GTLT - ____2

NMSU PG-4 UL:M 23-23S-02E Dona Ana County

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STATE OF NEW MEXICO ENERGY AND MIGERALS DEPARTMENT SANTA FE, NEW MEXICO 87501		Form G-101 Adopted 10-1-74 Revised 10-1-78
NO. OF COPIES RECEIVED DISTRIBUTION File N.M.B.M. U.S.G.S. APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACKGEOTHERMAL RESOURCES WELL	5. Indicate STATE 5.a State Lea	Type of Lease] FEE [] ase No. N/A
Operator / / / / / / / / / / / / / / / / / / /		
Ia. Type of Work Drill LX Deepen Plug Back b. Type of Well Geothermal Producer Temp Observation	7. Unit Agr 8. Farm or L	Lease Name
Low-Temp Thermal LA! Injection/Disposal ^{2. Name of Operator} New Mexico State University	9. Well No.	N/A PG-4
3. Address of Operator Box 3545, New Mexico State University	10. Field an NMSU	d Pool, or Wildcat
AND 300 FEET FROM THE SOUTHLINE OF SEC. 23 TWP. 235 RGF 2F		
	12. County Dona An	
21. Elevations (Show whether DF, RT, etc.) 21A. Kind & Status Plug. Bond 21B. Drilling Contractor 4340 feet above M.S.L. Bond # 6358013 T.B.D.	Formation Fe/Paleozoic 22. Approv 0/a 1	20. Rotary or C.T. Rotary x. Date Work will start Oct. 1984
Grindell & Rollings PROPOSED CASING AND CEMENT PROGRAM	·	
SIZE OF HOLE SIZE OF CASING WEIGHT PER FOOT SETTING DEPTH SA 20 3/4 inch 18 5/8 0D 103 LB/FT 300' 103 LB/FT 100' 100' 17 1/2 inch 16 0D 63 LB/FT 1650' 100' 100' 100' 12 3/4 inch 8 7/8 0D 28 LB/FT 2000' 100' 100'	CKS OF CEMENT 120 410 N/A	EST. TOP G.L. G.L.
This well is to be drilled after NMSU DT-3 has been drilled and tes is within 200 feet of the DT-3 location; hence subsurface formation: similar.	ted. Plannec s are expecte	lwell site d to be quite
After the surface casing is set and cemented to 300 feet of depth, to T.D. of 1650. 16-inch O.D. casing will then be bottomed, and ce drillable cement plug in the bottom. A smaller hole will then be d (2000 feet <u>+</u> 300 feet), and completed as open hole with a perforate overlapping from 1600 to 1650 feet of depth.	the hole will mented in pla rilled to tar d liner hung	l be drilled ace with a get horizon in the hole,
APPROVAL VALID FOR 180 DAYS PERMIT EXPIRES 12-11-54 UNLESS DRILLING UNDERWAY	E MOTIFIED ENATIONS	
IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on presentione. Give blowout preventer program, if any.	it productive zone and	d proposed new productive
inhereby certify that the information above is true and complete to the best of my knowledge and belief.	Dute_12 .11	ine 1984
(This space for State Use) APPROVED BY Own Wing DISTRICT SUPERVISOR	- 1.	-14-84
ONDITIONS OF APPROVAL, IF ANY:	DATE	

