GTLT - ____2__

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

NEW MEXICO OIL CONSERVA	FION COMMISSION	Form G-104
P. C. Box 2088, Santa	Fe 87501	
CERTIFICATE OF CO AND AUTHORIZATION GEOTHERMAL RES		EC 07 1981
	OIL CUR	SERVATION UNICIÓN SANTA FE
OWNER OR OPERATOR		
Name <u>New Mexico State University</u> Address Box 3445 NMSU, Las Cruces, NM 8800	3	
Address		· · · · · · · · · · · · · · · · · · ·
TYPE OF WELL	701	
Ceothermal Producer [] Low-Temperature	Thermal [XX	Injection/Disposal []
REASON FOR FILING New Well [X] Recompletion [] Change in Ownership [] Designation of Purchaser [] Other (Please Explain) []		
DESCRIPTION OF WELL		
Lease Well NMSU-PG-3-LRG No. 520	Name of Reservoir	NMSU
Kind of Lease Lease (Fee, Fed. or State) Private Number	N/A	
LOCATION		•
Unit Letter P 4825 feet from the	ne North	line and
80 feet from t	e East	line of
Section 22 Township 23S	Range2E	
County Dona Ana		
TYPE OF PRODUCT Dry Steam and	Low Tem	p
Steam Water	Thermal V	Vater X
DESIGNATION OF PURCHASER OF PRODUCT Name of Purchaser <u>None</u> Self-use		
Address of Purchaser		
Product Will Be Used For		

G-104

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 Profecuent	Position Project Director Date 1 Nov. 1981
Approved Carl Ulvog	Position Date 12/8/81

	NEW MEXICO OIL CONSERVATION COMMISSION THE TILL WAR	Form G-10 Adopted 1
	GEOTHERMAL RESOURCES WELLING	
Operator	New Mexico State University OIL CONSERVATION DIMENSION	-
Address	Box 3445 NMSU, Las Cruces, NM 88003	
Reservoir	NMSU	
Lease Name	NMSU-PG-3-LRG Well No. 520 Unit Letter P	-
Location:		_
	4825 feet from the North line Section22	_
Township	23SRangeCounty_Dona_Ana	

FORMATIONS PENETRATED BY WELL

DEPT	Н ТО	Thickness	Drilled or	D	
Top of Formation	Bottom of Formation	THICKNESS	Cored	Recovery	DESCRIPTION
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.

vyl lum ff <u>Cunnif</u>f Roy A Signed ____

Position <u>Project Director</u> Date <u>1 Nov. 1981</u>

.4						NEW ME:	<ico cc<br="" oil="">Р. О. Вох 20</ico>	DNSERVAT 188, Santa I	TION COMMISS Fe 87501		EC 07 198		rm G-106 opted 10/1/74
					GEO [.]	THERMAI	RESOUR	CES WEL	L SUMMARY	REPORT	SANTA FE		
Ope	rator <u>N</u>	ew Mexi	co	Stat	e Univ	versity		Adc	Iress <u>Box</u>	<u>3445 NMSU,</u>	Las Cruce	s, NM 8	8003
Leas Unit	e Name t Letter	NMSU-PC P	-3-	LRG	Sec	22	Τ\	Well vp	No. <u>520</u> 23S	Rge	e2E		
Rese	ervoir]	NMSU						Cou	nty <u>Dona</u>	Ana		<u></u>	
Com	Commenced drilling 7 January 1981 GEOLOGICAL MARKERS DEPTH												
Com	pleted drillin	g27	Jan	uary	1981			<u> </u>	<u>Santa Fe</u>			870	
Tota	l depth			_ Plugg	ed depth							···· · · · · · · · · · · · · · · · · ·	
Junk									·····				
Com	menced proc	lucing	Jan	uary	1982				Geologic a	age at total depth	Recent Qu	iatenary	<u>···</u>
	Sta	tic test		Date)			<u></u>	Р	roduction Tes	t Data			
Date	Shut-ir	n well hea	d	<u> </u>		Total	Mass Flow	Data			Separato	or Data	
	Temp. •17	Pres. P	sig.	LI	os/Hr	Temp. °F	Pres. Psig.	Enthalpy	Orifice	Water cuft/Hr	Steam Lbs/Hr	Pres. Psig.	Temp. °F
-22-8	<u>81 150⁰F</u>	0		150	,000	146	150psig	N/A		NOT AP	PLICABLE		
						• 						· ·	
\$		-											
													·
			1			C.	ASING REC	' 'ORD (Pre	esent Hole)		· · · · · · · · · · · · · · · · · · ·		· ·
Size	Size	Weight	Gra	ade	New	Seam	less	Depth	Top	Number of Sacks	Top	Cem	ent Top
Hole	Casing	Csg/ft.	Cas	ing	Used	Lapw	veld	Shoe	Casing	Cement	Cement	Deter	mined By
18''	10"	34.71			New	Seam	less	N/A	GL	surface		Inspe	ection
PERFORATED CASING													
	<u></u>			(Siz	e, top, bo	ttom, perfo	rated intervals	s, size and s	pacing of perfor	ration and method	l.)		
F	Roscoe m	oss shu	itte	<u>r ty</u>	pe, fi	<u>com 750</u>	to 860	feet of	depth.				
													
