING CASING [ ]
TEMPORARILY ABANDON [ ]		COMMENCE DRILLING OPNS. [ ]	PLUG & ABANDONMENT [ ]
PULL OR ALTER CASING [ ]	CHANGE PLANS [ ]	CASING TEST AND CEMENT JOB [ ]	
		OTHER Well completion XX	
OTHER [ ]			

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

The well was completed to a depth of 870 feet, with perforations from 750 to 860 feet. Casing is copper-impregnated steel, and the screen is Roscoe-Moss Shutter-type. Casing and screen are 10 inch I.D., with weight of 34.71 lb/foot. Casing was cemented from surface to 730 feet of depth. An 18-inch conductor casing was cemented in a 26-inch hole, for the top 60 feet of the well.

The well was test-pumped for 48 hours, 25-27 January, 1981, at a steady flow of 200 gpm; peak flow of 250 gpm. Water temperature is 145°F.

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

SIGNED Roy A. Cunniff TITLE Director, NMSU Geothermal Proj. DATE 9 February 1981

APPROVED BY Carl Ulvog TITLE SENIOR PETROLEUM GEOLOGIST DATE 7/28/81

CONDITIONS OF APPROVAL, IF ANY:

NEW MEXICO STATE UNIVERSITY

Physical Science Laboratory

BOX 3-PSL, LAS CRUCES, NEW MEXICO 88003
AREA (505) 522-9100 TWX 910-983-0541

PG-3

January 15, 1981

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

Dear Mr. Ramey,

For continuing information to you, please find attached diagrams which reflect the extent of impoundment of geothermal waters from NMSU-PG-1, along with our plans for NMSU-PG-3.

NMSU-PG-1 was tested for 48 hours on 18-19 December, 1980, and again on a limited duration on 22 December. These tests were necessary to provide information on aquifer transmissibility, water quality, dissolved gas content and hydraulic head. As you can note from Enclosure One, almost all the water was contained within the first two check dams, and quickly percolated into the very porous soil.

We are planning to conduct a 48-hour flow test on NMSU-PG-3 sometime during the period 23-28 January 1981. If conditions warrant, during the latter part of the 48-hour period, we will pump NMSU-PG-1 in order to gain information on maximum possible sustained flow rate. We will use the check dams (four total) for NMSU-PG-1, along with those new dams we are erecting in the discharge channel from NMSU-PG-3. I can state with confidence that the geothermal waters will be contained within 300 yards distance from the wells.

