APPLICATION FOR AUTHORIZATION TO INJECT

| I. PURPOSE: X Secondary Recovery Pressure Maintenance Disposal Storage Application qualifies for administrative approval? X 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: 505 327-48 |
| III. WELL DATA: Complete the data required on the reverse side of this form for each well processed for injection. Addition sheets may be attached if necessary. See Appendix A |
| IV. Is this an expansion of an existing project: X 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 radiu circle drawn around each proposed injection well. This circle identifies the well's area of review. See Appendix O |
| VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the groups in a construction of data shall include a description of each well's type, construction, date drille the construction and a schematic of any plugged well illustrating all plugging detail. See Appendix D. denthis resort completion |
| VII. Attach data on the proposed operation, including: MAR 0 2 1994 |
| Proposed average and maximum daily rate and volume of fluids to be injected; Whether the system is open or closed; Proposed average and maximum injection pressure; Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and 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/1 or less) overlying the proposed injection zone as well a 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 mil 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 |
| 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. |
| DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office |

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.





ENGINEERING & PRODUCTION CORP.

Petroleum Engineering Consulting Lease Management Contract Pumping

204 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:

- 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

Proof of Notice: XIII.

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, P.E.

_____ Date: 3/1/94

President

Walsh Engineering and Production Corporation



21st CENTURY INVESTMENTS MESA GALLUP WATERFLOOD

APPLICATION FOR AUTHORIZATION TO INJECT

LIST OF APPENDIXES

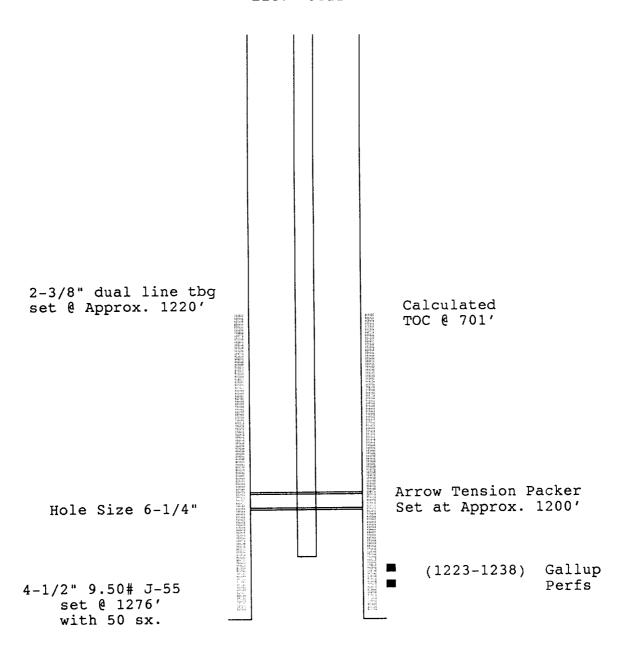
| INJECTION WELL DATA | APPENDIX A | A |
|---------------------------------------|------------|----|
| MESA GALLUP WATERFLOOD DIVISION ORDER | APPENDIX E | 3 |
| WELL LOCATION MAPS | APPENDIX (| 2 |
| OFFSET WELL DATA AND P&A SCHEMATICS | APPENDIX I | O |
| MAKE-UP AND PRODUCED WATER ANALYSIS | APPENDIX E | ₹ |
| WELL LOGS | APPENDIX E | ਟਾ |
| PROOF OF NOTIFICATION | APPENDIX C | 3 |



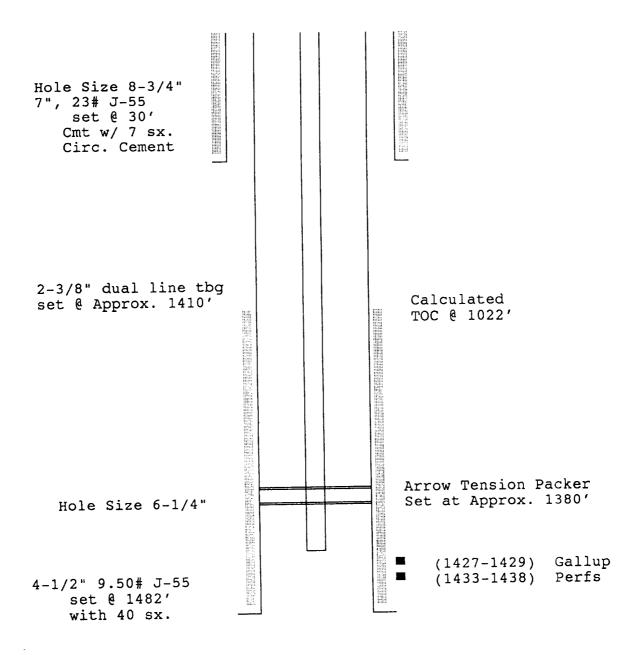
APPENDIX A

INJECTION WELL DATA

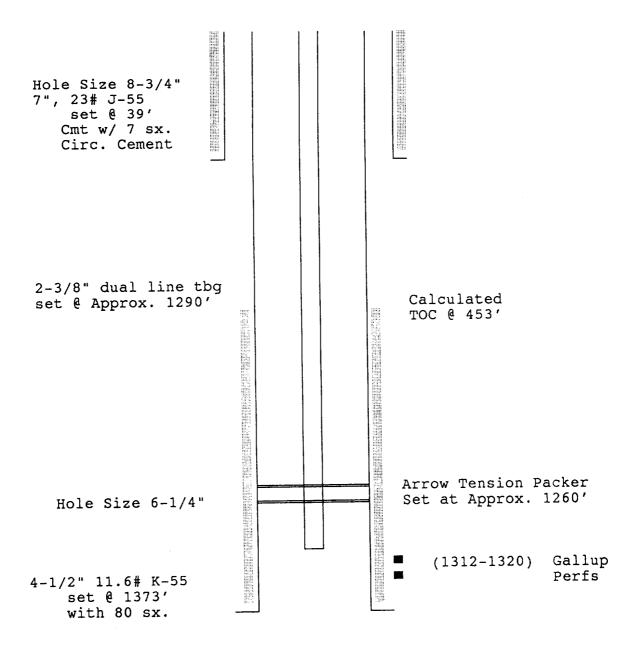
21st Century Investments Navajo #C1 1700 FNL & 685 FEL SEC 15 32N 18W Elev 5311'



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



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





APPENDIX B

MESA GALLUP WATERFLOOD DIVISION ORDER





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.

CASE NO. 9637 Order No. R-8966 Page -2-

- (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.

CASE NO. 9637 Order No. R-8966 Page -3-

- (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

CASE NO. 9637 Order No. R-8966 Page -4-

- (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.