Was	analysis of ef	fluent mad	e?	Yes	_Electric:	al log depth	s942 d	depth		_ Temperature log	depths 860) feet	
	CERT	IFICATI	NC										
	l here	by certify	that	the i	nformati	on given a	bove and th	e data an	d material att	tached hereto a	re true and co	mplete to th	ne
	best o	· my kno	wiedą)	je and		\rightarrow							
	Signec		γ ,		niff	78	Posit	ion <u>Pr</u>	<u>coject Dir</u>	ectorl	Date <u>1 Nov</u>	<u>. 1981</u>	

NEW MEXICO OIL CONSERVATION COMMISSION

P. O. Box 2088, Santa Fe 87501

. int GEOTHERMAL RESOURCES WELL HISTOR $\widehat{\mathbf{Y}^{\mathrm{ML}}}$ SANTA FE

Operator	New Mexico Sta	ate Uni	versity	Add	ress	Box 3445	NMSU,	Las	Cruces,	NM	88003
Lease Name	NMSU-PG-3-LRG		· · · · · · · · · · · · · · · · · · ·	Well	No	520					
Unit Letter	PP	Sec	27	Twp	23	5	Rge		2E		
Reservoir	NMSU			Coui	nty	De	ona An	а			

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.)

01-07-81 Started drilling.

Date

- 01-27-81 Completed drilling, set screen and casing.
- 200 gpm @ 145⁰F. Commenced 48 hour pump test with contractor-operated pump. Water 01-28-81 initially had large amounts of sand and mud. Subsequently became very clean.
- Using rented TRW-REDA pump, set at 700 feet of depth, flow rate was 250 gpm @ 146°F. 06-22-81 Pump subsequently was lowered to 750 feet, and second flow test was conducted. Flow was 275 gpm, later improved to 307 gpm @ 146⁰F. Water analysis showed 2000 ppm TDS, and dissolved CO₂ at 220 cc/liter. Traces of N₂, methane, and other gases. Pump provided 200 psig 2 back pressure @ flow rate of 250 gpm.
- Well was connected to gas separator/surge tank complex 1150 feet south, using 4" 07-22-81 insulated AC pipeline. Subsequently gas separation tests using pump pressure head, produced separation of CO₂ 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 Signed Roy A. Cunniff

Project Director Position.

Form G-107 Adopted 10/1/74

NO. OF COPIES RECEIVED Form G-101 Adopted 10/1 NN.B.M. 1 U.S.G.S. 1 Operator 1 Land-office &L M 1 N.W.B.M. 1 U.S.G.S. 1 Operator 1 Land-office &L M 1 N.W.B.M. 1 U.S.G.S. 1 Operator 1 Land-office &L M 1 Now Mexico State University, Physical Plant Department 7. Unit Agreement Name b. Type of Well Geothermal Producer Temp Observation Low-Temp Thermal Injection/Disposal 8. Farm or Lease Name NMSU 9. Well No. 9. Well No. New Mexico State University, Physical Plant Department NMSU PCG-3 3. Address of Operator New Mexico State University 10. Field and Pool, or Wildcat P.O. Box 3445, Las Cruces, New Mexico 88003 NMSU Property 4. Location of Well UNIT LETTER Cucated 80 Abort Elect 80 FEET FROM THE NorthLINE OF SEC 22 Abort Elect 12. County Dona Ana	Ne i San						,
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P.O. Box 3445, Las Cruces, New Mexico 88003 A. Location of Well UNIT LETTER DOCATED 80 FEET FROM THE East AND 4825 FEET FROM THE NorthLINE OF SEC. 22 TWP. 23S RGE. 2E NMPM 12. County Dona Ana	3. Address of Operator	New Mexico St	ate University			10. Field and	Pool, or Wildcat
4. Location of Well UNIT LETTER DOCATED 80 FEET FROM THE East LINE AND 4825 FEET FROM THE NorthLINE OF SEC. 22 TWP. 235 RGE. 2E NMPM 12. County Dona Ana		<u>P.O. Box 3445</u>	5, Las Cruces, New M	exico 88003		NMSU	Property
AND 4025 PEEL PROMITIE NOT LILLINE OF SEC. 22 TWP. 255 RGE. 2E NMPM (11. County) Dona Ana	4. Location of Well	UNIT LETTER	LOCATED 80 FEET	FROM THE East	LINE		
Λ						12. County Oona Ana	
(1)							
ANN///////////////////////////////////				19. Proposed Depth	19A. Formation	n [2	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	21. Elevations (Show W Approx. 4200	whether DF, RT, etc.) ft.	21A. Kind & Status Plug. Bond	21B. Drilling Contractor Cole Drillin	ng Company	22. Approx.	Date Work will start