ENERGY AND MIN	ERALS DEPARTMEN	т	P. D. BO SANTA PE, NEV	X 2044 V MEXICO 87501		 	. Ad Re	opted 10-1-74 vised 10-1-78
	GEOTHERMA	L RESOURCES	WELL LOCA	TION AND AC	REAGE DE	DICATION PLAT		
		All distances m	ust be from the	outer boundaries	of the Sectio	n		
Operator	4 		Lease				Well No.	
New Mexico St	tate Universit	Town able	<u></u>	MSU land	Country	· · · · · · · · · · · · · · · · · · ·	NMAD A(-4
Unit Letter M	Section 23	rownstup 23	3S Ra	"ge 2E	County	Dona Ana		
Actual Footage Locat	ion of Welt:	······	.		·			
400	feet from the	lest	line and	300	feet from the	South !	ine	
Ground Level Elev.	Producing Form	ation	Pool	Ny Manipao Si	tata Uni	Dedica	ed Acreage:	
<u>4340</u> 1. Outline t	he acreage dedicate	d to the subject	well by colore	ed pencil or hac	hure marks	on the plat below.	40	Acres
 2. If more and roya 3. If more community Yes If answer is necessary.) No allowable 	than one lease is d hy). than one lease of a tization, unitization No If ans "no," list the own de will be assignd	edicated to the different owners 1, force-pooling, wer is "yes," ty ers and tract de d to the wel	well, outline ip is dedicated etc? pe of consolid escriptions whi l until all in	each and identi d to the welly h ation <u>N/</u> ich have actuall terests have be	fy the own have the int A y been con een consoli	ership thereof (both erests of all owner solidated. (Use rev dated (by commu	n as to work s been cons erse side of initization,	this form if
forced-poolir	ng, or otherwise) or	until a non-star	ndard unit, elir	ninating such in	terests, has	been approved by	the Divisior	1.
	1 -					CER	TIFICATION	
		•	•	1 1 1 1 1		I hereby certif contained herein the best of my k	y that the i is true and c nowledge and	information complete to ' belief.
		·				Name Ziji Calvin D Position	Black	lant
	1					Company New Mexico	State Un	iversity
	i i			1		June 1	1, 1984	
						I hereby certify shown on this p notes of actual under my super is true and con knowledge and L	r that the wa at was plotted surveys made vision, and the rect to the l elief.	ell location of from field of by me or at the same best of my
			~ ~ ~ ~	· +		Date Surveyed		
0			· · ·			Registered Professio and/or Land Survey	nal Engineer or	,
	90 1320 1850 1880	2319 2640	2000 15		500 0	Certificate No.		

....

. .,

since PG-4 is really the concellation for deepening the this well is coming. also I have requested a Memo hole 90 PG-1 (also known as #52) PG-4 ter l' tion tar From CARL ULVOG pern Chief Geologist 8/12/43 I to drill

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION

TONEY 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 Ulvoq

PHYSICAL PLANT DEPARTMENT

2

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

July 25, 1983





SANTA FE

Request for Temporary Surface Disposal Re: 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.

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i,

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

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.





NEW MEXICO STATE UNIVERSITY

DEPARTMENT OF AGRONOMY

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

INTER-OFFICE MEMORANDUM

George Mitchell W To:

Date: 8-14-80

Andrew Lee Bristol From:

Geothermal Well Samples Subject:

	umhos/cm		meg/L							
Sample_	E.C	pH	Na	<u>K</u>	Ca	Mg	<u></u>	<u>03</u>	HC03	SO4
13A hot 27A hot 27 cool	-3,060 3,110 3,110	7.95 7.79 7.36	20.20 21.00 20.89	1.40 1.50 1.48	7.87 7.45 7.77	2.48 2.42 2.44	16.16 16.35 16.66	0 0 0	10.20 10.22 10.04	6.09 6.08 5.93

	1,01	00 č.Ľ	m	mg/l						
-	TDS)NO3-N	Na	K	<u>Ca</u>	Mg	<u>C1</u>	<u>C03</u>	HC03	<u></u> SO4
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 <u>Mn As Ba Cd Cr Pb Hg Se Ag Cu</u> Fe .78 <.005 ≤.05 <.005 .0003 .002 <.05 13A hot .11 .002 <.4 <.10 4.005 4.05 <.10 27A hot .43 .05 .004 <.4 **.005**.0005 .002 .05 ⁵.10 27 cool .38 .06 .002 <.4 **~.005 ..05 ..005 ..002 ..002 ..05** .05

	<u>P</u>	<u> </u>	Zn	S102		Hardness	Alkalinity
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

(O2 content as free que 200 cc/liter H2S content - not microcale but faitly letutate pA at sampling 6.8 PG-1 will

GEOTHERMAL RESOURCES WELL LOG

Operator	New Mexic	co State Univers	ity				
Address	Box 3548	, NMSU, Las Cruc	es, NM 8	8003			
Reservoir	New Mexic	co State Univers	ity				
Lease Name	Physical	Plant Departmen	t	Wel	I No. NMSU PG-4	Unit Le	tter M
Location:	330		feet from	the	West		line and
	600	feet from the _	South		line Section	23	
Township	23S		Range _	2E	Cou	inty Do	na Ana

