

APPLICATION FOR AUTHORIZATION TO INJECT

8 89

- I. PURPOSE: Secondary Recovery Pressure Maintenance Disposal Storage
Application qualifies for administrative approval? Yes No
- II. OPERATOR: 21st Century Investment Company
c/o Walsh Engr. & Prod. Corp.
ADDRESS: 204 N. Auburn Farmington, New Mexico 87401
CONTACT PARTY: Paul C. Thompson PHONE: 505 327-4892
- III. WELL DATA: Complete the data required on the reverse side of this form for each well processed for injection. Additional sheets may be attached if necessary. See Appendix A
- IV. Is this an expansion of an existing project: Yes No
If yes, give the Division order number authorizing the project R-8966 Appendix B
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review. See Appendix C
- VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail. See Appendix D
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;
 2. Whether the system is open or closed;
 3. Proposed average and maximum injection pressure;
 4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
 5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- *VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any. None
- * X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted.) See Appendix F
- * XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken. Appendix E
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form. Appendix G
- XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.
- NAME: Paul C. Thompson TITLE: Agent
SIGNATURE: Paul C. Thompson DATE: 3/1/94
- * If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstance of the earlier submittal. _____

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

- (1) Lease name; Well No.; Location by Section, Township, and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the section, township, and range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates and pressures; and
- (4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, PO Box 2088, Santa Fe, NM 87504-2088 within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.



WALSH

ENGINEERING & PRODUCTION CORP.

Petroleum Engineering Consulting
Lease Management
Contract Pumping204 N. Auburn
Farmington, New Mexico 87401
(505) 327-4892

Application for Authorization to Inject

I. Purpose:

This Application is for an expansion of an existing waterflood project in the Mesa Gallup pool. Three currently producing oil wells are proposed to be converted to injection wells for the purpose of recovering secondary oil reserves.

II. Operator: 21st Century Investments
c/o Walsh Engineering and Production Corp.
204 N. Auburn
Farmington, NM 87401

Contact: Paul C. Thompson, P.E.

Phone: 327-4892

III. Well Data:

Well data for the three proposed injection wells is attached as Appendix A.

IV. This is an expansion of an existing project. The Division order number authorizing the project is R-8966. A copy of this Order is attached as Appendix B.

V. Maps:

A plat of all wells in the Mesa Gallup field and a topographical map are attached as Appendix C.

VI. Offset Wells

A tabulation of all offset wells as well as schematic drawings of all offsetting P&A's are attached as Appendix D.



VII. Proposed Operations:

1. Average Injection Rate = 250 B/D
Maximum Injection Rate = 300 B/D
2. The system will be closed.
3. Average Injection Pressure = 850 psig
Maximum Injection Pressure = 950 psig
4. The injected water will come from the Mesa Gallup Unit well #18 which is an Entrada well. This well was drilled as the water supply well for this water flood project. An analysis of this water is attached in Appendix E.
5. Injection is for secondary oil recovery in the Gallup formation. A chemical analysis of the Gallup formation water is attached in Appendix E.

VIII. Geologic Data:

Injection is proposed for the Cretaceous Gallup Sandstone. This zone is part of the Juana Lopez Member of the Mancos Shale. The Mancos shale extends from the surface to the top of the Gallup. There are no underground sources of drinking water above or below the Gallup Sandstone.

IX. Stimulation:

No stimulation is planned.

X. Logs:

Logs are attached in Appendix F.

XI. No fresh water wells are within one mile of the proposed injection wells.



XII. Does not Apply

XIII. Proof of Notice:

The surface owner is the Navajo Tribe. There are no other offset operators within one-half mile of the proposed injection wells. The Navajo Tribe has been notified of this Application by certified mail and a legal advertisement was published in the Daily Times. Copies of these notifications are attached as Appendix G.

XIV. Certification:

I hereby certify that the information submitted with this Application is true and correct to the best of my knowledge and belief.

Paul C. Thompson Date: 3/1/94
Paul C. Thompson, P.E.
President
Walsh Engineering and Production Corporation



21st CENTURY INVESTMENTS
MESA GALLUP WATERFLOOD

APPLICATION FOR AUTHORIZATION TO INJECT

LIST OF APPENDIXES

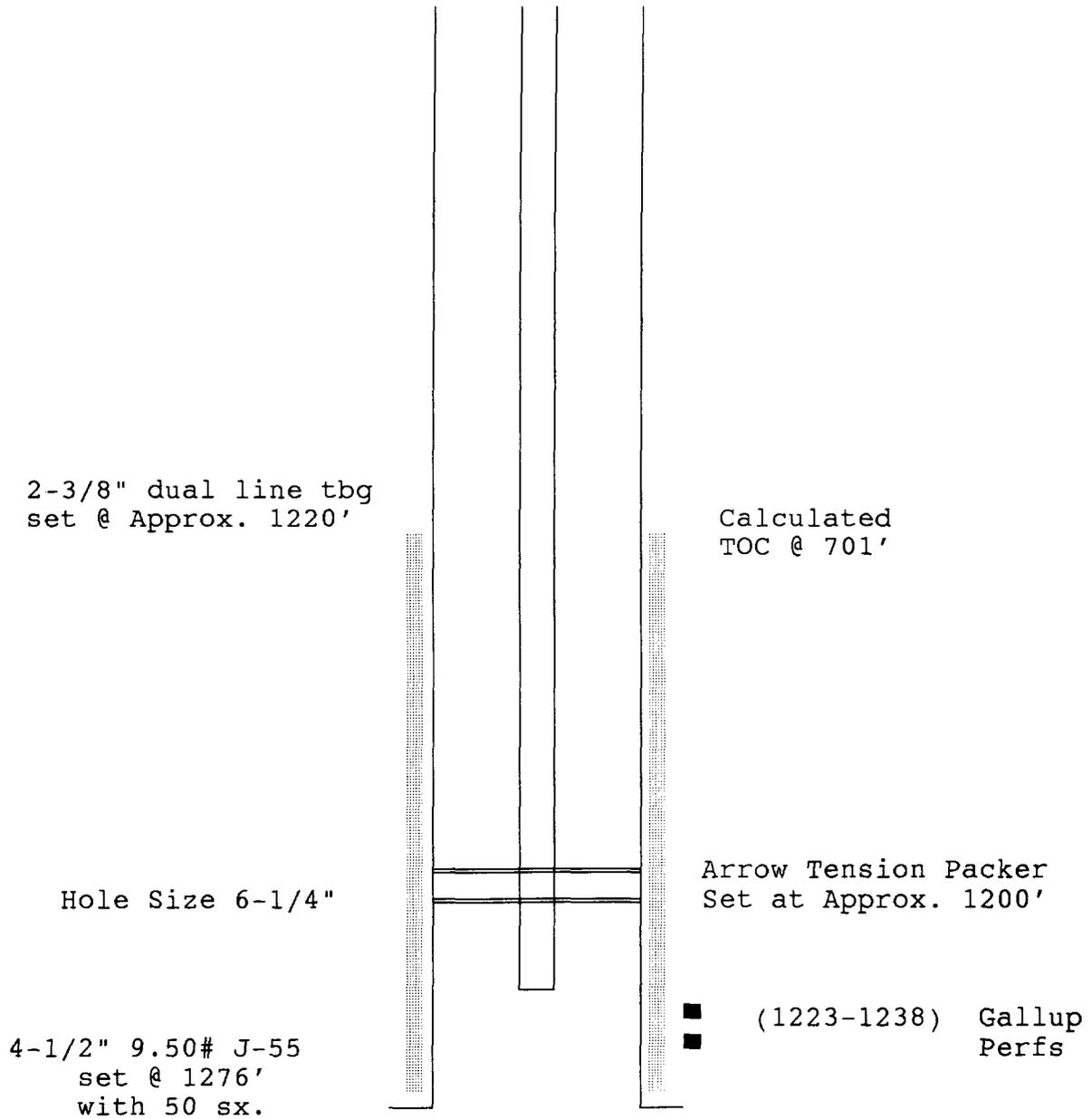
INJECTION WELL DATA	APPENDIX A
MESA GALLUP WATERFLOOD DIVISION ORDER	APPENDIX B
WELL LOCATION MAPS	APPENDIX C
OFFSET WELL DATA AND P&A SCHEMATICS	APPENDIX D
MAKE-UP AND PRODUCED WATER ANALYSIS	APPENDIX E
WELL LOGS	APPENDIX F
PROOF OF NOTIFICATION	APPENDIX G



APPENDIX A

INJECTION WELL DATA

21st Century Investments
Navajo #C1
1700 FNL & 685 FEL
SEC 15 32N 18W
Elev 5311'



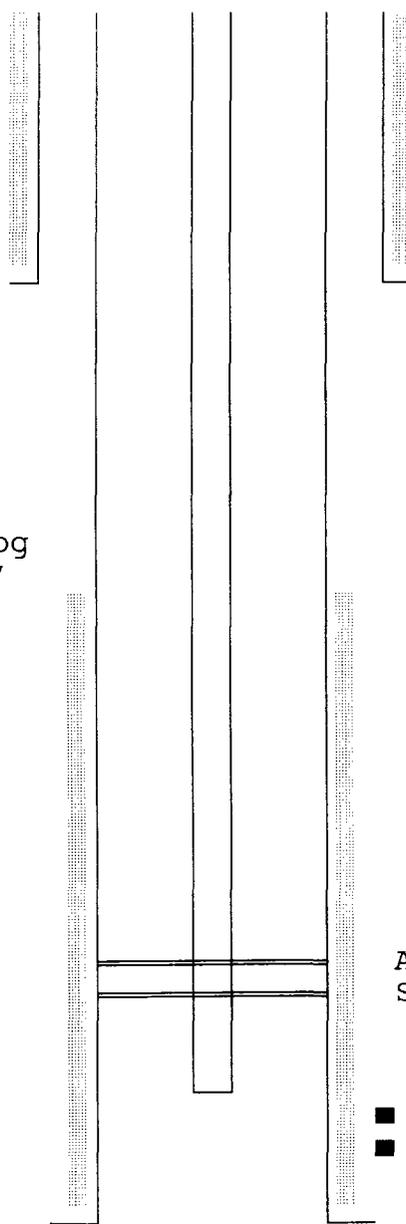
21st Century Investments
Navajo #7
2310 FNL & 330 FWL
SEC 24 32N 18W
Elev 5565

Hole Size 8-3/4"
7", 23# J-55
set @ 30'
Cmt w/ 7 sx.
Circ. Cement

2-3/8" dual line tbg
set @ Approx. 1410'

Hole Size 6-1/4"

4-1/2" 9.50# J-55
set @ 1482'
with 40 sx.



Calculated
TOC @ 1022'

Arrow Tension Packer
Set at Approx. 1380'

■ (1427-1429) Gallup
■ (1433-1438) Perfs

21st Century Investments
Navajo "C" #3
330 FSL & 2310 FEL
SEC 14 32N 18W
Elev 5347

Hole Size 8-3/4"
7", 23# J-55
set @ 39'
Cmt w/ 7 sx.
Circ. Cement

2-3/8" dual line tbg
set @ Approx. 1290'

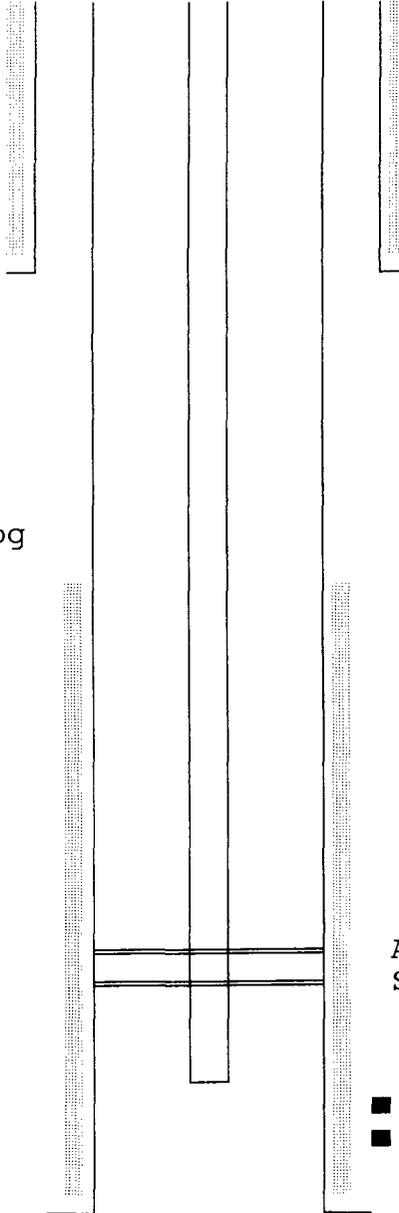
Hole Size 6-1/4"

4-1/2" 11.6# K-55
set @ 1373'
with 80 sx.

Calculated
TOC @ 453'

Arrow Tension Packer
Set at Approx. 1260'

■ (1312-1320) Gallup
■ Perfs





APPENDIX B

MESA GALLUP WATERFLOOD DIVISION ORDER

Misc. ✓

RECEIVED
AUG 1 1989
OIL CON. DIV
DIST. 3

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CG

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9

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 9637
Order No. R-8966

APPLICATION OF GRAND RESOURCES
INC. FOR A WATERFLOOD PROJECT,
SAN JUAN COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on April 26, 1989, at Santa Fe, New Mexico, before Examiner David R. Catanach.

NOW, on this 9th day of August, 1989, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

- (1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.
- (2) The applicant, Grand Resources Inc., seeks authority to institute a waterflood project in its proposed Mesa Gallup Unit (being the subject of Division Case No. 9673) located in all or portions of Sections 10, 11, 14, 15, 23, 24 and 25 of Township 32 North, Range 18 West, NMPM, San Juan County, New Mexico, all as projected into the unsurveyed Navajo Indian Reservation, by the injection of water into the Gallup formation, designated and Undesignated Mesa-Gallup Oil Pool, through the gross perforated interval from approximately 1110 feet to 1392 feet in four existing wells shown on Exhibit "A" attached hereto and made a part hereof.

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Order No. R-8966
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(3) The Mesa-Gallup Oil Pool currently comprises some 1040 acres in Township 32 North, Range 18 West, NMPM, and the Mesa Gallup Unit Area comprises some 2680 acres in said Township 32 North, Range 18 West, NMPM.

(4) The wells currently located in the Mesa-Gallup Oil Pool are in an advanced state of depletion and should properly be classified as "stripper wells".

(5) The proposed waterflood project should result in the recovery of otherwise unrecoverable oil, thereby preventing waste.

(6) The proposed Mesa Gallup Unit Area contains a substantial amount of acreage that is currently undeveloped in the Mesa-Gallup Oil Pool.

(7) In order to assure the orderly development of the Mesa Gallup Unit Area, the proposed waterflood operations should be initially limited to the area that currently comprises the Mesa-Gallup Oil Pool, described as follows, and hereinafter referred to as the Project Area.

TOWNSHIP 32 NORTH, RANGE 18 WEST, NMPM

Section 10: S/2 SE/4
Section 14: NW/4 SW/4, E/2 SW/4, and W/2 SE/4
Section 15: NW/4 NE/4, E/2 NE/4, and NE/4 SE/4
Section 23: NE/4
Section 24: W/2
Section 25: NE/4 NW/4 and N/2 NE/4

(8) The Division Director should have the authority to administratively authorize expansion of the Project Area by placing additional wells on injection and/or production upon proper application by the operator.

(9) The operator should take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface.

(10) In order to assure that the injected water enters only the injection formation and is not allowed to escape to other formations which may reduce the effectiveness of the proposed waterflood operations, the wells or injection pressurization system should be so equipped as to limit injection pressure at the wellhead to no more than 0.2 psi per foot of depth to the uppermost injection perforation in each injection well, provided however, the Division Director should have the authority to authorize an increase in said injection pressure, should circumstances warrant.