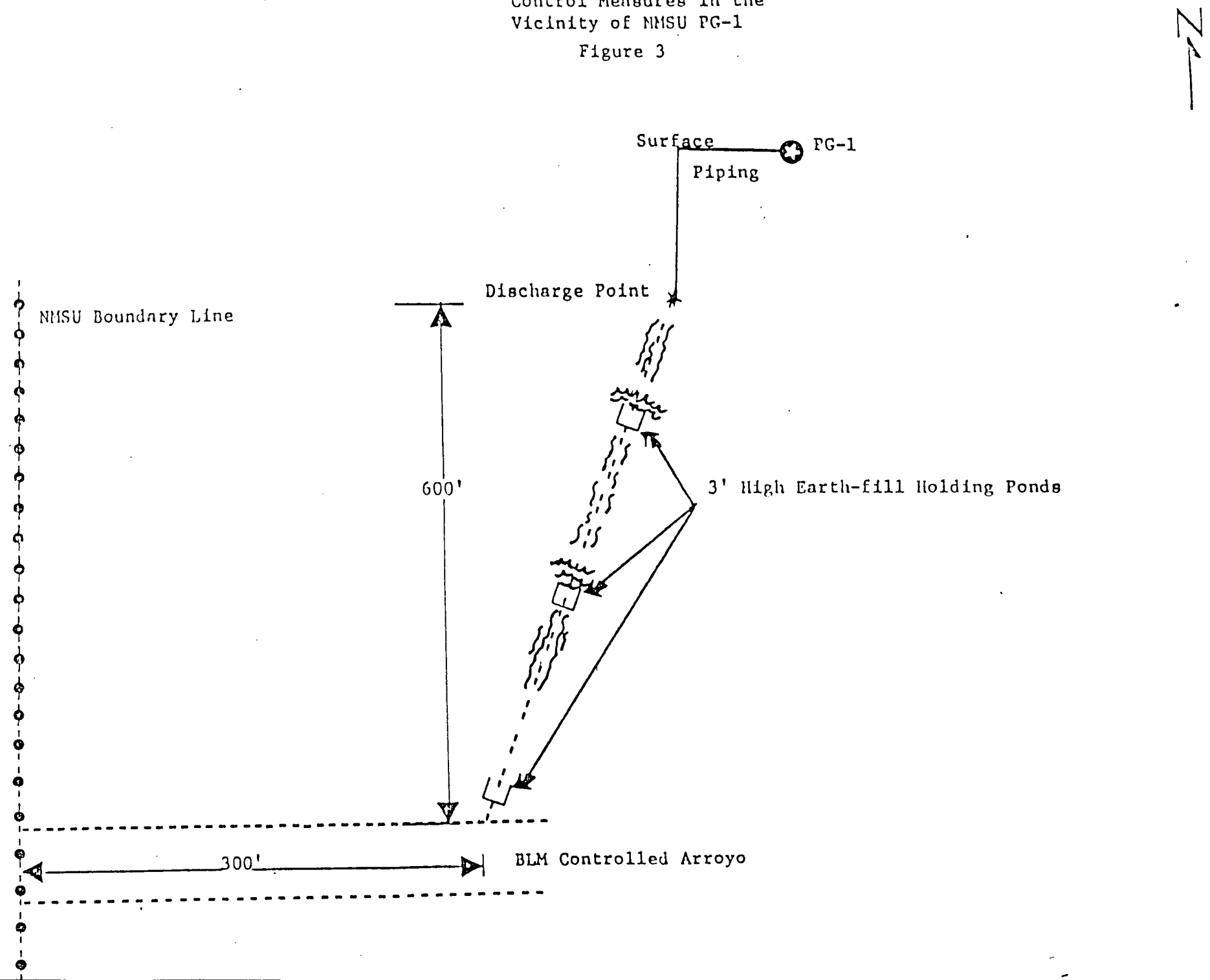
Sincerely,

Roy A. Cunniff
NMSU Geothermal Project

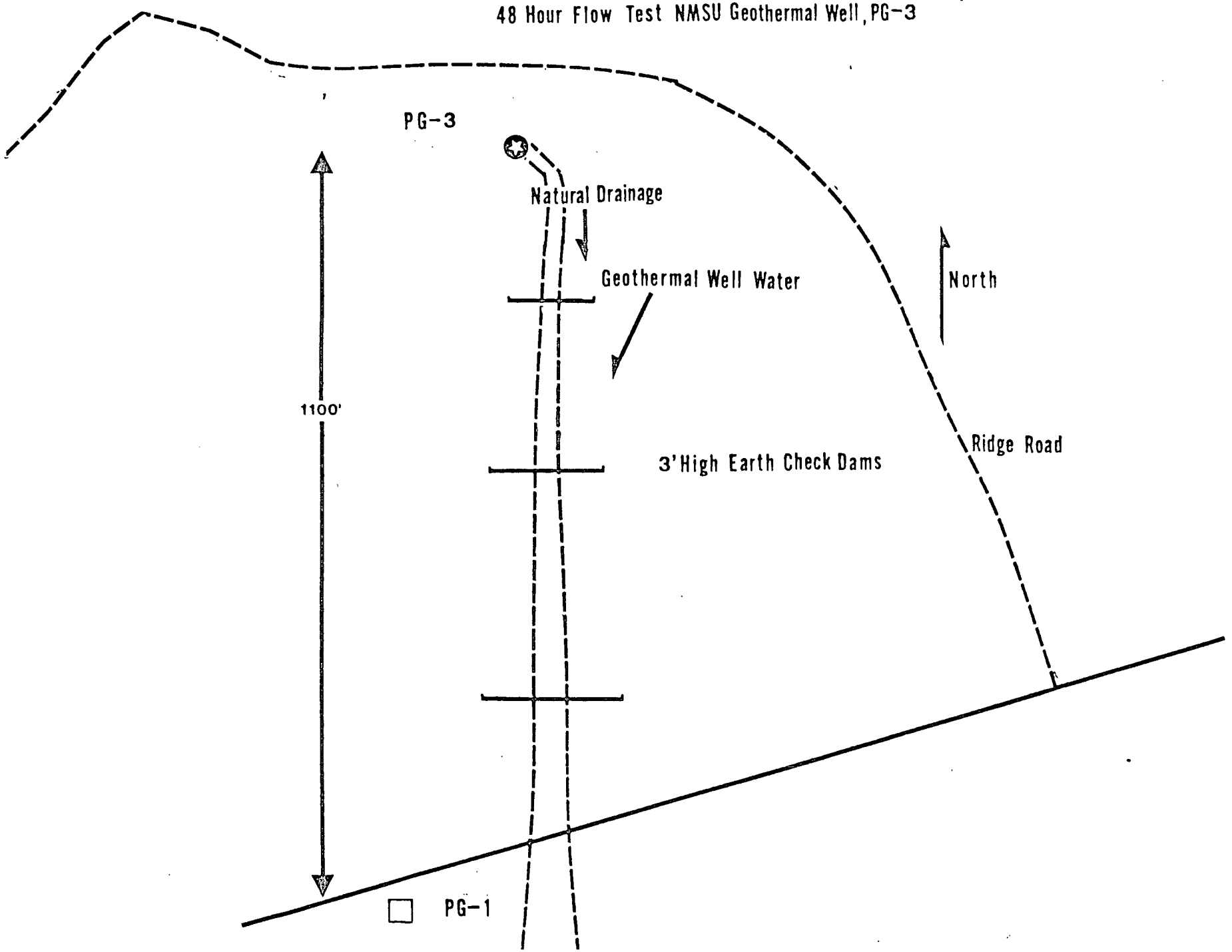
Enclosures: 2 as stated

Control Measures in the
Vicinity of NMSU PG-1

Figure 3



48 Hour Flow Test NMSU Geothermal Well, PG-3



NEW MEXICO STATE UNIVERSITY
Physical Science Laboratory
BOX 3-PSL, LAS CRUCES, NEW MEXICO 88003
AREA (505) 522-9100 TWX 910-983-0541

PG-3

November 12, 1980

Subject: Request for approval of temporary surface discharge of geothermal water.

To: Oil Conservation Division
State Land Office Bldg.
P.O. Box 2088, Santa Fe, NM 87501
ATTN: Mr. Carl Ulvog

Dear Mr. Ulvog,

As we discussed by telephone on 12 November, 1980, forwarded herewith is a request for approval of temporary surface discharge of geothermal water from NMSU wells PG-1 and (new) PG-3. This request is submitted based on the need for temporary surface disposal of geothermal waters during testing of the geothermal aquifer during the next 12 month period, and is in compliance with Rule 502 of your regulations.

Attached are exhibits which define the probable limits of the geothermal aquifer, and the location of the current production well NMSU-PG-1. As is shown, the only wells located within one mile of the PG-1 are the University Center well NMSU-PG-2, and the abandoned NMSU golf course well. The newest well, NMSU-PG-3, for which a permit application is pending, will be drilled approximately 1,000 feet North-East of PG-1. Because only these wells are involved, request a waiver of the 20-day period defined in Rule 502.

The attached plot plans (Enclosures 1 and 3) also depict the natural drainage system for surface waters in the vicinity of PG-1. As is depicted, natural drainage is via a small arroyo southwesterly, intersecting with a BLM controlled arroyo which passes west-southeast through NMSU property and adjoining private property, and then terminates