FORMATIONS PENETRATED BY WELL

DEPT	н то	Thiskness	Drilled or	Dessure	
Top of Formation	Bottom of Formation	THICKNESS	Cored	Recovery	, DESCRIPTION
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
I					

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	Caller	Director Physical Plant Dept. Date	
Signed _	C. D. Black		

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

GEOTHERMAL RESOURCES WELL SUMMARY REPORT

Opera Lease Unit Reser	Name Name Letter voir	lew Mexi Physica M NMSU	ico Sta 11 Plan	te Univ It Depar Sec	/ersity rtment 23	· 	Adc Wel Cοι	Iress Box I No. NMS 23S Junty Doi	3548, NMSL <u>SU - PG-4</u> Rg na Ana	J, Las Cruc _{je 2E}	ces, NM 8	38003
Comm	enced drijli leted drillin	ng Oc	:tober pril 26	19, 198 5, 1986	34	, ,		geologi Santa	ICAL MARKERS Fe Group	3 0-	_{DEPTH} -960 # fe	et
Total d Junk -	depth	1,015	Plugg	;ed depth _				Paleozo	pic (?)	96	0-987 (?) feet
-Comm	ienced prod	Lucing A	lugust (Date)	26, 198	36			Geologic a	ge at total depth	Paleozo	Jic	
-	Stat	tic test					P:	roduction Test	t Data			·
Date	Shut-in	well head			Total	Mass Flov	N Data		Ţ	Separato	or Data	
	Temp. •F	Pres. Psig	g. Lł	bs/Hr	Temp. •F	Pres. Psig.	. Enthalpy	Orifice	Water cuft/Hr	Steam Lbs/Hr	Pres. Psig.	Temp. •F
3/27/86	147.6	0	1,00	0,000	146		Τ		NOT APPI	LICABLE	•	
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]	<u> </u>					+						<u> </u>
	<u> </u>				í						ļļ	ļ
	<u> </u>				L					!		L
					C	ASING RF	ECORD (Pre	esent Hole)				
Size of Hole	Size of Casing	Weight of Csg/ft.	Grade of Casing	New or Used	Seam or Lapv	iless r weld	Depth of Shoe	Top of Casing	Number of Sacks Cement	Top of Cement	Ceme Deter	ent Top mined By
17 1/2	14	54.57	K-55	U	Seam	less	688	above GL	180	GL	Inspec	stion .
12 1/2	2 5/8	23 36	K-55	N	Seam	Jacc	706 ft.	658 ft	22	SEQ ft	Tagge	
7 7/8	5 9/16	1/ 62	K-55	N	Seam	lace	None	072	<u>ید</u>	NA	Layyes	۱
<u> </u>	5 5/10	14.02	<u> </u>	<u>IN</u>	Jeun	1035	None	912	<u> </u>			
l	<u> </u>	······································	(Si:	ze, top, bot	ttom, perfo	PERFO prated interv	RATED CA	SING spacing of perfor	ation and methor	d.)	 	
Slott	ed line		יחD fr≀	.om 735	tn 985	feet;	slotted	liner 5 9/	/16"ND from	n 974 to 1	015 feet	
							5100000			<u>1 3/ T LO 1</u>	JUIJ ICCO	·
												<u> </u>
Was an	alysis of eff	fluent made?	, Yes	Electrica [†]	l log depths	s 974			Temperature log	, depths975	5	
	CERTI	FICATION	N									
	l hereb best of	ly certify t ∫my know'	that the it rledge and	nformatio 3 belief.); /	n given al	bove and	the data an	d material atta	ached hereto ar	re true and con	mplete to th	r e
	Signed	<u> </u>	<u></u> ВТ	ack		Pos	Dir sition _Phy	ector sical Plar	<u>it Dept.</u> [Date		