(11) Prior to commencing injection operations into the wells shown on Exhibit "A", the applicant should be required to obtain the appropriate Federal and/or Indian injection permits in accordance with the requirements of 40 CFR Part 147.

(12) The application should be approved and the project should be governed by the provisions of Rules 701 through 708 of the Oil Conservation Division Rules and Regulations.

IT IS THEREFORE ORDERED THAT:

(1) The applicant, Grand Resources Inc., is hereby authorized to institute a waterflood project in a portion of its Mesa Gallup Unit Area (described in Exhibit "A" of Division Order No. R-8957), by the injection of water into the Gallup formation, designated and Undesignated Mesa-Gallup Oil Pool, through the gross perforated interval from approximately 1110 feet to 1392 feet in four existing wells shown on Exhibit "A" attached hereto and made a part hereof, all located in Township 32 North, Range 18 West, NMPM, San Juan County, New Mexico.

(2) The proposed waterflood operations shall be initially limited to the area that currently comprises the Mesa-Gallup Oil Pool, described as follows, and hereinafter referred to as the Project Area.

TOWNSHIP 32 NORTH, RANGE 18 WEST, NMPM

Section 10: S/2 SE/4
Section 14: NW/4 SW/4, E/2 SW/4, and W/2 SE/4
Section 15: NW/4 NE/4, E/2 NE/4, and NE/4 SE/4
Section 23: NE/4
Section 24: W/2
Section 25: NE/4 NW/4 and N/2 NE/4

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(3) The Division Director shall have the authority to administratively authorize expansion of the Project Area by placing additional wells on injection and/or production upon proper application by the operator.

(4) Injection into each of the wells shown on said Exhibit "A" shall be through internally coated tubing, set in a packer which shall be located as near as practicable to the uppermost injection perforation; the casing-tubing annulus in each well shall be loaded with an inert fluid and equipped with an approved pressure gauge or attention attracting leak detection device.

(5) The operator shall immediately notify the supervisor of the Division's Aztec district office of the failure of the tubing, casing, or packer in any of said injection wells, the leakage of water or oil from or around any producing well, or the leakage of water or oil from or around any plugged and abandoned well within the project area and shall take such steps as may be timely and necessary to correct such failure or leakage.

(6) The injection wells herein authorized and/or the injection pressurization system shall be so equipped as to limit the injection pressure at the wellhead to no more than 0.2 psi per foot of depth to the uppermost perforations therein (as more fully described in Exhibit "A"), provided however, the Division Director may authorize a higher surface injection pressure upon satisfactory showing that such pressure will not result in fracturing of the confining strata.

→ (7) Prior to commencing injection operations, the casing in each of the wells shown on Exhibit "A" shall be pressure-tested from the surface to the proposed packer setting depth to assure the integrity of such casing.

→ (8) The operator shall notify the supervisor of the Aztec district office of the Division of the date and time of the installation of injection equipment and of the mechanical integrity pressure test in order that the same may be witnessed.

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(9) Prior to commencing injection operations into the wells shown on Exhibit "A", the applicant shall be required to obtain the appropriate Federal and/or Indian injection permits in accordance with the requirements of 40 CFR Part 147.

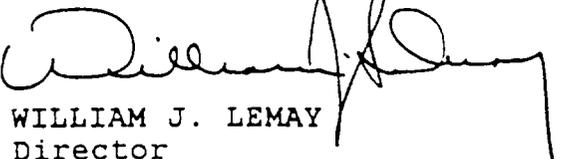
(10) The subject waterflood project is hereby designated the Mesa Gallup Unit Waterflood Project and shall be governed by the provisions of Rules 701 through 708 of the Division Rules and Regulations.

(11) Monthly progress reports of the waterflood project herein authorized shall be submitted to the Division in accordance with Rules 704 and 1120 of the Division Rules and Regulations.

(12) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION


WILLIAM J. LEMAY
Director

S E A L

EXHIBIT "A"
CASE NO. 9637
ORDER NO. R-8966
MESA GALLUP UNIT WATERFLOOD PROJECT INJECTION WELLS

<u>WELL & LOCATION</u>	<u>MAXIMUM SURFACE INJECTION PRESSURE</u>
<u>TOWNSHIP 32 NORTH, RANGE 18 WEST, NMPM</u>	
Navajo "C" Well No. 1 1700' FNL & 685' FEL, Unit (H) Section 15	245 PSIG ✓
Navajo Well No. 3 660' FSL & 1980' FWL, Unit (N) Section 24	222 PSIG ✓
Navajo Well No. 11 330' FNL & 1650' FEL, Unit (B) Section 23	276 PSIG ✓
Navajo Well No. 4 1650' FSL & 1710' FEL, Unit (J) Section 14	263 PSIG



APPENDIX C

WELL LOCATION MAPS

MESA GALLUP

R18W

R17W

<p>10</p> <p>Navajo #2  Navajo #5 </p>	<p>11</p>	<p>12</p>	<p> P & A</p> <p> PRODUCING</p> <p> INJECTION</p> <p> PROPOSED INJECTION</p>
<p>Navajo #7  Nav. #A3 </p> <p>Nav. #B3 </p> <p>Nav. B#1  Nav. C#1 </p> <p>Navajo #6 </p> <p>15 Nav. #4  Nav. C#5 </p> <p>Nav. B#2 </p>	<p>14 Navajo #4 </p> <p>Nav. C#6  Nav. C#3 </p>	<p>13</p> <p>Navajo #6 </p>	<p>18</p>
<p>22</p>	<p>Navajo #11 </p> <p>Nav. C#2 </p> <p>23 Navajo #5 </p>	<p>Navajo #8 </p> <p>Nav. #7 </p> <p>Navajo #12 </p> <p>24 Nav. C#3 </p> <p>Nav. C#4 </p> <p>Navajo #3 </p>	<p>19</p>
<p>27</p>	<p>26</p>	<p>Nav. A#5  Nav. A#6 </p> <p>Bluehill #1  Nav. #6 </p> <p>25 Nav. #3 </p>	<p>Horseshoe #2E </p> <p>30</p>

T32N



APPENDIX D

OFFSET WELL DATA

P&A WELL SCHEMATICS

WELL IN AREA OF REVIEW

OPERATOR	WELL NAME	SPUD DATE	LOCATION	SECTION	TOTAL DEPTH	COMPLETION INTERVAL	I.P. (BOPD)	FORMA-TION	CASING SIZE & DEPTH	CEMENT SXS	STATUS
ZOLLER &											
DANNENBERG	BLUEHILL #1	7/26/65	2319FNL-1980FEL	25,32N-18W	1573	-	-	"	7"q30	CIRC.	P&A
GRAND NAV "A"	#4	11/8/61	B600FNL-1980FEL	25,32N-18W	1120	1051-66	8	GALLUP	4-1/2"q1045	100	P
GRAND NAV "A"	#5	12/4/61	C610FNL-1980FWL	25,32N-18W	1062	1037-45	5	"	3-1/2"q1057	100	I
RL BAYLESS NAV	#6	7/2/64	3300FSL-3300FWL	25,32N-18W	1093	-	-	"	5-1/2"q52	CIRC.	P&A
NAVAJO											
GRAND	#3	8/10/61	N660FSL-1980FWL	24,32N-18W	1163	1110-26	49	"	4-1/2"q1158	45	I
GRAND	#4	10/3/61	J1650FSL-1710FEL	14,32N-18W	1365	1315-23	6	"	4-1/2"q1357	35	P
EXPL/DRILL/CO	#5	11/29/61	J2135FSL-1935FEL	23,32N-18W	1254	-	-	"	7"q30	CIRC.	P&A
EXPL/DRILL/CO	#6	12/30/61	365FSL-760FWL	13,32N-18W	1472	-	-	"	7"q66	CIRC.	P&A
GRAND	#7	1/13/62	E2310FNL-330FWL	24,32N-18W	1482	1423-38	88	"	4-1/2"q1481	40	P
GRAND	#8	2/10/62	A950FNL-330FEL	23,32N-18W	1445	1383-94	88	"	4-1/2"q1437	40	P
GRAND	#11	1/24/62	B330FNL-1650FEL	23,32N-18W	1438	1381-92	87	"	4-1/2"q1438	40	I
GRAND	#12	2/18/62	F2290FNL-1780FWL	24,32N-18W	1573	1521-28	8	"	4-1/2"q1572	40	P
NAVAJO TRIBAL C											
GRAND	#1	2/26/62	L660FNL-2310FSL	24,32N-18W	1295	1225-36	92	"	4-1/2"q1288	80	P
GRAND	#2	3/10/62	H1650FNL-330FEL	23,32N-18W	1478	1407-17	89	"	4-1/2"q1476	80	P
GRAND	#3	3/17/62	O330FSL-2310FEL	14,32N-18W	1380	1312-20	36	"	4-1/2"q1373	80	P
GRAND	#4	10/3/61	J1650FSL-1710FEL	14,32N-18W	1365	1315-23	6	"	4-1/2"q1357	35	P
GRAND	#5	3/23/68	L2310FSL-330FWL	14,32N-18W	1762	1642-65	84	"	4-1/2"q1749	35	I
GRAND	#6	3/12/69	N1720FWL-650FSL	14,32N-18W	1310	1252-69	77	"	4-1/2"q1310	35	P
EXPL/DRILL/CO	#7	4/7/69	H990FSL-990FWL	14,32N-18W	1327	-	-	"	7"q30	CIRC.	P&A
AZTEC											
OIL & GAS	NAV #3	11/14/59	4745FWL-790FSL	25,32N-18W	1660	-	-	GALLUP	8-5/8"q60	35	P&A
DUGAN											
ARI-MEX	HORSESHOE #2E	6/17/64	330FWL-3210FSL	30,32N-17W	1175	1101-10	10	GALLUP	4-1/2"q1172	35	P
ARI-MEX	NAV B #2	10/15/70	4950FWL-2310FSL	15,32N-18W	1718	1612-14	10	"	4-1/2"q1717	125	P
ARI-MEX	NAV #6	5/16/68	4950FWL-3030FSL	15,32N-18W	1360	1282-1304	-	"	4-1/2"q1345	35	P
ARI-MEX	NAV C #1	5/2/64	4595FWL-3580FSL	15,32N-18W	1276	1223-38	32	"	4-1/2"q1276	50	P
ARI-MEX	NAV #3A	5/30/64	4530FWL-4335FSL	15,32N-18W	1312	1250-60	19	"	4-1/2"q1312	35	P
AAA FSHING TL	NAV #4	1/24/68	3850FWL-2510FSL	15,32N-18W	1414	-	-	"	7"q50	CIRC.	P&A
AAA FSHING TL	NAV B #1	12/18/70	1650FNL-1650FEL	15,32N-18W	1285	-	-	"	7"q60	25	P&A
ARI-MEX	NAV B #3	3/19/70	1115FWL-1480FEL	15,32N-18W	1275	1197-1205	6	"	4-1/2"q1272	125	P
AAA FSHING TL	NAV #7	2/24/69	2310FWL-4950FSL	15,32N-18W	1295	-	-	"	7"q30	CIRC.	P&A
AIR-MEX	NAV #5	10/4/67	3300FWL-440FSL	10-32N-18W	1873	1664-78	6	"	4-1/2"q1764	135	I
HARLAN DRLG	NAV #2	5/4/64	350FWL-540FSL	10,32N-18W	1183	-	-	"	7"q30	CIRC.	P&A

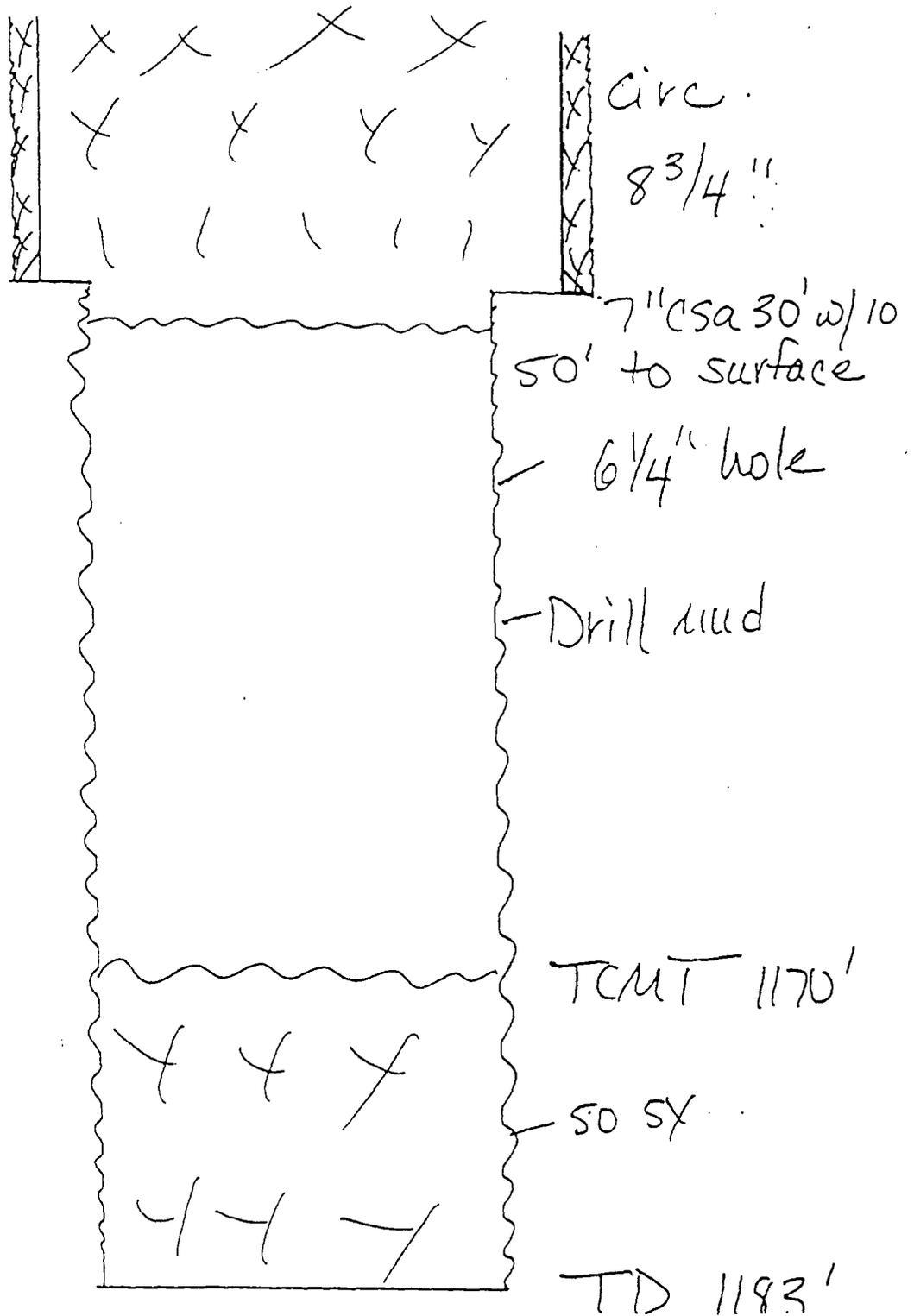
* ALL WELLS ARE 6-1/4" HOLE SIZE EXCEPT:

RL BAYLESS NAVAJO #6, 3300 FSL - 3300 FWL, SECTION 25-32N-18W and
 AZTEC OIL & GAS NAVAJO #3, 4745 FWL - 790 FSL, SECTION 25-32N-18W and
 these two wells have 7-7/8" hole size

* THE TOP OF THE CEMENT IS NOT INDICATED BY EITHER TEMPERATURE SURVEY OR
 BOND LOG ON THE PRODUCING WELLS. ALL CEMENT TOPS MUST BE CALCULATED.

