



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
AZTEC DISTRICT OFFICE

10010 RIO BRAZOS ROAD
AZTEC, NEW MEXICO 87410
(505) 334-6178

OIL CONSERVATION DIVISION
BOX 2088
SANTA FE, NEW MEXICO 87501

DATE 5-12-89

RE: Proposed MC _____
Proposed DHC _____
Proposed NSL _____
Proposed SWD _____
Proposed WFX X _____
Proposed PMX _____

Gentlemen:

I have examined the application dated 5-11-89

for the ARCO OIL & GAS CO. HORSESHOE CANYON UNIT #1 32-31N-16W
Operator Lease and Well No. Unit, S-T-R

and my recommendations are as follows:

Approve

Yours truly,

E. J. Bernal

ARCO Oil and Gas Company
Central District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 688 5200



May 8, 1989

Mr. David Catanack
UIC Section
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87504

Dear Mr. Catanack:

Subject: Application for Class II UIC Permit
Conversion of Horseshoe Gallup #1 Well
San Juan County, New Mexico

Enclosed is a full application for a Class II permit under New Mexico's Underground Injection Control (UIC) regulations for ARCO's Horseshoe Gallup #1 Well. ARCO has already applied for the necessary approvals through the Navajo Nation, the U.S. EPA, Region VI and the BLM.

EPA accepted our proposed alternative mechanical integrity program in their draft permit. As you indicated in our telephone conversation on May 8, ARCO hopes your office will also approve of the proposed alternative method, since EPA has authority for testing on the well.

To satisfy NMOCD's proof of notice requirement, ARCO notified the Navajo and Ute Mountain Indian tribes. This letter is confirmation of your acceptance of our correspondence and permit with the tribe as proof of notice for the Navajos. A copy of the letter sent to the Ute Mountain tribe is enclosed, and the return receipt of the certified letter will be forwarded when received.

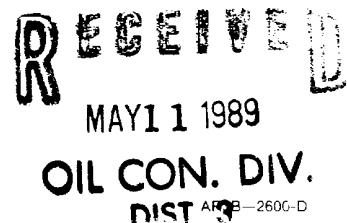
Please let me know (915-688-5651) if there are any questions regarding this permit application.

Sincerely,

C. T. Stilwell
Environmental Engineer

CTS:pjk

Attachment



ARCO Oil and Gas Company
Central District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 688 5200



May 8, 1989

Tribal Energy Department
Ute Mountain Indian Tribe
P.O. Box 54
Towaoc, Colorado 81334

Dear Gentlemen:

Subject: Notice of Application for Injection Well Permit
ARCO Horseshoe Gallup Field
San Juan County, New Mexico (Navajo Nation)

By this letter, ARCO Oil and Gas Company (ARCO) is hereby notifying the Ute Mountain Indian Tribe of our application to permit an injection well. The well, Horseshoe Gallup #1, is located on the Navajo Nation in New Mexico, but is within one-half mile of the boundary with the Ute Mountain land. Therefore, ARCO is required to notify you of this activity.

The well to be permitted is an existing producing well which is being converted to an injection well in the field's existing waterflood operation. We are obtaining the required permits from the Navajo Nation, U.S. Environmental Protection Agency, and U.S. Bureau of Land Management.

Sincerely,

A handwritten signature in dark ink, appearing to read "C. T. Stilwell". The signature is written in a cursive, flowing style.

C. T. Stilwell
Environmental Engineer

CTS:pjk

Attachment

cc: David Catanack
NMOCD - Sante Fe

III. WELL DATA See BLM Sundry Notice and other attachments for 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, P. O. Box 2088, Santa Fe, New Mexico 87501 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.

APPLICATION FOR AUTHORIZATION TO INJECT

- I. Purpose: ☒ Secondary Recovery ☐ Pressure Maintenance ☐ Disposal ☐ Storage
Application qualifies for administrative approval? ☒ yes ☐ no
- II. Operator: ARCO Oil and Gas Company
Address: P.O. Box 1610, Midland, TX 79702
Contact party: Chuck Stilwell Phone: (915) 688-5651
- III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project? ☒ yes ☐ no
If yes, give the Division order number authorizing the project _____.
- 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.
- * 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.
- 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 source known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any.
- * X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)
- * 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. N/A
- 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. N/A
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- 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: C. T. Stilwell Title: Environmental Engineer
Signature: *Chuck Stilwell* Date: 5/8/89
- * If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal. Surrounding well and geologic data should be available in

NMOCD/Aztec office files

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate Division district office.

