GTLT - 2

NMSU DT-3 LRG 4905
UL:M 23-23S-02E
Dona Ana County

DT-3 NMSU

40' 5 9/16 slotted liner

TD @ 1016

4-30-86

BHT @ 970' → 147° +

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-74
Revised 10-1-78

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SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

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.)

5. Indicate Type of Lease — State ☐ Fee ☐

5.a State Lease No. N/A

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

7. Unit Agreement Name N/A

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

8. Farm or Lease Name N/A

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

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

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

10. Field and Pool, or Wildcat NMSU

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

12. County Dona Ana

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

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	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 Convert to Production Well; change name ☒		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.

NMSU intends to convert NMSU DT-3, LRG 4905 to a production well. This notice serves to also show that the well will be designated NMSU PG-4, LRG 4905.

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

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

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

CONDITIONS OF APPROVAL, IF ANY:

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-74
Revised 10-1-78

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Land Office		

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: N/A

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

8. Farm or Lease Name: N/A

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

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

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

10. Field and Pool, or Wildcat: NMSU

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

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 ☐	

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.

This well was spudded on 19 October 1984, and was drilled to 684 feet with a 17 and 1/2-inch drill bit. Surface casing, 14-inch diameter 0.375 inch wall thickness was set and cemented. Hole was deepened to 975 feet using a 12 and 3/4-inch drill bit. Massive lost circulation zone encountered at 965 feet. Hole was encased with 321 feet of 8 and 5/8-inch slotted liner and casing to T.D. Actual casing setting depth was 974 feet. See attachment No. 1 for schematic of well configuration.

Water samples and temperature data were acquired, along with geophysical logs. Attachment No. 2 is temperature data, and Attachment No. 3 is water analysis.

Well now will be deepened to target horizon of 1500 feet, using a 7 3/4-inch drill bit. Proposed drilling program will be as determined from sealed written bids. After hole is drilled, appropriate logs will be acquired, and an 8-hour DST is planned. Depending on information from drilling and logging program, well will be completed for use as a geothermal production well.

Work estimated to start o/a 1 August 1985.

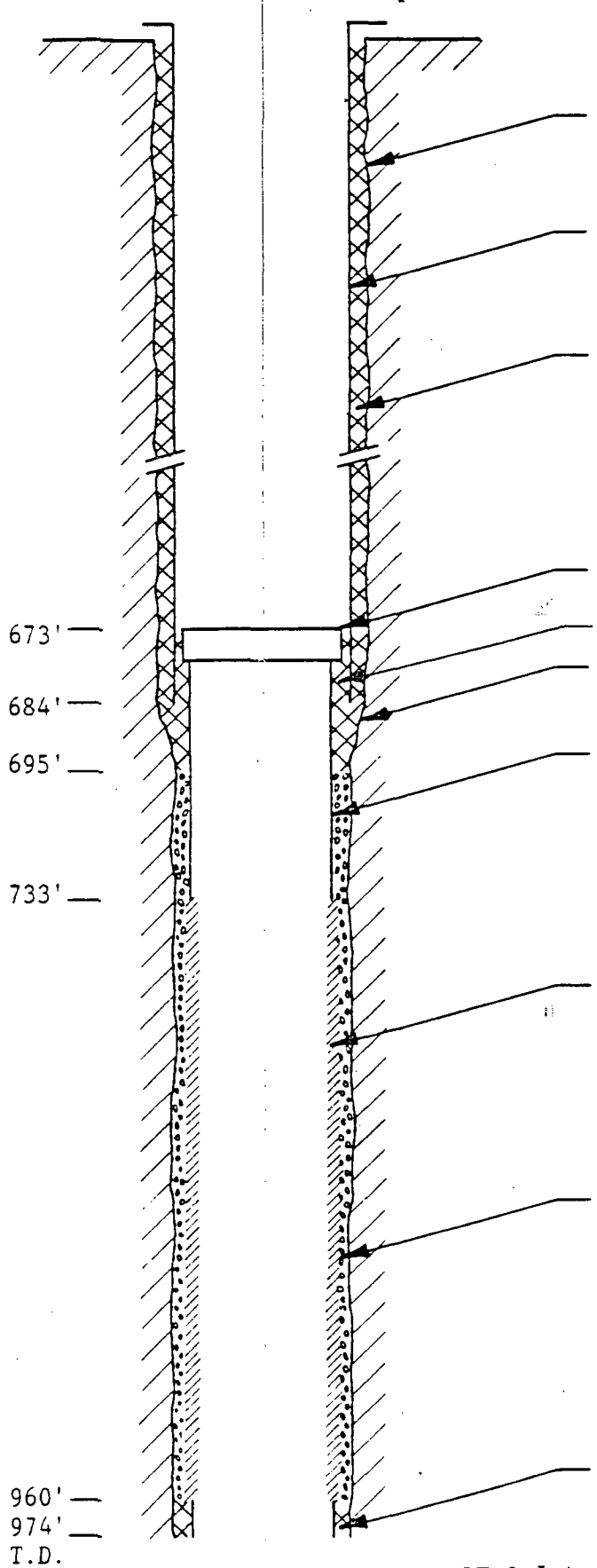
18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED Calvin D. Black TITLE Director, Physical Plant DATE May 14, 1985

APPROVED BY Roy E. Johnson TITLE Senior Petroleum Geologist DATE 5-24-85

CONDITIONS OF APPROVAL, IF ANY:

(Depths Referenced to Casing Top)



17½-inch borehole

14-inch (OD) steel casing, 0.375-inch wall thickness. 54.57 pounds per foot.

Cemented annulus, 684 feet to ground surface. 180 sacks of cement.

Top of 8-5/8 inch casing.

Cement 695' to 674', 18 sacks

12¼-inch borehole. Bottom of 14-inch casing at 684'.

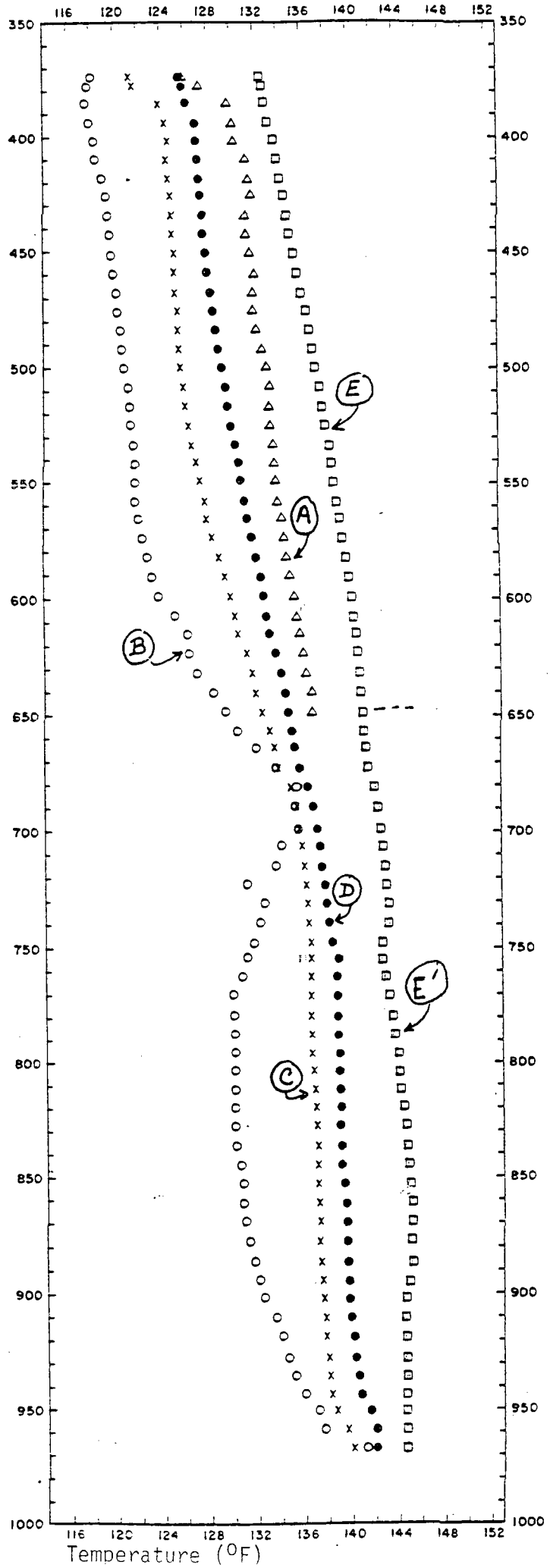
8-5/8 inch casing, 0.250-inch wall thickness. 22.36 pounds per foot.

8-5/8 inch slotted liner, 0.250-inch wall thickness. Perforations are 0.060 by 3-inch, 40 slots per foot. Slotted liner from 733 feet to 960 feet.

Gravel pack from 695 feet to 960 feet, Colorado silica gravel grade 6 by 9. 40 sacks.

Cement plug from 960 to 970 feet with cement basket at 970 feet.

NMSU DT-3 Intermediate Completion Configuration



Logging Dates:

- (A) 10/26/84 Mud-Filled Surface Casing
- (B) 10/30/84 } "Lost Circulation" Open Hole
- (C) 10/31/84 }
- (D) 11/1/84 }
- (E) 12/4/84 Cased well
- (E') 12/7/84 Cased well

NMSU DT-3 Comparative Temperature Logs, Water Table to Total Depth

CHEMICAL ANALYSIS OF DISSOLVED SOLIDS (mg/ℓ)
NMSU Geothermal Wells

	PG-1	PG-3	GD-2 (468[1])	GD-2 (840[1])	DT-3 (Group I)	DT-3 (Group II)
PH	6.30	6.25	7.65	7.80	6.72	8.47
µmhos	3110	3120	3120	2680	2800	2450
TDS	2010	1981	1948	1787	1818	1636
NA	488	488	428	386	428	389
K	54	52	44	35	74	35
Ca	143	141	130	115	132	107
Mg	18.6	18.8	36.0	36.6	32.1	25.1
Cl	584	546	574	440	570	341
CO_3	0	0	0	0	0	31.2
HCO_3	620	610	422	494	487	593
SO_3	250	240	315	280	251	250
Fe	2.8	5.0	1.28	6.00	0.22	0.83
Mn	0.11	0.11	0.09	0.13	1.22	0.45
Hardness	NA	NA	NA	NA	460	369
Alkalinity	NA	NA	NA	NA	399	538
As	<0.004	<0.004	<0.001	0.001	<0.001	<0.001
Ba	0.04	0.04	0.08	0.09	0.07	0.06
Cd	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cr	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05
Pb	<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
Se	<0.002	<0.002	<0.001	0.001	<0.001	<0.001
Ag	<0.05	<0.05	0.05	0.05	<0.05	<0.05
NO_3-N	0.03	0.02	0.01	0.02	<0.01	0.54
F	1.27	NA	1.29	0.55	1.78	1.57

Memo

From

ROY JOHNSON

Geologist

To Roy Conniff

DT-2

965 - lost Circulation
7:00 October 30, 1984

Going to run logs
~~Taking~~ mud at
400 GPM

Oil Conservation Division
P.O. Box 2088 Santa Fe, N.M. 87501

PHYSICAL PLANT DEPARTMENT

Box 3545/Las Cruces, New Mexico 88003-3545
Telephone (505) 646-3021

October 15, 1984

Mr. Roy Johnson
Oil Conservation Division
Main Office and Geothermal Section
State Land Office Building
Post Office Box 2088
Santa Fe, NM 87501

RE: Request for approval of temporary surface disposal of geothermal water.