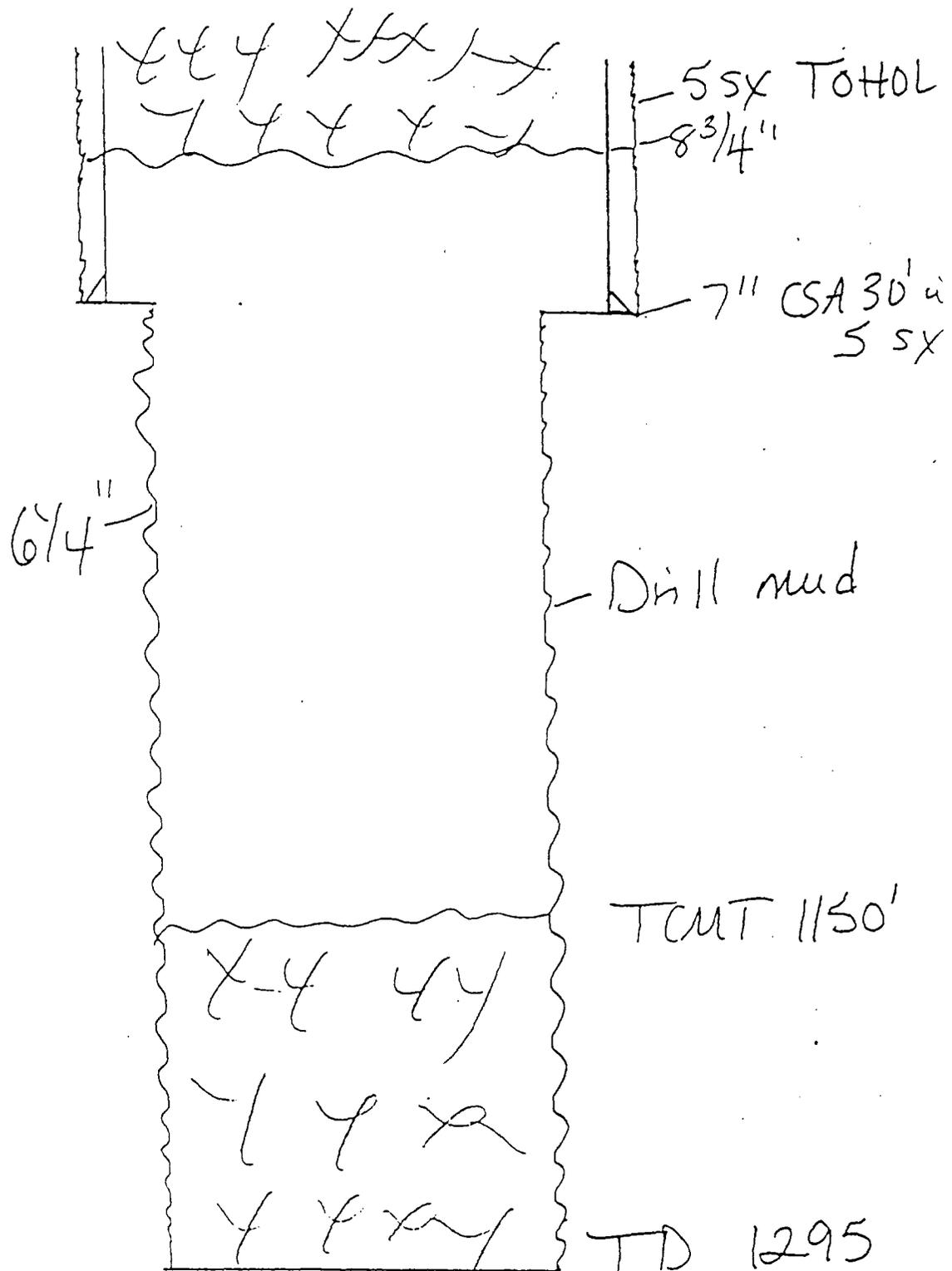
WELL DATA SHEET

OPERATOR	LEASE	SPUD DATE		
HARLAN DRILLING CO.	NAVAJO	5-4-64		
#2	350FW-540FS	10	32N	17W
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE



WELL DATA SHEET

OPERATOR	LEASE	SPUD DATE		
AAA FISHING TOOL	NAVAJO	2-24-69		
#7	2310FW-4950FS	15		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
			32N	18W



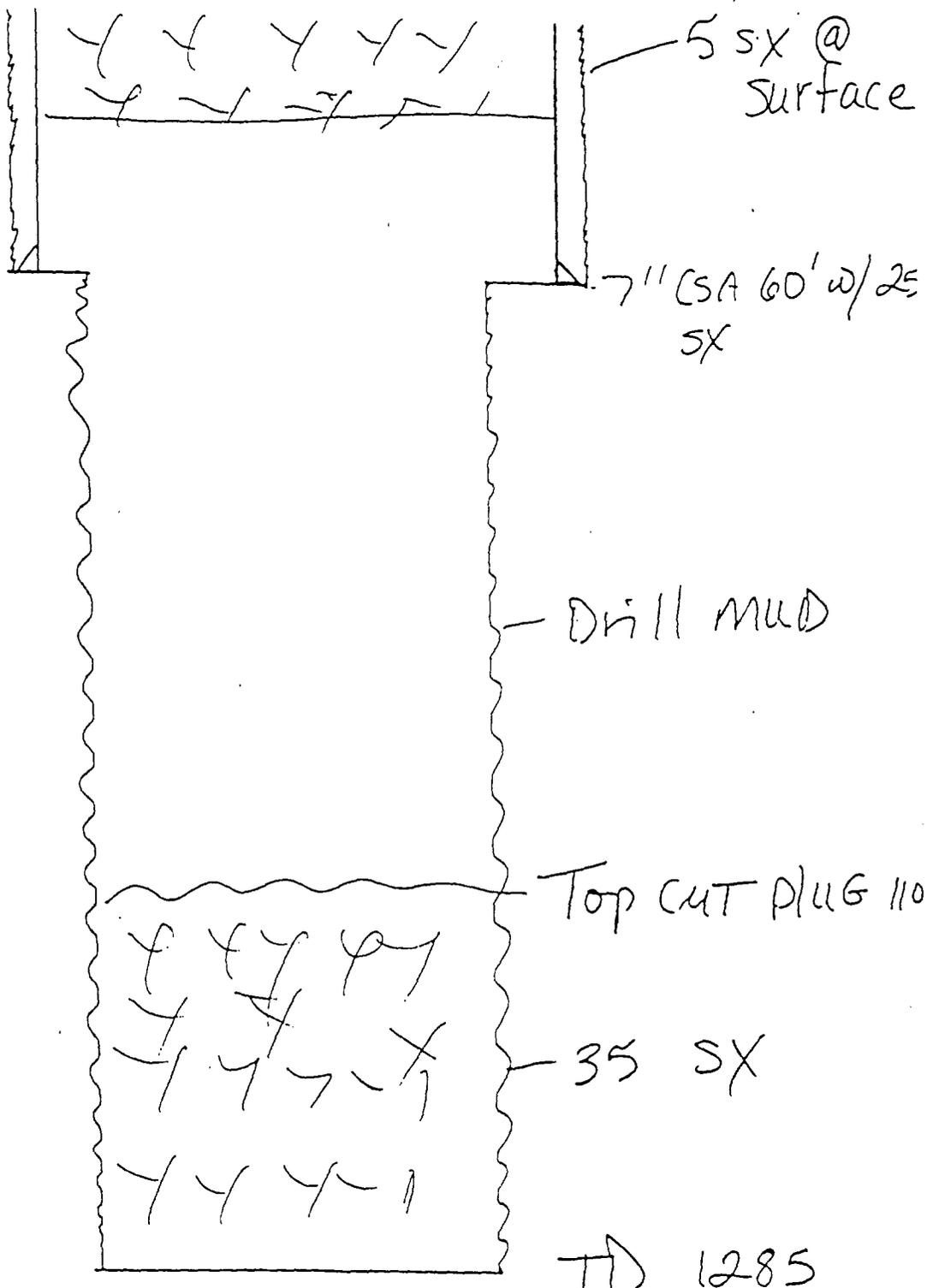
WELL DATA SHEET

OPERATOR	FOOTAGE LOCATION	LEASE	TOWNSHIP	RANGE
AAA FISHING TOOL	1650FN-1650FE	NAVAJO	32N	18W
B-1		15		

12-3-70

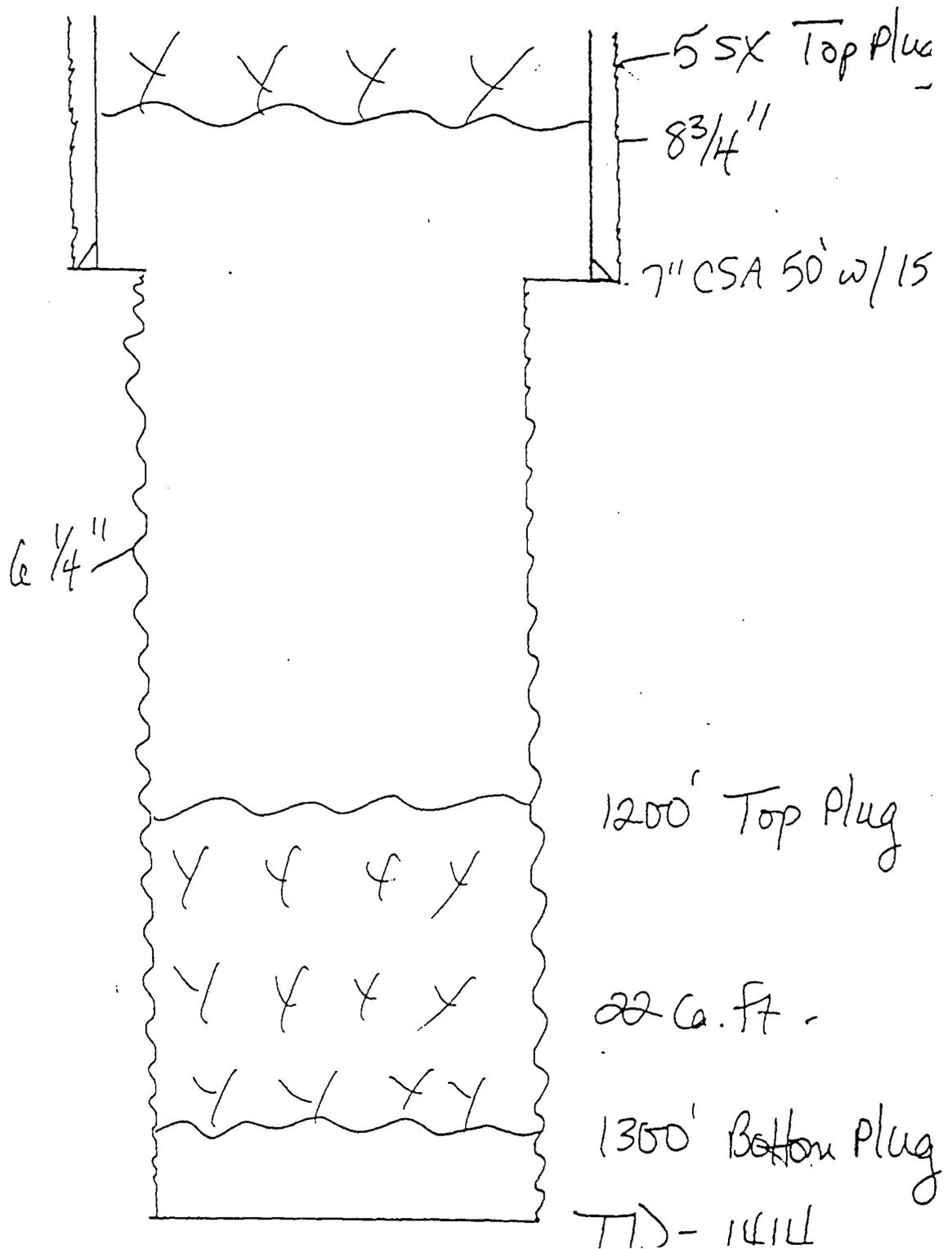
SPUD DATE

WELL NO. FOOTAGE LOCATION SECTION TOWNSHIP RANGE



WELL DATA SHEET

AAA FISHING TOOL	NAVAJO	1-24-68		
OPERATOR	LEASE	SPUD DATE		
#4	3850FW-2510FS	15	32N	18W
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE



2. 1st

WELL DATA SHEET

AZTEC OIL & GAS CO.

NAVAJO

11-14-59

OPERATOR

LEASE

SPUD DATE

#3

790FS-535FE

25

32N

18W

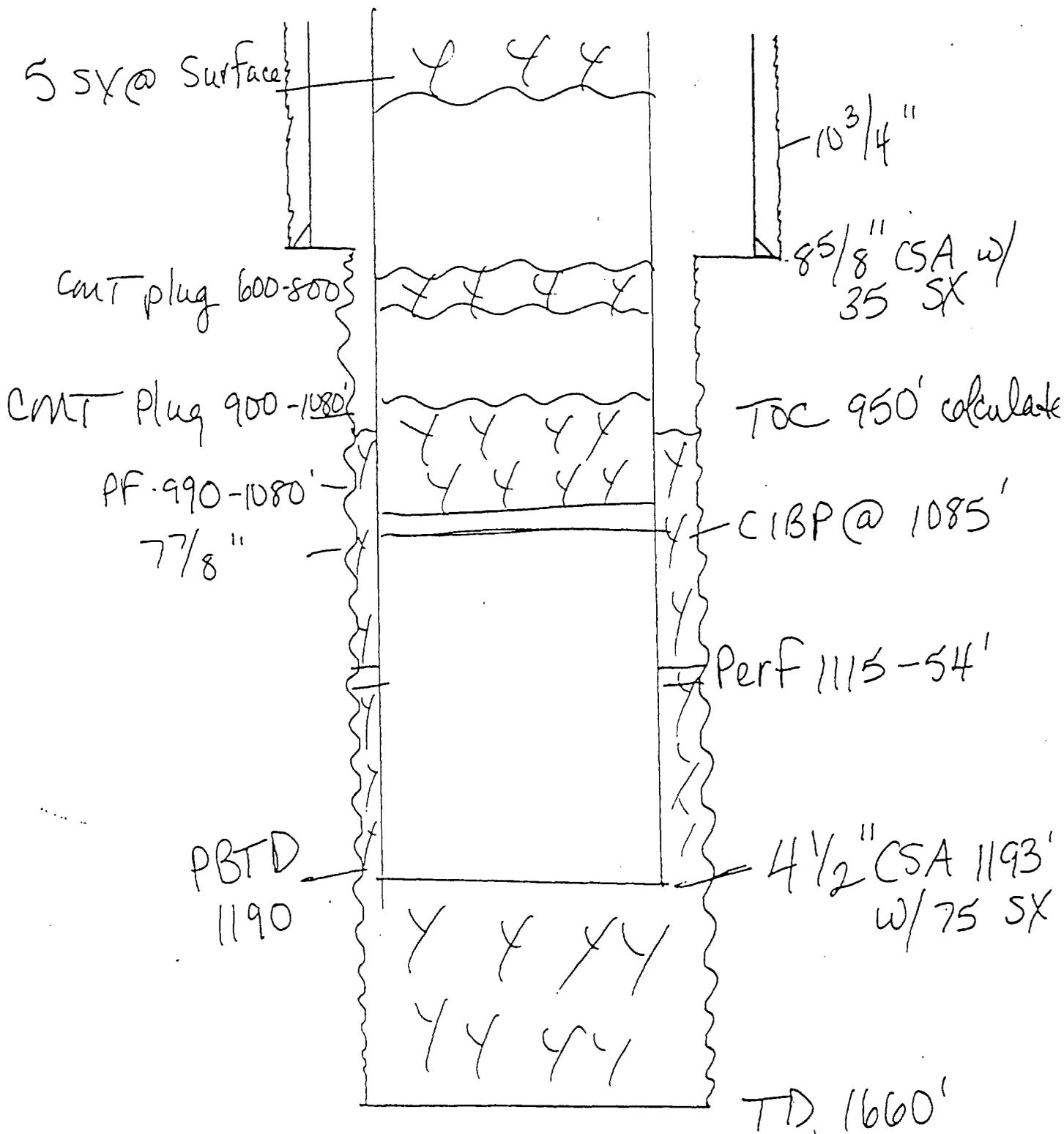
WELL NO.