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 NM5U-PG-3-LRG #520

APPROVAL VALID FOR 90 DAYS PERMIT EXMINES 3-23-21 UNLESS DRILLING UNDERWAY

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

IN ABOVE SPACE DESCRIBE P	ROPOSED PROGRAM: I	f proposal is to deepen or	′ plug back, give data or	present productive	zone and proposed new	productive
zone. Give blowout preventer pro	gram, if any.					

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

 $Male_{Martin F. Whalen Title Director, Physical Plant Dept.NMSU_Date_}$

(This space for State Use)

Carl APPROVED BY CONDITIONS OF APPROVAL, IF

Signed

TITLE SENIOR PETROLEUM GEOLOGIST

DATE 12/23/80

	NE		SERVATION CON	MISSION		Form G-102
•	GEOTHERMAL RESOL	JRCES WELL LOCA	ATION AND AC		ATION-PEAD	Adopted 10/1//4
	All dista	ances must be from the	e outer boundaries	of the Section.		
Operator New Mexi	co State Universit	Lease	NMSU	IPIT DE	C 2 2 1980 NMSU-1	'G-3
Jnit Letter Sect	ion Township 22 23	3S	ange 2E	Dona Ana	CRVATICN DIVISION	1
Actual Footage Location	of Well: East	line and 4	825	fact from the N	SANTA FE	
Ground Level Elev.	Producing Formation	Pool		leet nom the	Dedicated Acrea	ge:
pprox. 4200 ft.	Santa Fe	N	MSU Propert	У		Acres
 Outline the a If more than and royalty) 	none lease is dedicated to the s	to the well, outline	red pencil or hac each and identi	thure marks on t	the plat below.	vorking interest
 3. If more that communitiza Yes If answer is "non necessary.) No allowable of forced-pooling, or 	n one lease of different of tion, unitization, force-po No If answer is "yo b," list the owners and t will be assigned to th or otherwise) or until a no	ownersip is dedicate poling, etc? es," type of consolic ract descriptions wh e well until all ir on-standard unit, eli	d to the well, h dation <u>N/A</u> nich have actuall nterests have be minating such in	y been consolid een consolidate iterests, has beer	ated. (Use reverse side d (by communitization n approved by the Com	onsolidated by of this form if on, unitization, mission.
			1		CERTIFICAT	ION
				Nan Ma	I hereby certify that t contained herein is true a the best of my knowledge MARCON PAR me rtin F. Whalen	he information and complete to and belief. 2 Valen
				Pos Di Con NM Dat	sition rector, Physical mpany ISU te	. Plant Dept.
					I hereby certify that the shown on this plat was pla notes of actual surveys r under my supervision, and is true and correct to t knowledge and belief.	e well location otted from field nade by me or d that the same he best of my
	- +	+	Proposed location NMSU-PG-	of Dat	te Surveyed gistered Professional Engin 1/or Land Surveyor	eer
			} 	×87		
				Cer	tificate No.	

90 1320 1650 1980 2310 2640

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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.