Dear Mr. Johnson:

As coordinated by telephone between you and Roy Cunniff, this letter is a request for temporary surface discharge of geothermal water produced during the drilling and testing of the new NMSU DT-4 geothermal gradient well.

This new well is to be drilled in the established geothermal field. Enclosure 1 is a sketch map which shows all wells within a two-mile radius of the new DT-4 well. You will note that all of these wells are geothermal. This map also depicts the seismic traces which were conducted to help define the geothermal aquifer. Note the large dam on Tortugas Arroyo. Should an accidental spill occur during drilling and testing DT-4, this dam would act to prevent the geothermal water from migrating to the nearest freshwater well, which is located three miles to the SW of this dam.

Concerning water quality, the geothermal resource area is characterized by sub-surface water of less than 2,000 mg/ℓ. All sub-surface water is geothermal. Depth of water at this location is estimated to be 350 feet. Enclosure 2 is a tabulation of the chemical analyses of the geothermal wells shown on Enclosure 1. You will note that the quality ranges from 1,600 to 2,080 mg/ℓ, with the deeper wells having somewhat better quality. Drilling operations require use of a mud rotary drilling technique to at least 450 feet. Surface casing will then be set. If satisfactory progress is being made, the driller will use mud rotary techniques to the planned total depth of 2,000 feet. The driller might have to change to air and foam drilling, however, and this technique can produce formation water at the surface. Even so, since drilling make-up water will be provided by the NMSU domestic water system, the actual surface water will have some degree of dilution of the geothermal. Thus, produced fluid is likely to contain 1,500 - 1,600 mg/ℓ.

Enclosure 3 is a sketch which depicts details of the drilling pad. The large reserve pit (roughly 75 feet by 100 feet; average depth of 4 feet) can hold safely more than 150,000 gallons of water. This volume represents more than three times the expected production of formation water during air drilling.

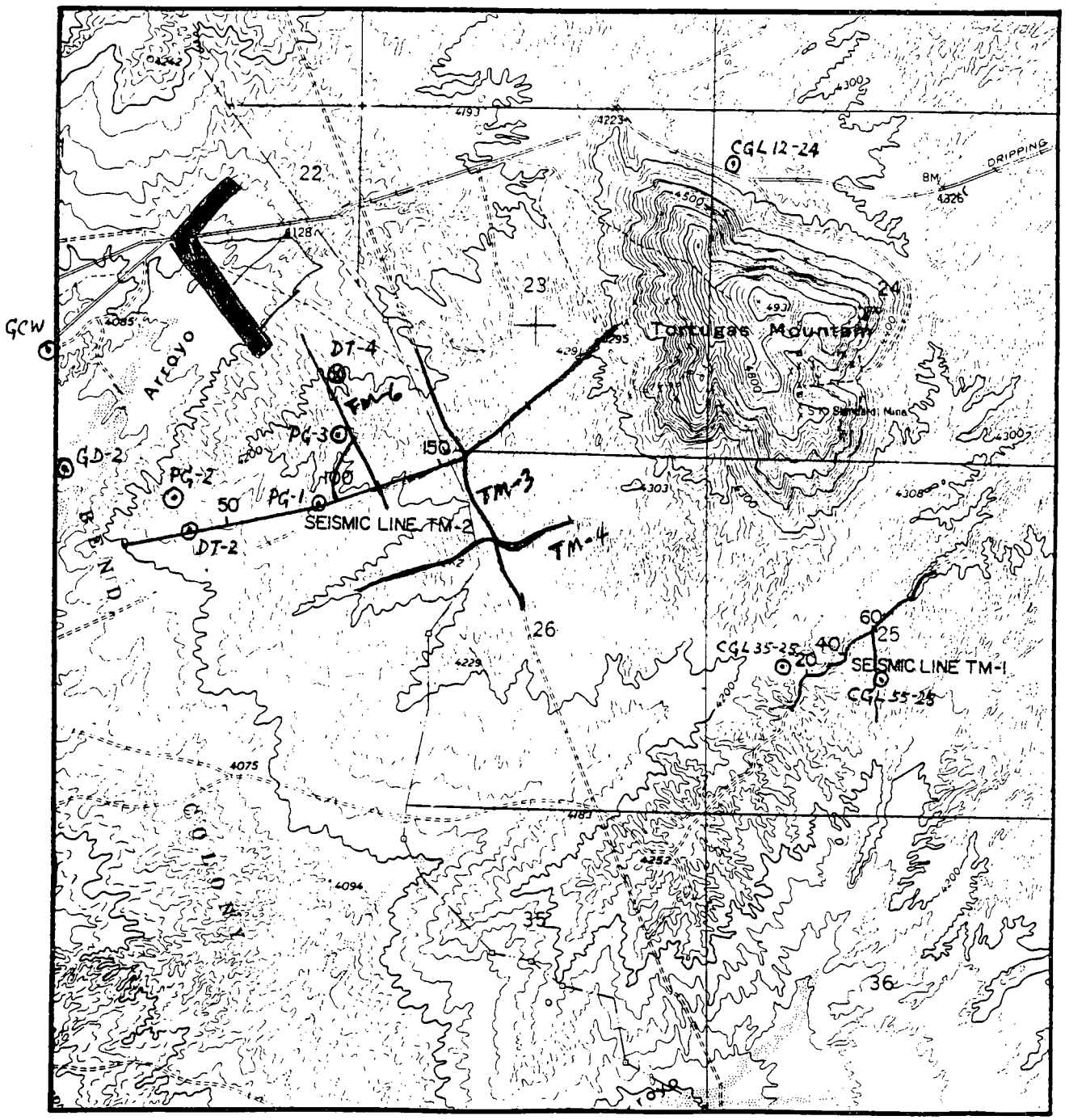
Based on the precautions taken to assure that potable water supplies are not endangered, coupled with the fact that this well is in an area in which all subsurface water is the low salinity geothermal water, we request approval of the planned surface disposal of these geothermal waters. If the test well proves successful, the reserve pits likely will be used as a disposal point (by natural percolation) of water produced during development and test pumping.

Sincerely,

C. B. Black,
Director

Enclosures

1. Map showing well location.
2. Water quality analyses.
3. Sketch of well pad.

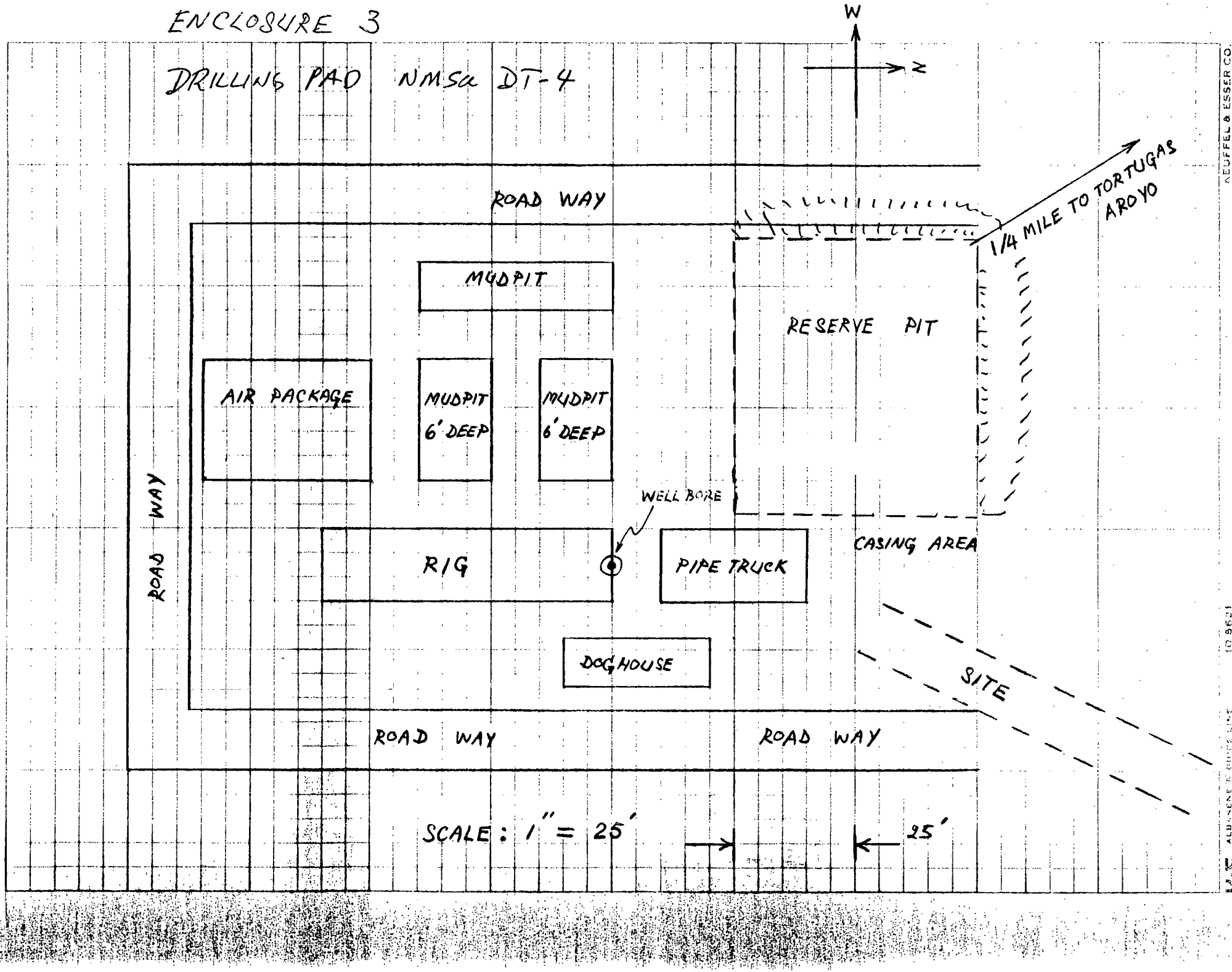

CGL 12-24
DRIPPING
BM
4326
22
23
24
GCW
Arroyo
DT-4
TM-6
PG-3
150
Tortugas Mountain
Standard Mine
GD-2
PG-2
50
PG-1
100
TM-3
SEISMIC LINE TM-2
DT-2
TM-4
26
60
25
40
CGL 35-25
20
SEISMIC LINE TM-1
CGL 55-25
4075
35
36