Explanation for Map of Project Area

Horseshoe Gallup Unit

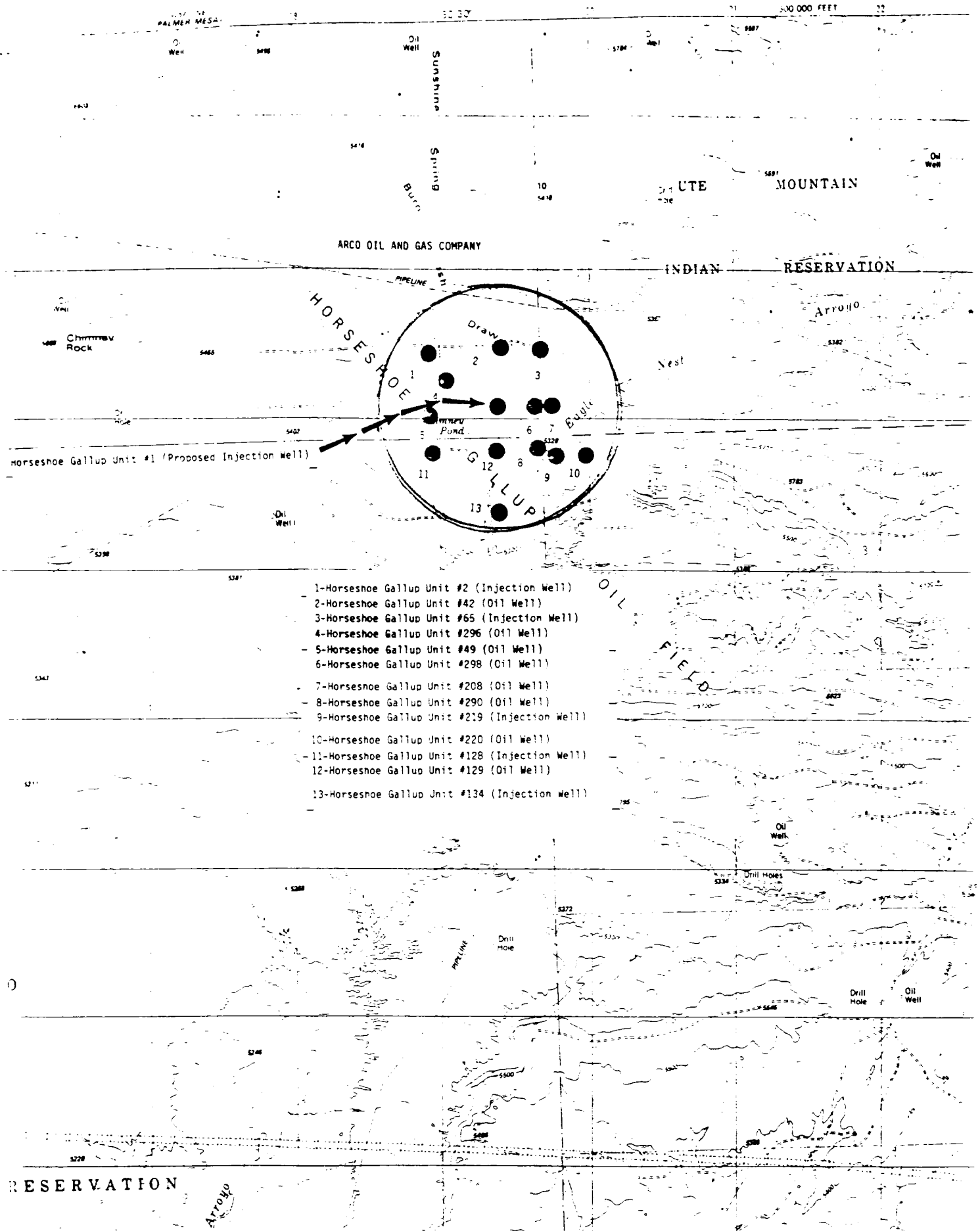
Required Information Existing on Map

1. Surface bodies of water - consist of dry washes.
2. No springs, mines, quarries, or faults near project area.
3. No residences or public water supply facilities near project area.

Required Information Supplied by ARCO on Map

1. Area of Review - 1/2 mile radius, shown with red circle.
2. Identification of all wells in area of review.
 - See Radius of Endangering Influence forms and your department's well database for further information.

CHIMNEY ROCK QUADRANGLE
NEW MEXICO-SAN JUAN CO
7.5 MINUTE SERIES (TOPOGRAPHIC)
1:25,000 SCALE



HORSESHOE GALLUP #1 WELL
RADIUS OF ENDANGERING INFLUENCE FILE

Explanation of Well Information in Area of Review:

1. The following has descriptions of the wells within that Area of Review (1/2 mile) of the HSGU #1.
2. Information available on these wells can be found in UIC Section's database for the Horseshoe Gallup Field.
3. Information given here for the wells in the Area of Review is sufficient because:
 - a. There is no Underground Source of Drinking Water in the area to contaminate.
 - b. Routine well operation and monitoring performed on the active wells in the field will indicate if there is any communication between HSGU #1 and the surrounding wells.