OIL CONSERVATION DIVISION

P. O. BOX 2088

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT

CERTIFICATE OF COMPLIANCE AND AUTHORIZATION TO PRODUCE **GEOTHERMAL RESOURCES**

Name New Mexico State University Address P. O. Box 3545, Las Cruces, NM 88003 TYPE OF WELL Geothermal Producer [] Low-Temperature Thermal [k] REASON FOR FILING New Well [] Recompletion [] Change in Ownership [] Designation of Purchaser [] Other (Please Explain) [x] To place this well into production for us New Mexico State University DESCRIPTION OF WELL Lease Well Name N/A Name N.M.S.U (State) Number N/A	
Address 1.0. Box 3343, Las cruces, Mr 00003 TYPE OF WELL Geothermal Producer [] Low-Temperature Thermal [x] REASON FOR FILING New Well [] Recompletion [] Change in Ownership [] Designation of Purchaser [] Other (Please Explain) [x] To place this well into production for us New Mexico State University DESCRIPTION OF WELL Lease Well Name N/A Kind of Lease Lease (Fee, Fed. or State) N.M.S.U (State)	
TYPE OF WELL Geothermal Producer [] Low-Temperature Thermal [x] REASON FOR FILING New Well [] Recompletion [] New Well [] Recompletion of Purchaser [] Other (Please Explain) [x] To place this well into production for us	
REASON FOR FILING New Well [] Recompletion [] Change in Ownership [] Designation of Purchaser [] Other (Please Explain) [xx] To place this well into production for us New Mexico State University	Injection/Disposal []
DESCRIPTION OF WELL Well Name of Lease No. LRG-4905 Reservoir Lower Kind of Lease Lease (Fee, Fed. or State) N.M.S.U (State) Number N/A	se_by
Kind of LeaseLease(Fcc, Fed. or State)N.M.S.U (State)Number	Rio Grande
LOCATION	
Letter M; 330 feet from the West	line and
feet from the South	line of
Section 23 Township 23 South Range 2 East	
CountyDona Ana	
TYPE OF PRODUCT Dry Steam and Low Temp. Steam Water Thermal Water	. X
DESIGNATION OF PURCHASER OF PRODUCT Name of Purchaser Address of Purchaser Product Will	

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 Division 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.

CNIS.	
Signed	Position_Proceros PYD DateDate
Approved they C Attane	PORISTRICT SUPERVISOR 8-18-86

NEW MEXICO OIL CONSERVATION COMMISSION

P. O. Box 2088, Santa Fe 87501

GEOTHERMAL RESOURCES WELL HISTORY

Box 3545,

Operator	New Mexico	State University	Address _ New	Mexico	State Uni	iversity	88003-3548
Lease Name	Physical P	lant Department	Well No.	NMSU PG	i-4		
Unit Letter	Μ	Sec. 23	<u>Twp.</u> 23S	F	Rge 2E		-
Reservoir	New Mexico	State University	County	Dona Ana	ι		

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.)

- 19 Oct 84 Exploration well DT-3 spudded. Driller was Stewart Drilling. Borehole was 17¹/₂-inch to 688 feet. (Note: For convenience this depth, and other depths cited, are referenced 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 Fishing efforts were able to retrieve 42 feet of the missing tremie pipe. Remaining 3 Dec 84 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 5/8inch 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

Date

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	Clash-	Position	Director.	Physical	PlantDate
0.9.100	Calvin D. Black			· · · ·	Dute _

NEW MEXICO OIL CONSERVATION COMMISSION

P. O. Box 2088, Santa Fe 87501

GEOTHERMAL RESOURCES WELL HISTORY

Box 3545.

Operator New Mexico State	e University	Address	lew Mexico	State Un	niversity	88003-3548
Lease Name Physical Plan	t Department	Well No	NMSU PG	-4		
Unit LetterM	Sec23		<u>}S</u>	Rge <u>2E</u>		·
Reservoir <u>New Mexico S</u>	tate University	County	<u>Dona Ana</u>			

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.)

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 $5\frac{1}{2}$ -inch slotted liner at 1,015 feet. Top of liner is at 972 feet. Liner has slots 0.06 by $3\frac{1}{2}$ -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

Date

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/PG-4



CHEMICAL ANALYSIS OF DISSOLVED SOLIDS (mg/l)

NMSU Geothermal Wells

	PG-3	<u>GD-2</u>		(Group I)	(Group II-1)	(Group II-4)
	PG-3	<u>GD-2</u>	00.0			(droup II +)
	PG-3		<u>_GD-2_</u>	(During		
PG-1		(4684)	(840 ')	Drilling)	(During F	low Test)
рН 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
К 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
C1 584	546	574	40	570	528.3	528.3
CO ₃ 0	0	0	0	0	0	0
HCO ₃ 620	610	422	94	487	462.5	489.4
S0; 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	<0.003	<0.005
Cr <0.05	<0.05	<0.02	<0.02	<0.05	<0.02	<0.002
РЬ <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 ₃ -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