in a large BLM flood control dam approximately three miles from the well. From measurements on the ground, the natural surface flow channel is approximately 300 yards (900 feet) from the well to NMSU boundary. This is a key point, because at the tested flow rate of 100-200 gpm, the surface discharge percolates into the very porous arroyo soil within 600 feet distance from the well. Accordingly, the surface discharge is contained within NMSU property.

Also depicted on the attached plots is the inferred westerly boundary of the geothermal aquifer. From chemical analysis of existing wells, the water quality at the water table is in the range of 1500-2000 gpm total dissolved solids everywhere to the East of the dashed line denoting probable aquifer limits. Accordingly, the conclusion is that percolation of the surface discharged geothermal water acts to recharge the existing geothermal aquifer at the water table.

Chemical analyses of the geothermal water from NMSU-PG-1 are attached. From these analyses, it can be determined that the water meets all primary water standards, and slightly exceeds secondary standards for sodium and total alkalinity.

This request is designed to cover surface disposal of geothermal water from a planned 48-hour flow test on or about 30 November 1980, and a follow-on 48-hour pumping test of the new well (PG-3) in late December 1980. During each test, it is estimated that 2.2 acre feet of geothermal water will be discharged on the surface. In addition, other tests in the next year are planned on a twice monthly basis for limited operation. These tests discharge roughly 0.1 acre feet per test. We also envision at least two additional 48-hour flow tests during the period January-August, 1981.

Request expeditious approval of this request so as to enable us to complete the scheduled tests. If re-application is necessary using form G-112, please advise.