FOOTAGE LOCATION

SECTION

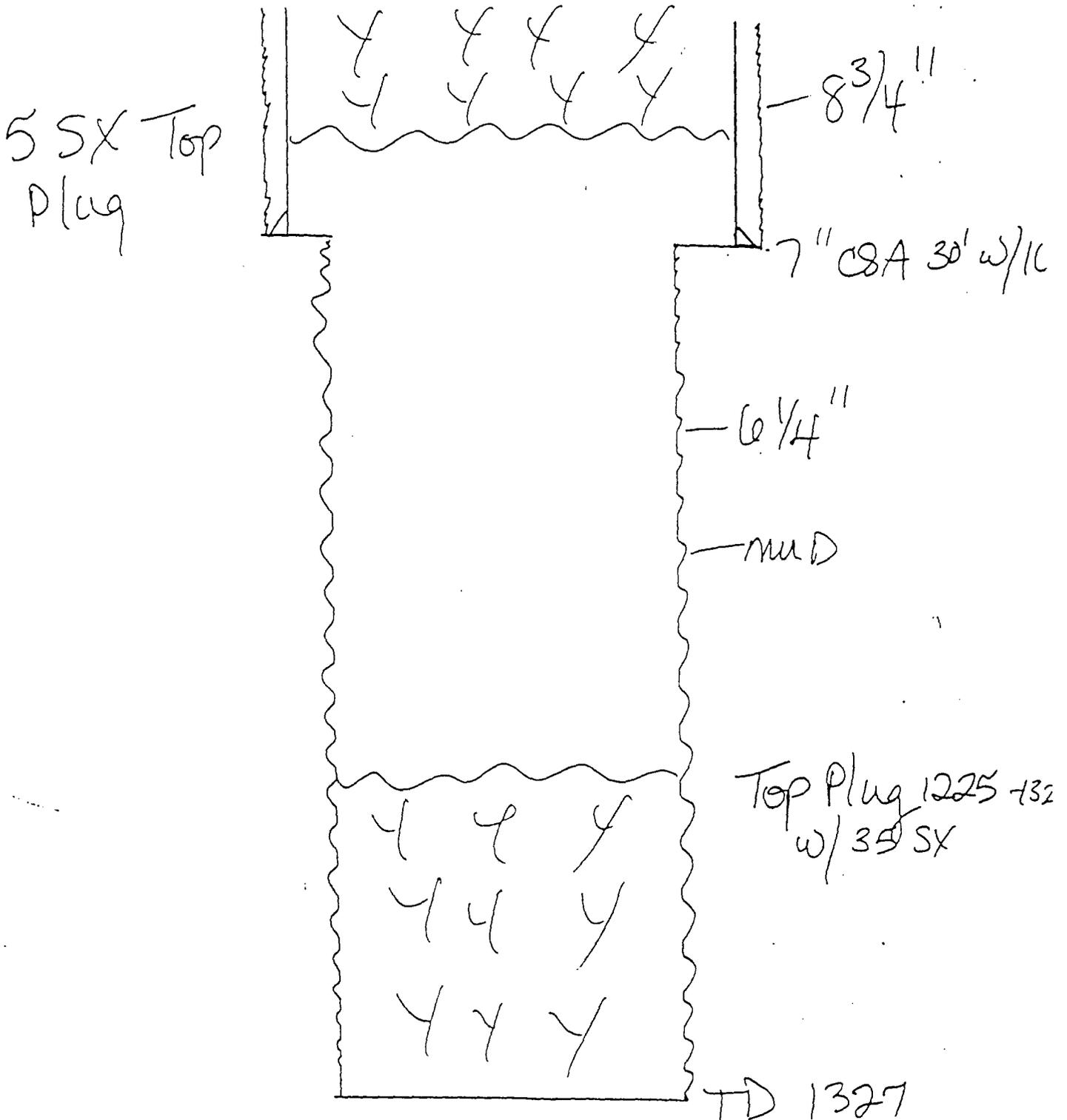
TOWNSHIP

RANGE



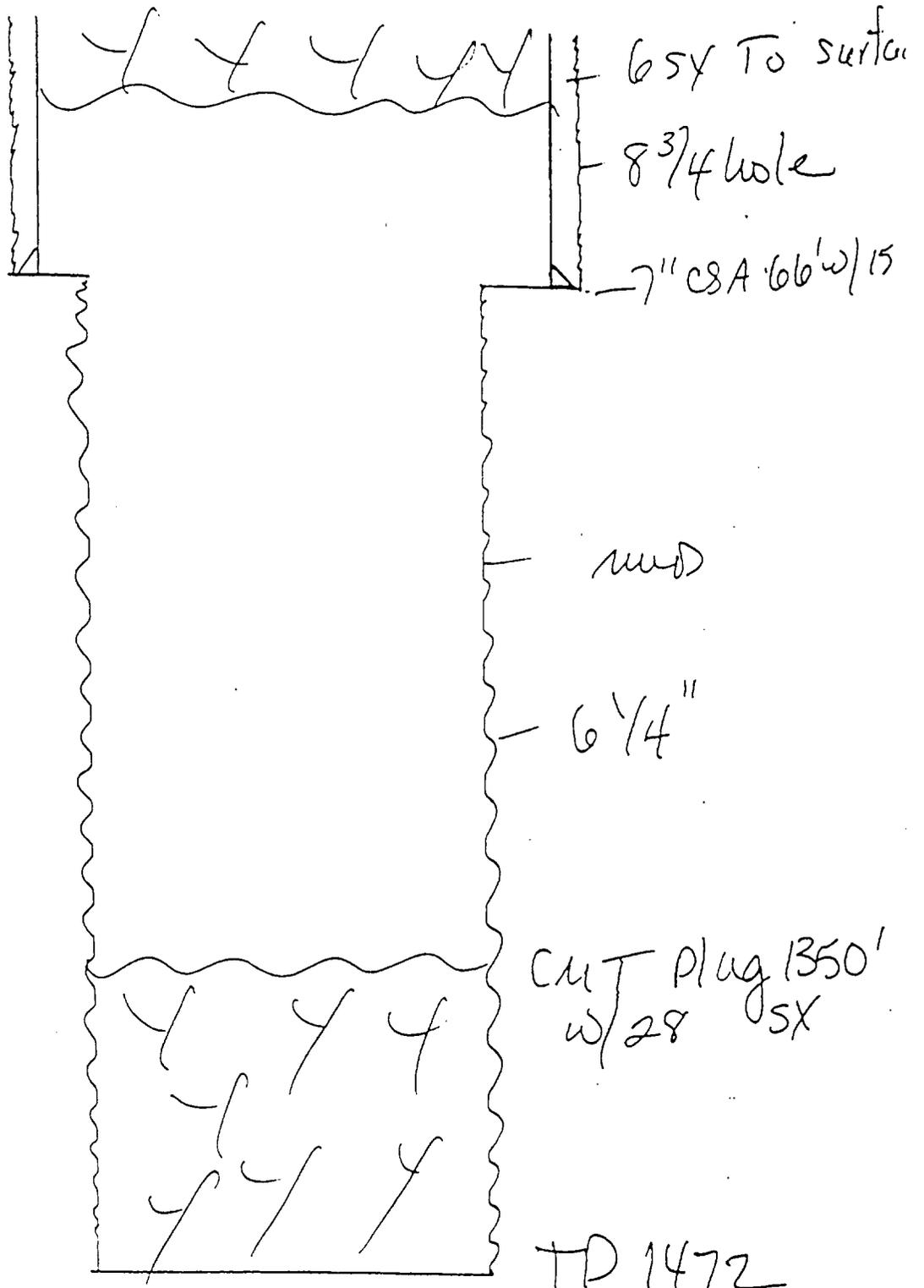
WELL DATA SHEET

EXPLORATION DRILLING CO.	NAVAJO	4-7-69		
OPERATOR	LEASE	SPUD DATE		
#7	990FS-990Fw	14		
		32N		
		18W		
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE



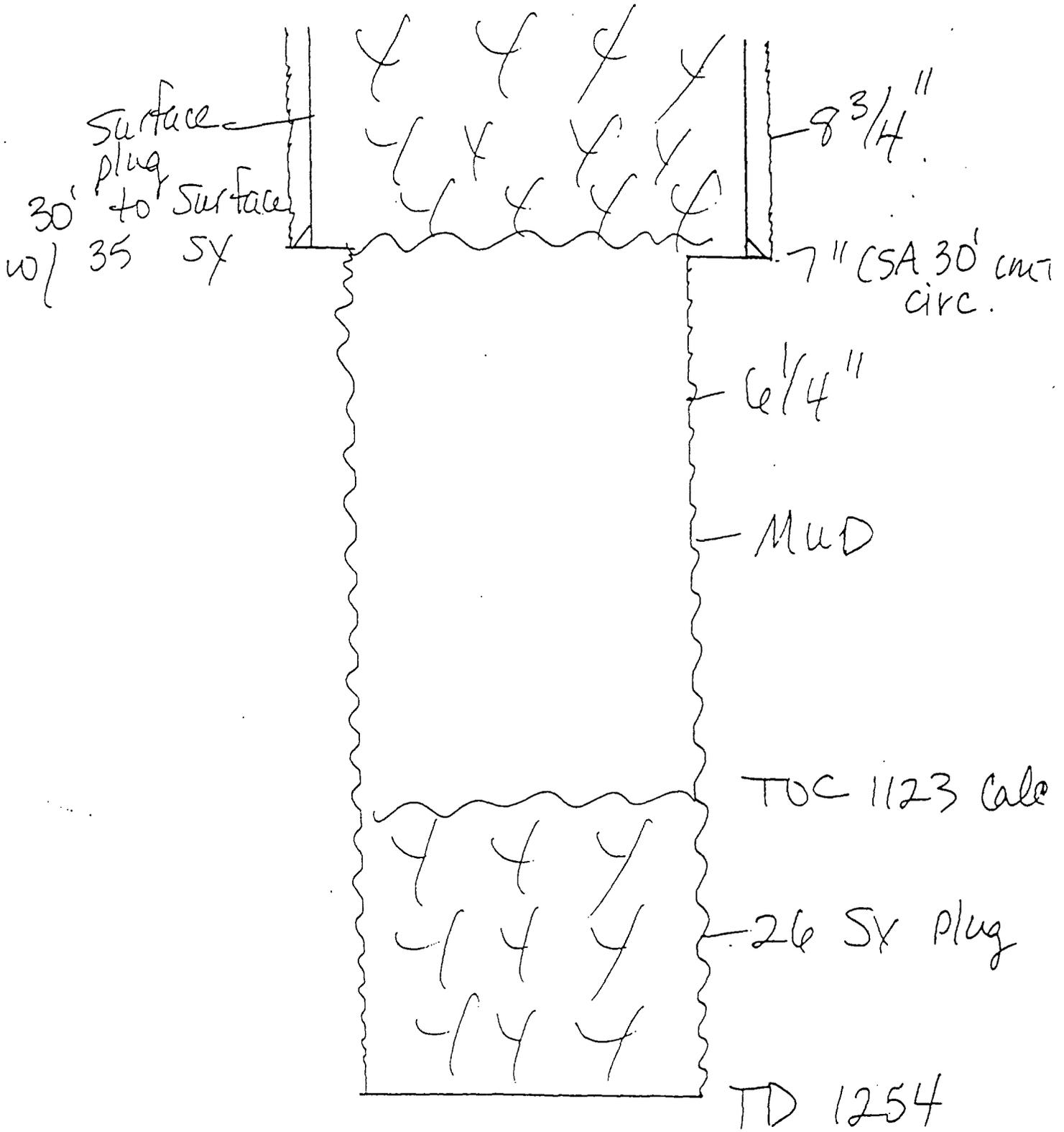
WELL DATA SHEET

OPERATOR	LEASE	SPUD DATE		
EXPLORATION DRILLING CO.	NAVAJO	12-30-61		
#6	365FS-760FW	13	32N	18W
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE



WELL DATA SHEET

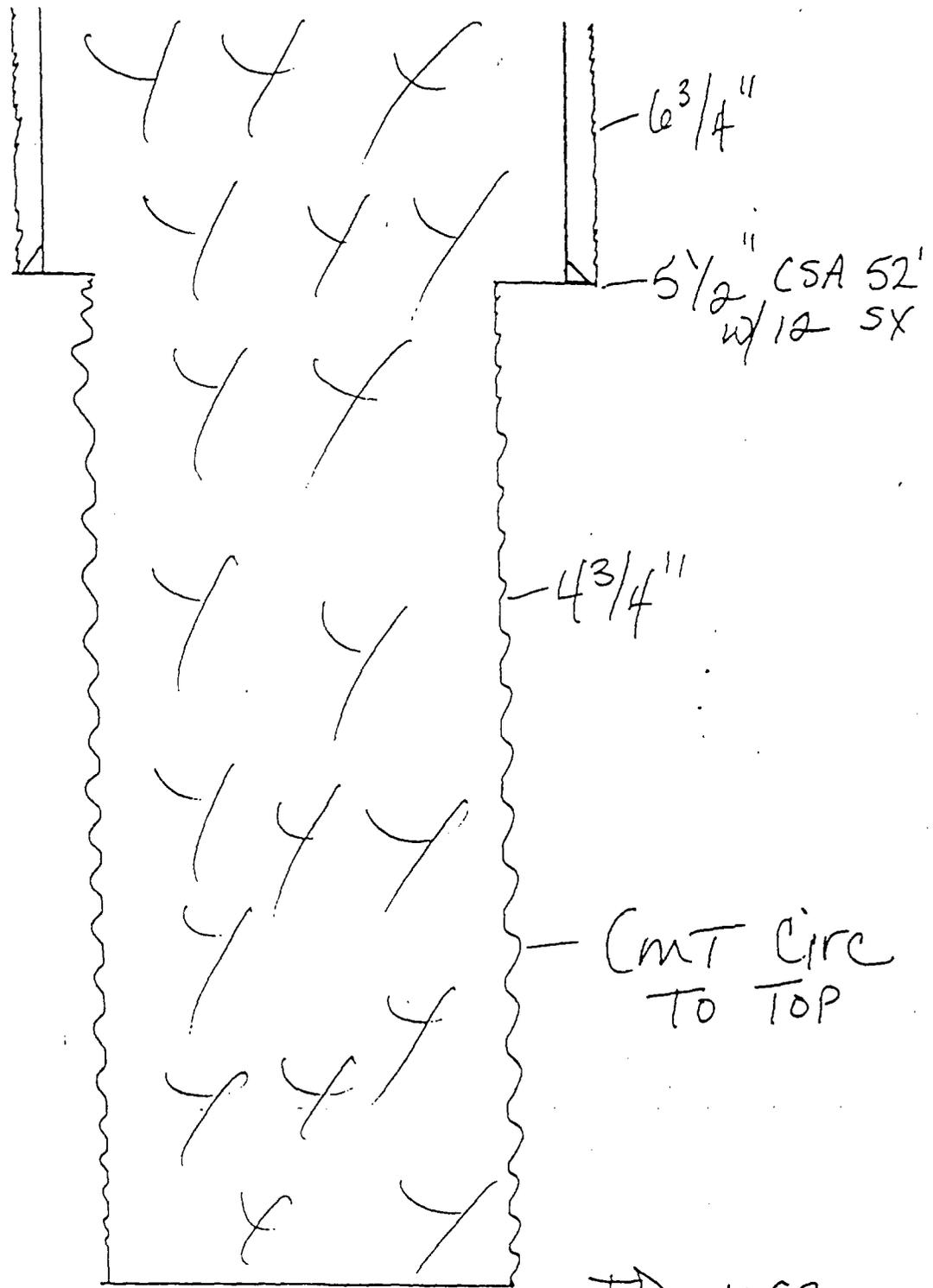
EXPLORATION DRILLING CO.	NAVAJO	11-29-61		
OPERATOR		LEASE	SPUD DATE	
#5	2135FS-1935FE	23	32N	18W
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGT.