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES Chimney Rock

RADIUS OF INFLUENCE: 2640 FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO HORSIES HOLE GALLUP COUNTY #1

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
<input type="checkbox"/> WW WATER WELL	<input type="checkbox"/> ACT ACTIVE	<input type="checkbox"/> DOM DOMESTIC
<input type="checkbox"/> WA ARTESIAN WELL	<input checked="" type="checkbox"/> INA INACTIVE	<input type="checkbox"/> AGR AGRICULT.
<input type="checkbox"/> WS SPRING	<input type="checkbox"/> ABA ABANDONED	<input type="checkbox"/> LIV LIVESTOCK
<input type="checkbox"/> OW OBSERVATION WELL		<input type="checkbox"/> IND INDUSTRIAL
<input type="checkbox"/> GS GAS WELL		<input type="checkbox"/> MIN MINING
<input checked="" type="checkbox"/> OP OIL PRODUCTION		<input type="checkbox"/> REC RECREATION
<input type="checkbox"/> MW MINERAL WELL		<input type="checkbox"/> MUN MUNICIPAL
<input type="checkbox"/> IN INJECTION		<input checked="" type="checkbox"/> OTH OTHER
<input type="checkbox"/> ER ENHANCED RECOVERY		
<input type="checkbox"/> DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME/OTHER NO H'S GUY #2

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
<input type="checkbox"/> WW WATER WELL	<input checked="" type="checkbox"/> ACT ACTIVE	<input type="checkbox"/> DOM DOMESTIC
<input type="checkbox"/> WA ARTESIAN WELL	<input type="checkbox"/> INA INACTIVE	<input type="checkbox"/> AGR AGRICULT.
<input type="checkbox"/> WS SPRING	<input type="checkbox"/> ABA ABANDONED	<input type="checkbox"/> LIV LIVESTOCK
<input type="checkbox"/> OW OBSERVATION WELL		<input type="checkbox"/> IND INDUSTRIAL
<input type="checkbox"/> GS GAS WELL		<input type="checkbox"/> MIN MINING
<input type="checkbox"/> OP OIL PRODUCTION		<input type="checkbox"/> REC RECREATION
<input type="checkbox"/> MW MINERAL WELL		<input type="checkbox"/> MUN MUNICIPAL
<input type="checkbox"/> IN INJECTION		<input checked="" type="checkbox"/> OTH OTHER
<input checked="" type="checkbox"/> ER ENHANCED RECOVERY		
<input type="checkbox"/> DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW	NE SE SW NW	NE SE SW NW	NE SE SW NW
10 acre	40 acre	160 acre	320 acre

SECT. 32 TOWNSHIP 31 N RANGE 16 W

APPROXIMATE LOCATION 210 MILES WEST OF FAIRMINGTON

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES [Chimney Rock]

RADIUS OF INFLUENCE: () 12 16 14 10 FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO THOR'S E'S HOLE "GRAVELL" UPP. UNIT 1-1

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	() ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	(X) INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME OTHER NO H'S G U = 42

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	(X) ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	() INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		(X) OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW	(NE) SE SW NW	(SE) SW NW	<u>312</u>	<u>31 N</u>	<u>16 W</u>
10 acre	40 acre	160 acre	SECT.	TOWNSHIP	RANGE

APPROXIMATE LOCATION 210 MILES S.W. SITE OFF OF AIRMINGTON

--

LATITUDE _____ LONGITUDE _____

UTM COORDINATES: X(east) _____ Y(north) _____ ZONE _____

DISTANCE FROM INJECTION WELL:

111200 Ft. (X) N _____ Ft. (Y) E (X) W

LEGAL CONTACT: NAME _____

ADDRESS _____

COMPLETED: ____/____/____ TOTAL DEPTH: _____ FT. FROM / S.

WORKOVERS: ____/____/____ : _____ PLUGGED: _____

1. CASING PERFORATED FROM _____ FT TO _____ FT OPENING TYPE _____

2. CASING PERFORATED FROM _____ FT TO _____ FT OPENING TYPE _____

3. CASING PERFORATED FROM _____ FT TO _____ FT OPENING TYPE _____

4. CASING PERFORATED FROM _____ FT TO _____ FT OPENING TYPE _____

5. CASING PERFORATED FROM _____ FT TO _____ FT OPENING TYPE _____

opening codes: f=fractured rock, l=lowered or slotted-type screen,
m=mesh screen, p=perforated, prous, slotted casing, r=wire-wound screen,
s=screen, type unknown, t=sand point, w=walled or shored, x=open hole,
z=other

REMEDIAL ACTION PROPOSED:

- () NR NO REMEDIAL ACTION PROPOSED
- () PP PROPER PLUGGING
- () CP OTHER PROPOSAL - SEE COMMENTS

COMMENTS:

See department well database for further information. Available
information for this well was submitted to your department in 1987.