ENCLOSURE 1

ENCLOSURE 2

Well No.	Water Quality TDS (mg/l)
PG-1	2010
PG-2	2070
PG-3	1980
GD-1 (GLW)	1600+
GD-2	1870
CGL 12-24	1800
CGL 35-25	(Not Sampled)
CGL 55-25	1850

ENCLOSURE 3


DRILLING PAD NMSA DT-4
W
N
ROAD WAY
1/4 MILE TO TORTUGAS ARROYO
MUDPIT
RESERVE PIT
AIR PACKAGE
MUDPIT 6' DEEP
MUDPIT 6' DEEP
WELL BORE
RIG
PIPE TRUCK
CASING AREA
ROAD WAY
DOGHOUSE
SITE
ROAD WAY
ROAD WAY
SCALE: 1" = 25'
25'

8 to 11

- OK -

10-9-84

Form G-101
Adopted 10/1/74

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U.S.G.S.	2	
Operator	1	
Land Office		

EN,
NELL

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: N/A

8. Farm or Lease Name: N/A

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

9. Well No.: NMSU DT-3

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

10. Field and Pool, or Wildcat: NMSU

4. Location of Well: UNIT LETTER M LOCATED 330 FEET FROM THE West LINE AND 600 FEET FROM THE South LINE OF SEC. 23 TWP. 23 S RGE. 2E NMPM

12. County: Dona Ana

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

21. Elevations (Show whether DF, RT, etc.)	21A. Kind & Status Plug. Bond	21B. Drilling Contractor	22. Approx. Date Work will start
4230 feet above M.S.L.	Bond #6358013	T.B.D.	o/a 2 July 1984

Grindell & Rollings

PROPOSED CASING AND CEMENT PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	SACKS OF CEMENT	EST. TOP
14 inch	8 inch I.D.		50 feet	38	G.L.
7 5/8 inch	3 ½ inch O.D.	7.6	2000 feet	13	G.L.

This well is to be drilled within 1000 feet of NMSU-PG3, and in the general area in which seven intermediate depth geothermal wells previously have been drilled. In addition, one deep (2700 feet) test well also was drilled. All of these wells intersected the geothermal aquifer at ground water level, and were in this aquifer throughout total depth. Three of these wells intersected paleozoic limestones, at depths ranging from 600 feet to 1450 feet depth. This new well will confirm seismic data which has been interpreted to show a strong reflector at 1650 feet of depth which marks the transition from Santa Fe Group to the paleozoics.

After the surface casing is cemented, the slim hole will be drilled to a target horizon, and completed by inserting 2000 feet of the specified tubing, which then will be cemented inside the 8-inch casing.

APPROVAL VALID FOR 180 DAYS
PERMIT EXPIRES 11-24-84
UNLESS DRILLING UNDERWAY

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

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

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

Signed _____ Title Director, Physical Plant Date May 21, 1984

(This space for State Use)

APPROVED BY Carl Ulvog TITLE DISTRICT SUPERVISOR DATE 5-28-84

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 University	NMSU Land	NMSU DT-3

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

Actual Footage Location of Well:
330 feet from the West line and 600 feet from the South line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
4320	Santa Rosa/ Paleozoic	New Mexico State University	40 Acres

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

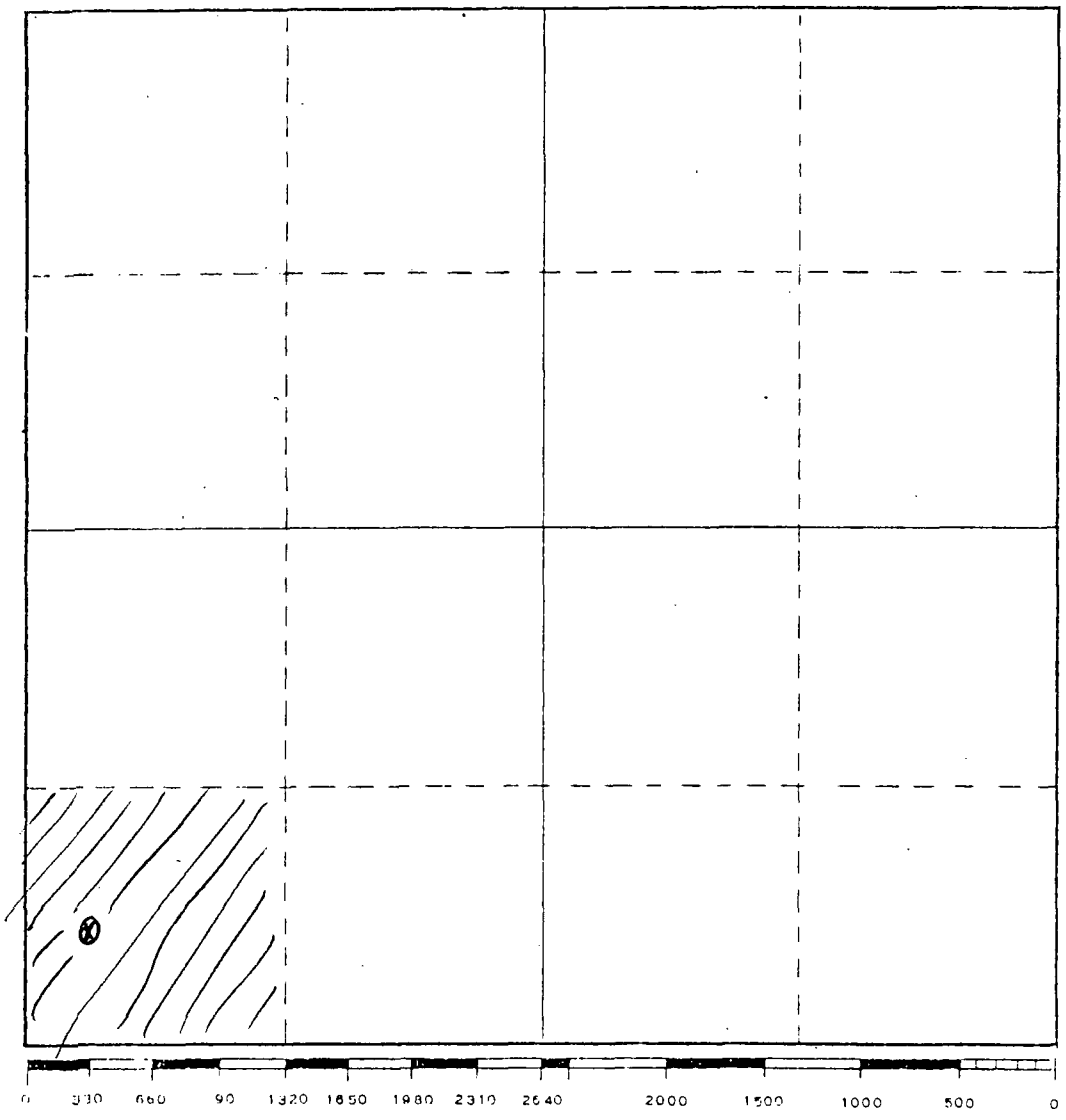
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

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 _____

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.

Name Calvin D. Black

Position Director, Physical Plant

Company New Mexico State Univer.

Date May 21, 1984

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed

Registered Professional Engineer and/or Land Surveyor

Certificate No.

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 University	NMSU Land	NMSU DT-3

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

Actual Footage Location of Well:
330 feet from the West line and 600 feet from the South line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
4320	Santa Rosa/ Paleozoic	New Mexico State University	40 Acres

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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?

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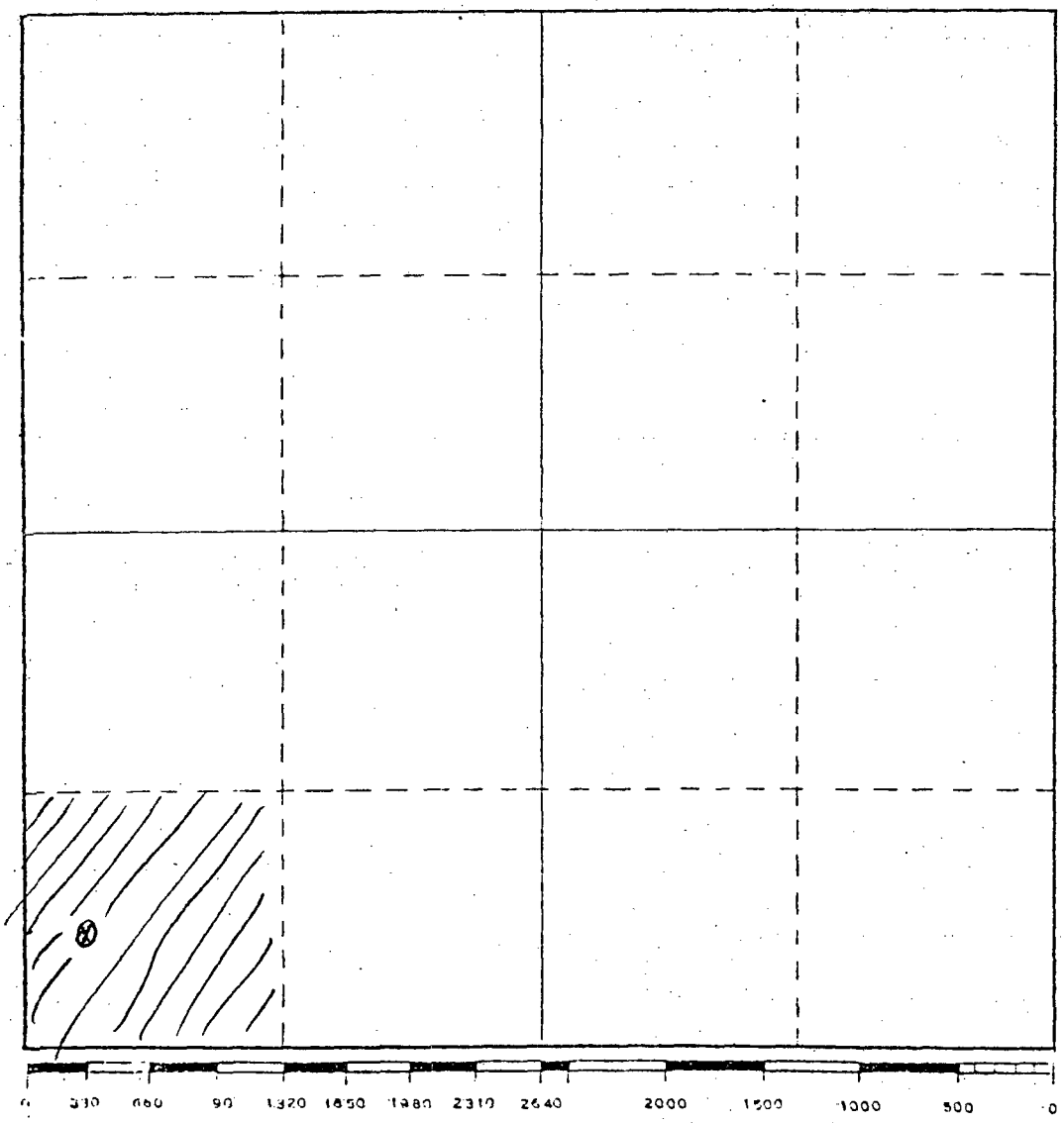

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Position Director, Physical Plant

Company New Mexico State Univer.