STATE OF NEW MEXICO DIL CONSERVATION DIVISION Form C-101 P. O. BOX 2088 Adopted 10-1-78 NO. OF COMES RECEIVED APPLICATION FOR PERMIT TO DRILL, DEEPEN, STATE DISTRIBUTION I APPLICATION FOR PERMIT TO DRILL, DEEPEN, STATE N.A.B.A. I OR PLUG BACKGEOTHERMAL RESOURCES WELL S. Indicate Type of Lease N.A.B.A. I OR PLUG BACKGEOTHERMAL RESOURCES WELL N/A Lami Office I Deepen Plug Back 1. Unit Agreement Name h. Type of Well Geothermal Producer Temp Observation 8. Farm or Lease Name Low-Temp Thermal Injection/Disposal 9. Well No. New Mexico State University, Physical Plant Department NMSU GD-3 3. Address of Operator NMSU GD-3 Box 3545, New Mexico State University Io. Crated _650 Feet FROM THE _MastLine	
NO. OF COPIES RECEIVED	
1a. Type of Work Drill Deepen Plug Back 7. Unit Agreement Name b. Type of Well Geothermal Producer Temp Observation 8. Farm or Lease Name b. Type of Well Geothermal Producer Injection/Disposal 8. Farm or Lease Name Low-Temp Thermal Injection/Disposal N/A 2. Name of Operator N/A New Mexico State University, Physical Plant Department 9. Well No. 3. Address of Operator NMSU GD-3 Box 3545, New Mexico State University 10. Field and Pool, or Wildcat 4. Location of Well UNIT LETTER M UNIT LETTER M LOCATED 650	
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3. Address of Operator 10. Field and Pool, or Wildcat Box 3545, New Mexico State University NMSU 4. Location of Well UNIT LETTER M UNIT LETTER M LOCATED 650	
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	
Image: Angele Ang Imagele Angele Ang Angele Angele Ange	H_{I}
19. Proposed Depth 19. Formation 20. Rotary or C.T. Δ00 Santa Fo Potamy	
21. Elevations (Show whether DF, RT, etc.) 21A. Kind & Status Plug. Bond 21B. Drilling Contractor 22. Approx. Date Work will star. 4230 feet above M S 1 Rond # 6358013 T D D 22. Approx. Date Work will star.	5л
Grindell & Rollings PROPOSED CASING AND CEMENT PROCEAM) 'i
12 3/4 inch 6 5/8 inch 19 LB. 350 feet 180 6.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 back set from 400 to 350 feet. A 10-feet sand back will then be installed, and the casing cemented from 340 feet to ground level with a tremie line.	
APPROVAL VALID FOR 120 DAYS PERMIT EXPIRES 12-11-89 UNLESS DRILLING UNDERWAY OIL CONSERVATION COMMISSION TO BE INTIONS WITHIN 24 HOURS OF BEGINNING OPERATIONS 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 produ zone. Give blowout preventer program, if any,	ctive
t hereby certify that the information above is true and complete to the best of my knowledge and belief. Signed Calvin D. Black	
(This space for State Use) APPROVED BY Carl Uling TITLE DISTRICT SUPERVISOR 6-14-84	