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES Chimney Rock

RADIUS OF INFLUENCE: () (26) 400 FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO THORPE'S HOLE "GATE" LUP. UNIT 1-11

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
<input type="checkbox"/> WW WATER WELL	<input type="checkbox"/> ACT ACTIVE	<input type="checkbox"/> DOM DOMESTIC
<input type="checkbox"/> WA ARTESIAN WELL	<input checked="" type="checkbox"/> INA INACTIVE	<input type="checkbox"/> AGR AGRICULT.
<input type="checkbox"/> WS SPRING	<input type="checkbox"/> ABA ABANDONED	LIVESTOCK
<input type="checkbox"/> OW OBSERVATION WELL		<input type="checkbox"/> IND INDUSTRIAL
<input type="checkbox"/> GS GAS WELL		MINING
<input checked="" type="checkbox"/> OP OIL PRODUCTION		<input type="checkbox"/> REC RECREATION
<input type="checkbox"/> MW MINERAL WELL		<input type="checkbox"/> MUN MUNICIPAL
<input type="checkbox"/> IN INJECTION		<input type="checkbox"/> OTH OTHER
<input type="checkbox"/> ER ENHANCED RECOVERY		
<input type="checkbox"/> DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME OTHER NO THIS GUY = 65

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
<input type="checkbox"/> WW WATER WELL	<input type="checkbox"/> ACT ACTIVE	<input type="checkbox"/> DOM DOMESTIC
<input type="checkbox"/> WA ARTESIAN WELL	<input checked="" type="checkbox"/> INA INACTIVE	<input type="checkbox"/> AGR AGRICULT.
<input type="checkbox"/> WS SPRING	<input type="checkbox"/> ABA ABANDONED	LIVESTOCK
<input type="checkbox"/> OW OBSERVATION WELL		<input type="checkbox"/> IND INDUSTRIAL
<input type="checkbox"/> GS GAS WELL		MINING
<input type="checkbox"/> OP OIL PRODUCTION		<input type="checkbox"/> REC RECREATION
<input type="checkbox"/> MW MINERAL WELL		<input type="checkbox"/> MUN MUNICIPAL
<input type="checkbox"/> IN INJECTION		<input type="checkbox"/> OTH OTHER
<input checked="" type="checkbox"/> ER ENHANCED RECOVERY		
<input type="checkbox"/> DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW	NE SE SW NW	NE SE SW NW	<u>313</u>	<u>T31N</u>	<u>R16W</u>
10 acre	40 acre	160 acre	SECT.	TOWNSHIP	RANGE

APPROXIMATE LOCATION 1200 MILES WEST OF FAIRMINGTON

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES Chimney Rock

RADIUS OF INFLUENCE: () 26400 FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO THOR'S E'S HOLE (GATELUMP) UNIT 1

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	() ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	(X) INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME OTHER NO HIS GULF 296

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	(X) ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	() INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW	NE (SE) SW NW	NE (SE) SW NW	32	T31N	R16W
10 acre	40 acre	160 acre	SECT.	TOWNSHIP	RANGE

APPROXIMATE LOCATION 1200' MILES S' WEST TO FARM IN N

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES [Chimney Rock]

RADIUS OF INFLUENCE: () 1206400 FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/OTHER NO [HORSESHOE GRASSLAND UNIT #1]

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	() ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	(X) INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME/OTHER NO [HISIGU #49]

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	(X) ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	() INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW/NE SE (SW) NW NE (SE) SW NW [3]2 [T31N] [R16W]
10 acre 40 acre 160 acre SECT. TOWNSHIP RANGE

APPROXIMATE LOCATION [270' MILLERS' WERSIT OFF FAIRMINGTON]

— 45 —

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES Chimney Rock

RADIUS OF INFLUENCE: () 2' 6' 4' 0' FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO HIORESSES HIOE GALLUP UNIT 1-11

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	() ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	(X) INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME/OTHER NO HISGU 1-2' 0' 8'

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	(X) ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	() INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW/NE SE (SW) NW/NE SE (SW) NW 313 T 31 N R 16 W
10 acre 40 acre 160 acre SECT. TOWNSHIP RANGE

APPROXIMATE LOCATION 2' 0' 11" MILLERS' WEBSITE OFF FAIRMINGTON

--
[] [] [] [] [] [] LATITUDE [] [] [] [] [] [] LONGITUDE [] [] [] [] [] []

UTM COORDINATES: X(east) [] [] [] [] [] [] Y(north) [] [] [] [] [] [] ZONE [] []

DISTANCE FROM INJECTION WELL:

[] [] [] [] [] [] Ft. () N () S [] [] [] [] [] [] Ft. (X) E () W

LEGAL CONTACT: NAME (AMERICAN OVERSEAS DEVELOPMENT CORPORATION) [] [] [] [] [] []

ADDRESS P.O. BOX 116110 [] [] [] [] [] []

COMPLETED: ___/___/___ TOTAL DEPTH: [] [] [] [] [] [] FT. FROM / S.

WORKOVERS: ___/___/___ ; ___/___/___ PLUGGED: ___/___/___

1. CASING PERFORATED FROM [] [] [] [] [] [] FT TO [] [] [] [] [] [] FT OPENING TYPE []

2. CASING PERFORATED FROM [] [] [] [] [] [] FT TO [] [] [] [] [] [] FT OPENING TYPE []

3. CASING PERFORATED FROM [] [] [] [] [] [] FT TO [] [] [] [] [] [] FT OPENING TYPE []

4. CASING PERFORATED FROM [] [] [] [] [] [] FT TO [] [] [] [] [] [] FT OPENING TYPE []

5. CASING PERFORATED FROM [] [] [] [] [] [] FT TO [] [] [] [] [] [] FT OPENING TYPE []

opening codes: f=fractured rock, l=louvered or shutter-type screen,
m=mesh screen, p=perforated, prous, slotted casing, r=wire-wound screen,
s=screen, type unknown, t=sand point, w=walled or shored, x=open hole,
z=other

REMEDIAL ACTION PROPOSED:

- () NR NO REMEDIAL ACTION PROPOSED
- () PP PROPER PLUGGING
- () OP OTHER PROPOSAL - SEE COMMENTS

COMMENTS:

See department well database for further information. Available
information for this well was submitted to your department in 1987.