CASE NO. 9637 Order No. R-8966 Page -5-

- (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

SEAL

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EXHIBIT "A" CASE NO. 9637 ORDER NO. R-8966

MESA GALLUP UNIT WATERFLOOD PROJECT INJECTION WELLS

MAXIMUM SURFACE INJECTION PRESSURE

TOWNSHIP 32 NORTH, RANGE 18 WEST, NMPM

TATAN SALE SALES

141772

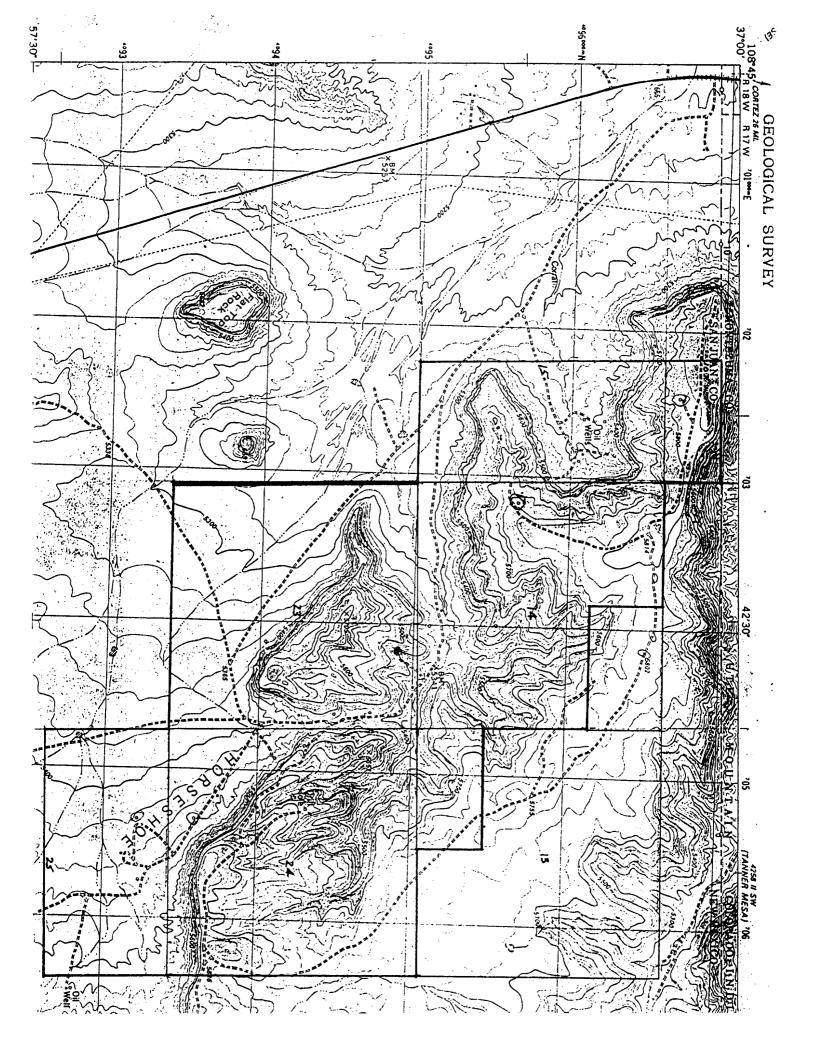
| Navajo "O" Well No. 19 1700' FNL & 685' FEL, Unit (H)/ Section 15 | 245 PSIG |
|---|------------|
| Navajo Well No. 3 660' FSL & 1980' FWL, Unit (N) Section 24 | 222 PSIG 🗸 |
| Navajo Well No. 11 330' FNL & 1650' FEL, Unit (B)/ Section 23 | 276 PSIG |
| Navajo Well No. 4 1650' FSL & 1710' FEL, Unit (J), Section 14 | 263 PSIG |



APPENDIX C

WELL LOCATION MAPS

| | | R18W | | R17W |
|------|------------------------------|---|--|--------------------------|
| | , | , | | ○ Р&А |
| | 10 | 11 | 1.2 | ● PRODUCING |
| | Navaio | | | ▲ INJECTION |
| | Navajo ♦ #2 | | | PROPOSED INJECTION |
| | 15 Nav.#4∳ Nav. B#2 | vajo #6 ▲ Nav. ¹⁴ Navajo C#5 | 13 | . 18 |
| T32N | 22 | Navajo #11 📤 | . Navajo #6 Navajo #8 Nav. #7 | 19 |
| | 27 | , 26 | Nav. Δ Nav. Λ#6 Bluehill #1 - Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ | Horseshoe ● #2E 30 |





APPENDIX D

OFFSET WELL DATA
P&A WELL SCHEMATICS

WELL IN AREA OF REVIEW

| | | SPUD | | | TOTAL | COMPLETION | I.P. | FORMA- | CASING | CEMENT | • |
|----------------|---------------|----------|------------------|------------|-------|------------|--------|--------|--------------|--------|--------|
| OPERATOR | WELL NAME | DATE | LOCATION | SECTION | DEPTH | INTERVAL | (BOPD) | TION | SIZE & DEPTH | SXS | STATUS |
| ZOLLER & | | | | | | | | | | | |
| DANNENBERG | BLUEHILL #1 | 7/26/65 | 2319FNL-1980FEL | 25,32N-18W | 1573 | - | - | 11 | 7"a30 | CIRC. | P&A |
| GRAND NAV "A" | #4 | 11/8/61 | B600FNL-1980FEL | 25,32N-18W | 1120 | 1051-66 | 8 | GALLUP | 4-1/2"a1045 | 100 | P |
| GRAND NAV "A" | #5 | 12/4/61 | C610FNL-1980FWL | 25,32N-18W | 1062 | 1037-45 | 5 | ** | 3-1/2"a1057 | 100 | I |
| RL BAYLESS NAV | i #6 | 7/2/64 | 3300FSL-3300FWL | 25,32N-18W | 1093 | - | - | и | 5-1/2"a52 | CIRC. | P&A |
| | NAVAJO | | | | | | | | | | |
| GRAND | #3 | 8/10/61 | N660FSL-1980FWL | 24,32N-18W | 1163 | 1110-26 | 49 | 11 | 4-1/2"@1158 | 45 | I |
| GRAND | #4 | 10/3/61 | J1650FSL-1710FEL | 14,32N-18W | 1365 | 1315-23 | 6 | 41 | 4-1/2"a1357 | 35 | P |
| EXPL/DRILL/CO | #5 | 11/29/61 | J2135FSL-1935FEL | 23,32N-18W | 1254 | - | _ | ** | 7"a30 | CIRC. | P&A |
| EXPL/DRILL/CO | #6 | 12/30/61 | 365FSL-760FWL | 13,32N-18W | 1472 | - | - | n | 7"a66 | CIRC. | P&A ~ |
| GRAND | #7 | 1/13/62 | E2310FNL-330FWL | 24,32N-18W | 1482 | 1423-38 | 88 | 11 | 4-1/2"a1481 | 40 | P |
| GRAND | #8 | 2/10/62 | A950FNL-330FEL | 23,32N-18W | 1445 | 1383-94 | 88 | 41 | 4-1/2"a1437 | 40 | P |
| GRAND | #11 | 1/24/62 | B330FNL-1650FEL | 23,32N-18W | 1438 | 1381-92 | 87 | " | 4-1/2"a1438 | 40 | I |
| GRAND | #12 | 2/18/62 | F2290FNL-1780FWL | 24,32N-18W | 1573 | 1521-28 | 8 | n | 4-1/2"a1572 | 40 | Р |
| | NAVAJO TRIBAL | С | | | | | - | | | | |
| GRAND | #1 | 2/26/62 | L660FNL-2310FSL | 24,32N-18W | 1295 | 1225-36 | 92 | H | 4-1/2"a1288 | 80 | P |
| GRAND | #2 | 3/10/62 | H1650FNL-330FEL | 23,32N-18W | 1478 | 1407-17 | 89 | *1 | 4-1/2"a1476 | 80 | P |
| GRAND | #3 | 3/17/62 | 0330FSL-2310FEL | 14,32N-18W | 1380 | 1312-20 | 36 | 81 | 4-1/2"@1373 | 80 | P |
| GRAND | #4 | 10/3/61 | J1650FSL-1710FEL | 14,32N-18W | 1365 | 1315-23 | 6 | 11 | 4-1/2"a1357 | 35 | Р |
| GRAND | #5 | 3/23/68 | L2310FSL-330FWL | 14,32N-18W | 1762 | 1642-65 | 84 | 0 | 4-1/2"a1749 | 35 | I |
| GRAND | #6 | 3/12/69 | N1720FWL-650FSL | 14,32N-18W | 1310 | 1252-69 | 77 | " | 4-1/2"@1310 | 35 | P |
| EXPL/DRILL/CO | #7 | 4/7/69 | H990FSL-990FWL | 14,32N-18W | 1327 | - | - | 11 | 7"230 | CIRC. | P&A ~ |
| AZTEC | | | | | | | | | | | |
| OIL & GAS | NAV #3 | 11/14/59 | 4745FWL-790FSL | 25,32N-18W | 1660 | | | GALLUP | 8-5/8"a60 | 35 | P&A |
| DUGAN | HORSESHOE #2E | 6/17/64 | 330FWL-3210FSL | 30,32N-17W | 1175 | 1101-10 | 10 | GALLUP | 4-1/2"a1172 | 35 | Р |
| ARI-MEX | NAV B #2 | 10/15/70 | 4950FWL-2310FSL | 15,32N-18W | 1718 | 1612-14 | 10 | 11 | 4-1/2"@1717 | 125 | P |
| ARI-MEX | NAV #6 | 5/16/68 | 4950FWL-3030FSL | 15,32N-18W | 1360 | 1282-1304 | • | 11 | 4-1/2"@1345 | 35 | P |
| ARI-MEX | NAV C #1 | 5/2/64 | 4595FWL-3580FSL | 15,32N-18W | 1276 | 1223-38 | 32 | u | 4-1/2"@1276 | 50 | P |
| ARI-MEX | NAV #3A | 5/30/64 | 4530FWL-4335FSL | 15,32N-18W | 1312 | 1250-60 | 19 | 11 | 4-1/2"@1312 | 35 | P |
| AAA FSHING TL | NAV #4 | 1/24/68 | 3850FWL-2510FSL | 15,32N-18W | 1414 | - | | 11 | 7"a50 | CIRC. | P&A |
| AAA FSHING TL | NAV B #1 | 12/18/70 | 1650FNL-1650FEL | 15,32N-18W | 1285 | - | | и | 7"a60 | 25 | P&A |
| ARI-MEX | NAV B #3 | 3/19/70 | 1115FWL-1480FEL | 15,32N-18W | 1275 | 1197-1205 | 6 | н | 4-1/2"@1272 | 125 | P |
| AAA FSHING TL | NAV #7 | 2/24/69 | 2310FWL-4950FSL | 15,32N-18W | 1295 | - | - | 11 | 7"a30 | CIRC. | P&A |
| AIR-MEX | NAV #5 | 10/4/67 | 3300FWL-440FSL | 10-32N-18W | 1873 | 1664-78 | 6 | | 4-1/2"a1764 | 135 | I |
| HARLAN DRLG | NAV #2 | 5/4/64 | 350FWL-540FSL | 10,32N-18W | 1183 | - | - | 11 | 7"a30 | 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.