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT	OIL CONSERVATIC P. O. DOK 201 SANTA FE, NEW ME	DN DIVISION 18 XICO 87501		Form 6-102 Adopted 10-1-74 Revised 10-1-78
GEOTHERMAL RESOL	JRCES WELL LOCATIO	N AND ACREAGE D	EDICATION PLAT	•
All dist	nees must be from the oute	r boundaries of the Section	on.	Well No.
New Mexico State University		N/A	•	NMSU GD-3
Unit Letter Section Township	Range	County		
M 23	23S · · ·	2E D	ona Ana	
Actual Footage Location of Well:				
450 feet feet from the South	line and 650	feet from th	ne West	line
Ground Level Elev. Producing Formation 1220 foot MSI Santa Fe	Pool	ИСП	Dedica	ACreage:
+2.50 TEEL 11.5.L. Suffer Source dedicated to the	ubject well by colored p	ancil or bachura mark	s on the plat below	10 Acres
 Outmit the acreage dedicated to the . 2. If more than one lease is dedicated and royalty). 3. If more than one lease of different . 	to the well, outline each	and identify the own	nership thereof (bot nerests of all owne	h as to working interest
communitization, unitization, force-pe	poling, etc?	N/A		· . ·
If answer is "no." list the owners and t	ract descriptions which l	nave actually been con	nsolidated. (Use rev	erse side of this form if
necessary.) N/A				
No allowable will be assigned to th forced-pooling, or otherwise) or until a n	e well until all interes on-standard unit, elimina	sts have been conso ting such interests, ha	lidated (by comm s been approved by	unitization, unitization, the Division.
T			CEF	TIFICATION
			l harabu carti	fu that the information
	1		contained herein	is true and complete to
	1		the best of my	knowledge and belief.
			Name Of	n yn gal
			Calvin	D. Black
			Position	
		· .	Director, Pl	nysical Plant
	1		New Mexico	State University
			Date	oute on versite
			12 June	1984
l	•			. `
				and the second
	- 1		shown on this n	y that the well location
			notes of actual	surveys made by me or
			under my super	vision, and that the same
	1		is true and co	rrect to the best of my
			knowledge and	belief.
777777	++			
			Date Surveyed	······································
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V/////			Registered Profession and/or Land Survey	onal Engineer for
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STATE OF NEW MEXICO



ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION

TONEY 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.

Sincerel

R. L. STAMETS Director

RLS:JB:dp

cc: Roy Johnson, OCD

Page 2

P. O. Box 2088, Santa Fe. 87501

GEOTHERMAL RESOURCES WELL LOG

Operator	New Mexic	co Stat	e Univers	ity				•	
Address	Box 3548	, NMSU,	Las Cruce	es, NM 8	8003				
Reservoir	New Mexic	co Stat	e Univers	ity					
Lease Name	Physical	Plant	Department	t	Well	No. NMSU P	<u>G-4 Un</u>	it Letter_	M
Location:	330			feet from	the	West		line	and
	600	fe	et from the	South		line Sec	ction <u>2</u>	23	
Township_	235			Range_	2E		_County_	Dona A	Ina

FORMATIONS PENETRATED BY WELL

DEPT	н то	Thickpass	Drilled or	Danayan	DESCRIPTION		
Top of Formation	Bottom of Formation	THERIESS	Cored	Recovery	DESCRIPTION		
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.

Cinnad	All
Signed	C. D. Black

Director Position Physical Plant Dept. Date HEW MEXICO OIL CONSERVATION COMMISSION

P. O. Box 2088, Santa Fe. 87501

GEOTHERMAL RESOURCES WELL LOG

Operator	New Mexi	co State Univers	ity			-	
Address	Box 3548	, NMSU, Las Cruc	es, NM 8	38003			
Reservoir	New Mexi	co State Univers	ity				
Lease Name	Physical	Plant Departmen	t	Wel	I No. NMSU PG-4	Unit Letter M	
Location:	330		_ feet_from	the_	West	line an	id
	600	feet from the _	South		line Section	23	
Township_	235		Range	2E	Count	ty Dona Ana	<u>1 </u>

FORMATIONS PENETRATED BY WELL

DEPT	НТО	Thickpuss	Drilled or	Dungung	
Top of Formation	Bottom of Formation	THICKNESS	Cored	Recovery	, DESCRIPTION
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

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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.

	\sim	Λ
Signed	C/4	ĬŊ
J	C. D.	Black

Director Position Physical Plant Dept. Date

NEW MEXICO COL CONSERVATION COMMISSION

P. O. 5 🗰 2088, Santa Fell 87501

GEOTHERMAL RESOURCES WELL SUMMARY REPORT

Oper:	etor	New Mex	kico Sta	ate Uni	versity	,	Ai	diess Box	3548, NMSU	l, Las Cru	ces, NM	88003
Leuse	Lesse Name Physical Plant Department							ell No. NM	SU - PG-4			
Unit	Letter	М		Sec	23		Twp	235	Rge	<u>2E</u>		
Reser	voir	NMSU					Cc	ounty Do	na Ana			·····
Comn	enced drill	ing C)ctober	19, 19	84			GEOLOG	ICAL MARKERS		DEPTH	
<i>C</i>		Α	April 20	5, 1986				Santa	Fe Group	0-	960 # fe	et
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Junk .												
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	<u> </u>		(Date)	·····				Production Tes	t Data	<u></u>		
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ize	Size	Weight	Grade	New	Sean	nless	Depth	Top	Number of Sacks	Top	Cem	ent Top
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	Signed	C	D. B1	ack		P	osition		ne bept.	Jate		