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES Chimney Rock

RADIUS OF INFLUENCE: 2640 FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO HIORESSES HIGER GALLUP UNIT #1

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
<input type="checkbox"/> WW WATER WELL	<input type="checkbox"/> ACT ACTIVE	<input type="checkbox"/> DOM DOMESTIC
<input type="checkbox"/> WA ARTESIAN WELL	<input checked="" type="checkbox"/> INA INACTIVE	<input type="checkbox"/> AGR AGRICULT.
<input type="checkbox"/> WS SPRING	<input type="checkbox"/> ABA ABANDONED	<input type="checkbox"/> LIV LIVESTOCK
<input type="checkbox"/> OW OBSERVATION WELL		<input type="checkbox"/> IND INDUSTRIAL
<input type="checkbox"/> GS GAS WELL		<input type="checkbox"/> MIN MINING
<input checked="" type="checkbox"/> OP OIL PRODUCTION		<input type="checkbox"/> REC RECREATION
<input type="checkbox"/> MW MINERAL WELL		<input type="checkbox"/> MUN MUNICIPAL
<input type="checkbox"/> IN INJECTION		<input type="checkbox"/> OTH OTHER
<input type="checkbox"/> ER ENHANCED RECOVERY		
<input type="checkbox"/> DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME OTHER NO HISGUP #290

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
<input type="checkbox"/> WW WATER WELL	<input checked="" type="checkbox"/> ACT ACTIVE	<input type="checkbox"/> DOM DOMESTIC
<input type="checkbox"/> WA ARTESIAN WELL	<input type="checkbox"/> INA INACTIVE	<input type="checkbox"/> AGR AGRICULT.
<input type="checkbox"/> WS SPRING	<input type="checkbox"/> ABA ABANDONED	<input type="checkbox"/> LIV LIVESTOCK
<input type="checkbox"/> OW OBSERVATION WELL		<input type="checkbox"/> IND INDUSTRIAL
<input type="checkbox"/> GS GAS WELL		<input type="checkbox"/> MIN MINING
<input checked="" type="checkbox"/> OP OIL PRODUCTION		<input type="checkbox"/> REC RECREATION
<input type="checkbox"/> MW MINERAL WELL		<input type="checkbox"/> MUN MUNICIPAL
<input type="checkbox"/> IN INJECTION		<input type="checkbox"/> OTH OTHER
<input type="checkbox"/> ER ENHANCED RECOVERY		
<input type="checkbox"/> DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW	NE SE SW NW	<u>14</u>	<u>130N</u>	<u>16W</u>
10 acre	40 acre	SECT.	TOWNSHIP	RANGE

APPROXIMATE LOCATION 210 MILES S W E S T 10 F 1 F A I R M I N G T O N

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES [Chimney Rock]

RADIUS OF INFLUENCE: () (2) (6) (4) (0) FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO [HORSESHOE GALLUP UNIT #1]

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	() ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	(X) INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME OTHER NO [H'S G U #219]

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	() ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	(X) INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
() OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
(X) ER ENHANCED RECOVERY		
() DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW/NE SE SW (NW) (NW) 14 [T] 30 N [R] 16 W
 10 acre 40 acre 160 acre SECT. TOWNSHIP RANGE

APPROXIMATE LOCATION [20] MILES WEST OF [FAIRMINGTON]

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES Chimney Rock

RADIUS OF INFLUENCE: () (2) (6) (4) (0) FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO H10 R S E S H O T E I G A L L U P U N I T # 1

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
<input type="checkbox"/> WW WATER WELL	<input type="checkbox"/> ACT ACTIVE	<input type="checkbox"/> DOM DOMESTIC
<input type="checkbox"/> WA ARTESIAN WELL	<input checked="" type="checkbox"/> INA INACTIVE	<input type="checkbox"/> AGR AGRICULT.
<input type="checkbox"/> WS SPRING	<input type="checkbox"/> ABA ABANDONED	LIVESTOCK
<input type="checkbox"/> OW OBSERVATION WELL		<input type="checkbox"/> IND INDUSTRIAL
<input type="checkbox"/> GS GAS WELL		MINING
<input checked="" type="checkbox"/> OP OIL PRODUCTION		<input type="checkbox"/> REC RECREATION
<input type="checkbox"/> MW MINERAL WELL		<input type="checkbox"/> MUN MUNICIPAL
<input type="checkbox"/> IN INJECTION		<input type="checkbox"/> OTH OTHER
<input type="checkbox"/> ER ENHANCED RECOVERY		
<input type="checkbox"/> DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME OTHER NO H1 S G U # 2 2 0