WELL DATA SHEET

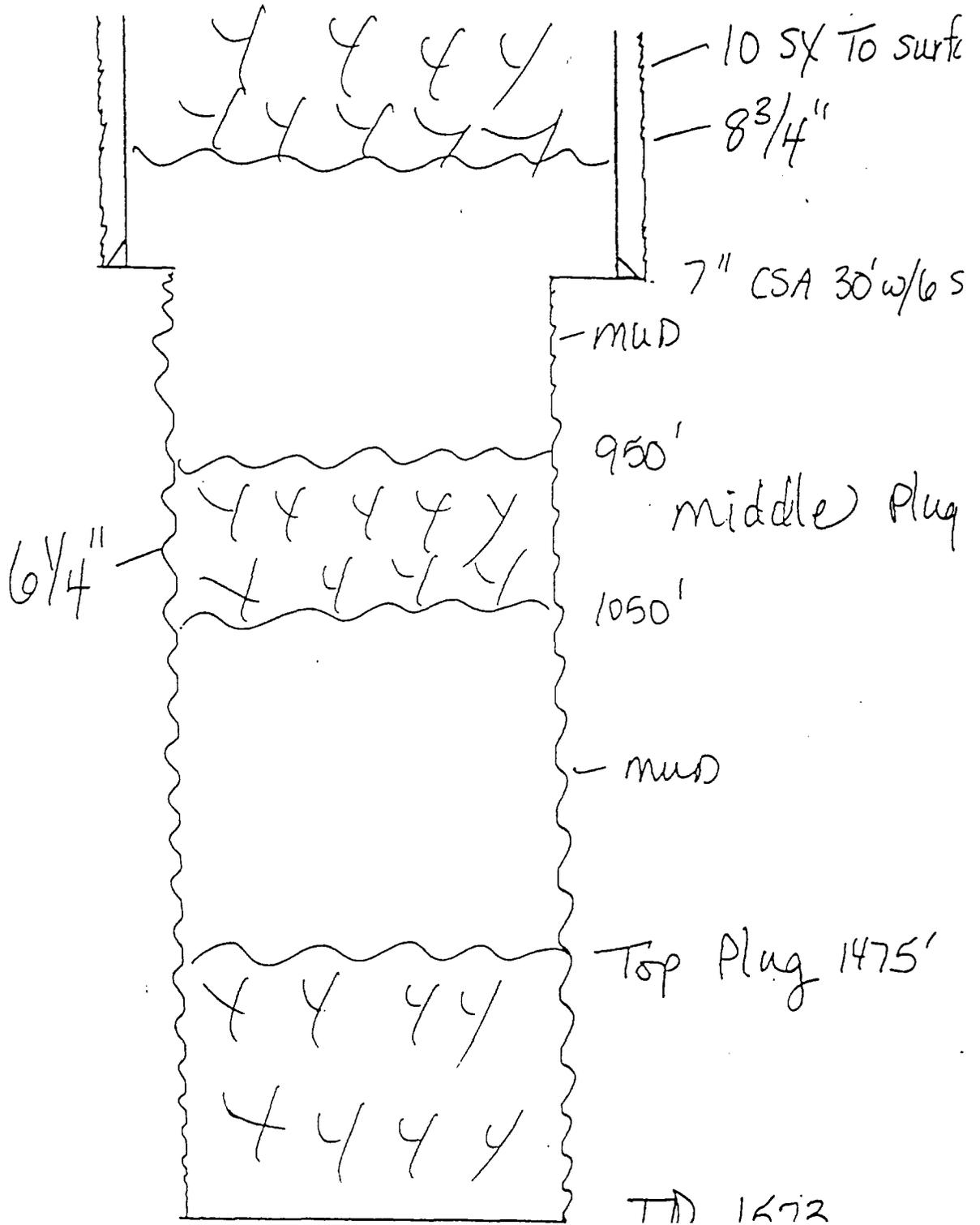
R. L. BAYLESS	NAVAJO	7-1-64
OPERATOR	LEASE	SPUD DATE
#6	1980FN-1980FE	25
		32N 18W

WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
----------	------------------	---------	----------	-------



WELL DATA SHEET

ZOLLER & DANNEBERG	BLUEHILL	7-26-65
OPERATOR	LEASE	SPUD DATE
#1	2319FN-1980FE	25
		32N
		18W
WELL NO.	FOOTAGE LOCATION	SECTION
		TOWNSHIP
		RANGE





APPENDIX E

WATER ANALYSIS

- MAKE-UP WATER FROM WELL #18 ENTRADA
- PRODUCED WATER

ENTRADA WATER

WATER ANALYSIS REPORT

Company : GRAND RESOURCES
 Address :
 Lease : NAVEJO
 Well : #18
 Sample Pt. :

Date : 03/10/92
 Date Sampled : 02/06/92
 Analysis No. : 1

ANALYSIS	mg/L	* meq/L
-----	----	-----
1. pH	7.0	
2. H2S	0	
3. Specific Gravity	1.02	
4. Total Dissolved Solids	30976.3	
5. Suspended Solids		
6. Dissolved Oxygen		
7. Dissolved CO2	22	
8. Oil In Water		
9. Phenolphthalein Alkalinity (CaCO3)		
10. Methyl Orange Alkalinity (CaCO3)		
11. Bicarbonate	HCO3 244.0	HCO3 4.0
12. Chloride	Cl 16000.0	Cl 451.3
13. Sulfate	SO4 3000.0	SO4 62.5
14. Calcium	Ca 400.0	Ca 20.0
15. Magnesium	Mg 133.9	Mg 11.0
16. Sodium (calculated)	Na 11192.5	Na 486.8
17. Iron	Fe 6.0	
18. Barium	Ba 0.0	
19. Strontium	Sr 0.0	
20. Total Hardness (CaCO3)	1550.0	

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter	Compound	Equiv wt X meq/L	= mg/l
+-----+	-----	-----	-----
20 *Ca <----- *HCO3 4	Ca (HCO3) 2	81.0	324
----- /-----> -----	CaSO4	68.1	1086
11 *Mg -----> *SO4 62	CaCl2	55.5	
----- <----- / -----	Mg (HCO3) 2	73.2	
487 *Na -----> *Cl 451	MgSO4	60.2	663
+-----+	MgCl2	47.6	
Saturation Values Dist. Water 20 C	NaHCO3	84.0	
CaCO3 13 mg/L	Na2SO4	71.0	2521
CaSO4 * 2H2O 2090 mg/L	NaCl	58.4	26376
BaSO4 2.4 mg/L			

REMARKS:

Petrolite Oilfield Chemicals Group

Respectfully submitted,
 MARC ROSE

GALLUP PRODUCED WATER
WATER ANALYSIS REPORT

Company : GRAND RESOURCES	Date : 03/10/92
Address :	Date Sampled : 02/06/92
Lease : NAVEJO	Analysis No. : 2
Well :	
Sample Pt. : TREATER	

ANALYSIS	mg/L	* meq/L
-----	----	-----
1. pH	6.0	
2. H2S	0	
3. Specific Gravity	1.024	
4. Total Dissolved Solids	42737.6	
5. Suspended Solids		
6. Dissolved Oxygen		
7. Dissolved CO2	44	
8. Oil In Water		
9. Phenolphthalein Alkalinity (CaCO3)		
10. Methyl Orange Alkalinity (CaCO3)		
11. Bicarbonate	HCO3 305.0	HCO3 5.0
12. Chloride	Cl 24800.0	Cl 699.6
13. Sulfate	SO4 1175.0	SO4 24.5
14. Calcium	Ca 620.0	Ca 30.9
15. Magnesium	Mg 243.3	Mg 20.0
16. Sodium (calculated)	Na 15589.3	Na 678.1
17. Iron	Fe 5.0	
18. Barium	Ba 0.0	
19. Strontium	Sr 0.0	
20. Total Hardness (CaCO3)	2550.0	

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter	Compound	Equiv wt X meq/L	= mg/L
+-----+	-----	-----	-----
31 *Ca <----- *HCO3	Ca(HCO3)2	81.0	405
/----->	CaSO4	68.1	1665
20 *Mg -----> *SO4	CaCl2	55.5	82
<-----/	Mg(HCO3)2	73.2	
678 *Na -----> *Cl	MgSO4	60.2	
+-----+	MgCl2	47.6	953
Saturation Values Dist. Water 20 C	NaHCO3	84.0	
CaCO3 13 mg/L	Na2SO4	71.0	
CaSO4 * 2H2O 2090 mg/L	NaCl	58.4	39628
BaSO4 2.4 mg/L			

REMARKS: TREATER

Petrolite Oilfield Chemicals Group

Respectfully submitted,
MARC ROSE



APPENDIX F

WELL LOGS

- NAVAJO #C1
- NAVAJO #7
- NAVAJO C #3

SCHUMBERGER

FORMATION DENSITY LOG

COUNTY SAKAJAH N.M.
FIELD WILCOAT
WELL NAVAJO #1
COMPANY HARLAN DRILLING COMPANY

COMPANY HARLAN DRILLING COMPANY
WELL NAVAJO #1
FIELD WILCOAT
COUNTY SAKAJAH STATE
LOGGING TIME 1:00 P.M. AND 5:30 P.M.
DATE 12-15-54



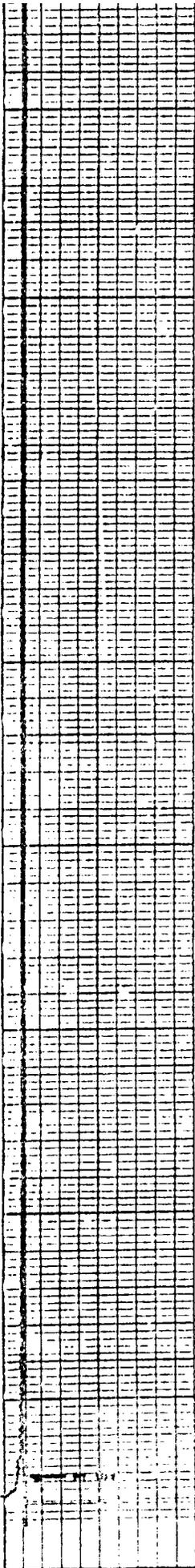
Table with columns for well logs, including depth, casing, and other well parameters.

EQUIPMENT DATA and LOGGING DATA sections containing technical specifications for the logging equipment used.

CALIPER table with columns for hole diameter in inches (7, 8, 9, 10, 11, 12, 13, 14) and depth.

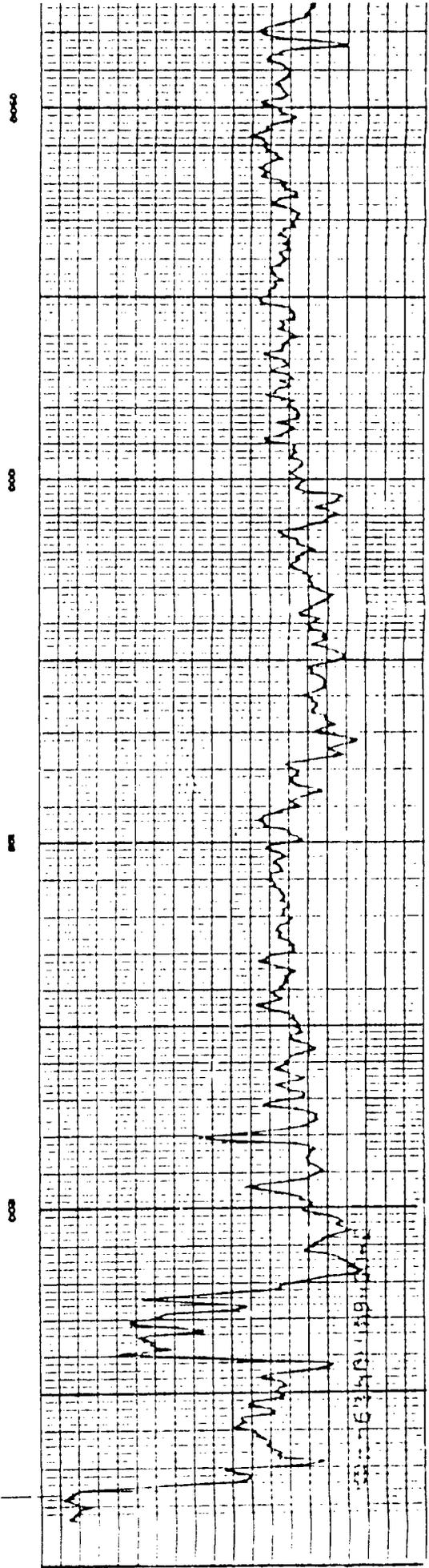
FORMATION DENSITY LOG table with columns for standard counts per second and depth.