NEW MERICO OL CONSERVATION COMMISSION

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P. O. B 🗰 2088, Santa Fel 87501

GEOTHERMAL RESOURCES WELL SUMMARY REPORT

Operi Leuse Unit	ator Name Letter	New Mex Physic M	aico Sta al Plan	ate Uni nt Depa Sec	versity rtment 23		Adi Wel Twp	Hress Box I No. NM 23S	3548, NMSU SU - PG-4 	J, Las Cru _e <u>2E</u>	ces, NM a	38003
Reser	voir	INMISU					Cou	ntyUO	na Ana			
Comm	nenced drill	ing0	ctober	19, 19	84			GEOLOG	ICAL MARKERS	5	DEPTH	
Comp	leted drillin	A ۲	pril 20	5, 1986				Santa	Fe Group		-960 # fe	et
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.Comm	nenced prod	lucing	August (Date)	26,19	86			Geologic a	ge at total depth	Paleoz	oic	
	Sta	tic test					P	roduction Tes	t Data			
Date	Shut-in well head			Total Mass Fl			Data			Separate	or Data	
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					<u> </u>	ASING RE	CORD (Pr	esent Hole)				
Size of Hole	Size of Casing	Weight of Csg/ft.	Grade of Casing	New or Used	Seam oi Lapw	miess Depth To r of o weld Shoe Cas		lop of Casing	Number of Sacks Cement	lop of Cement	Cem Deter	ent Top mined By
7 1/2	14	54.57	K-55	5 U Seamless 688 above GL 180 GL Inspect							tion	
2 1/2	8 5/8	23.36	K-55	N	Seam	Seamless 706		658 ft.	32	659 ft.	Tagged	
7 7/8	5 9/16	14.62	K-55	N	Seamless Non		None	972	NA	NA	NA NA	
			(Si	ze, top, bo	ttom, perfu	PERFO	RATED C/ als, size and s	ASING spacing of perfor	ation and method	j		
Slott	ed line	er 8 5/	8"0D fr	om 735	to 985	feet; s	slotted	liner 5 9,	/16"0D from	1 974 to 1	,015 feet	
Was an	alysis of eff	fluent made	<u>Yes</u>	Electric:	al log depth	<u>s 974</u>			Temperature log	depths <u>97</u>	5	<u> </u>
	CERT	IFICATIO	IN									
	l heret best of	by certify Emiy knov	that the viedge and	nformati belief.	on given a	bove and i	the data an	id material att	ached hereto a	re true and co	mplete to th	e
	Signed	C	. D. B1	ack		Pos	Dir ition Phy	rector /sical Plan	nt Dept	Date		

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.