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
<input type="checkbox"/> WW WATER WELL	<input checked="" type="checkbox"/> ACT ACTIVE	<input type="checkbox"/> DOM DOMESTIC
<input type="checkbox"/> WA ARTESIAN WELL	<input type="checkbox"/> INA INACTIVE	<input type="checkbox"/> AGR AGRICULT.
<input type="checkbox"/> WS SPRING	<input type="checkbox"/> ABA ABANDONED	LIVESTOCK
<input type="checkbox"/> OW OBSERVATION WELL		<input type="checkbox"/> IND INDUSTRIAL
<input type="checkbox"/> GS GAS WELL		MINING
<input checked="" type="checkbox"/> OP OIL PRODUCTION		<input type="checkbox"/> REC RECREATION
<input type="checkbox"/> MW MINERAL WELL		<input type="checkbox"/> MUN MUNICIPAL
<input type="checkbox"/> IN INJECTION		<input type="checkbox"/> OTH OTHER
<input type="checkbox"/> ER ENHANCED RECOVERY		
<input type="checkbox"/> DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW/NE SE SW NW/NE SE SW NW 4 T 3 0 N R 1 6 W
10 acre 40 acre 160 acre SECT. TOWNSHIP RANGE

APPROXIMATE LOCATION 210' MILLERS' WEST 11' OFF FARM MINING TO N

TRIBAL INJECTION WELL RECORD
RADIUS OF ENDANGERING INFLUENCE FILE

WUPS #

NAME OF USGS TOPO MAP ATTACHED WITH SURFACE FEATURES [Chimney Rock]

RADIUS OF INFLUENCE: () 2640 FT.

ALL WELLS IN PROJECT AREA: See USGS Map

TRIBAL WELL NO PWSID

WELL NAME/WUPS NO [HORSSESHOE GALLUP TOWNSHIP]

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	() ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	(X) INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
(X) OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
() ER ENHANCED RECOVERY		
() DH DRY HOLE		

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO PWSID

WELL NAME OTHER NO [HISGU 28]

<u>WELL TYPE</u> (MARK ONE ONLY)	<u>WELL STATUS</u> (MARK ONE ONLY)	<u>WELL USE</u> (MARK ONE ONLY)
() WW WATER WELL	() ACT ACTIVE	() DOM DOMESTIC
() WA ARTESIAN WELL	(X) INA INACTIVE	() AGR AGRICULT.
() WS SPRING	() ABA ABANDONED	LIVESTOCK
() OW OBSERVATION WELL		() IND INDUSTRIAL
() GS GAS WELL		MINING
() OP OIL PRODUCTION		() REC RECREATION
() MW MINERAL WELL		() MUN MUNICIPAL
() IN INJECTION		() OTH OTHER
(X) ER ENHANCED RECOVERY		
() DH DRY HOLE		

QUAD NO MILES WEST MILES SOUTH

NE SE SW NW NE SE SW (NW) (NE) SE SW NW 5 T30N R16W
10 acre 40 acre 160 acre SECT. TOWNSHIP RANGE

APPROXIMATE LOCATION [20] MILES WEST OF FAIRMOUNT N

—

WELL NAME/WUPS NO [H]O[R]S[E]S[H]O[E] [G]A[L]L[U]P [U]NIT [1]

WELL TYPE
(MARK ONE ONLY)

WELL STATUS
(MARK ONE ONLY)

WELL USE
(MARK ONE ONLY)

()WW WATER WELL
()WA ARTESIAN WELL
()WS SPRING
()OW OBSERVATION WELL
()GS GAS WELL
(X)OP OIL PRODUCTION
()MW MINERAL WELL
()IN INJECTION
()ER ENHANCED RECOVERY
()DH DRY HOLE

() ACT ACTIVE
(X) INA INACTIVE
() AEA ABANDONED

() DOM DOMESTIC
() AGR AGRICULT.
LIVESTOCK
() IND INDUSTRIAL
MINING
() REC RECREATION
() MUN MUNICIPAL
() OTH OTHER

ALL WELLS PENETRATING INJECTION ZONE WITHIN RADIUS OF INFLUENCE:

TRIBAL WELL NO _____ PWSID _____

WELL NAME OTHER NO. HIS GU # 1219

WELL TYPE
(MARK ONE ONLY)

WELL STATUS
(MARK ONE ONLY)

WELL USE
(MARK ONE ONLY)

() WW WATER WELL
() WA ARTESIAN WELL
() WS SPRING
() OW OBSERVATION WELL
() GS GAS WELL
(X) OP OIL PRODUCTION
() MW MINERAL WELL
() IN INJECTION
() ER ENHANCED RECOVERY
() DH DRY HOLE