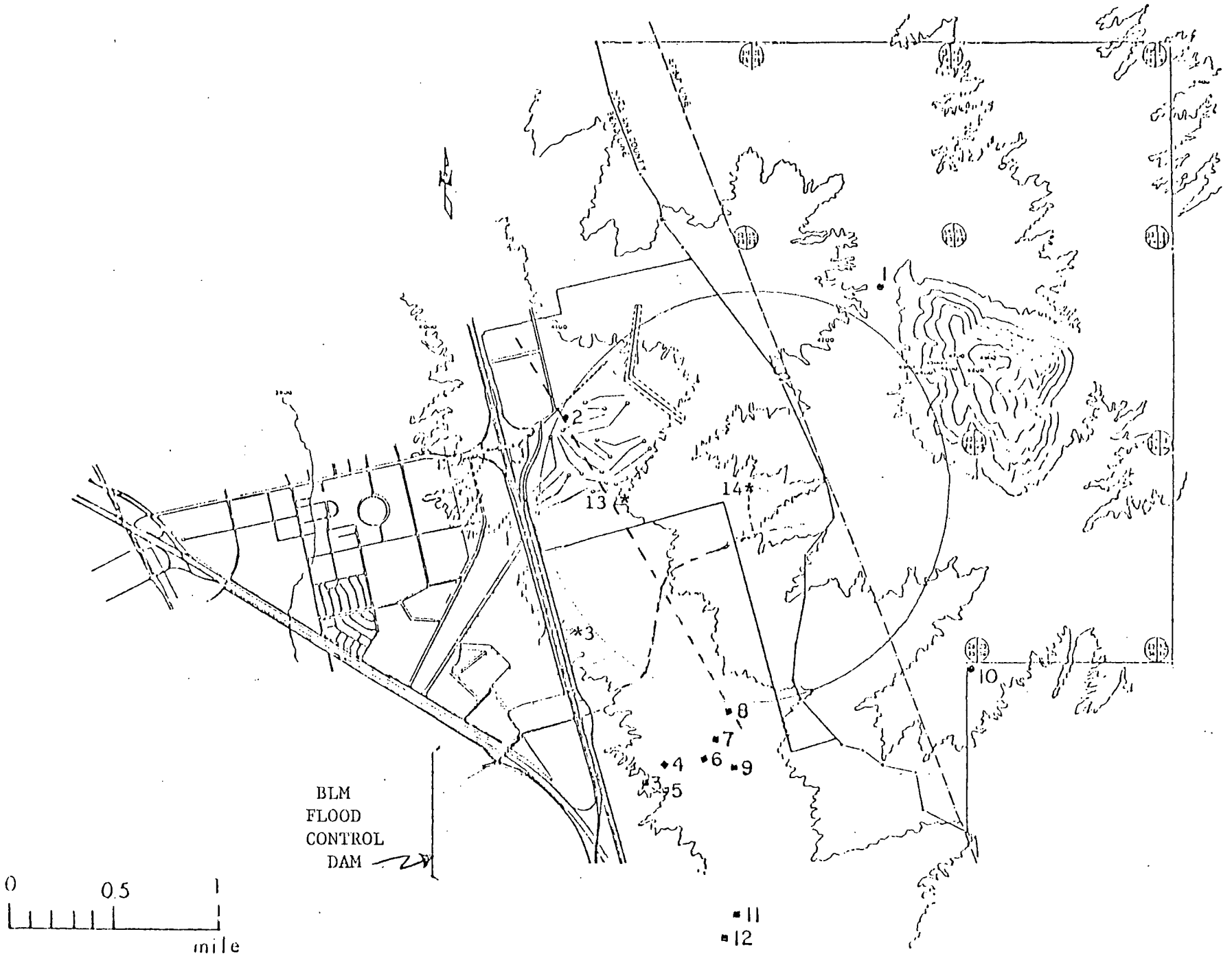
Sincerely,

Roy A. Cunniff
Principal Investigator, NMSU Campus Geothermal Project

RAC:sm

Enclosures:

Figure 1, Location of hot wells on and near NMSU land.
Table 1, Summary of data on hot wells in Las Alturas and surrounding area.
Figure 2, Location of wells within 1 mile of the NMSU-PG-1.
Chemical analysis of geothermal water from NMSU-PG-1.