| HARLAN | DRILLING CO. | NAVAJO | 5-4-64 |
|----------|------------------|---------|----------------|
| OPERATOR | | LEASE | SPUD DATE |
| #2 | 350FW-540FS | 10 | 32N 18w |
| WELL NO. | FOOTAGE LOCATION | SECTION | TOWNSHIP PANCE |

83/4"
7"csa 30' w/ 10
50' to surface

- Drill hud

MAR 0 2 1994 OIL CON. DIV. OIST. 3

| AAA FIS | HING TOOL | OLAVAN | 2-24-69 |
|-----------|------------------|---------|----------------|
| OPERATOR | | LEASE | SPUD DATE |
| | | 1 | |
| <u>#7</u> | 2310FW-4950FS | 15 | -32N 18W |
| WELL NO. | FOOTAGE LOCATION | SECTION | TOWNSHIP RANGE |

-5 sx ToHOL: TCMT. 1150'

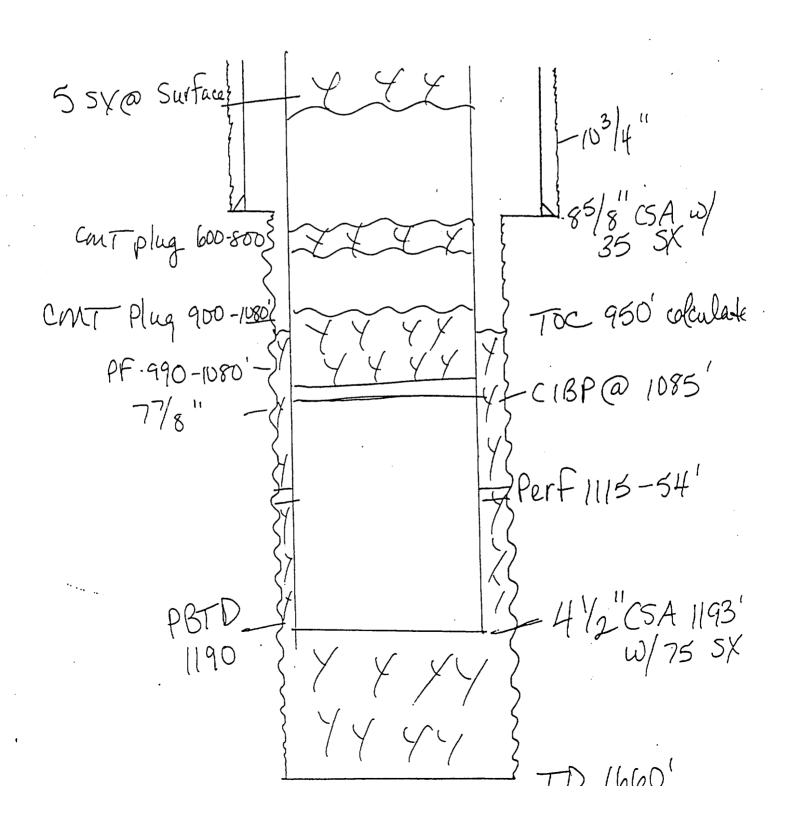
| AAA | FISHING TOOL | OLAVAIO | 12- | 3~70 |
|----------|------------------|---------|-------------|-------|
| OPERATOR | | LEASE | | DATE |
| B-1 | 1650FN-1650FE | 15 | 32N | • 18W |
| WELL NO. | FOOTAGE LOCATION | SECTION | TOWNSHIP | RANGE |