		*. p
		EIVED _Form G-103
······································		Adopted 10/1/74
NO. OF COPIES RECEIVED NEW MEXICO OIL CONSEI	RVATION COMMISSION	
DISTRIBUTION P. O. Box 2088, S	anta 🕫 87501	
File 1 1		
N. M. B. M. SUNDRY NOTICES	AND REPORTS	VTION DIVISION
U. S. G. S ON		5. Indicate Type of Lease
Operator / GEOTHERMAL RES	OURCES WELLS	State 🗌 🛛 Fee 🛣
Land Office		5.a State Lease No.
! <u></u>		
Do Not the This Form for Pressed to Daily of the Develop of Blue Bask to a D	Manual Decembra (1) Manufactor	
For Permit	Therefit Reservoir. Use Application	
1. Type of well Geothermal Producer Temp. Observation		7. Unit Agreement Name
Low-Temp Thermal		
2. Name of Operator		8. Farm or Lease Name
New Mexico State University, Physical Plant Dep	artment	NMSU-PG-3-LRG
3. Address of Operator New Mexico State University		9. Well No.
P.O. Box 3445, Las Cruces, New Me	xico 88003	520
4. Location of Well		10. Field and Pool, or Wildcat
Unit Letter P 80 Feet From The East	Line and 4825 Fast From	NMSU Property
\sim North ~ 22 ~ 235	- 2E	
The Line, Section Township	RangeNMPM.	X////////////////////////X
Elevation (Show whether	DF, RT, GR, etc.)	12. County
4210 above MSL		Dona Ana
to. Check Appropriate Box To Indicate Nat	ure of Notice, Report or Other Da	ta
NOTICE OF INTENTION TO:	SUBSEQUE	NT REPORT OF:
PERFORM REMEDIAL WORK D PLUG AND ABANDON	REMEDIAL WORK	
TEMPORARILY ABANDON	COMMENCE DRILLING OPNS.	PLUG & ABANDONMENT
PULL OR ALTER CASING CHANGE PLANS	CASING TEST AND CEMENT JOB	
	Upli complete	ion VV
	well complet	1 U I I I I I I I I I I I I I I I I I I
	OTHERWell Compiler.	
OTHER	OTHER WEIL COMPLEE.	
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CONDITIONS OF APPROVAL, IF ANY:

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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



Physical Science Laboratory

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Sincerely yours,

Roy A. Cunniff Project Director NMSU Geothermal Project

cjs Enclosure

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SANTA FE



Physical Science Laboratory

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Sincerely yours,

Roy A! Cunniff

Project Director NMSU Geothermal Project

cjs Enclosure

NO. OF COPIES RECEIVED DISTRIBUTION File / / N. M. B. M. / U. S. G. S Operator / Land Office	NEW MEXICO OIL CONSERVATION P. O. Box 2088, Santa Fe SUNDRY NOTICES AND R ON GEOTHERMAL RESOURCE	N COMMISSION 37501 EPORTS OIL CONS S WELLS	CIENCIAL CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR 10/1/7-
Do Not Use This Form for Proposals to Dri For Permit –" (Form G-101) for Such Prop	Il or to Deepen or Plug Back to a Different f	Reservoir. Use "Application	
I. Type of well Geothermal Producer	Temp. Observation		7. Unit Agreement Name
2. Name of Operator			8. Farm or Lease Name
New Mexico State Universi	ty, Physical Plant Departmen	1t	NMSU-PG-3-LRG
3. Address of Operator New Mexico	State University	88003	9. Well No.
F.U. BUX 34	45, Las Cluces, New Mexico o		10. Field and Pool, or Wildcat
Unit Letter P	80. Feet From The East Line a	nd 4825 Feet From	NMSU Property
The North Line, Section 2	2Township235Ra	ange <u>2E</u> NMPM.	
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APPROVED BY Carl UL	SENIOR PETE	COLEUM GEOLOGIST	

CONDITIONS OF APPROVAL, IF ANY:



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 Mensures in the Vicinity of NMSU PG-1

7Z





Physical Science Laboratory

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

OIL COTIST RVATION DIVISION SANTA FE

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. Mr. Carl Ulvog Nov. 12, 1980 Page 2

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 alka-linity.

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,

Kingle Cumit

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.