Handwritten signature and date: 5-25-11-10-1-19-1-1-1



5 7 9 11 13 15
6 8 10 12 14

CALIPER



1.25 1.50 1.75

GAMMA GAMMA DENSITY LOG

0060

000

000

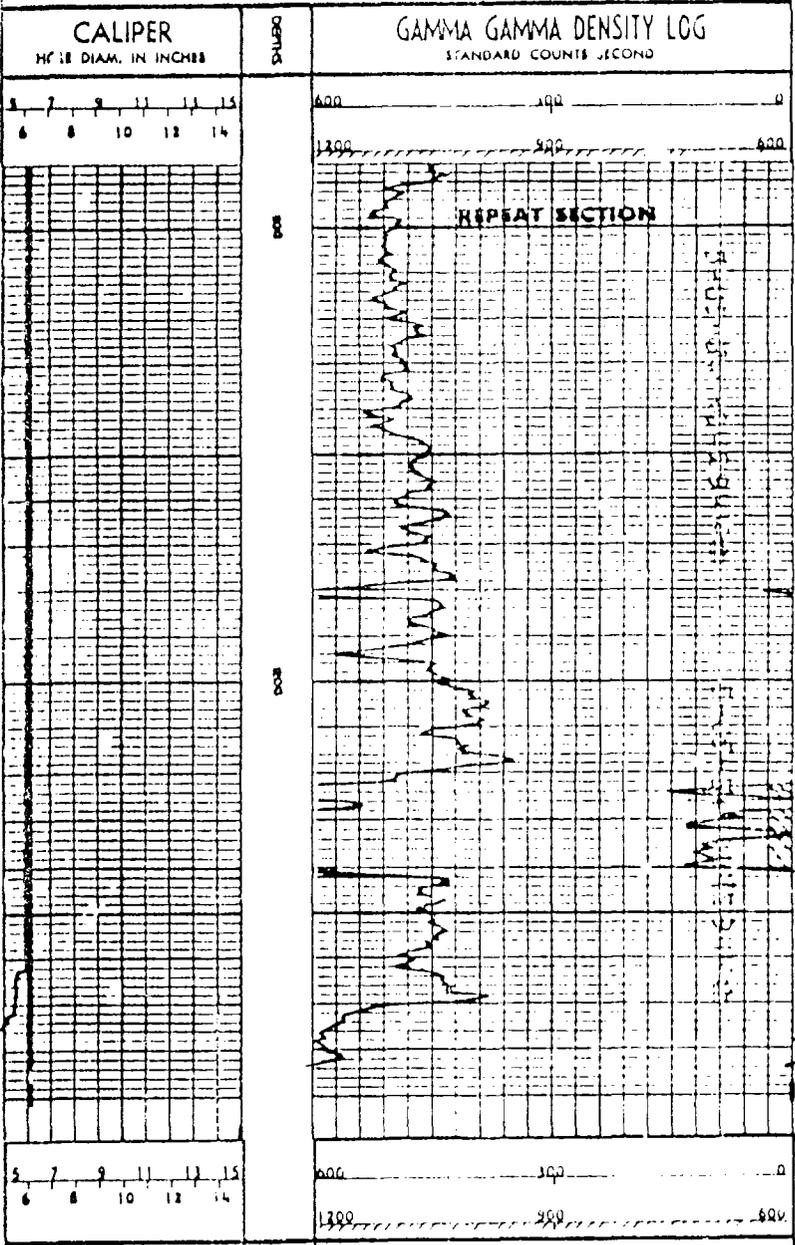
000

1.25 1.50 1.75

COMPANY HARLAN DRILLING COMPANY
 WELL NAYAJQ #1
 FIELD WILDCAT
 COUNTY SAN JUAN STATE NEW MEXICO

SWSC # 1276
 SWSC ID 1278
 DLR ID 1262
 Elev.
 AB NA
 DP NA
 GL 5311

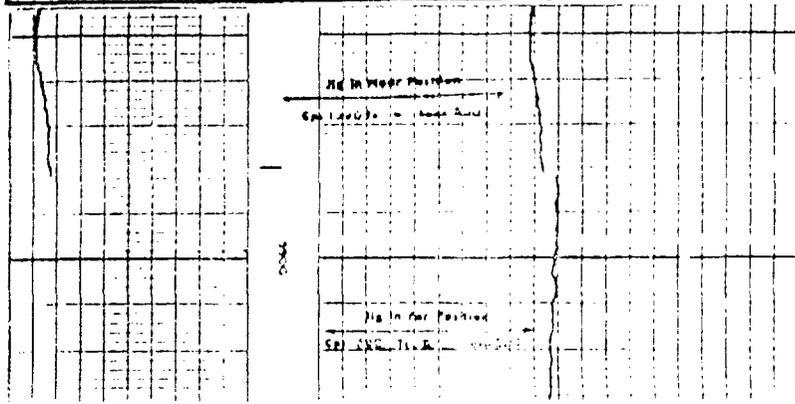
REPEAT SECTION

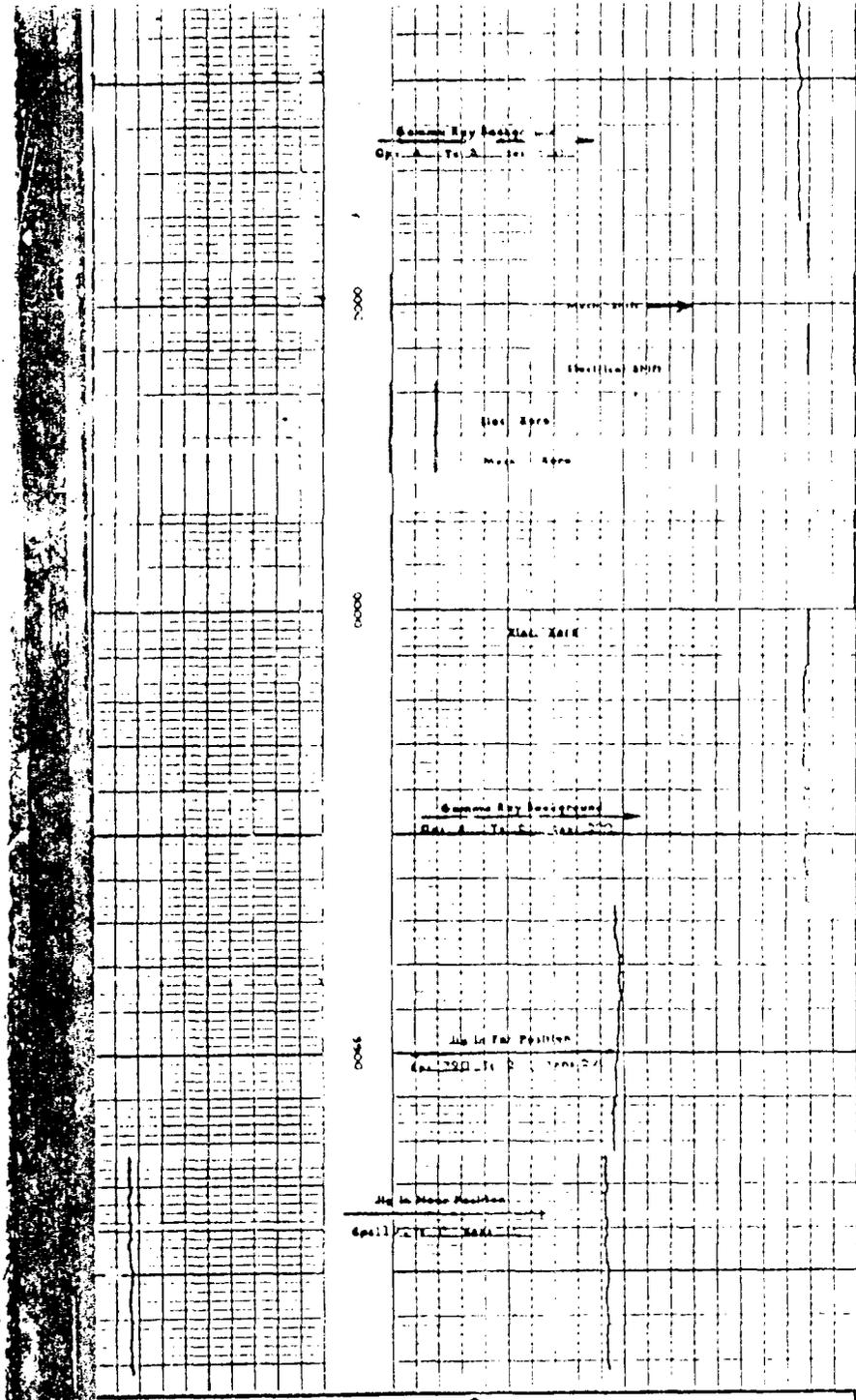


COMPANY HARLAN DRILLING COMPANY
 WELL NAYAJQ #1
 FIELD WILDCAT
 COUNTY SAN JUAN STATE NEW MEXICO

SWSC # 1276
 SWSC ID 1278
 DLR ID 1262
 Elev.
 AB NA
 DP NA
 GL 5311

CALIBRATION DATA



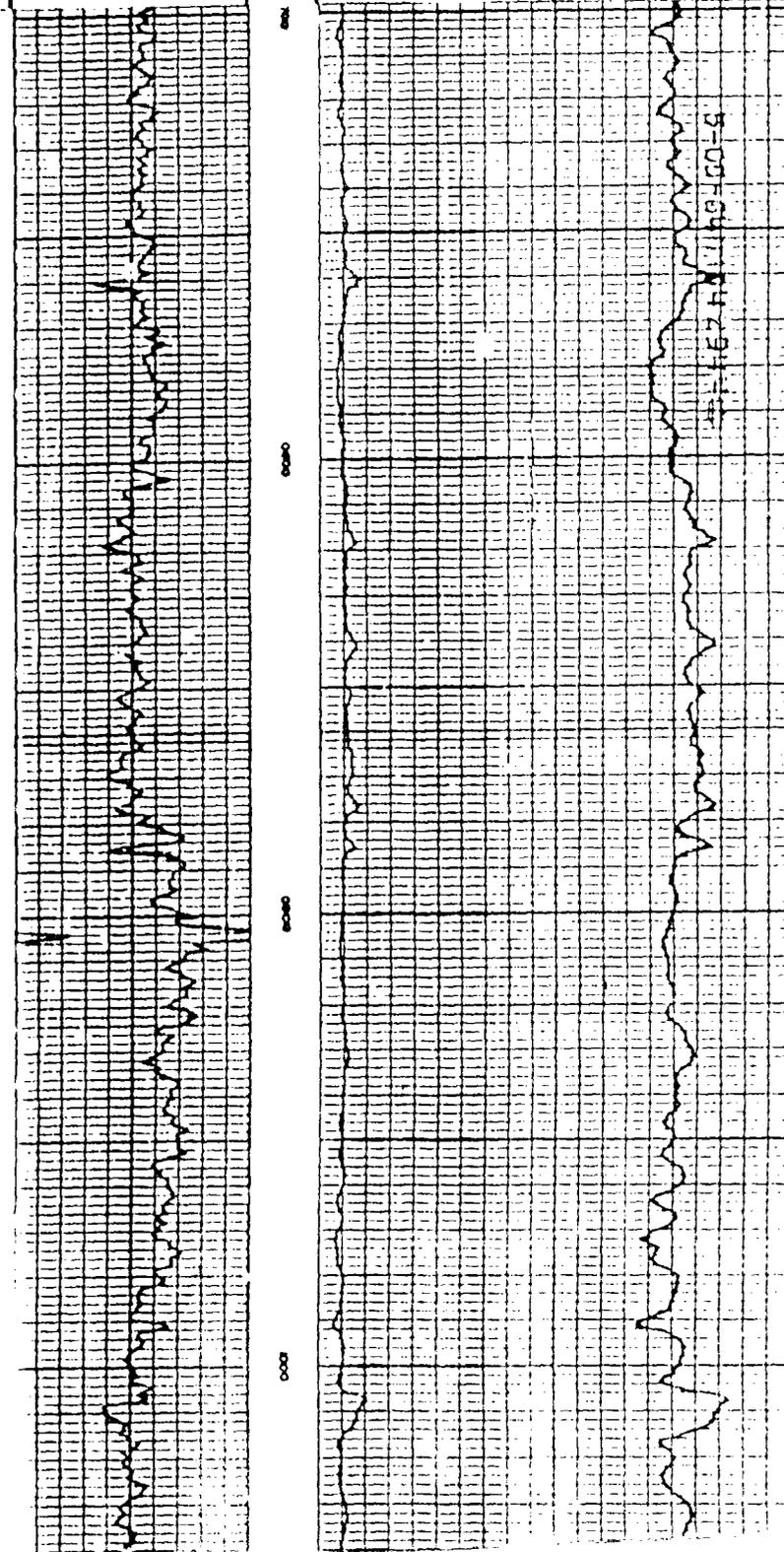


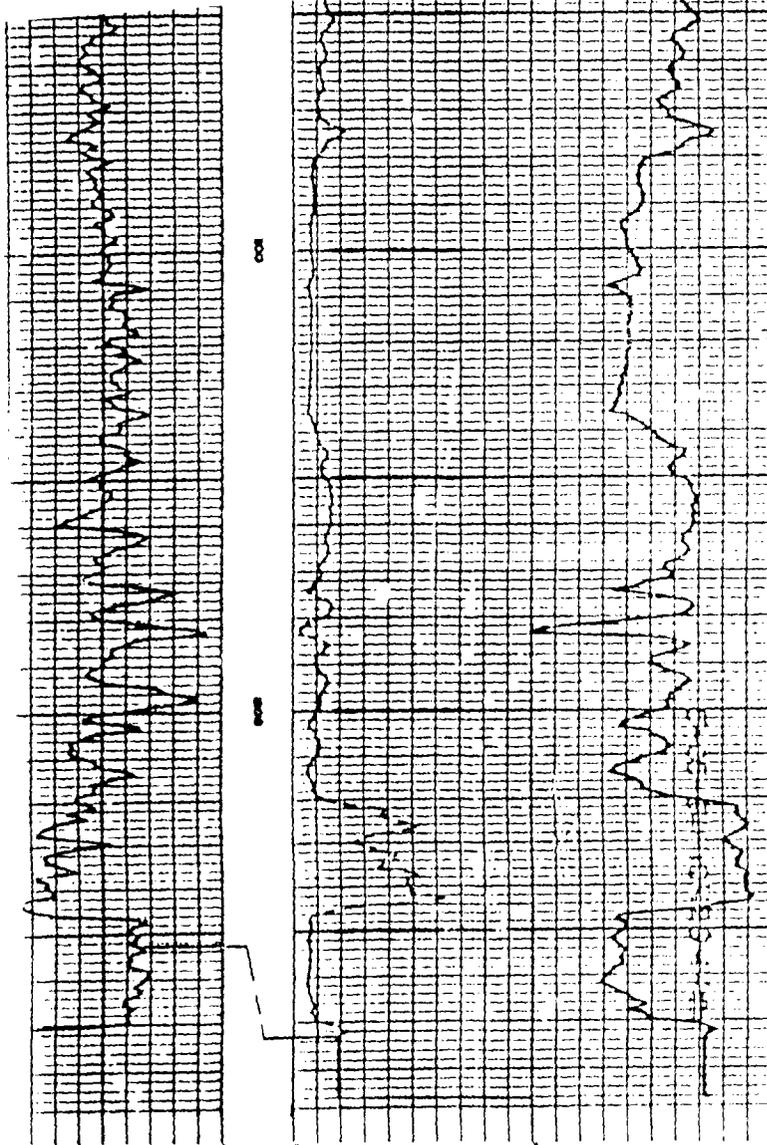
CALIBRATION DATA

COMPANY HARLAN DRILLING COMPANY Am ... SWSC # 1276
 WELL HAYAJQ #1 ... SWSC ID 1276
 PHID WILDCAT ... ORR ID 1282
 COUNTY SAN JUAN STATE NEW MEXICO ...