Date May 21, 1984

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Date Surveyed

Registered Professional Engineer and/or Land Surveyor

Certificate No.

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 University	NMSU Land	NMSU DT-3

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

Actual Footage Location of Well:
330 feet from the West line and 600 feet from the South line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
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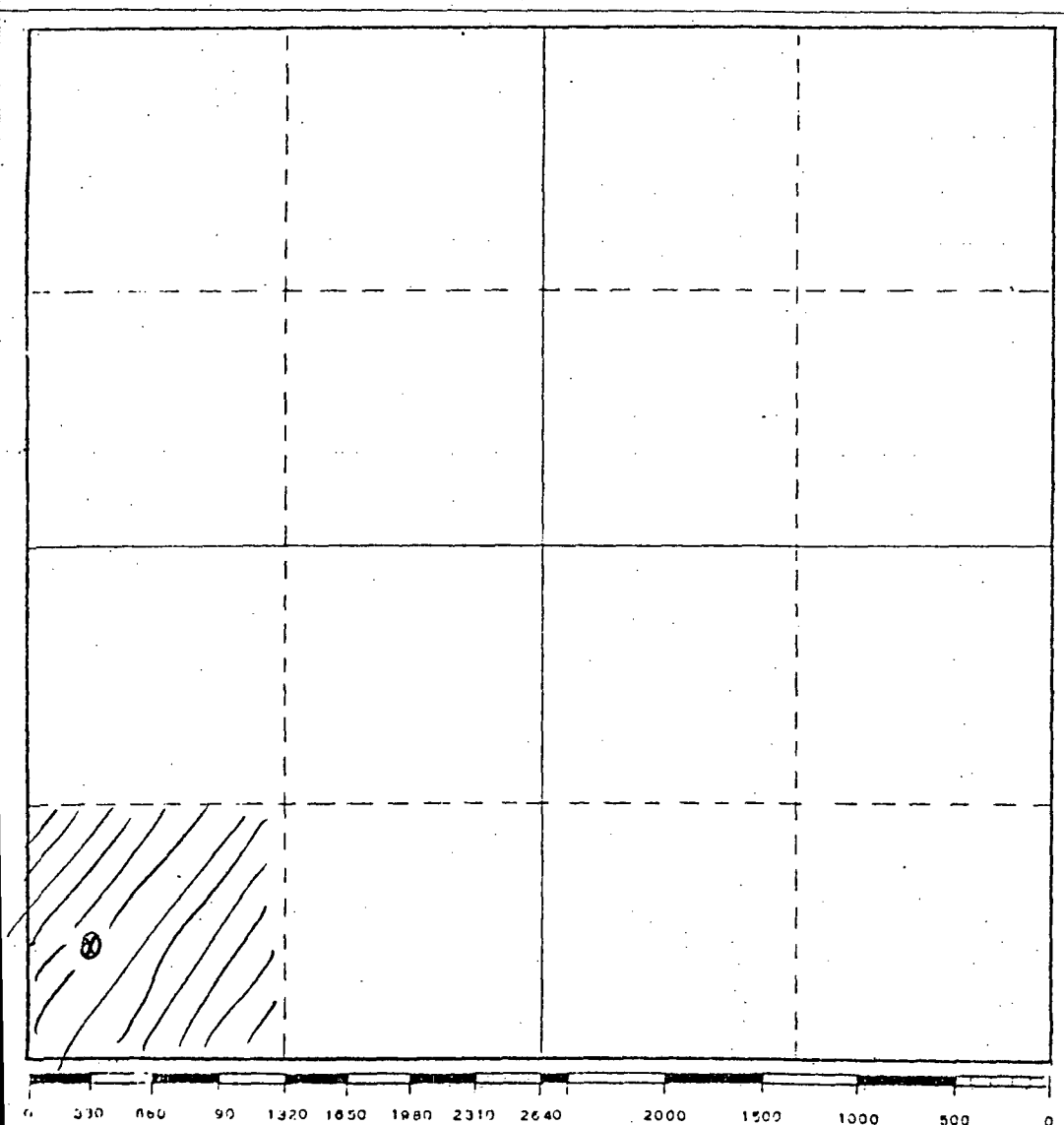

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Name Calvin D. Black

Position Director, Physical Plant

Company New Mexico State Univer.

Date May 21, 1984

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed

Registered Professional Engineer and/or Land Surveyor

Certificate No.

DRILLING PLAN

NMSU DT-3, Well Deepening

NOTE: This is a budgetary plan only and final actions are dependent on drilling conditions.

I. Present Well Conditions

Site Location: See Figure ~~IV~~ I.

Depth: 974 feet

Casing: 14-inch to 684 ± feet; cemented from T.D. to surface.
8 5/8-inch from 673 to 974 feet. Slotted casing 733-960 feet.
(See Figure ~~IV~~ II)

Cement Plugs: Cement basket on annulus at 970, with cement plug at 960 ± feet. Cement plug from 674 ± to 695 feet.

Unusual Conditions

a. The 8 5/8-inch casing is s~~lightly off-center~~ centered but slightly canted in 14-inch (video camera record available for bidder review) (See Figure ~~IV~~ II)

b. Borehole and casing from 700-974 feet contain 9,500 pounds of LCM (cotton seed hulls, paper, DRISPAC, Dick's well seal, bentonite, and polymers). Likely that much of this material is in bottom 50 feet of well bore.

c. Top of 8 5/8-inch is female (internally threaded) coupling.

II. Proposed Remedial Actions

1. Prepare site for drilling, to include enlarging existing flow line pit. (See Figure I)

2. Assure good bond between 8 5/8-inch and 14-inch casing by installing 673 feet (±) of thin-wall (0.188-inch wall thickness) 8 5/8-inch steel casing pipe into top of existing 8 5/8-inch casing. Use special threaded adapter. Install cement plug in annulus between 14-inch and 8 5/8-inch casing strings from 675 (±) feet to 653 feet, using 1-inch tremie pipe. (Thin wall casing is planned for removal above 653 feet after other drilling actions have been taken. Accordingly, driller is required to provide procedures to be followed for removing this 653 ± feet of casing.)

3. Using at least six 6-inch drill collars, and 4½-inch drill stem, use 6½ to 7½-inch drill bit and drill to 1500 (±) feet using air and stiff foam.

4. Acquire suite of temperature and geophysical logs. At least two, and possible three different logging firms will be used, including NMSU and El Paso Water Utilities. Commercial geophysical logs will be ordered through the driller.

5. Using NMSU-supplied 3.5-inch hydril tubing as an airline, conduct limited airlift test after logs are acquired. This 3.5-inch tubing is 40-feet lengths, with upset collars. (As option, driller can use driller supplied 2.5 or 4.5-inch drill stem as air line.) Air-lifted flow will be up the annulus between the airline and the 8 5/8-inch casing.

III. Required Equipment and Procedures

1. Three 850 cfm compressors delivering a total of up 2550 cfm at 300-400 psi while drilling are required to be on-site at start of drilling.

2. At least one 2-stage booster capable of providing up to 1000 psi at 2500 cfm shall be on-site at start of drilling.

3. Two "flapper" valves will be incorporated in the drill string, one immediately above the bit and one as near to the top as convenient, at about 950 feet above the bit.

4. In addition to the bit, the "bottom-hole" assembly shall include a reamer, a short (12-feet) collar, an ID stabilizer, and up to six 6-inch, full-length drill collars. This combination is desirable because of the deviation already present in the previously drilled hole, in the expectation that a more nearly true vertical borehole can be established during continuation drilling.

5. Drill stem will be 4.5-inch, with 6½ to 7½-inch Tri-Cone bit. Bit shall be a new, good quality bit, capable of drilling up to one thousand feet of hole under anticipated drilling conditions.

6. Continuous 24-hour drilling is required.

7. Drilling rig shall be rated at least 180,000 pounds of draw-bar pull. Desired that rig mast height be capable of standing 40-feet lengths of drill stem and/or air line.

8. Drilling contractor shall be experienced with air drilling.

9. Procedure for acquiring sample drill cuttings:

   a. Driller shall install a system to collect drill cuttings. This system shall consist of a U-shaped tube or pipe installed at the bottom of the return flow line (blooie pipe) with a collection box a short distance away. If the flow line is of sufficient length (determined by air volume and velocity) some of the larger cuttings required for examination will separate from the fines before reaching the U-tube. (See Figure ~~III~~ IV)

b. At least one pint of sample cuttings shall be collected by the Site Geologist at regular ten-foot intervals. If, at any time during drilling, cuttings fail to reach the surface the rig operator must note this fact and provide an explanation (or interpretation) of the cause--equipment failure, cavernous porosity, lifting the drill string, etc. The drilling report must note evidence and relative quantities of formation water encountered as well.

10. Deviation logs:

a. The driller shall have on site equipment capable of measuring bore-hole deviation. NMSU intends to acquire from the driller a bore-hole deviation measurement when the bore-hole has reached 1000 ± feet of depth. Thereafter, deviation measurements are not expected to be acquired until after bore-hole has reached Target Depth. (1500 ± feet, or as determined by NMSU officials.)

b. NMSU shall acquire from a commercial logging firm (contracted through the driller) a deviation survey of the completed bore-hole.

11. Well Completion (Tentative)

a. Depending on drilling conditions and results, NMSU desires to complete the well by inserting a slotted liner from 940 ± feet, landed at Total Depth.

b. Slotted Liner shall consist of 5-inch (ID) ~~plain~~ plane-end steel casing, A-153, Grade A, 0.258 wall thickness, or API 5 1/2 or 6 5/8-inch, H-40, K-55, or S-55, ~~plain~~ plane-ends. The 5 1/2-inch will have 0.244-inch wall thickness, and the 6 5/8-inch will have 0.288-inch wall thickness. Slot size and interval will be determined by drilling conditions and review of geological, geophysical, and hydrological data.

c. After liner is installed, the 8 5/8-inch casing would be removed above 653 ± feet, and a 24-hour controlled pump test shall be conducted, using contractor-operated pump.