LOCATION OF HOT WELLS ON AND NEAR N.M.S.U. LAND

Figure 1

TABLE 1

SUMMARY OF DATA ON HOT WELLS IN LAS ALTURAS AND SURROUNDING AREA

(Numbering of wells same as Fig. 1)

Well No.	Year of Drilling	Owner and Location (Past and Present)	Max. Temperature	Water Level (ft.)	Total Depth	Total Dissolved Solids PPM	Remarks
1	1960	NMSU Near Antenna Towers NW Tortugas Mtns.	Hot	Dry	200	-	Dry; hot well, "Tools too hot to hold in hand
2	1961-62	NMSU Golf Course	24°C	-	630	1575	Abandoned due to high salinity
3	1957	Soules Las Alturas Estate	25°C	161	296	-	
4	1963	L. R. Evans	Hot	174	332	-	
5	1964	Wm. Evans/Partridge	Hot	-	256	-	
6	1964	Rowan	36.7°C	190-200	330	-	
7	1964	White/Catcher	34°C	190	311	-	
8	1964	Mattons/Huddleston	45°C	240	335	1625	
9	1964	Husand/Kinzer	42.5	180	348	520	
10	1948-49	Clary & Ruther State No. 1	Hot	526	2573	-	
11	1975	Charles Jordan	46°C	200	330	-	4" casing being used for drinking water
12	1966 to 1969	Wayne Johnson	70°F	165	280	Potable	4" PVC being used for domestic purposes on Trailer Park 2000 gallons per day from two wells
13	1979	NMSU-PG-2	118°F	278	505	1575	20 gpm flow tested
14	1979	NMSU-PG-1	141°F	255	860	1900-2000	200 gpm flow tested

COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING
Box 3CE/Las Cruces, New Mexico 88003
Telephone (505) 646-3803

NEW MEXICO STATE UNIVERSITY

December 19, 1980

Mr. Carl Ulvog
Senior Petroleum Geologist
New Mexico Oil Conservation Commission
P.O. Box 2086
Santa Fe, NM 87503

was PG-3
now #520

Dear Mr. Ulvog:

Enclosed please find Forms 101 and 102 for the new geothermal production well we intend to drill on NMSU land.

These forms are being resubmitted due to a small change in location resulting from our recent tests of the first production well.

Sincerely yours,

M F Whalen

M. F. Whalen
Director, Physical Plant

cd

Enclosure

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

December 11, 1980

PG-3

Mr. Roy Cunniff
Physical Science Laboratory
New Mexico State University
Box 3-PSL
Las Cruces, New Mexico 88003

Dear Mr. Cunniff:

Permission is hereby granted to test wells PG-1 and PG-3 as outlined in your letter of December 5, 1980.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

cc: Carl Ulvog

NEW MEXICO STATE UNIVERSITY

Physical Science Laboratory

BOX 3-PSL, LAS CRUCES, NEW MEXICO 88003
AREA (505) 522-9100 TWX 910-983-0541

Approval letter
12/11/80
PG-3

December 5, 1980

Subject: Request for approval of temporary surface discharge of geothermal water.

To: Oil Conservation Division
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87501
Attn: Mr. Joe Ramey

Dear Mr. Ramey:

Reference is made to my letter of November 12, 1980, and your response of November 20, 1980. Moreover, reference is made to the meeting with you on November 25, 1980, during which you provided additional guidance.

Forwarded herewith is a completed Form G-112, with supplementary data, in compliance with Rule 502 of your regulations. This form, however, does not appear to be completely adaptable to the problem of temporary surface discharge of geothermal water. Accordingly, fuller details are provided in the following paragraphs.

The requested approval is for the period December 10, 1980 through December 31, 1981. During that time frame, we will be testing the current production well PG-1, and also the new production well, PG-3, for which a permit application is pending. During testing of these wells, at least four tests will be conducted of 48-hours duration. For each test, we estimate approximately 2.2 acre feet of water will be discharged on the ground surface. In addition, we anticipate a need to operate the well pump on a more limited basis once each week to acquire water and gas samples, and to evaluate design changes in the pumps. Each of these limited-duration tests will discharge an estimated 0.1 to 0.2 acre feet of water onto the ground surface.

Our initial 48-hour test on PG-1 well is planned for 13-14 December, 1980, subject to your approval.

A brief summation of each of the key exhibits is as follows.

- Figure 1, together with Table 1, depicts the location and water chemistry analysis for all wells located near the PG-1 well. Also depicted is the location of all geothermal wells located within one mile of the PG-1. Figure 1 indicates a probable westerly limit of the geothermal aquifer. This is an artificial line of demarcation, however, because our tests and water chemistry analyses indicate that it is most likely that the warm geothermal water rises along a subsurface fault, and these migrate westerly and gradually mix with the cooler Rio Grande valley water. In support of this assumption, wells #16 and #17 in Figure 1 (DG-2 and DG-1 on Table 1) both intersected the water table at the same depth, and both encountered the same formations to total depth. In terms of temperature, however, the wells are significantly different. The DG-2 well had a positive temperature gradient and a temperature of 145°F at 1000 feet. Well DG-1, drilled 0.4 mile to the west, had a slightly negative gradient from the water table to bottom, and the 122°F temperature at the water table was then duplicated at hole bottom of 1200 feet.