DETAIL LOG
1" = 100'

GAMMA RAY API units	DEPTHS	CONDUCTIVITY millimhos/m = $\frac{1000}{\text{ohms} \cdot \text{m} / \text{m}}$
24 144 144 288		5 H 37 INDUCTION 400 200 0 600 400
		RESISTIVITY ohms · m/m
		INDUCTION 0 100 0 1000





INDUCTION
 0 100
 0 1000

RESISTIVITY
 ohms-m/m

5 ft 27
 INDUCTION 200
 400 600 400

AMMA RAY
 API units

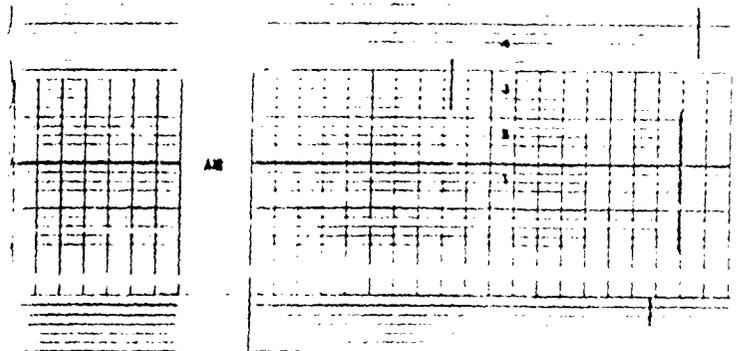
SCALE

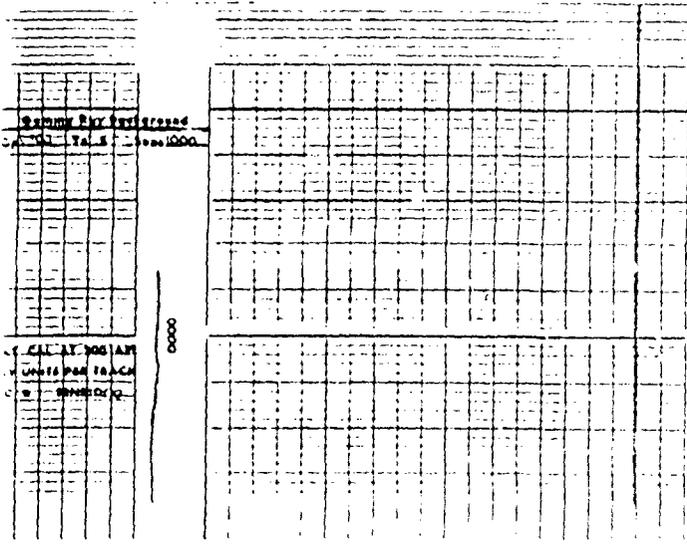
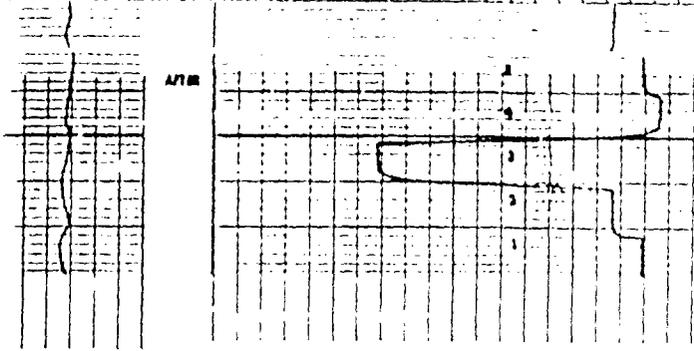
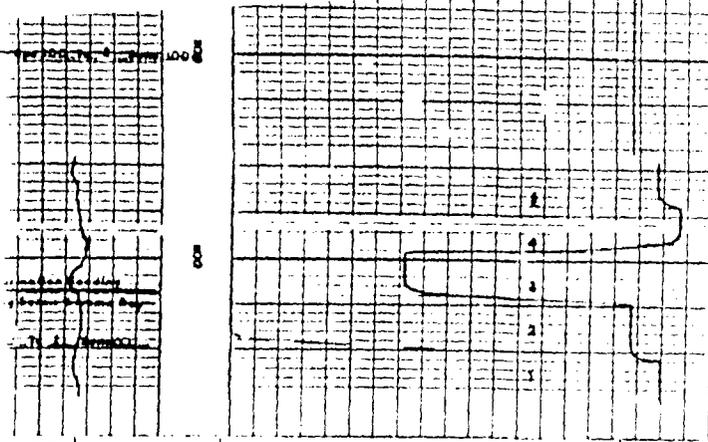
CONDUCTIVITY
 millimhos/cm = $\frac{1000}{\text{ohms-m/m}}$

COMPANY HANLAN DRILLING COMPANY
 WELL NO. NAVAJO #1
 D WILDCAT
 COUNTY SAN JUAN STATE NEW MEXICO

SWSC # 12271
 SWSC ID 12711
 DATE TO 12/21
 Elev. AB NA
 DF NA
 GI 53112

CALIBRATION DATA





CALIBRATION DATA

HARLAN DRILLING COMPANY
 NAVAJO #1
 WILDCAT
 SAN JUAN STATE NEW MEXICO

SWSC FR. 12731
 SWSC ID. 1278
 DIR. TO. 1242
 Elev. KA. NA
 OF. NA
 GI. 5311

COUNTY SAN JUAN, N.M.
 FIELD or LOCATION UNDES. GALLUP
 WELL NAVAJO TRIBAL "C" #3
 COMPANY TEXAS PACIFIC COAL & OIL COMPANY

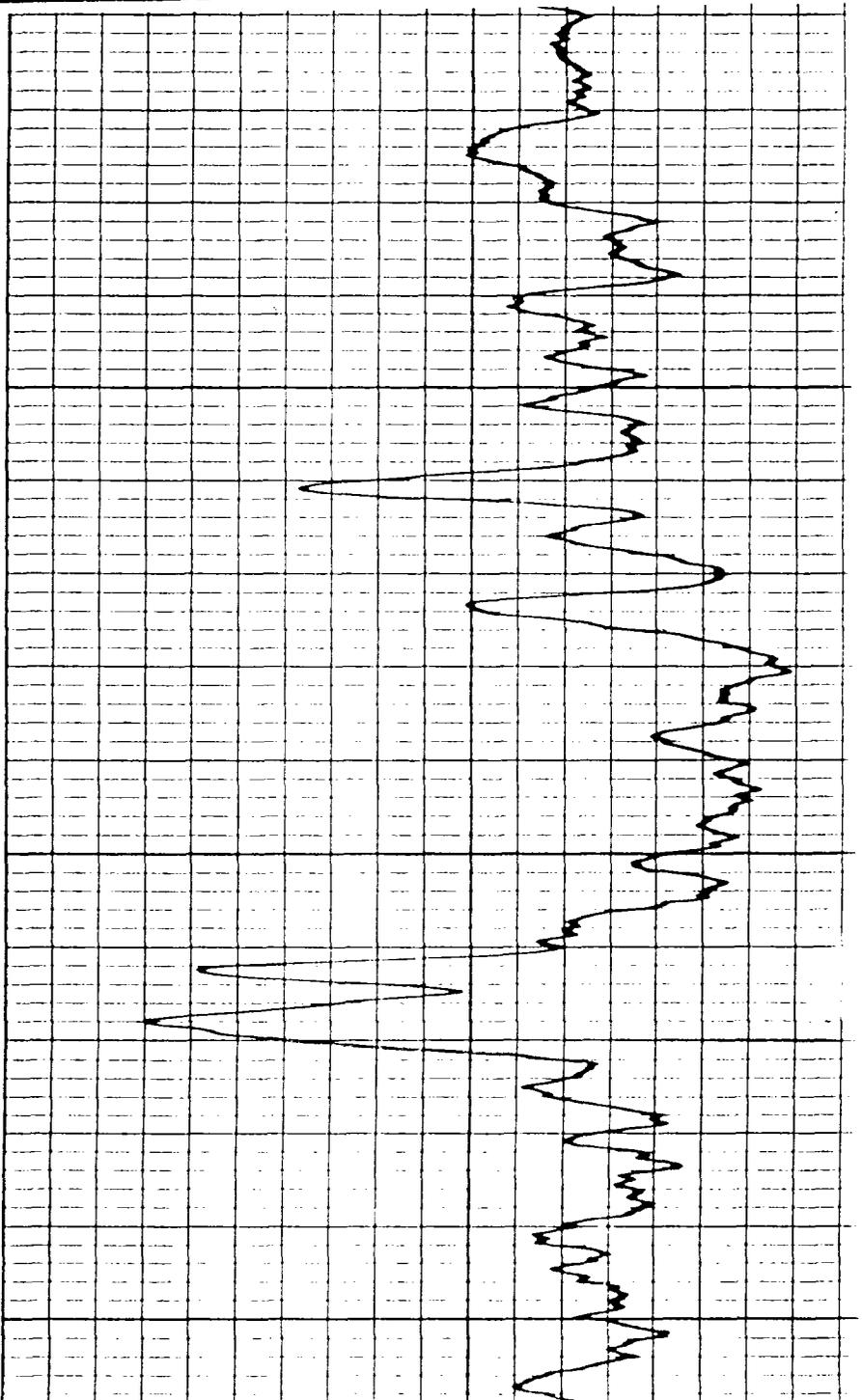
COMPANY TEXAS PACIFIC COAL & OIL COMPANY
 WELL NAVAJO TRIBAL "C" # 3
 FIELD UNDESIGNATED GALLUP
 COUNTY SAN JUAN STATE NEW MEXICO
 Location: 330' FSL
2310' FEL
 Sec. 14 Twp. 32N Rge. 18W
 Other Services: NONE

Permanent Datum: GL; Elev.: 5341'
 Log Measured From KB, 4.5 Ft. Above Perm. Datum
 Drilling Measured From KB Elev.: K.B. 5351.5'
920 D.F. --
G.I. 5347'

Date	3-22-62	
Run No.	ONE	
Type Log	GAMMA GAMMA	
Depth—Driller	1380	
Depth—Logger	1380	
Bottom logged interval	1379	
Top logged interval	1000	
Type fluid in hole	OIL	
Salinity, PPM Cl.	--	
Density	--	
Level	FULL	
Max rec. temp. deg F.	--	
Operating rig time	1 1/2 HOURS	
Recorded by	HANDLEY	
Witnessed by	MR. PENILLIA	

RECEIVED
 SEP 16 1963
 OIL CON. C
 DIST. 3

BORE-HOLE RECORD				CASING RECORD			
Run No.	Bit	From	To	Size	Wgt.	From	To
1	6 1/4	CSG.	TD	7"		SURF.	39'



01250	01300	01350
-------	-------	-------

COUNTY SAN JUAN, N. M.
FIELD or LOCATION UNDES. GALLUP
WELL NAVAJO TRIBAL "C" #3
COMPANY TEXAS PACIFIC COAL & OIL COMPANY

COMPANY TEXAS PACIFIC COAL & OIL COMPANY
WELL NAVAJO TRIBAL "C" # 3
FIELD UNDESIGNATED GALLUP
COUNTY SAN JUAN STATE NEW MEXICO

Location: 330' FSL
2310' FEL / 15
Sec. 14 Twp. 32N Rge. 18W

Other Services: NONE

Permanent Datum: GL; Elev.: 5341'
Log Measured From KB, 4.5 Ft. Above Perm. Datum
Drilling Measured From KB Elev.: K.B. 5351.5
920 D.F. --
920 G.L. 5347'

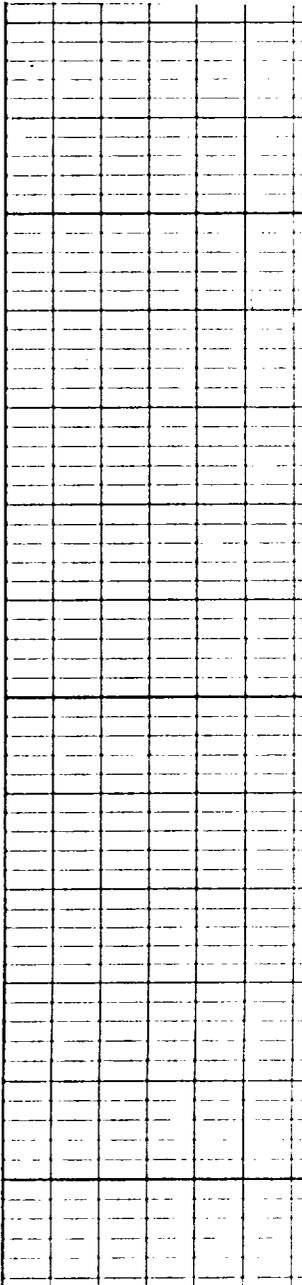
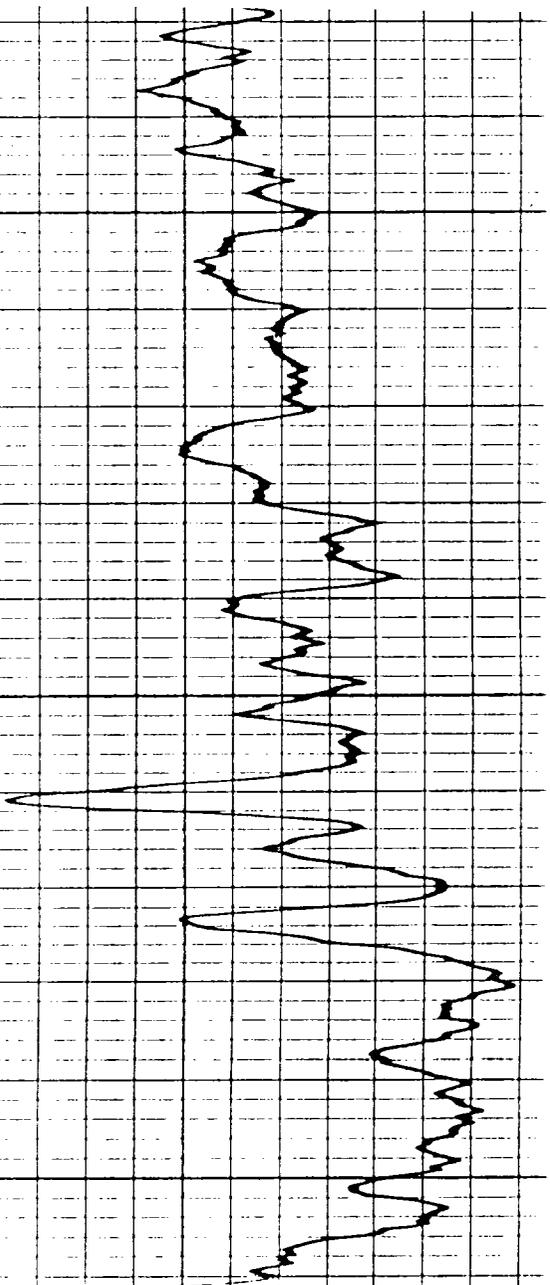
Date 3-22-62
Run No. ONE
Type Log GAMMA GAMMA
Depth—Driller 1380
Depth—Logger 1380
Bottom logged interval 1379
Top logged interval 1000
Type fluid in hole OIL
Salinity, PPM Cl. --
Density --
Level FULL
Max rec. temp., deg F. --
Operating rig time 1 1/2 HOURS
Recorded by HANDLEY
Witnessed by MR. PENITILLA



BORE-HOLE RECORD

Run No.	Bit	From	To	Size	Wgt.	From	To
1	6 1/4	CSG.	TD	7"		SURF.	39'

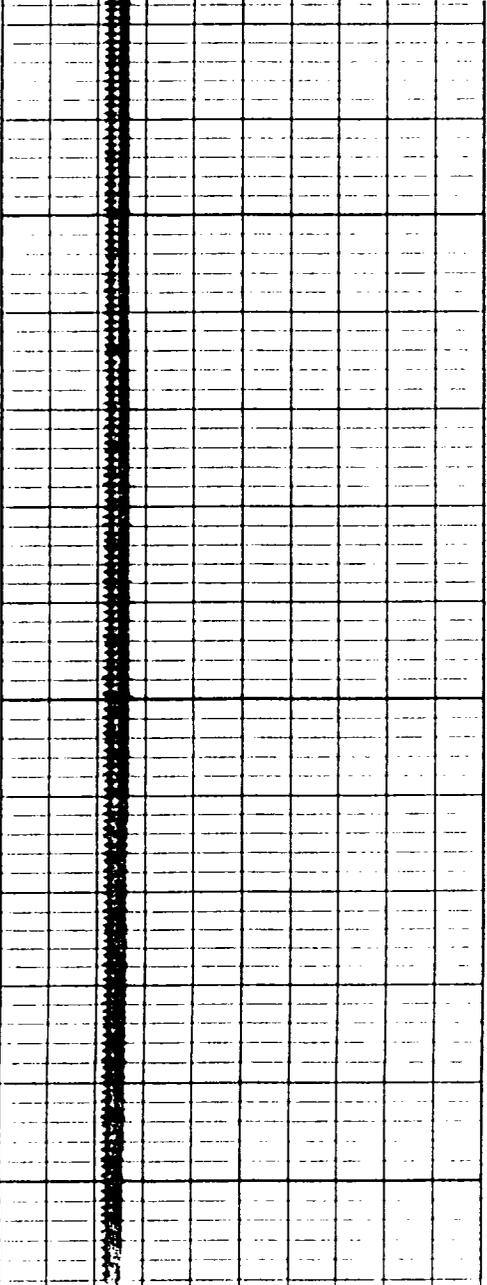
CASING RECORD



01200

01250

01300





PROOF OF NOTIFICATION

- NAVAJO TRIBE
- DAILY TIMES

SENDER: • Complete items 1 and/or 2 for additional services. • Complete items 3 and 4a & b. • Print your name and address on the reverse of this form so that we can return this card to you. • Attach this form to the front of the mailpiece, or on the back if space does not permit. • Write "Return Receipt Requested" on the mailpiece below the article number. • The Return Receipt Fee will provide you the signature of the person delivered to and the date of delivery.		I also wish to receive the following services (for an extra fee): 1. <input type="checkbox"/> Addressee's Address 2. <input type="checkbox"/> Restricted Delivery Consult postmaster for fee.	
3. Article Addressed to: Jim Benally, Land Administration Project Review Section Navajo Nation P. O. Box 308 Window Rock, AZ 86515		4a. Article Number P 794 519 154	
		4b. Service Type <input type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise	
		7. Date of Delivery 12-10-93	
5. Signature (Addressee)		8. Addressee's Address (Only if requested and fee is paid)	
6. Signature (Agent) <i>Joe M. [Signature]</i>			
PS Form 3811, November 1990 • U.S. GPO: 1991-287-066 DOMESTIC RETURN RECEIPT			

P 794 519 154



Certified Mail Receipt

No Insurance Coverage Provided
 Do not use for International Mail
 (See Reverse)

Sent to Mr. Jim Benally	
Land Administration	
Street & No. Project Review Section	
Navajo Nation - P.O. Box 308	
P.O., State & ZIP Code	
Window Rock, AZ 86515	
Postage	\$.29
Certified Fee	2.00
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	\$ 2.29
Postmark or Date	
12-9-93	

PS Form 3800, June 1990



WALSH ENGINEERING & PRODUCTION CORP.