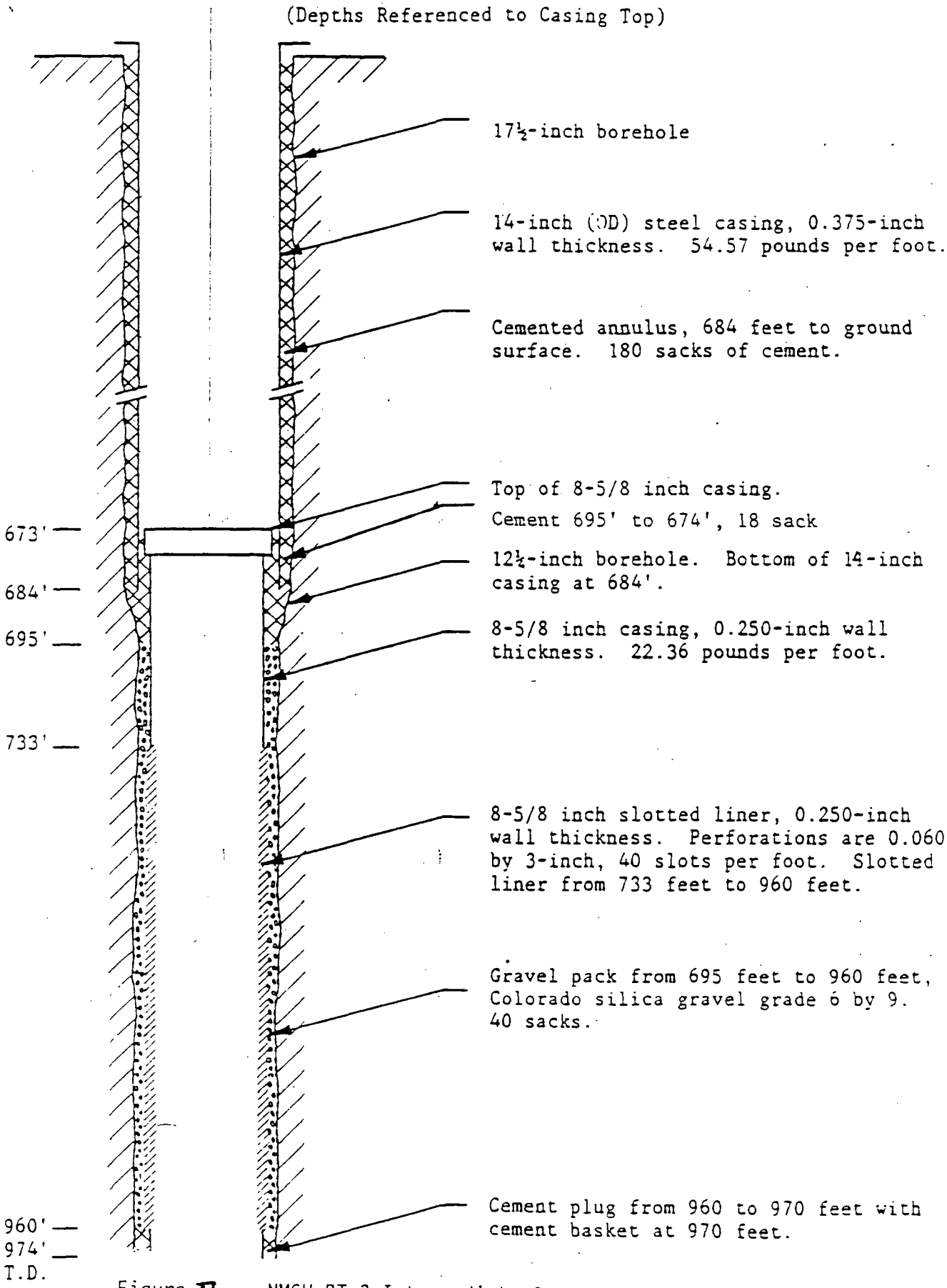


Figure 11 NMSU DT-3 Intermediate Completion Configuration

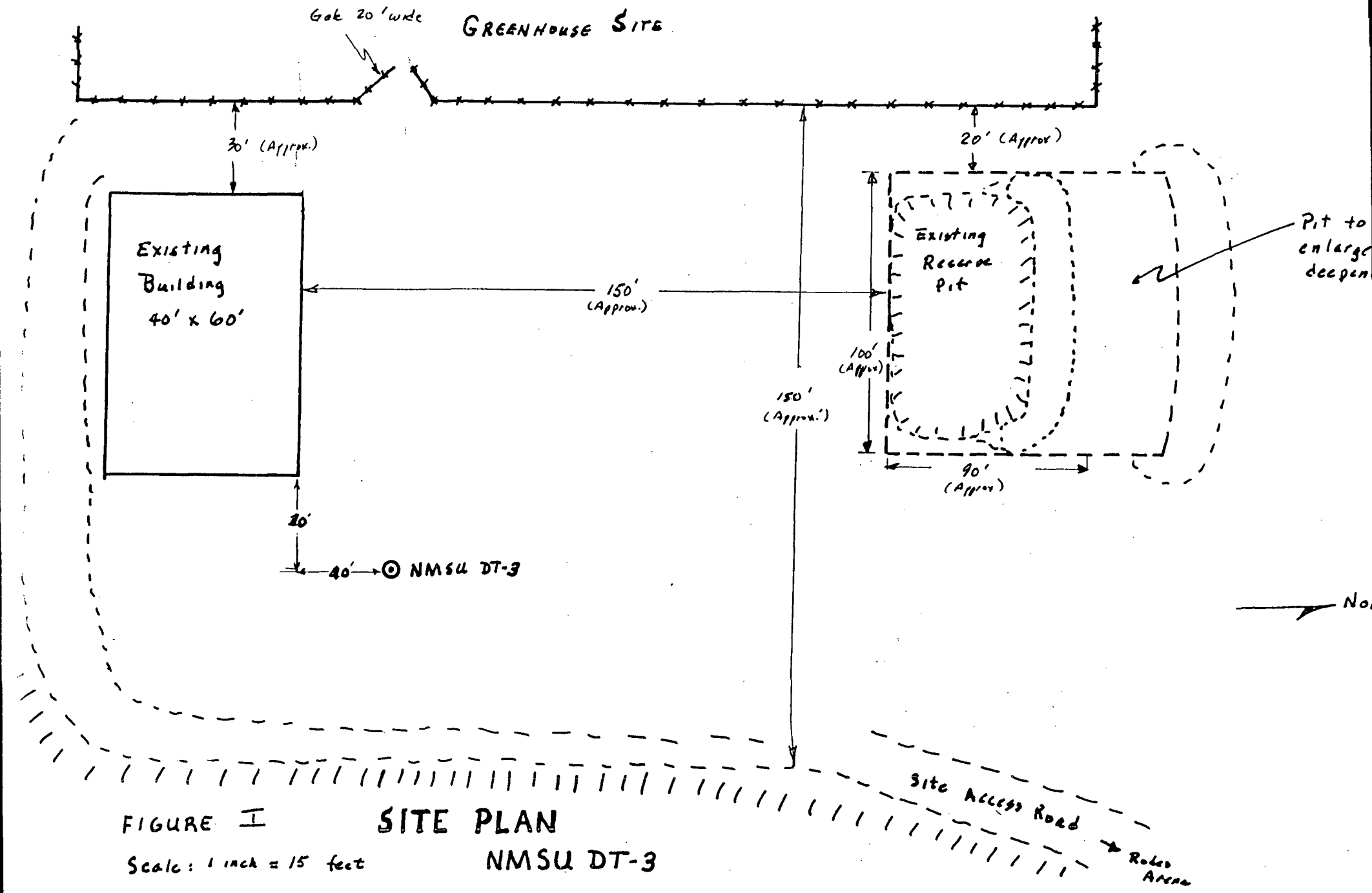


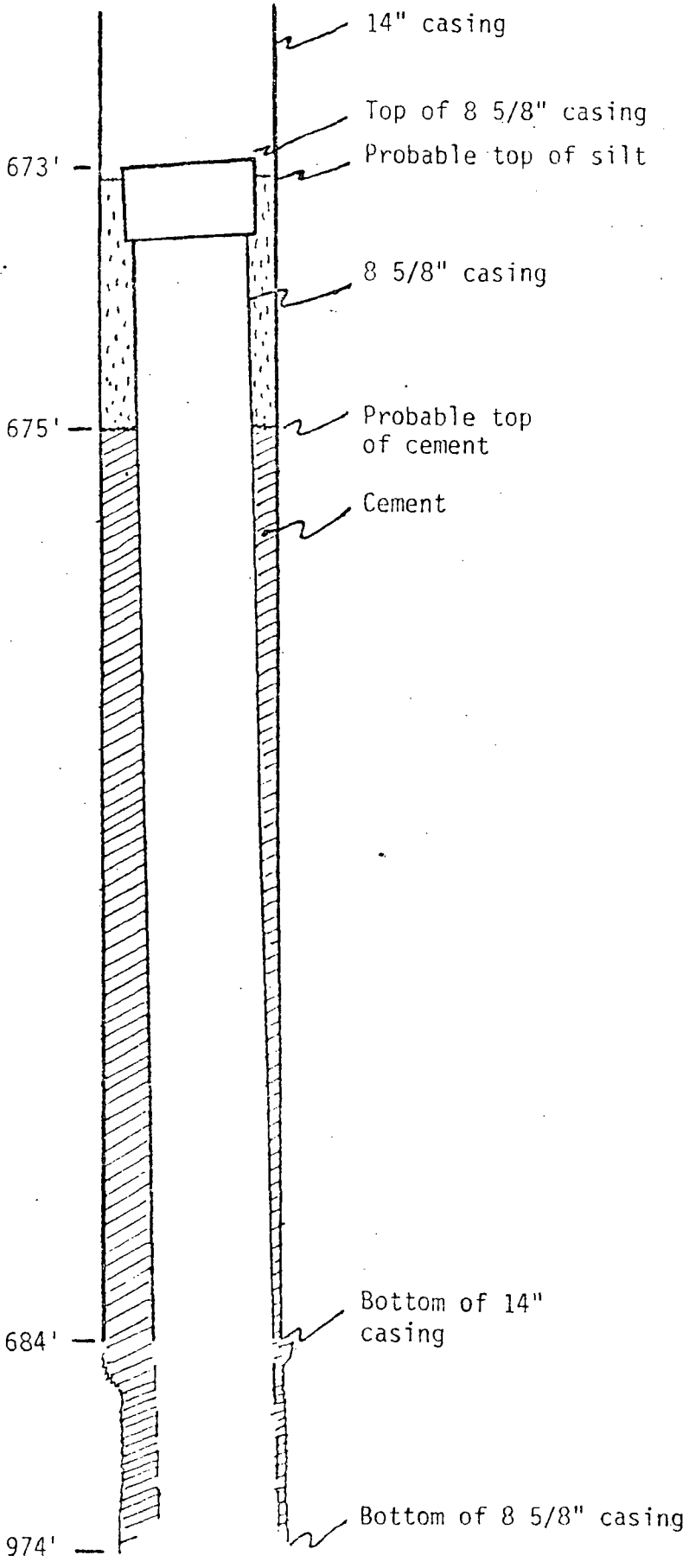
FIGURE I SITE PLAN

Scale: 1 inch = 15 feet NMSU DT-3

Figure II NMSU DT-3

Casing Status

a/o February 18, 1986



Notes

1. Video camera inspection indicates 8 5/8-inch casing is nearly centered in 14-inch casing.

2. Inspection also indicates 8 5/8-inch casing is slightly canted. (Estimate 1-inch off relative horizon.)

3. Calculated top of cement is 675 feet; with possible ± one foot of error. Both December 1984, and January 1985 video camera records indicate a reflective, shadowed outline exists in annulus between 14-inch and 8 5/8-inch casings. Analysis indicates this surface could be cement, but more likely is silt that has precipitated from the very turbid conditions that existed after intermediate completion.