(X) ACT ACTIVE
() INA INACTIVE
() ABA ABANDONED

() DOM DOMESTIC
() AGR AGRICULTURE
LIVESTOCK
() IND INDUSTRIAL
MINING
() REC RECREATION
() MUN MUNICIPAL
() OTH OTHER

QUAD NO. 1111 MILES WEST 111111

MILES SOUTH 10.00

NE SE SW NW NE SE SW NW 15
10 acre 40 acre 160 acre SECT

T 30 N
TOWNSHIP

R 16 W
RANGE

APPROXIMATE LOCATION 120 MILES WEST OF FAIRMINGTON

WELL SCHEMATIC

ATTACHMENT 4

Operator ARCO Oil and Gas Company
 Completion Date: 9/24/58

Well Name: Horseshoe Gallup Well # 1
660 Ft. F S L & 417 Ft. F E L
SE 1/4 Section 32 Twp. 31N Rg. 16W

Surface Elevation 5500'

Formation(s) Top/Bottom
 from PBTD to surface:

Mancos Shale	0' / 1087'
Upper Gallup	1090' / 1128'
Mancos Shale	1129' / 1189'
Lower Gallup	1190' / 1233'
Mancos Shale	1234' /
	/
	/

Tubing Size: 2-3/8 In.
 Weight: 4.7 lb./Ft.
 Length: 1060 Ft.

Packer Type: AD-1 Tension Pkr
 Set at: +1060 Ft.

Formation(s) perforated above
 packer:

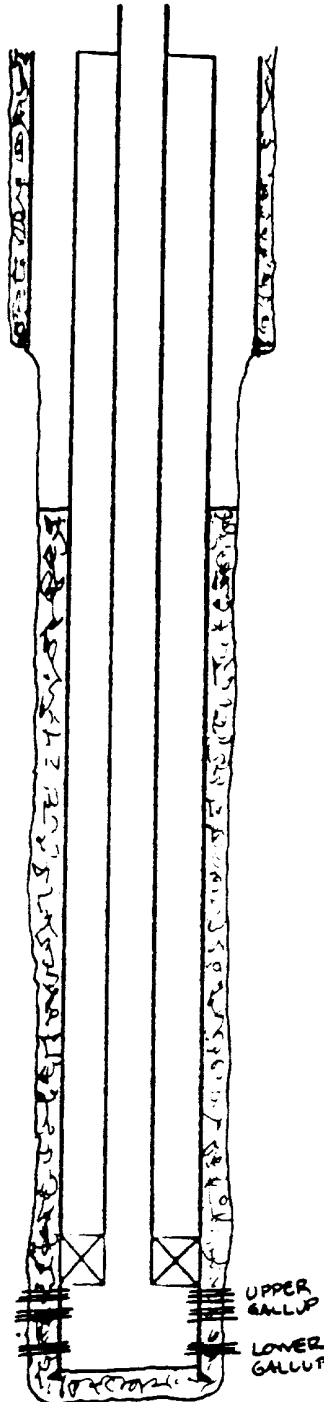
None _____ ' to _____ '
 _____ ' to _____ '

Formation(s) perforated below packer:

Upper Gallup	1091' to 1094'
Upper Gallup	1099' to 1128'
Lower Gallup	1192' to 1233'

Open hole below production casing
 from N/A ' to _____ '

Formation(s) present in open hole:
N/A



SURFACE CASING DATA

Hole Size: 12-1/4 In.
 Casing Size: 8-5/8 In.
 Weight: 24 lb./Ft.
 Length: 137.99 Ft.
 Cement Type: Class Common
 Amount: 75 Sx.
 Additives: _____
 Casing set at: 137.99 Ft.
 Top of Cement: 0 Ft.
 Method of
 Determination: Circulated

PRODUCTION CASING DATA

Hole Size: _____ In.
 Casing Size: 5-1/2 In.
 Weight: 14 lb./Ft.
 Length: 1285.15 Ft.
 Cement Type: Class reg. pozmix
 Amount: 150 Sx.
 Additives: _____
 Casing Set at: 1285.15 Ft.
 Top of Cement: 450 Ft.
 Method of
 Determination: Calculation

PBTD: 1252'
 TD: 1285'

NOTE: All depths are to be from ground level. If KB depths are used make notations on diagram & give height of KB above ground level.

(Place "X" in proper space above. After TD is reached, if well is plugged back carry TD and Plugged Back Depth, each tour.)