- Depicted in Figure 1 and 2 are the natural drainage channels which the surface discharge would normally follow in the vicinity of PG-1. As is depicted, natural drainage is via a small arroyo southwesterly, intersecting with a BLM controlled arroy which passes west-southwest through NMSU property and adjoining private property, and then terminates in a large BLM flood control dam approximately three miles from the well. From measurements on the ground, the natural surface flow channel is approximately 300 yards (900 feet) from the well to NMSU boundary.

- Figure 3 depicts the earthen holding ponds constructed, to assure the geothermal water is contained on NMSU property. From the generalized lithologic logs of well PG-2, also enclosed, we believe that the geothermal water will percolate to the water table, and act to recharge the aquifer.

- Attached chemical analyses for PG-1 and PG-2 clearly indicate that the geothermal water permeates all water bearing formations from water table down to at least 1200 feet (the deepest well we have drilled). There is no evidence of fresh water formations overlying the geothermal waters at any point to the east of our assumed geothermal aquifer limit.

- Review of the chemical analysis indicates that the geothermal water meets all primary water standards. It does, however, exceed slightly the secondary standards for sodium, total alkalinity, chlorides, sulfates, manganese, and iron. This water meets the water quality standards for irrigation and other general use.

Request expeditious approval of this request for temporary surface discharge so as to enable us to meet our scheduled tests.

Sincerely,

Roy A. Cunniff
Principal Investigator,
NMSU Campus Geothermal Project

RAC:njb

Enclosures:

Form G-112
Figure 1, Location of Wells on and Near NMSU Land
Table 1, Summary of Data on Wells
Figure 2, Location of Wells within 1 mile of NMSU-PG-1
Figure 3, Control Measures in the Vicinity of NMSU-PG-1
Chemical Analysis of water from NMSU-PG-1
Chemical Analysis of water from NMSU-PG-2 (President's Well)
Technical Completion Report on NMSU-PG-1, containing lithologic and electric logs

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

December 11, 1980

Mr. Roy Cunniff
Physical Science Laboratory
New Mexico State University
Box 3-PSL
Las Cruces, New Mexico 88003

Dear Mr. Cunniff:

Permission is hereby granted to test wells PG-1 and PG-3 as outlined in your letter of December 5, 1980.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

cc: Carl Ulvog

FILED

DEC 22 1980
9:35 AM
STATE ENGINEER FIELD OFFICE
Las Cruces N. M.

Revised August 1967

87428 D - $1.00

IMPORTANT—READ INSTRUCTIONS ON BACK BEFORE FILLING OUT THIS FORM

TEST WELL

APPLICATION FOR PERMIT

To ~~Appropriate~~ Explore for the Underground ~~Waters~~ Geothermal Sources of the State of New Mexico

Date Received December 22, 1980 File No. LRG-520

1. Name of applicant New Mexico State University
   Mailing address Las Cruces, New Mexico 88003
   City and State Las Cruces, New Mexico
2. Source of water supply artesian, located in Lower Rio Grande Undergrand Water Basin
   (artesian or shallow water aquifer) (name of underground basin)
3. The well is to be located in the SE ¼ SE ¼ SE ¼, Section 22 Township 23S
   Range 2E N.M.P.M., or Tract No. ____ of Map No. ____ of the ____ District,
   on land owned by ____.
4. Description of well: name of driller Cole Drilling Co.;
   Outside Diameter of casing 10-3/4 inches; Approximate depth to be drilled 850-1000 feet;
5. Quantity of water to be appropriated and beneficially used consumptive (see Item 7) acre feet,
   (consumptive use, diversion)
   for See item 7 purposes.
6. Acreage to be irrigated or place of use see item 7. acres.

Subdivision	Section	Township	Range	Acres	Owner
test					

7. Additional statements or explanations This well is being drilled as a continuation of the geothermal exploration, development and production program of the New Mexico State University Geothermal Project which is trying to develop geothermal resources for use on the New Mexico State University campus.

RECEIVED
JAN 1 1981
OIL CONSERVATION DIVISION
SANTA FE

I, M. F. Whalen, 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.

Signature Mary L Dunn

OFFICIAL SEAL
MARY L. DUNN
NOTARY PUBLIC—NEW MEXICO
NOTARY BOND FILED WITH SECRETARY OF STATE
MY COMMISSION EXPIRES: 12-3-83

New Mexico State University, Permittee,

By: M F Whalen
M. F. Whalen, Director, Physical Plant

Subscribed and sworn to before me this 19th day of December, A.D., 1980.