.. Figure 1

		SUMMARY OF D	ATA ON NOT WELLS IN LA (Numberlug of wells	NS ALTURAS AND S Bame as FIR. 1	URROUNDING /	IREA	
	Year of <u>Prillin</u> g	Owner and Location (<u>Past and Present)</u>	. Max. Temperature	Warer Level	Total <u>Depth</u>	Total Disgolved Solids 	<u>Renarka</u>
-	1960	NNSU Near Antenna Tovers NV Tortugas Nuns.	Пос	Dry	200	i	Dry; hot well, "Tools too hot to hold in hand
2	1961-62	Golf Course NISU	24°C	ı	019	1575	Abandoned due to high mailuity
.	1957	Soules Las Alturas Estate	25°C	191	296	ı	
v	1963	L. R. Evans	- llot	174	332	ı	
Ś	1964	Wm. Evans/Pertridge	llot	ı	256	ı	
÷	1964	kovan	36.7°C	190-200	330	·	
1] 964	White/Cutcher	3°7C	190	1 I C	•	
Đ	1 964	Mat tons/Ruddleston	45°C	240	335	1625	
9	1964	llusand/KInzer	42.5	180	34.8	520	
le	1948-49	Clary & Ruther State No. 1	llot	526	2573	I	
11	1975	Charles Jordan	46 6	200	330	i	4" casing being used for drink- ing 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	NNSU-PG-2	$118\overline{F}$	278	505	1575	20 gpm flow tested
14	1979	NMSU-PG-1	141°F	255	860	1900-2000	200 gpm flow tested

TABLE 1

COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING Box 3CE/Las Cruces, New Mexico 88003 Telephone (505) 646-3803 DEC 2 2 1980 OIL CONSERVATION DIVISION SANTA FE

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 how # 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,

To los

M. F. Whalen Director, Physical Plant

 $^{\rm cd}$

Enclosure



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

BRUCE KING GOVERNOR

LARRY KEHOE SECRETARY

December 11, 1980

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

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



Physical Science Laboratory

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

Approval letter 12/11/80 PG-2

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.

December 5, 1980 Page 2

> Figure 1, together with Table 1, depicts the location and water 0 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.
- o 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.

December 5, 1980 Page 3

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

Sincerely,

Roy A. Čunniff / U 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

OIL CONSERVATION DIVISION

BRUCE KING GOVERNOR LARRY KEHOE SECRETARY

December 11, 1980

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

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 DOE D. RAMEY Director

Director

JDR/fd

cc: Carl Ulvog

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		To AR	xplore for RHAMKACXThe U	Ģe nderground	eotherma Waxaasso	1 Sources f the State	of New Mexic	þ	
	Date F	Received Dec	ember 22, 1	980	File No	LRG-	520		
	l. Na Ma	me of applicant	New Mexico	State U	versit	y		······································	
	Cit	ty and State <u>Las</u>	Cruces, New	Mexico					
	2. Sou	arce of water supply	y <u>artesian</u> (artesian or shal	llow water aq	, loce uifer)	ted in $LOWE$	name of und	le Undergrand lerground basin)	<u>W</u> ater B
	3. Th	e well is to be loca	ated in the <u>SE</u>	_¼_ <u>_SE</u> _¼	<u>SE 1/4</u> ,	Section 2	2Township	235	_
÷.,	Ka OD	nge <u> </u>	.M.P.M., or Tract	Noof	Map No	of the		Distric	:t, _•
	4. De	scription of well:	name of driller	Cole	Drilling	L Co.			_;
	⇒5. Qu	antity of water to b	e appropriated an	inches d beneficially	; Approxim y used <u>CO</u>	nsumptive	e (see Item	<u>1000</u> fee <u>7)</u> acre fee	:t; :t,
	í.	Seeli	tem 7	14 July 14	a construction of the second sec	(consum	ptive use, divers	ion)	_
	6. Ac	reage to be irrigate	d or place of use	see	item 7	· · · · ·		purpose	s.
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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 Engiwells be complied with; and further subject to the following neer pertaining to the drilling of 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: 3. The State Engineer Office in Deming shall be notified at least Division. 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.

December

19

. A.D., 19 80

Proof of completion of well shall be filed on or before_	<u>.</u>
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Proof of application of water to beneficial use shall be filed on or before _____

Witness my hand and seal this_____30th

S. E. Reynolds, State Engin Bv: T. Putnam Ĺ. Supervisor, District III

INSTRUCTIONS

day of

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.