4. Video camera inspection indicates the exposed (internal) threads on the coupling are clean, and appear to be free of burrs, nicks, or other imperfections.

5. No sign is visible of the missing 10-feet long piece of 1-inch tremie pipe. This missing piece is believed to be in the annulus between the 14-inch and 8 5/8-inch casing strings, and probably is located with the top of the pipe at 674-675 feet of depth.

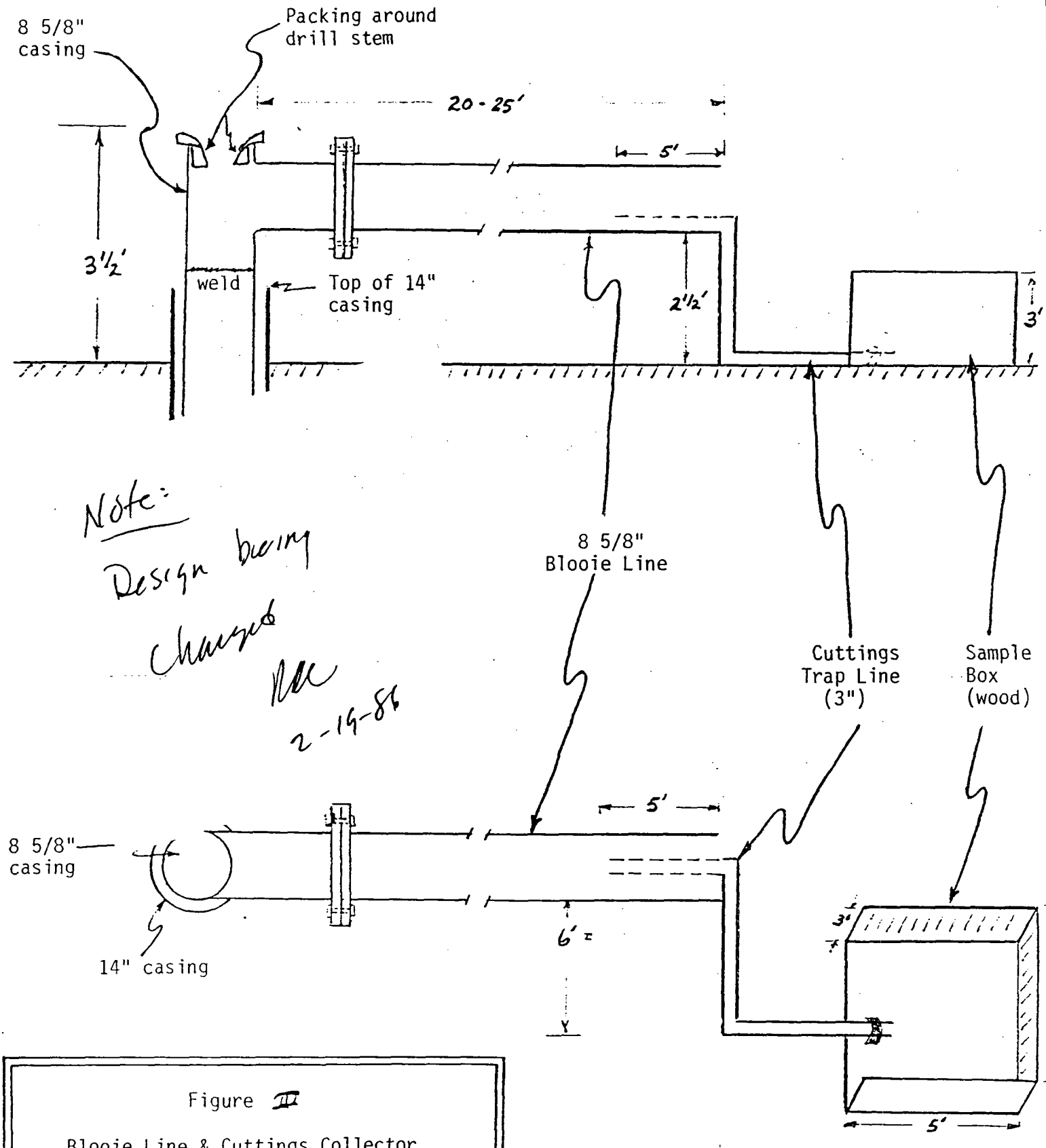


Figure III

Blooie Line & Cuttings Collector

NMSU DT-3

No Scale

SPECIFICATIONS FOR WELL DRILLING, NMSU DT-3

1. Project Located:

   New Mexico State University (NMSU), Las Cruces, New Mexico. (See Figure 1 and Figure 2)

2. NMSU Project Team:

   Project Engineer: Roy A. Cunniff (505) 522-9100
   Project Geologist: Carl Ulvog (505) 522-9100

3. Time Frame Performance:

   Desired that Job No. 1 commence o/a 17 March 1986. Driller is required to indicate availability.

4. Evaluation *Factors* :

   Experience (Driller shall provide summary of applicable experience and contracts for last three contracts.)

   Equipment to be used.

   Cost.

   NMSU knowledge of driller.

   Proposed Cost Basis:
   a. Fixed daily and hourly rate for rig stand by.
   b. Fixed daily and hourly rate for rig operation.
   c. Fixed hourly rate for special equipment.
   d. Fixed hourly rate for special equipment (hoist truck, welder, other)
   e. Fixed cost for mobilization and demobilization.
   f. Reimburseable cost with not-to-exceed limits for rental equipment.
   g. NMSU-supplied fuel and material (except where otherwise specified) including air package.
   h. NMSU accepts lost-circulation risk for tools and equipment.

5. Present Well Conditions

   Depth: 974 feet

   Casing: 14-inch to 684 ± feet; cemented from T.D. to surface.
   8 5/8-inch from 673 to 974 feet. Slotted casing 733-960 feet.
   (See Figure 3)

Cement Plugs: Cement basket on annulus at 970, with cement plug at 960 ± feet. Cement plug from 674 ± to 695 feet.

Unusual Conditions:

a. The 8 5/8-inch casing is centered but slightly canted in 14-inch (video camera record available for bidder review) (See Figure 4)

b. Borehole and casing from 700-974 feet contain 9,500 pounds of LCM (cotton seed hulls, paper, DRISPAC, Dick's well seal, bentonite, and polymers). Likely that much of this material is in bottom 50 feet of well bore.

c. Top of 8 5/8-inch is female (internally threaded) coupling.

6. Anticipated drilling conditions (Furnished as a service to driller: NMSU does not guarantee data).

a. Existing well is bottomed into a lost circulation zone, which currently is plugged with 10,000 pounds of cotton seed hulls, DRISPAC, Dick's Drilling Additives, and bentonite.

b. From surface geologic testing, including reflection seismic survey, anticipated formation is Santa Fe group alluvial fill approximately to 1350-1450 feet of depth. At that horizon, contact is expected to be made with either Paleozoic limestones, or a layer of Orejon Andesite (volcanics).

c. Formation is faulted, layered, and weathered, so driller can anticipate encountering other lost circulation zones prior to, or after making contact with base of Santa Fe group alluvium.

d. Site Geologist will collect drill cuttings at 10-feet horizons, and will make continuous evaluations of formation characteristics.

7. TECHNICAL DESCRIPTION

a. Description of work:

Job No. 1: Using NMSU-supplied material, driller shall use his drill rig and related special equipment (including hoist truck and welding machine as necessary and appropriate) to accomplish three tasks:

1-A: Install blooie line and related well head items per attached drawing. (Figures 5 and 6)

1-B: Install 675 feet (±) of steel casing by threading into the top of the existing casing string located at 673 (±) feet of depth. Lowest 20-feet section of the new section of casing will have centering guides welded on at least four points as indicated in drawing. Casing will be 8 5/8-inches in ouside diameter, wall thickness 0.250 inches, in nominal 20-feet lengths. Lowest 20 feet will be threaded at both ends, with a coupling at the upper end. Next lower 20-feet length will be threaded only at the lower end, with the upper end beveled weldend. The remainder of the casing will consist of double weld end pipe which will be welded into a continuous casing string for insertion into the well. After the casing string has been inserted and threaded into the existing casing string by at least two complete revolutions of the casing string, the driller will trim the exposed portion of the casing preparetory for the well head equipment.

1-C: After the casing is installed, driller shall use driller-supplied 1-inch steel tremie line to emplace approximately 20 sacks of cement itno the annular space between the new casing string and the existing 14-inch surface casing. Cement placement shall be done so that the confirmed top of cement is level with the new coupling inserted with the casing string at approximately 652 (±) feet of depth. Tremie line will be withdrawn after cement top has been tagged and confirmed. NOTE: In terms of job sequencing, this task will be completed prior to installing the well head equipment shown on attached drawing.

Job No. 2: Using driller-supplied drill string and down-hole equipment, as defined later in these specifications, drill a bore-hole 7 7/8-inches in diameter to a target depth of 1500 feet. If drill bit cannot be floated through the bottom of the existing casing at 974 feet, driller shall be prepered to use 7 ½-inch, or smaller drill bit. Drilling shall be done with air, and the air package will be supplied by NMSU. For information to the driller, this air package is described in Attachment One. After the target depth has been reached, the hole will be logged by NMSU to acquire a suite of temperature and geophysical logs. Subsequently, a drill-stem test (DST) will be conducted using airlift for a period not to exceed eight (8) hours. Depending on hole conditions as determined from drilling and evaluation of the drill cuttings, this DST might be postponed until the open bore-hole has been cased.

Job No. 3: THIS JOB IS PROVISIONAL, AND THE POSSIBLE TASKS DEFINED AS FOLLOWS DEPEND ON DRILLING CONDITIONS AND THE STATUS OF THE BORE-HOLE AFTER DRILLING IS COMPLETED. FOR THESE REASONS, THE WORK TASKS DEFINED BELOW ARE INDIVIDUAL TASKS WHICH REPRESENT OPTIONS TO BE EMPLOYED DEPENDING ON CONDITIONS AT THE TIME.

3-A: Possible conditions: Major lost-circulation and down-hole equipment stuck. NMSU accepts full responsibility for all costs of lost circulation, and responsibility for tool recovery. As necessary and appropriate, expert firms and individuals will be brought to the job site to assist in the recovery of lost tools and equipment. The drilling contractor will be compenstated for time and materials used in drilling and recovery operations, and will be compensated for any lost equipment as necessary and appropriate. NMSU will inspect and evaluate all down-hole equipment used by the drilling contractor before drilling starts to provide a basis for fair market value.