My commission expires 12-3-83

Mary L Dunn
Notary Public

Number of this permit LRG-520

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 _____ wells be complied with; and further subject to the following conditions: 1. Well shall be drilled only by a drilling contractor licensed by the State Engineer of New Mexico. 2. Well shall be constructed in accordance with the rules and regulations and well specifications of the Oil Conservation Division. 3. The State Engineer Office in Deming shall be notified at least 48 hours before work commences on the well. 4. The State Engineer shall be given 3 days advance notice in writing of the initiation of any flow test utilizing the well. 5. Personnel from the State Engineer shall have access to the well site at all times during the flow test. 6. No water shall be diverted from the well except during the testing operation designated to develop the geothermal resource and no beneficial use of the water pumped during the test shall be made. 7. Diversion of water shall be measured by a totalizing meter of a type and at a location approved by and installed in a manner acceptable to the State Engineer. Records of such diversion and the amount of water reinjected into the geothermal reservoir shall be submitted to the State Engineer no later than 40 days from the completion of the test but in no event later than December 30, 1981. 8. Testing shall not be conducted for more than 90 days without the written permission of the State Engineer. 9. Well shall be plugged or capped on or before December 30, 1981, unless a permit to use water from the well is obtained from the State Engineer.

Proof of completion of well shall be filed on or before _____, 19____

Proof of application of water to beneficial use shall be filed on or before _____, 19____

Witness my hand and seal this 30th day of December, A.D., 1980.

S. E. Reynolds, State Engineer

By: _____
L. T. Putnam
Supervisor, District III

INSTRUCTIONS

This form shall be executed, preferably typewritten, in triplicate and shall be accompanied by a filing fee of $5.00. Each of triplicate copies must be properly signed and attested.

A separate application for permit must be filed for each well used.

Secs. 1–4—Fill out all blanks fully and accurately.

Sec. 5—Irrigation use shall be stated in acre feet of water per acre per annum to be applied on the land. If for municipal or other purposes, state total quantity in acre feet to be used annually.

Sec. 6—Describe only the lands to be irrigated or where water will be used. If on unsurveyed lands describe by legal subdivision "as projected" from the nearest government survey corners, or describe by metes and bounds and tie survey to some permanent, easily located natural object.

Sec. 7—If lands are irrigated from any other source, explain in this section. Give any other data necessary to fully describe water right sought.

12/23/90

Martin Whalen -

The attached copies of your Original application for PG-3 are now obsolete? Unless we hear otherwise, our copies will be destroyed.

As I have mentioned to various individuals at NMSU at different times, we do identify all wells by Unit Letter, Section Number, Township, Range, Operator-Name, Type of Lease, Lease or Farm Name, and Well Number. Your new application, although approved, defies classification or integration into our system. From your C-102 the well must be in Unit P (not K-B as shown), and we are considering this as Fee type lease. Somehow the well numbers of all the NMSU wells will eventually have to be reduced to just that-NUMBERS.

73, Carl Velez

Form G-101
Adopted 10/1/74

NO. OF COPIES RECEIVED		
DISTRIBUTION		
File		
N.M.B.M.		
U.S.G.S.		
Operator		
Land Office		

NEW MEXICO OIL CONSERVATION COMMISSION

P. O. Box 2088, Santa Fe 87501

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

5. Indicate Type of Lease: STATE ☐ FEE ☐

5.a State Lease No.:

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:

8. Farm or Lease Name: NMSU

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

9. Well No.: NMSU-PG-3

3. Address of Operator: Box 3445, New Mexico State University, Las Cruces, New Mexico 88003

10. Field and Pool, or Wildcat: NMSU Property

4. Location of Well: Within 1/2 mile North or East of NMSU-DG-3. Final location will be notified before drilling commences.

12. County: Dona Ana

19. Proposed Depth	19A. Formation	20. Rotary or C.T.
1000 ft.	Santa Fe	Rotary

21. Elevations (Show whether DF, RT, etc.)	21A. Kind & Status Plug. Bond	21B. Drilling Contractor	22. Approx. Date Work will start
Approx. 4200 Feet above MJR	Grindell & Rollings Bond No. 6358013	Cole Drilling Co., 600 Delhi Dr, El Paso, Tx.	Nov. 15, 1980

PROPOSED CASING AND CEMENT PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	SACKS OF CEMENT	EST. TOP
17"	10"				

This is planned to be the second geothermal production well, which will be used for NMSU geothermal project. Precise location will be selected after drilling and testing OW-1 and TG-1 and TG-2. A sundry notice will be submitted (Form G-103).