Petroleum Engineering Consulting
Lease Management
Contract Pumping

204 N. Auburn
Farmington, New Mexico 87401
(505) 327-4892

December 8, 1993

Mr. Jim Benally
Land Administration
Project Review Section
Navajo Nation
P.O. Box 308
Window Rock, AZ 86515

Dear Mr. Benally,

21st Century Investments, the operator of the Mesa Gallup Waterflood, proposes to convert three currently producing wells into water injection wells. This is an expansion of an existing project. The three wells planned for conversion are located in sections 14, 15, and 24 T32N R18W on Navajo surface land. Water will be injected into the Mesa Gallup formation at a maximum rate of 300 b/d at 1300 psig.

Questions concerning this proposal can be sent to Paul Thompson, P.E., Walsh Engineering and Production Corp., 204 N. Auburn, Farmington, NM 87401 (505) 327-4892.

As the surface owner you are being notified pursuant to NMOCD regulations. You should file comments or objections and requests for hearing with the New Mexico Oil Conservation Division, P.O. Box 2088, Santa Fe, NM 87504-2088 within 15 days.

Sincerely,

Paul C. Thompson, P.E.

AFFIDAVIT OF PUBLICATION

COPY OF PUBLICATION

No. 32632

STATE OF NEW MEXICO,
County of San Juan:

LEGAL NOTICE

C.J. SALAZAR being duly
sworn, says: "That she is the
CLASSIFIED MANAGER of
The Farmington Daily Times, a daily
newspaper of general circulation
published in English in Farmington,
said county and state, and that the
hereto attached LEGAL NOTICE

21st Century Investments, the operator of the Mesa Gallup Waterflood, proposes to convert three currently producing wells into water injection wells. This is an expansion of an existing project. The three wells planned for conversion are located in sections 14,15, and 24 T32N R18W. Water will be injected into the Mesa Gallup formation at a maximum rate of 300 b/d at 1300 psig.

Questions concerning this proposal can be sent to Paul Thompson, P.E., Walsh Engineering and Production Corp., 204 N. Auburn, Farmington, NM 87401 (505) 327-4892.

Interested parties should file comments or objections and requests for hearing with the New Mexico Oil Conservation Division, P.O. Box 2088, Santa Fe, NM 87504-2088 within 15 days.

was published in a regular and entire issue of the said Farmington Daily Times, a daily newspaper duly qualified for the purpose within the meaning of Chapter 167 of the 1937 Session Laws of the State of New Mexico for ONE consecutive (DAYS) (/////) on the same day as follows:

Legal No. 32632 published in the Farmington Daily Times, Farmington, New Mexico on Wednesday, December 15, 1993.

First Publication WEDNESDAY, DECEMBER 15, 1993

Second Publication _____

Third Publication _____

Fourth Publication _____

and the cost of publication was \$ 18.37

CJ Salazar

On Jan. 3, 1994 C.J. Salazar appeared before me, whom I know personally to be the person who signed the above document.

Sammy Best

Notary Public, San Juan County,
New Mexico

My Comm expires: APRIL 2, 1996



WALSH ENGINEERING & PRODUCTION CORP.

Petroleum Engineering Consulting
Lease Management
Contract Pumping

204 N. Auburn
Farmington, New Mexico 874
(505) 327-4892

December 8, 1993

Farmington Daily Times
P. O. Box 450
Farmington, New Mexico 87499

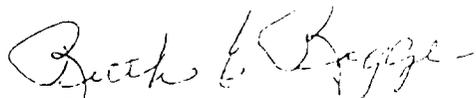
REF: Legal Notification
21st Century Investment Company

Dear Sirs:

Please publish the enclosed article one time in the "Legal Notice" section of your newspaper at the earliest possible date.

Please forward a copy of the published article and your invoice to 21st Century Investment Company at the above address.

Sincerely,


Ruth E. Rogge

rr

Enclosure



Legal Notice
Daily Times

21st Century Investments, the operator of the Mesa Gallup Waterflood, proposes to convert three currently producing wells into water injection wells. This is an expansion of an existing project. The three wells planned for conversion are located in sections 14,15, and 24 T32N R18W. Water will be injected into the Mesa Gallup formation at a maximum rate of 300 b/d at 1300 psig.

Questions concerning this proposal can be sent to Paul Thompson, P.E., Walsh Engineering and Production Corp., 204 N. Auburn, Farmington, NM 87401 (505) 327-4892.

Interested parties should file comments or objections and requests for hearing with the New Mexico Oil Conservation Division, P.O. Box 2088, Santa Fe, NM 87504-2088 within 15 days.

Microsoft Mail v3.0 IPM.Microsoft Mail.Note
From: Ernie Busch
To: Ben Stone
David Catanach
Subject: 21ST CENTURY INVESTMENT CO. (WFX)
Date: 1994-03-22 08:18
Priority: R
Message ID: BB7B1520
Conversation ID: BB7B1520

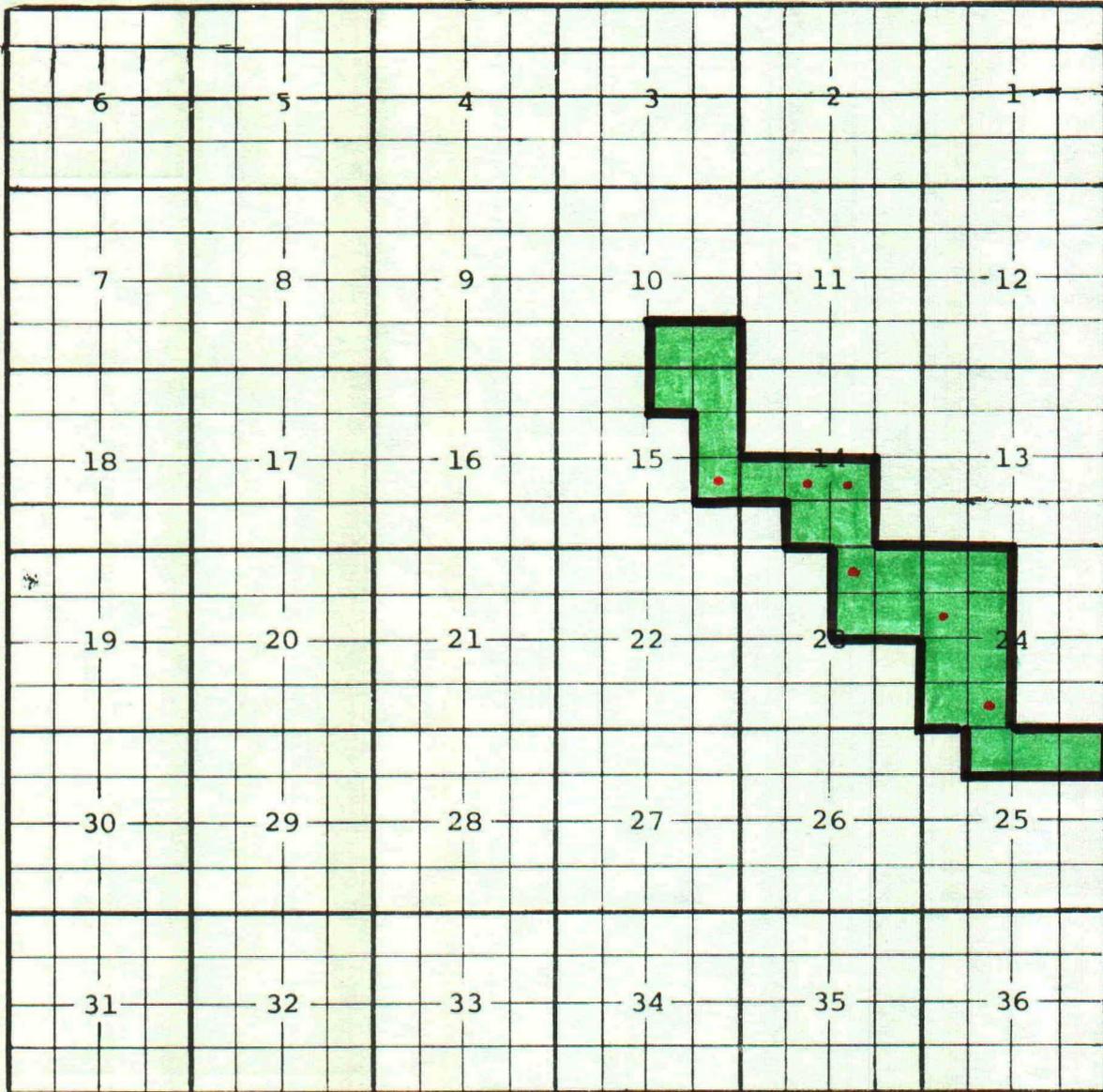
WELL NAME: NAVAJO C #1
LOCATION: H-15-32N-18W
WELL NAME: NAVAJO #7
LOCATION: E-24-32N-18W
WELL NAME: NAVAJO C #3
LOCATION: O-14-32N-18W
RECOMMEND: APPROVAL
=====

County SAN JUAN Pool MESA GALLOP UNIT WATERFLOOD

TOWNSHIP 32N

Range 18W

NMPM



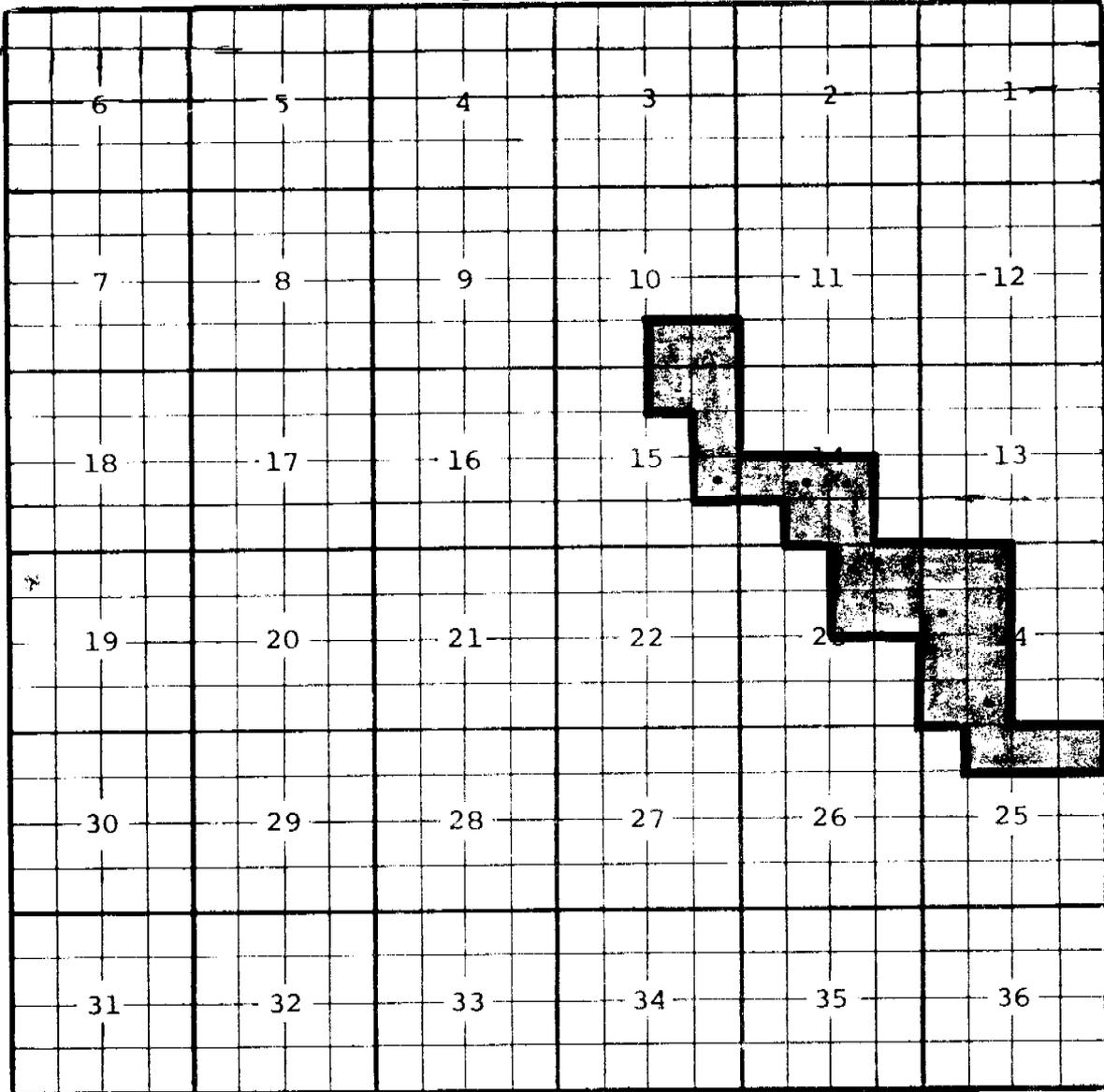
R-8966 (CASE FILE 9637) + WFX-659

WELLS:

SAME WELL	NAVAJO 'C' No. 1	}	R.	6 WELLS TOTAL	
	NAVAJO No. 3				8-21-95
	NAVAJO No. 11				PSI INCREASE
	NAVAJO No. 4				TO 700 PSI ON THESE 6 WELLS
	NAVAJO 'C' No. 1	}	WFX		
	NAVAJO 'C' No. 7				
	NAVAJO 'C' No. 3				

County SAN JUAN Pool MESA GALLOP UNIT WATERFLOOD

TOWNSHIP 32N Range 18W NMPM



R-8966 (CASE FILE 9637) + WFX-659

WELLS:

NAVATO 'C' No. 1	} R.	6 WELLS TOTAL
NAVATO No. 3		8-21-95
NAVATO No. 11		PSI INCREASE
NAVATO No. 4		TO 700 PSI ON THESE 6 WELLS
NAVATO 'C' No. 1	} WFX	
NAVATO 'C' No. 7		
NAVATO 'C' No. 3		