3-B: Possible conditions: Drilling operations are suspended because it is not possible to unload the bore-hole. This condition will be evaluated, and NMSU has the option to either employ additional air, change the drilling additives, or to terminate drilling at the horizon reached. It is recognized that this horizon could be the depth (974 feet) at which

drilling is started.

3-C: Possible conditions: Drilling operations are successful in locating and confirming the desired production zone. This zone or zones could be located between the current depth (974 feet) and the target depth of 1500 feet. NMSU may elect to case the open bore-hole with slotted liner from approximately 950 feet to target depth. Slotted liner will be NMSU-supplied steel liner, with a weight and size, and slot size appropriate for the producing horizons encountered. For information to the driller, the expected size is steel, Grade A53, 5 9/16-inches, wall thickness 0.250 inches, with a minimum of open slot area of 5.4 square inches per foot of pipe. Drilling contractor will land this liner on the bottom of the bore-hole. Liner will be double weld ends, and will be in double-random 40 feet lengths.

3-E: Possible conditions: Open bore-hole has been cased as indicated above. Drilling contractor shall conduct a DST of eight hours duration, using airlift. After completion of this DST, the drill stem and air equipment will be removed from the well, and the well head will be removed. Subsequently, the 8 5/8-inch casing string will be removed from 652 (±) feet of depth. Casing string will be removed from the job site, and transported to a location designated by NMSU.

3-F: Possible conditions: As indicated above, the open bore-hole could be abandoned. Under these circumstances, the drilling contractor will accomplish those actions indicated above after a DST is completed, or without a DST being conducted.

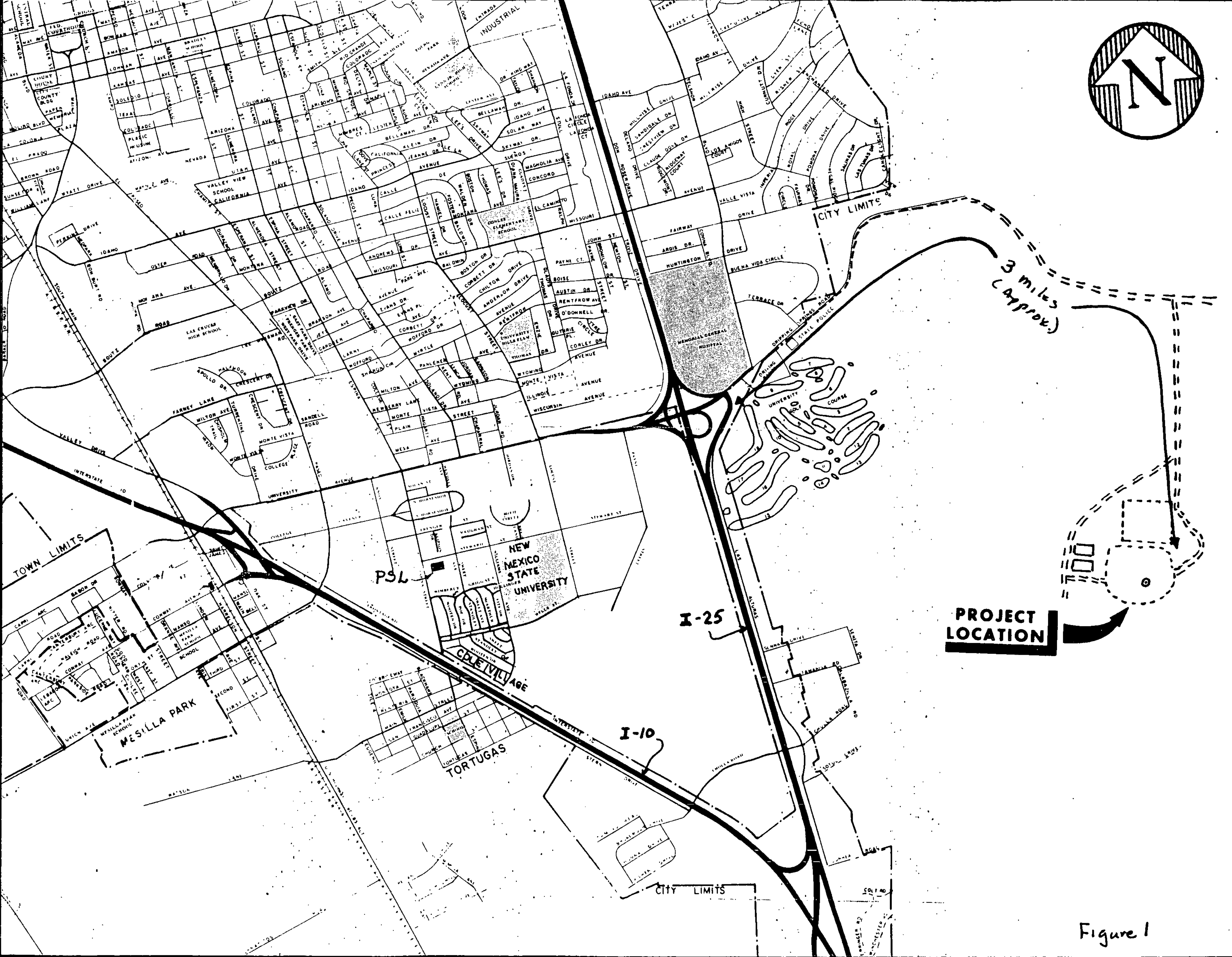

N
PROJECT LOCATION
3 miles (Approx.)
CITY LIMITS
I-25
I-10
NEW MEXICO STATE UNIVERSITY
PSL
TOWN LIMITS
MESILLA PARK
TORTUGAS
COLLEGE VILLAGE
UNIVERSITY GOLF COURSE
INDUSTRIAL