5 sx @ Surface 7''(SA 60' W/25 5X Drill MUD Top CUT Plus 110

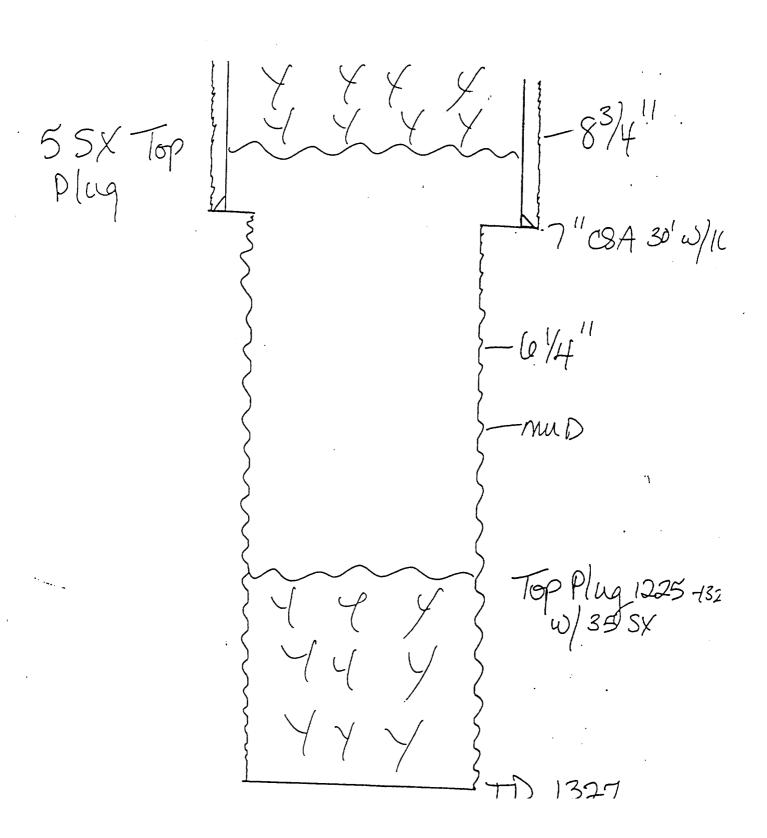
| AAA FISHING TOOL | | NAVAJO | 1-24-68 |
|------------------|------------------|---------|----------------|
| OPERATOR | | LEASE | SPUD DATE |
| #4 | 3850FW-2510FS | 15 | 32N 18W |
| WELL NO. | FOOTAGE LOCATION | SECTION | TOWNSHIP RANGE |

-55X Top Pluc -83/4" 1.7" CSA 50 w/15 6 1/4 / 1200' Top Plug 22 G. Ft. 1300' Botton Plug 7) - 1414

| AZTEC OIL & | | s co. | CO. NAVAJO | | 711-14-59 | | |
|-------------|------|--------------|------------|----------|-----------|--|--|
| OPERATOR | | | LEASE | SPUL | DATE | | |
| #3 | | 790FS-535FE | 25 | 32N | 18W | | |
| WELL NO. | FOOT | AGE LOCATION | SECTION | TOWNSHIP | RANGE | | |



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



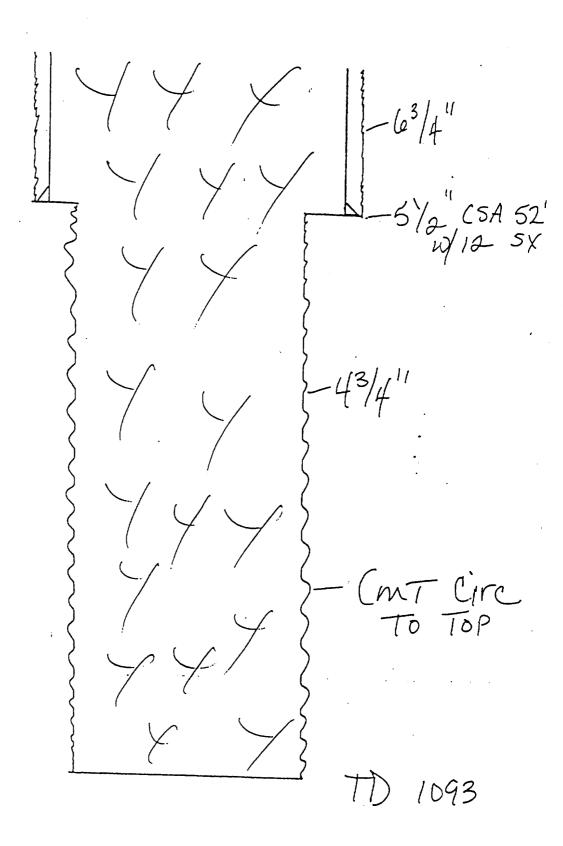
| EXPLO | RATION DRILLING CO. | N | OLAVA | 12-30-61 |
|----------|--|---------|-------------|------------|
| OPERATOR | ······································ | LEASE | | SPUD DATE |
| #6 | 365FS-760FW | 13 | 32N | 18W |
| WELL NO. | FOOTAGE LOCATION | SECTION | π∩ων | SHIP PANCE |

- 654 To surfai - 83/4 hole -7" CSA 66 W/15

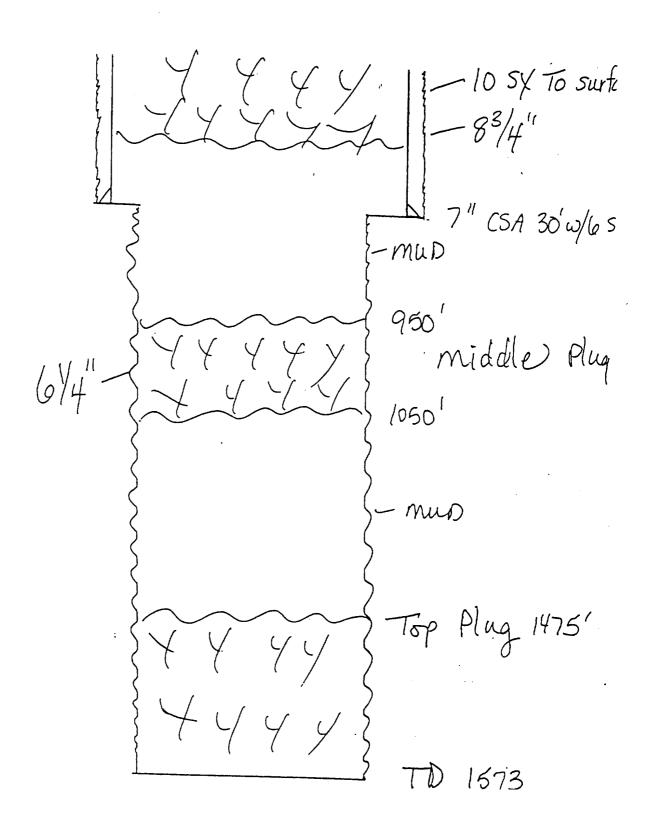
| WELL NO. | FOOTAGE LOCATION | SECTION | TOWNSHIP | RANGT |
|----------|-------------------|---------|-----------|-------|
| #5 | 2135FS-1935FE | 23 | 32N | 18W |
| OPERATOR | | LEASE | SPUD ~ | DATE |
| EXPLORA | TION DRILLING CO. | NAVAJO | 11- | 29-61 |

Surface plug 30' to Surface w) 35 SX " (SA 30 cm MUD TOC 1123 Cale 1254

| R. L. BAYLESS | | NAVAJO | 7-1-64 | | |
|---------------|------------------|---------|----------------|--|--|
| OPERATOR | | LEASE | SPUD DATE | | |
| #6 | 1980FN-1980FE | 25 | 32N 18W | | |
| WELL NO. | FOOTAGE LOCATION | SECTION | TOWNSHIP RANGE | | |



| | & DANNEBERG | BLUEHILL | 7-26-65 SPUD DATE | | |
|----------|------------------|----------|----------------------|-------|--|
| OPERATOR | | LEASE | | | |
| #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

Date : 03/10/92 Date Sampled : 02/06/92 Analysis No. : 1 Company : GRAND RESOURCES Address

Lease : NAVEJO
Well : #18
Sample Pt. :

| | ANALYSIS | | mg/L | | * meq/L |
|--|--|--------------------------------------|---|-------------------------------------|---|
| 1. 2. 3. 4. 5. 6. 7. | pH 7.0 H2S 0 Specific Gravity 1.02 Total Dissolved Solids Suspended Solids Dissolved Oxygen Dissolved CO2 Oil In Water | · | 30976.3 22 | | |
| 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. | Phenolphthalein Alkalinity (Cac Methyl Orange Alkalinity (Cac Bicarbonate Chloride Sulfate Calcium Magnesium Sodium (calculated) Iron Barium Strontium | CaCO3) HCO3 C1 SO4 Ca Mg Na Fe Ba Sr | 244.0 16000.0 3000.0 400.0 133.9 11192.5 6.0 0.0 | HCO3 Cl SO4 Ca Mg Na | 4.0 451.3 62.5 20.0 11.0 486.8 |