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 M.F. Whalen Martin F. Whalen Title Dir., Physical Plant Dept, NMSU Date 31 October 1980

(This space for State Use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

NEW MEXICO OIL CONSERVATION COMMISSION
P. O. BOX 2088 SANTA FE 87501

Form G-102
Adopted 10/1/74

GEOTHERMAL RESOURCES WELL LOCATION AND ACREAGE DEDICATION PLAT

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

Operator	Lease	Well No.
New Mexico State Univ., Physical Plant Dpt	NMSU	NMSU-PG-3

Unit Letter	Section	Township	Range	County
A	27	23S	2E	Dona Ana

Actual Footage Location of Well: Location will be notified before drilling commences
feet from the line and feet from the line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
Approx 4200 ft	Santa Fe	NMSU Property	Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

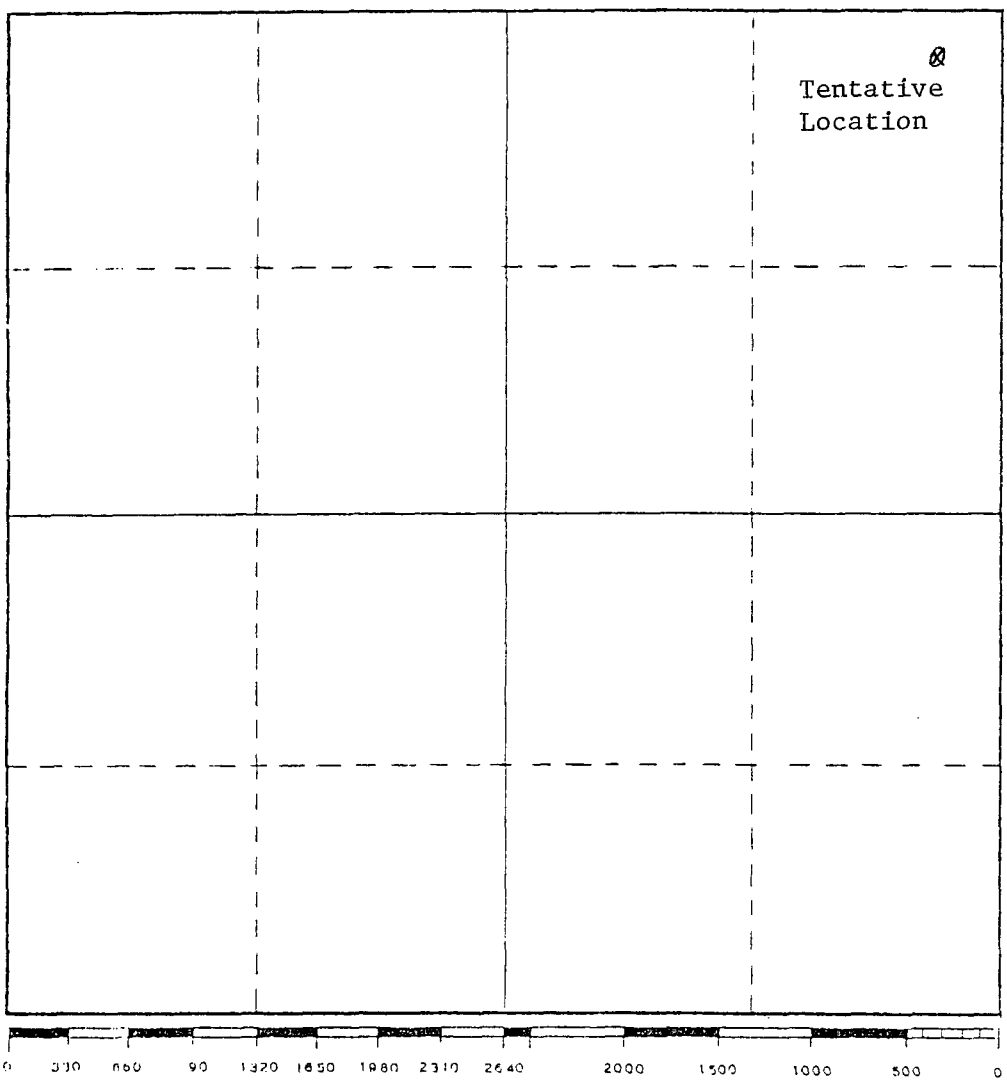
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

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 NA

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.

M.F. Whalen

Martin F. Whalen

Name: Director, Physical Plant Dept

Position: NMSU

Company: 31 October 1980

Date

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: 10-11-80

Registered Professional Engineer and/or Land Surveyor: Burod B. Keyes Jr.

Certificate No. 3720