Figure 1

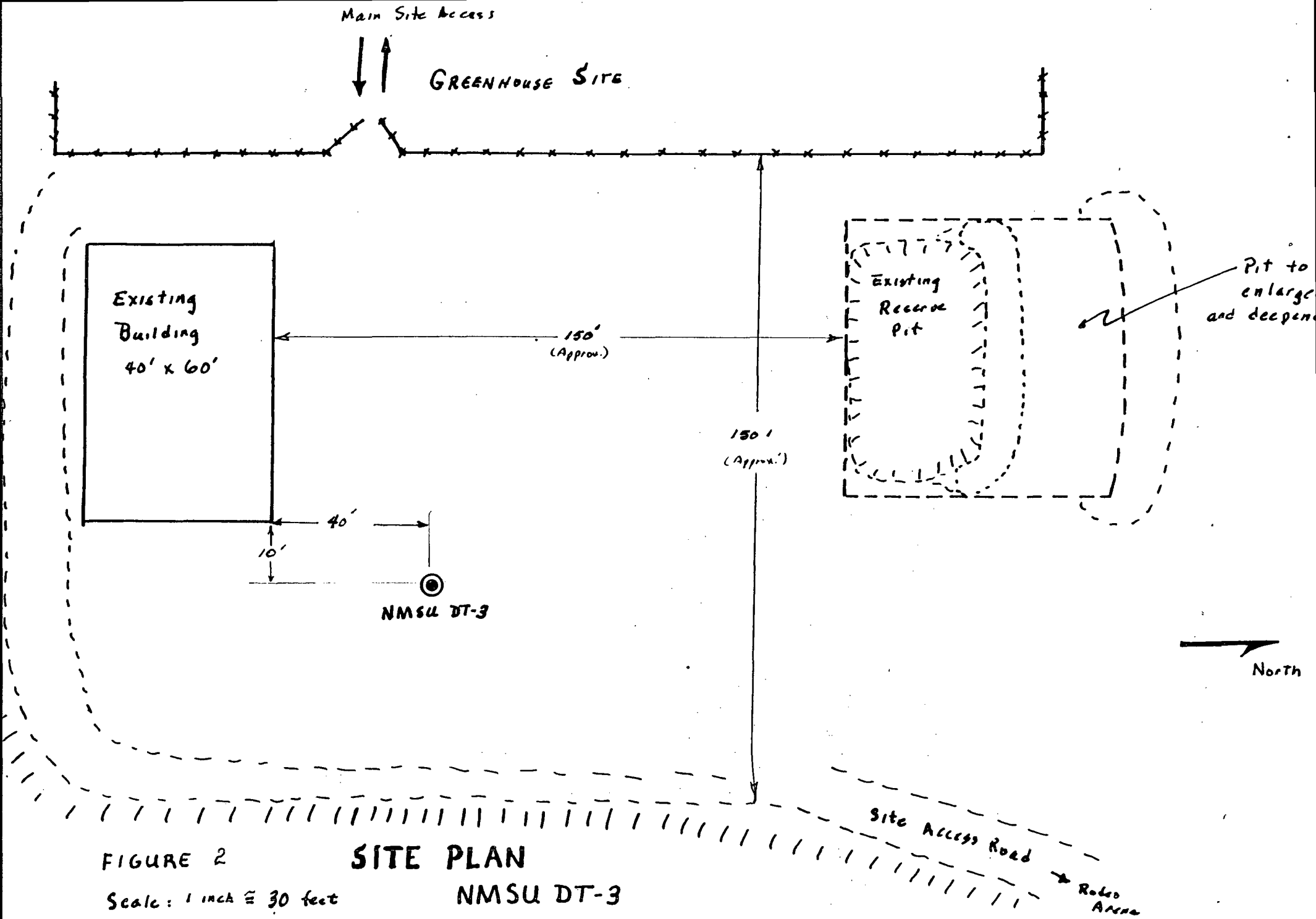


FIGURE 2 **SITE PLAN**

Scale: 1 inch ≅ 30 feet NMSU DT-3

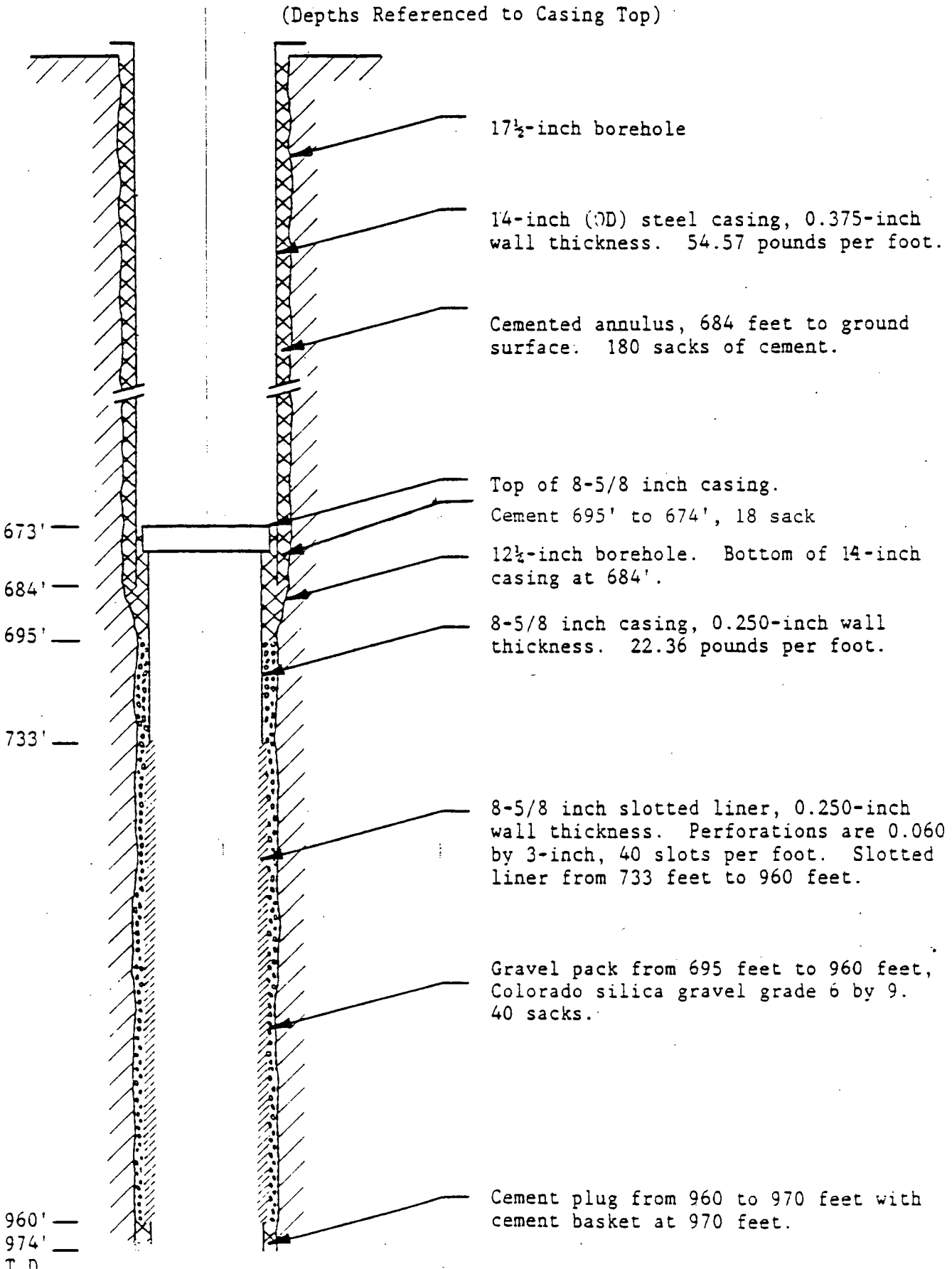


Figure 3 NMSU DT-3 Intermediate Completion Configuration

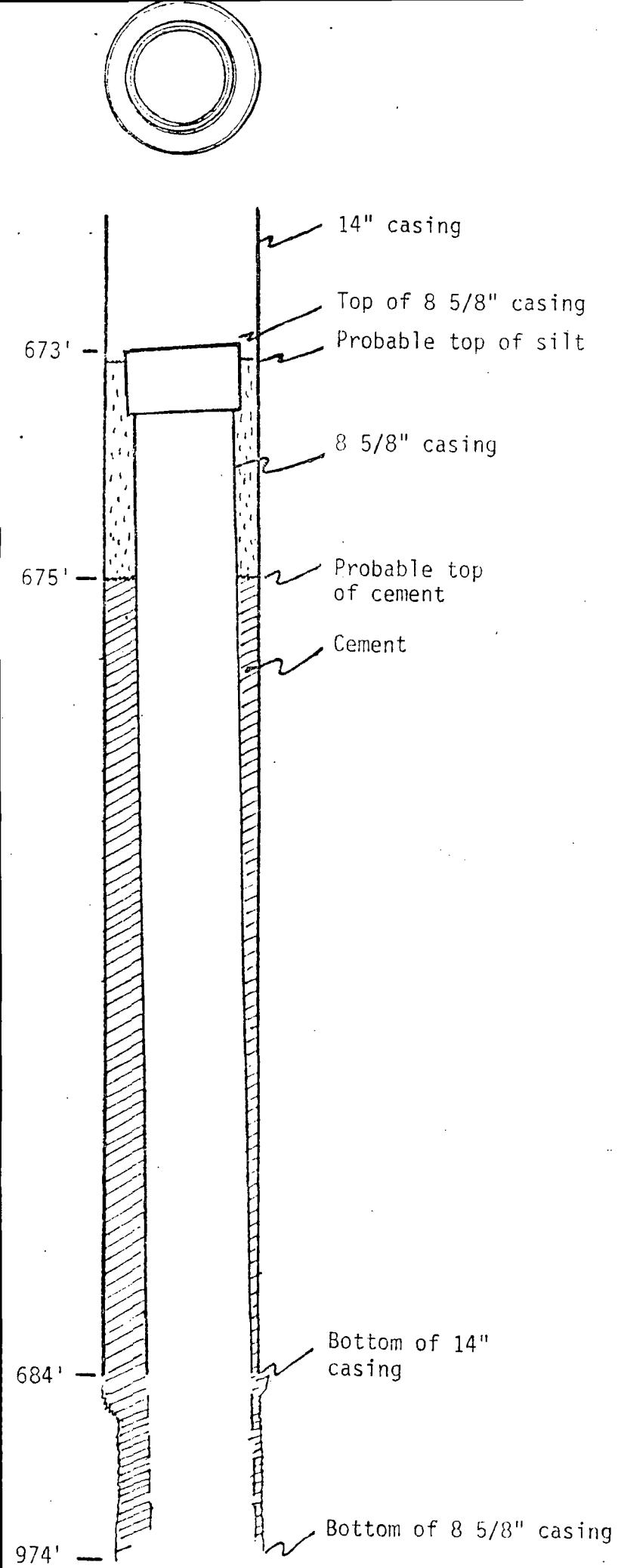


Figure 4 NMSU DT-3

Casing Status

a/o February 18, 1986

Notes

1. Video camera inspection indicates 8 5/8-inch casing is nearly centered in 14-inch casing.

2. Inspection also indicates 8 5/8-inch casing is slightly canted. (Estimate 1-inch off relative horizon.)

3. Calculated top of cement is 675 feet; with possible ± one foot of error. Both December 1984, and January 1985 video camera records indicate a reflective, shadowed outline exists in annulus between 14-inch and 8 5/8-inch casings. Analysis indicates this surface could be cement, but more likely is silt that has precipitated from the very turbid conditions that existed after intermediate completion.

4. Video camera inspection indicates the exposed (internal) threads on the coupling are clean, and appear to be free of burrs, nicks, or other imperfections.

5. No sign is visible of the missing 10-feet long piece of 1-inch tremie pipe. This missing piece is believed to be in the annulus between the 14-inch and 8 5/8-inch casing strings, and probably is located with the top of the pipe at 674-675 feet of depth.

REQUIRED DRILLING EQUIPMENT
NMSU WELL DT-3

EQUIPMENT ITEM	REQUIREMENTS
DRILLING UNIT	
DRAWWORKS	180,000 POUND DRAWBAR PULL
MAST	CAPABLE OF STANDING 40-FEET DOUBLE RANDOM
ROTARY TABLE	STANDARD: SPECIFY BY DRILLER
PIPE TONGS	STANDARD: SPECIFY BY DRILLER
AIR SLIPS	REQUIRED
SLIPS	SLIPS FOR 8 5/8, 5 9/16,6 5/8
LIGHT PLANT	SIX KW
DRILLING EQUIPMENT	
DRILL PIPE	MINIMUM OF 1650 FEET OF 4 1/2 INCH DRILL PIPE ALSO SAME LENGTH OF 3 1/2
DRILL COLLARS	NOT LESS THAN SIX FULL-LENGTH COLLARS
SUBS	STANDARD: DRILLER TO SPECIFY
ROTATING HEAD	CAPABLE OF MATING TO 8 5/8 CASING; PRESSURE CERTIFIED TO CONTROL UP TO 2500 ACFM AT 1500 PSI
REAMER	FULL-HOLE TO 7 7/8 INCH
FLAPPER VALVE	TWO REQUIRED; ABOVE THE BIT AND NEAR STRING TOP
CENTRALIZER	TWO REQUIRED: MAXIMUM DIAMETER 7 INCHES
STABILIZER	
DRILL BITS	NEW BITS WITH JETS; 7 7/8; 7 1/2, 6 1/4

TRUCKS AND TRAILERS	
PIPE TRUCKS	STANDARD; DRILLER SPECIFY SIZE
WATER TRUCK	FRESH WATER IS AVAILABLE AT SITE
DOGHOUSE	OPTIONAL
WELDING MACHINE	CAPABLE OF DOING WORK OUTLINED IN JOB 1
HOIST TRUCK	DRILLER MAY SUPPLY; NMSU CAN SUPPLY
SPECIAL EQUIPMENT	
DEVIATION EQUIP	CAPABLE OF MEASURING DEVIATION AT SPECIFIED INTERVALS
RECORDS	DRILLER IS REQUIRED TO MAINTAIN COMPLETE DRILLING RECORD AND SHALL HAVE THIS AVAILABLE FOR INSPECTION AT AHY TIME

AIR PACKAGE
NMSU WELL DT-3

EQUIPMENT LIST	REQUIREMENTS
PRIMARY UNITS	TWO UNITS REQUIRED: EACH UNIT SHALL DELIVER NOT LESS THAN 1200 ACFM AT A PRESSURE NOT LESS THAN 285 PSI
BOOSTER UNIT	AT LEAST ONE UNIT, WHICH CAN PROVIDE NOT LESS THAN 1200 ACFM AT A PRESSURE NOT LESS THAN 1500 PSI
MIST PUMP	REQUIRED: BIDDER SPECIFY
DOGHOUSE	OPTIONAL
PIPE RACK	
OPERATORS	TWO OPERATORS REQUIRED FOR 24-HOUR DUTY
OIL AND LUBE	AS NEEDED FOR ESTIMATED 10-DAY JOB
FLOW LINE	NOT LESS THAN 150 FEET OF 3-INCH FLOW LINE
LIGHT PLANT	SIX KW
FIRE EXTINGUISHERS	AS REQUIRED BY CODES

SPECIAL CONDITIONS

FUEL CONSUMPTION	SPECIFY RATE WITH ONE, TWO, OR THREE UNITS OPERATING
REFUELING TYPE	SPECIFY GRAVITY OR PUMPED REFUELING
FUEL	NMSU WILL SUPPLY FUEL
MOVEIN/MOVEOUT	SPECIFY COST BASIS AND COST
RATE BASIS	

STANDBY	RATE PER HOUR OR DAY; INDICATE BASIS FOR OPERATING DAY
OPERATING	RATE PER HOUR OR DAY
DURING MOVE	SPECIFY APPLICABLE RATES
SITE SPACE NEEDS	SPECIFY MINIMUM SPACE ENVELOPE FOR UNITS