PROBABLE MINERAL COMPOSITION

| *milli equivalents per Liter | Compound | Equiv wt | X meq/L | = mg/I |
|--|-------------------------------|----------------------|---------------|---------------|
| 20 | Ca (HCO3) 2 CaSO4 CaCl2 | 81.0 68.1 55.5 | 4.0 16.0 | 324 1086 |
| | Mg(HCO3)2 MgSO4 MgCl2 | 73.2 60.2 47.6 | 11.0 | 663 |
| Saturation Values Dist. Water 20 C CaCO3 13 mg/L CaSO4 * 2H2O 2090 mg/L BaSO4 2.4 mg/L | NaHCO3 Na2SO4 NaCl | 84.0 71.0 58.4 | 35.5 451.3 | 2521 26376 |

'REMARKS:

Petrolite Oilfield Chemicals Group

Respectfully submitted, MARC ROSE

GALLUP PRODUCED WATER WATER ANALYSIS REPORT

Company : GRAND RESOURCES Address : Date : 03/10/92 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. | | | | | | |
| 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. | | Ba | 0.0 | | | |
| | 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 | |
|------------------------------|----------|--|------------|-------------|---------|--------|-------|
| ٠ | ! 31 | + ! *Ca < *HCO3 | ++ 5! | Ca (HCO3) 2 | 81.0 | 5.0 | 405 |
| | | /> | | CaSO4 | 68.1 | 24.5 | 1665 |
| | 20 | *Mg> *S04 | 24 | CaCl2 | 55.5 | 1.5 | 82 |
| | | </td <td> </td> <td>Mg (HCO3)2</td> <td>73.2</td> <td></td> <td></td> | | Mg (HCO3)2 | 73.2 | | |
| | 678 | *Na> *Cl | 700 | MgSO4 | 60.2 | | |
| | + | + | ++ | MgCl2 | 47.6 | 20.0 | 953 |
| ; | Saturat | i <mark>on Values Dist. W</mark> at | ter 20 C | NaHCO3 | 84.0 | | |
| | CaC | D3 13 r | ng/L | Na2SO4 | 71.0 | | |
| | CaSC | 04 * 2H2O 2090 r | ng/L | NaCl | 58.4 | 678.1 | 39628 |