CHERCY WAS MARKENS CHARTMENT SANTA FE, NEW MEXICO 37501 SANTA FE, NEW MEXICO 3750 SANTA FE, NEW MEXICO 37501 SANTA FE, NEW MEXICO 3750 SANTA FE, NEW MEXICO	TATE OF NEW MEXIC		ATION DIVISION	Form G-103
SUNDRY NOTICES AND REPORTS ON GETTIENTIAN SUNDRY NOTICES AND REPORTS ON GETTIENTIAN Summer Supervised and supe	ENERGY AND MINERALS DEPA	SANTA FE, NE	W MEXICO 87501	Adopted 10-1-74 Revised 10-1-78
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Do Not Use This Form for Processes to Drill or to Descent or Plug Bisck to a Different Reservor. Use "Application for Form 5-110 tor State University. Physical Plant Department New Mayino State. University BSCC3 New Mayino State. University BSCC3 New Mayino State. University BSCC3 New Mayino State. University BSCC3 New Mayino State. University State University State Stat	Land Office			N/A
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	Do Not Use This Form for Propos For Permit —" (Form G-101) for S	ils to Drill or to Deepen or Plug Back to a uch Proposals.)	Different Reservoir. Use "Application	
Low-temp Thermal III insection/Discostal 117.5 Name of Overstor 8. Form or Lesse Name New, Mexico, State University, Physical Plant Department N/A S. Addess of Overstor 9. Well No. Box 3525, New Mexico, State University, BSOC3 NMSU DT-3, LRG 4905 A. Location of Well 320 Feet From The West Lune and 600 Feet From The South Lune, sector 23 The South Lune, sector 23 The Check Appropriate Box To Indicate Nature of Notice, Report or Other Data NOTICE OF INTENTION TO: Remediate Work Public Backboard Public Backboard Public Backboard Public Backboard Public Backboard Public Backboard Public Backboard Public Backboard Public Backboard Check Appropriate Backboard Public Backboard Public Backboard Public Backboard Check Appropriate Box To Indicate Nature of Notice, Report or Other Data NOTICE OF INTENTION TO: Remediate Work Public Backboard Public Backboard Public Backboard Public Backboard Public Backboard Public Backboard Public Backboard	1. Type of well Geothermal	Producer Temp. Observation		7. Unit Agreement Name
New Maria Number of the second se	Low-Temp 1	hermal 🖾 Injection/Disposal		8. Farm or Lease Name
	Now Mexico State Uni	versity Physical Plant De	partment	NZA
Bax 3545, New Mexico State University Stocs NMSU DT-3, LRG 4905 4. Location of Well 330 Peet From The West Line and 600 Peet From The South Line, Section 23 Township 235 Pange 2E NMEM. It. Field and Pool, or Wildcat NMSU The South Line, Section 23 Township 235 Pange 2E NMEM. It. County Dona Ana The County Line, Section 23 Township 235 Pange 2E NMEM. It. County Dona Ana NOTICE of InterNetNico TO: Subsciences Report of Other Data Subsciences Report of Pice Report of Other Data NOTICE of InterNetNico TO: PLUG AND ABANDON Subsciences Report of Pice Report of Pice Report of County Book Network (County State all pertinent deals, and give pertinent deals, including estimated date of starting any proposed works SEE RULE 203. This well was originally spudded on 19 October, 1984, and was completed to an intermediate definition zone. It was re-entered on 26 April, 1986, and drilling resumed. A major lost circulation zone. It was re-entered from 98 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 opm 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 lande at 1045 feet. Completed well. 8. I hereby setting that the Information above is true and complete to the best of my knowledge and belief. Note well was completed by inserting 43 feet of slotted 5 9/16 inch casing,	3. Address of Operator			9. Well No.
	Box 3545, New Mexico	State University 8800	>3	NMSU DT-3, LRG 4905
Unit Letter 1 1000 Feet From TheMEDL Line andOOO Feet From	4. Location of Well M	220 Wast	600	10. Field and Pool, or Wildcat NMS11
Tom South Line, Section 23 Township 238 Range 2E NMPM 15. Elevation (Show whether DF, RT, GR, etc.) 11. County Dona Ana 16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data SUBSEQUENT REPORT OF: PERFORM REMEdiaL WORK PLUG AND ABANDON SUBSEQUENT REPORT OF: PERFORM REMEdiaL WORK PLUG AND ABANDON SUBSEQUENT REPORT OF: PULL OR ALTER CASING CHANGE PLANS Other Alter No cement Job OTHER Change PLANS Other Alter No cement Job 0THER Other Alter No cement Job Other Alter No cement Job 0THER Other Alter No cement Job Other Alter No cement Job 17. Desistible Proposed or completed Operations (Clearly state all pertinent detail, and give pertinent date, including estimated date of starting any proposed work) SEE RULE 203. 18. Wass 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 results to regain circulation failed, the hole was drilled blind to 1015 feet. 10 test the zone, an 8-hour DST was conducted on 27-28 April, and the zone produces at least 1,000 opm at 147 °F, with minimal drawdown. Recause this zone is a major production zone, the well was completed by inserting 43 feet of slotted 5 9/16 inch casing, which	Unit Letter I'i	555 Feet From The	Line andFeet From	
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(Depths Referenced to KB on L&M Rig)



FINAL WELL CONFLGURATION, MMSU DT-3