12/23/80 Martin Whalen -The attached copies of your Original application for FG-3 are now obsolete? Unless we hear otherwise, our copies will be destroyed. as I have mentioned to various individuale at NMSU at different Times, we do identify all welle by Unit litter, Section humber, Township, Rouge, Operatorhame, Type of Lease, Lease or Farm hame, and Well Number. your new application, although approved, defies classification or integration into our system. From your 6-102 The well must be in Unit P (not K-Bac shown), and we are considering this as Fee type lease. Somehow the well numbers of all the NMSU wills will eventually have to be reduced to just that-NUMBERS . y VT, Carl Lelvoy

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Form G-2	101
Adopted	10/1/74

NO. OF COPIES RECEIVED	NEW MEXICO OIL CO	NSERVATION COMMISSION	a		
DISTRIBUTION	P. O. Box 20	88, Santa Fe 87501			
File			r		
N.M.B.M.	_			5. Indicate Typ	e of Lease
U.S.G.S.	APPLICATION FOR P	ERMIT TO DRILL, DEEP	EN,	STATE	FEE
Operator	OR PLUG BACKGEOT	HERMAL RESOURCES V	VELL	5.a State Lease I	No.
Land Office			-		······································
1a. Type of Work Drill 🕅	Deepen	Plug Back 🔲		7. Unit Agreeme	nt Name
b. Type of Well Geothermal	Producer 🔲	Temp Observation 🛛		8. Farm or Lease	e Name
Low-Temp T	hermal 🛛	Injection/Disposal 🛛		NMSU	
2. Name of Operator New Mexico	State University, Phy	sical Plant Dept.		9. Well No. NMSU-PO	G-3
3. Address of Operator Box 3445, Las Cruce	, New Mexico State Univ es, New Mexico 88003	ersity		10. Field and Po NMSU P	ol, or Wildcat
4. Location of Well Within 1/2	mile North or East of	NMSU-DG-3. Final		<u> </u>	
location wi	ill be notified before	dr:illing commences	5.		
				12. County Dona Ana	
		19. Proposed Depth 1000 ft.	19A. Formatio Santa F	n 20. e	Rotary or C.T. Rotary
21. Elevations (Show whether DF, RT, Approx. 4200 Feet abo	erc.) 21A. Kind & Status Plug. Bo Dye Grindéll & Rolling	nd 21B. Drilling Contractor gs Cole Drilling	Co., 600	22. Approx. D Nov. 1	ate Work will start 5, 1980
MJR	Bond No. 6358013 PROPOSED CASING	Delhi Dr, El P G AND CEMENT PROGRAM	aso, Tx.		

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 T. T. MaleMartin F. Whalen Title Dir., Physical Plant Dept, NMSU Date 31 October 1980

(This space for State Use)

TITLE

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

A A .

perator		All distances mi	ist be from the outer boundar	ies of the Sectio	on.	Well No
		D1 · 1 D1				MARIL DC - 2
ew Mexico St	sate Univ.,	Physical Plan	IL DPL NMSU	County		MMSU-rG-5
in Letter	07		A TE	Dony		
A Locat	Z/	235	natified before d	rilling of	Alla	
the rootage bocat	fout from the	ation will be	line and	feat from th	Ammences	line
ound Level Flev	Producing F	ormation	Pool		Dedic	ated Acreage:
pprox 4200 f	Et	Santa Fe	NMSU Pr	operty		Acres
1. Outline th	he acreage dedic	ated to the subject	well by colored pencil or l	hachure marks	on the plat below	
 If more t and royal 	than one lease is Ity).	s dedicated to the	well, outline each and ide	ntify the own	ership thereof (bo	h as to working inter
3. If more communi	than one lease of trians that the trians one lease of the trians the trians of trians of the trians of trian	of different owners tion, force-pooling,	p is dedicated to the well etc?	l, have the in	terests of all owne	rs been consolidated
Yes	🗆 No If	answer is "yes," ty	e of consolidation	NA	······································	
If answer is	"no." list the o	wners and tract de	scriptions which have actu	ally been cor	solidated. (Use rev	verse side of this form
necessary.) _					` <u>`</u>	
No allowabl	e will be assi	gned to the well	until all interests have	been consol	idated (by comm	unitization, unitizati
forced-poolin	ıg, or otherwise)	or until a non-stan	dard unit, eliminating such	interests, has	been approved by	the Commission.
			1		CE	RTIFICATION
	1			8	I hereby certi	fy that the informati
	1		Tent	ative	contained herei	n is true and complete
	1		Loca		the best of my	knowledge and belief
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	ł.				111.t.	malen
	1		1		Ma	artin F. Whale
					Name	•
	1		1		Director, Pl	nysical Plant I
	ſ				Position	
	1		1		NMSU	
	i			ļ	Company	
	1				31 October	1980
					Date	,
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Form G-102 Adopted 10/1/74