REMARKS: TREATER _____

Petrolite Oilfield Chemicals Group

BaSO4 . 2.4 mg/L

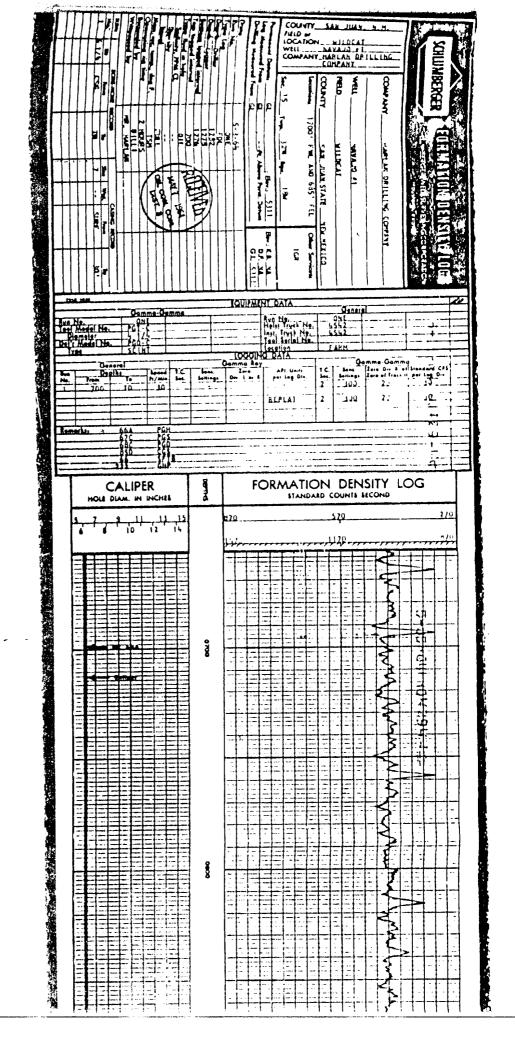
Respectfully submitted, MARC ROSE

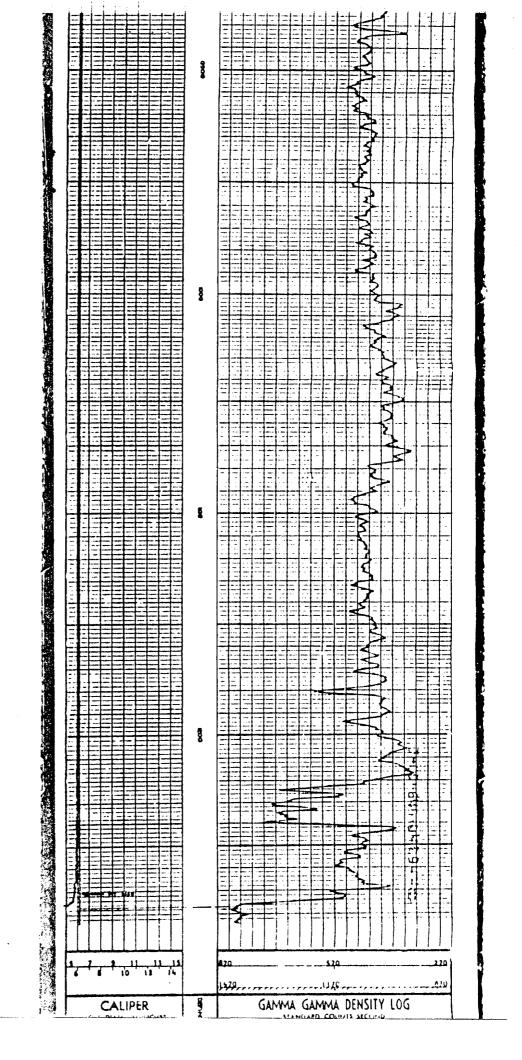


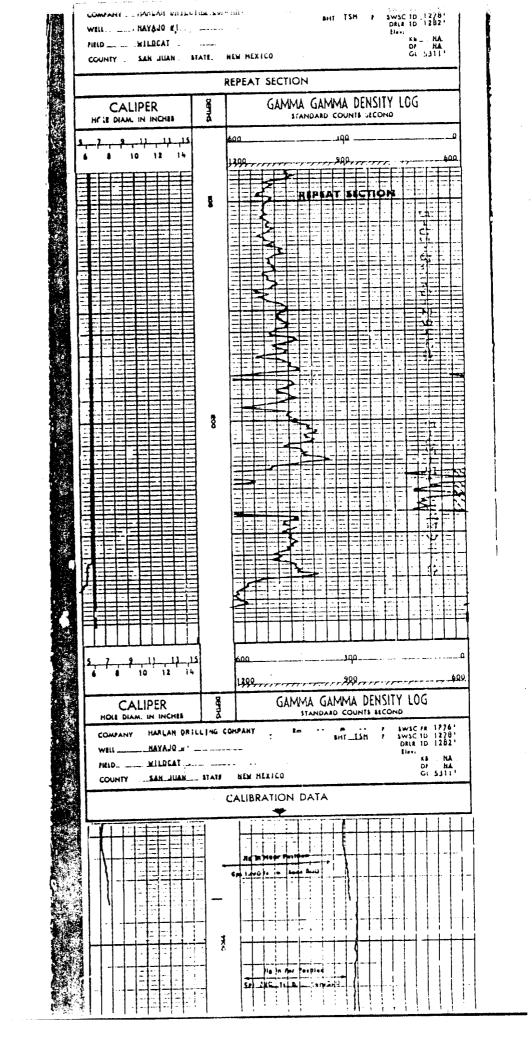
APPENDIX F

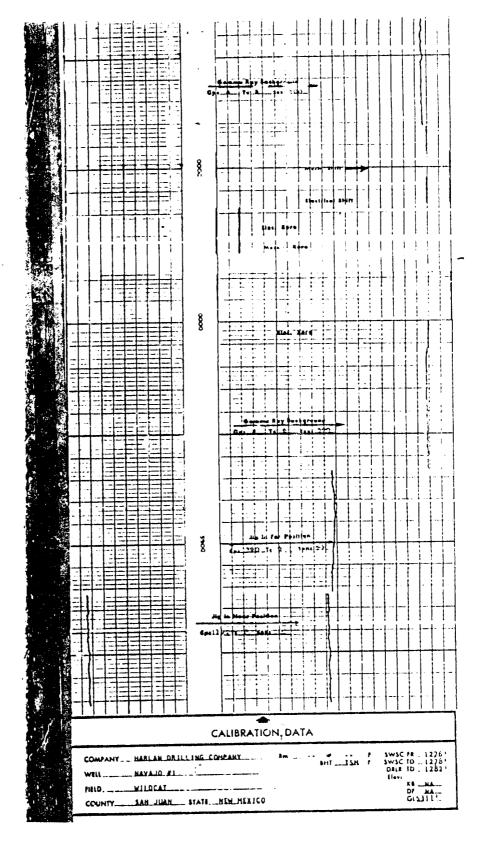
WELL LOGS

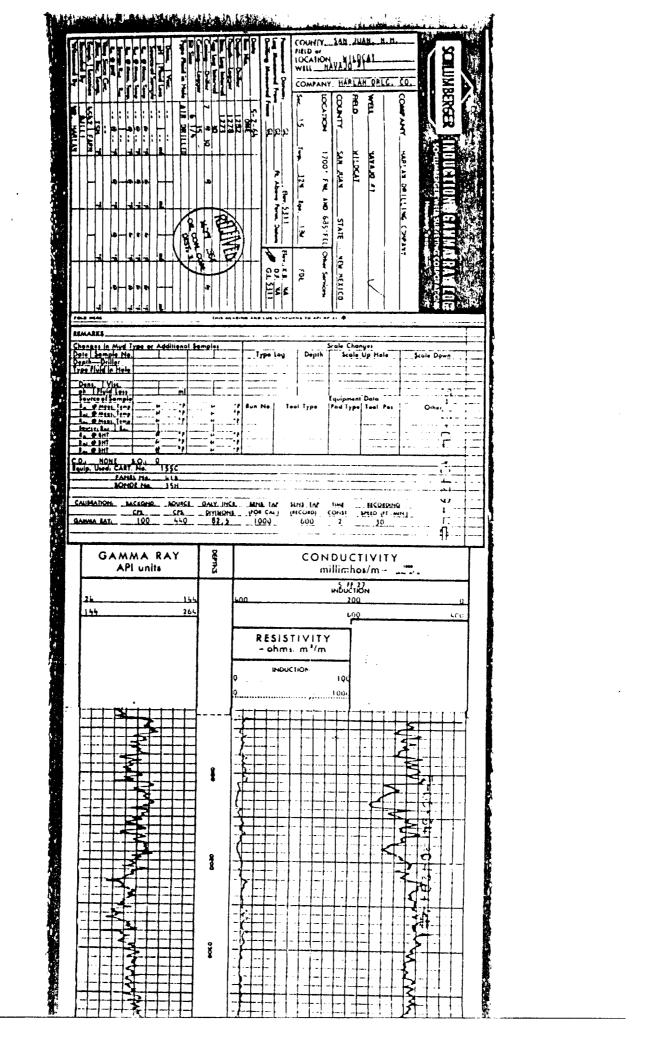
- NAVAJO #C1
- NAVAJO #7
- NAVAJO C #3

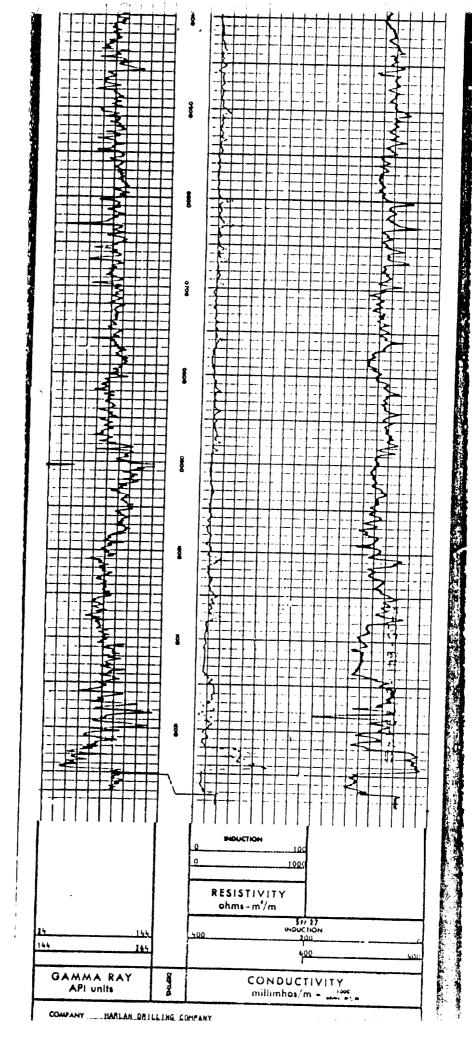




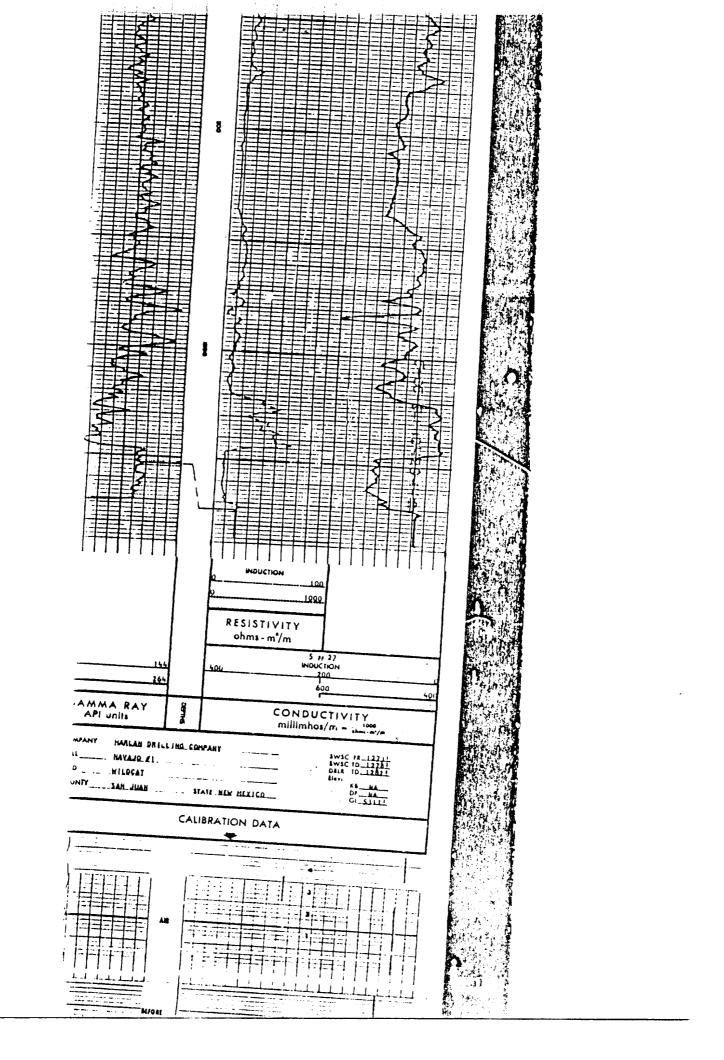


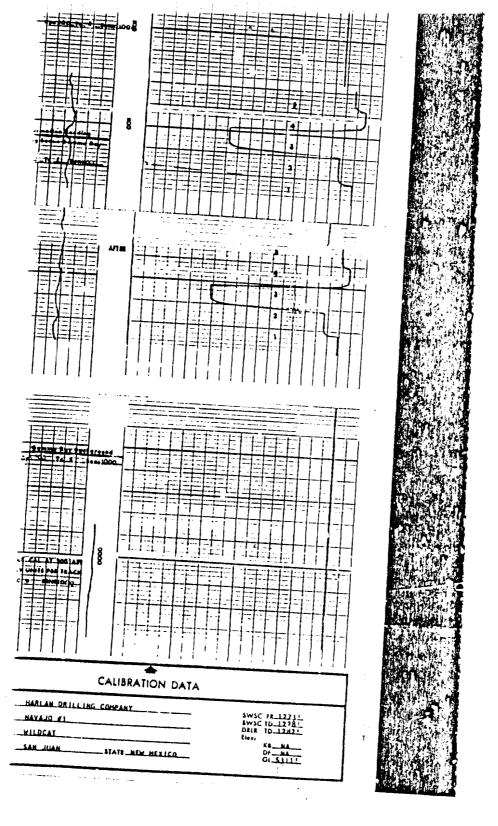


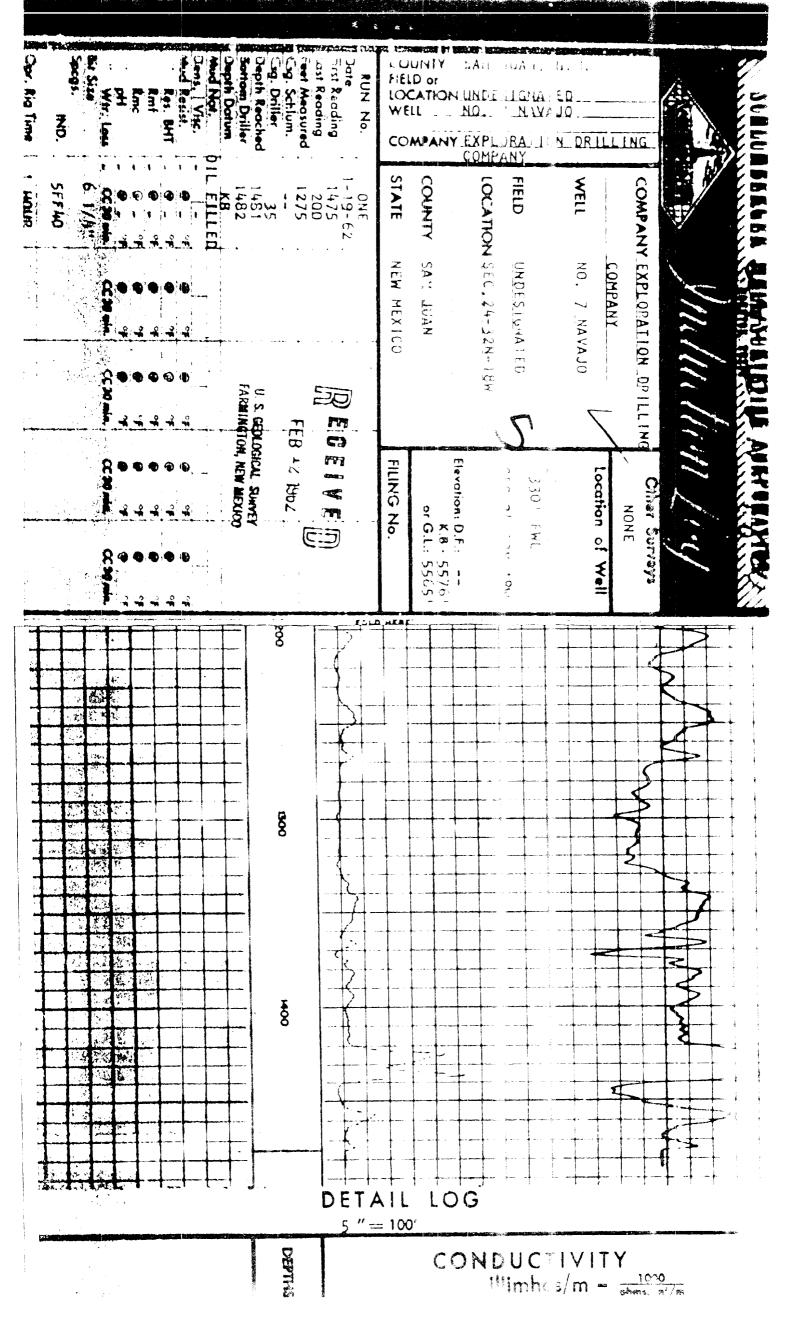


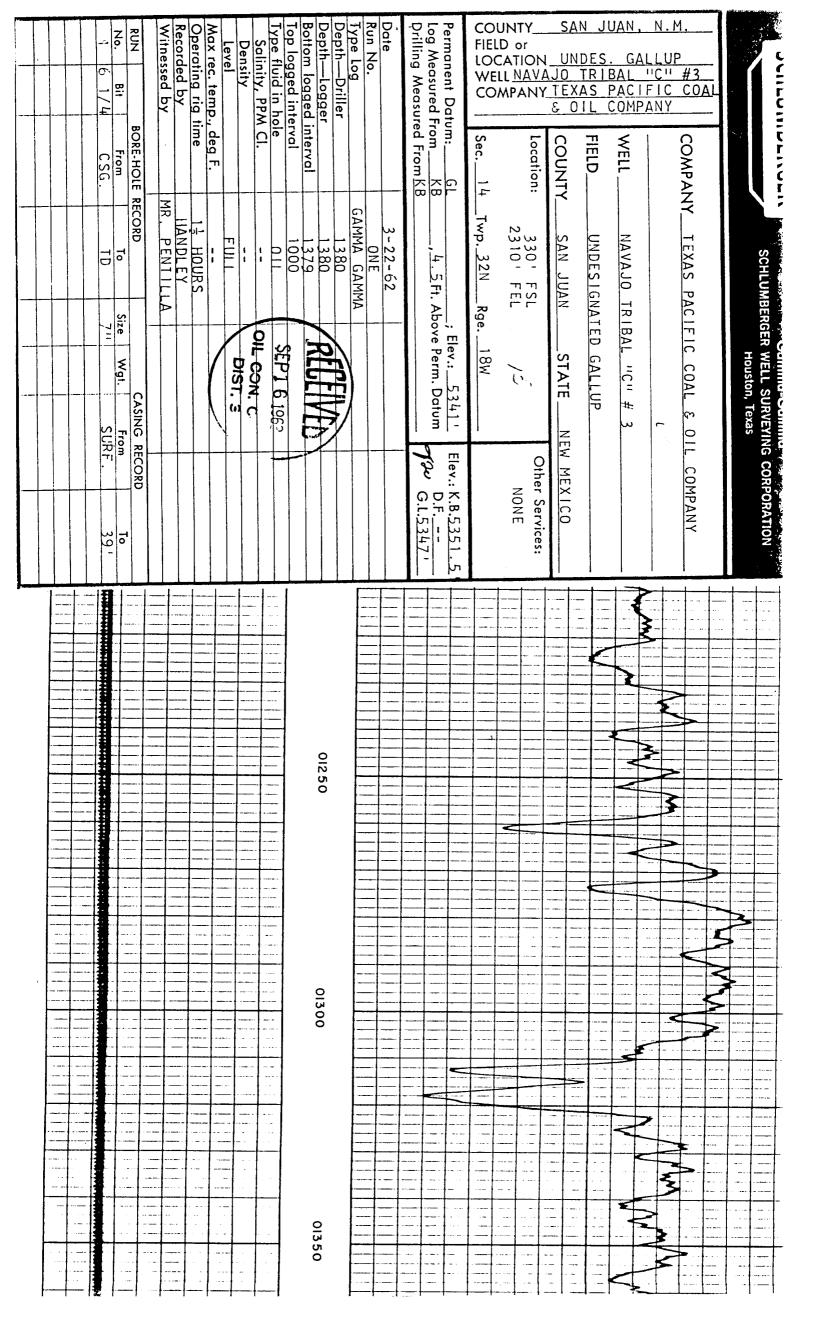


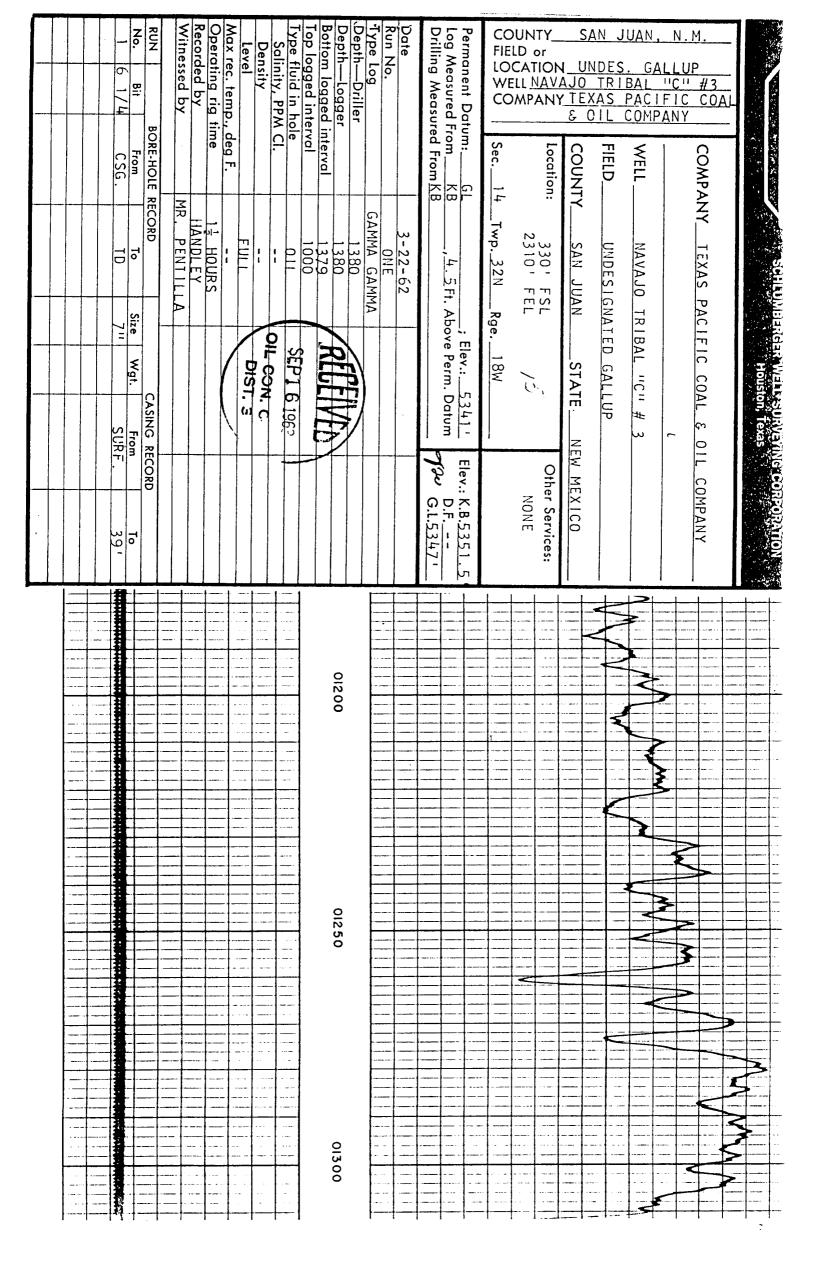
MILDEAT STATE HEW HEXICO COUNTY___ MAUL HAS DETAIL LOG GAMMA RAY API units CONDUCTIVITY millimhos/m = 1000 SH 27 RESISTIVITY ohms - m²/m MOUCTION 1000 ı 8













PROOF OF NOTIFICATION

- NAVAJO TRIBE
- DAILY TIMES



| A Committee of the Comm | | |
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| ea The Return Receipt Fee will provide you the signature of the person and the idea of delivery. | Consult postmaster for fee. | |
| 3. Article Addressed to Jim Benally, Land Andministratio | I 4a. Article Number | |
| # Project#Review#Section ** | 4b. Service Type Registered Linsured | |
| Navajo Nation | | |
| Po 0.→Box 308/ | ☑ Certified COD | |
| Window Rock: AZ 86515 | Return Receipt for Merchandise | |
| | 7. Date of Delivery? | |
| | 12-10-43 | |
| 5. Signature (Addressee) | 8. Addressee's Address (Only if requested and fee is paid) | |
| | dituitee is paul | |
| 8. Signature (Agent) | | |
| SKUE III WILLEN | | |
| PS F (m) 381 1. November 1990 1 ± U.S. GPO: 1991-28 | 7-066 DOMESTIC RETURN RECEIPT | |
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794 519 154

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

| ١ | Sent to Mr. Jim Benal | Ιv | | | |
|-----------------|---|------|------|--------------|--|
| | Land Administration | | | | |
| 1 | Street & No Project Revi | ew | Sect | ion | |
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| | P.O., State & ZIP Code Window Rock, AZ | 865 | 515 | | |
| | Postage | \$ | .29 | | |
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| 3800, June 1990 | Return Receipt Showing to Whom, Date, & Address of Delivery | | | | |
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WALSHI

ENGINEERING & PRODUCTION CORP.

Petroleum Engineering Consulting Lease Management Contract Pumping 204 N. Auburn Farmington, New Mexico 87/ (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 planed 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 persuent 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.

Paul C. Thompson

| STATE OF NEW MEXICO, |
|--|
| County of San Juan: |
| • |
| 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 |
| |
| was published in a regular and entire |
| issue of the said Farmington Daily |
| Times, a daily newspaper duly quali- |
| fied for the purpose within the |
| maning of Chapter 167 of the 1027 |
| 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: |
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| First Publication WEDNESDAY, DECEMBER 15, 1993 |
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| My Comm expires: APRIL 2, 1996 |
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No. 32632

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 concern-

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

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.

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





ENGINEERING & PRODUCTION CORP.

Potroleum 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 planed 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.

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