OUR NO.	DEPTH		FORMATION OR CORE CORE INTERPRETATION MUST BE SIGNED	DATA AT END OF TOUR		
	FROM	TO		TOUR 1	TOUR 2	TOUR 3
			Finished rigging up	DRILL PIPE IN USE: SIZE	4 1/2	4 1/2
2	107	143	Spudded @ 10:30 AM 9-9-58	LENGTH DRILL COLLARS	63-	65.20
			104 SHALE + SAND	LENGTH DRILL PIPE	90 1/4	59.52
				KELLY DOWN	15	18.00
				TOTAL IN HOLE	107	142.72
				DRILL BIT: SERIAL NO.	RT 1124	RT 12
				DRILL BIT: NUMBER	7	1
				MAKE	HTC	HTC
				TYPE	OSC	OSC
				CORE BARREL: KIND		
				SIZE		
				CORE BIT: SERIAL NO.		
				CORE BIT: NUMBER		
				KIND		
				SIZE		
				STRAIGHT HOLE TEST AT		143
				DEGREES OFF		1/4
				MUD MATERIAL: KIND	AMOUNT	AMOUNT
				1		
				2		
				3		
				CHEMICAL: KIND	AMOUNT	AMOUNT
				1		
				2		
				3		
				4		
				MUD TYPE		
				MUD WEIGHT		
				VISCOSITY: 1500 cc IN 1 quart OUT		
				PH		
				WATER LOSS: cc		
				FILTER CAKE	1/2"	1/2"
				FOR COMPANY REPRESENTATIVE ONLY		
				DRILLING		
				CORING		
				DST. OPEN HOLE		
				LOGGING		
				CASING & WOC		
				DOWNTIME		
				COMPLETING		
				LOSS CIRCULATION		
				FISHING		
				CO. TIME w/DP		
				CO. TIME w/o /DP		

CO. TIME W/S /DP

Concise explanation of all delays and reasons therefor SHALL be indicated by each driller and verified by Company representative. Time chargeable to Company on day rate basis SHALL be fully explained.

TOUR No. 1 FROM 7:00 A.M. TO 3:00 P.M. DRILLING HRS. TRIPPING HRS. REPAIRS HRS. OTHER

TOUR No. 2 FROM 7:00 AM TO 10:30 PM DRILLING HRS. TRIPPING HRS. REPAIRS HRS. OTHER:
7:00 T. 10:30 P. Running up & Date R-T Hole Spudded @ 10:30 A.M. 10:30 To 3:00 Dn/g. 12%

TOUR No. 3 FROM 300' X TO 1100' X DRILLING 2 HRS. TRIPPING 1/2 HRS. REPAIRS HRS. OTHER 5 1/2
D.R. 2 HRS. drilled out of hole 1/2 RUN (4-5) 8RD Th 1 85/4-COR SF
@ 12799.3 K.B. CEMENTED w/ 75 SK. plus 2 1/2 C2H5O2.
plug DOWN 1600-1100. 1600 TAIL 1100
SIGNED E. H. Caballero DRILLER

COMPANY REPRESENTATIVE: Accuracy and Completeness are your responsibility. SIGNED D. D. Kelly
 Tabulate drilling time, when taken, on Form JB-744 and mail with this form. Note depth each time bit pulled and reason for pulling and depth sharp bit run.
 INDICATE DATE AND HOUR RIG RELEASED AND MARK LAST REPORT "FINAL".
 IMPORTANT: ALL APPLICABLE SPACES MUST BE FILLED BEFORE MAILING. REPORT TO BE MAILED EACH DAY 20 12-1964

Cementing Records for Long String Casing

UNIT or LEASE Navajo TRACT _____ WELL NO. 1 DATE 7-15-58
Name to be same as shown in permit to drill Designation _____
FIELD Horse Shoe Gallup CONTRACTOR Barrow Drilling
SIZE HOLE 7 7/8 REDUCED AT 143 KIND OF TOOLS Power Rotaries
KIND OF FUEL Butane FURNISHED BY Conrail FROM _____ NO. OF HOURS 26
WATER FURNISHED BY Conrail FROM _____ NO. OF HOURS 24

CO. TIME W/O. 127

Concise explanation of all delays and reasons therefor SHALL be indicated by each driver and vanned by Company representative. Time chargeable to Company on day rate basis SHALL be fully explained.

TOUR No. 2 FROM _____ M TO _____ M DRILLING _____ HRS. TRIPPING _____ HRS. REPAIRS _____ HRS. OTHER _____

TOUR No. 3 FROM _____ M TO _____ M DRILLING _____ HRS. TRIPPING _____ HRS. REPAIRS _____ HRS. OTHER _____
300' TO 115' RUN Temp Test - TOP Cement 450' T.D. 1249

WOC

SIGNED *Ernest H. Chelant* DRILLER

SIGNED

COMPANY REPRESENTATIVE: Accuracy and Completeness are your responsibility. SIGNED _____
 Tabulate drilling time, when taken, on Form JB-744 and mail with this form. Note depth each time bit pulled and reason for pulling and depth sharp bit reached.
 DISEASED AND MARK LAST REPORT "FINAL" _____

INDICATE DATE AND HOUR RIG RELEASED AND MARK LAST REPORT "FINAL".
IMPORTANT: ALL APPLICABLE SPACES MUST BE FILLED BEFORE MAILING. R

REPORT TO BE MAILED EACH DAY

3B-128-4-57

[illegible][illegible]

SECRET

Permit # _____

Well Completion and Operation Data

Type Injection Well: (EOR/~~SAO/HC Storage~~) (~~NEW~~/Conversion)Injection: (Continuous/~~Cyclic~~)

Approximate # days operating/year 365
 Rate (B/D): Average 300 Maximum 500
 Wellhead pressure (psi): Average 800 Maximum 900
 Fluid: TDS 11100 ppm Sp. Gr. 1.008 Analyses included: (yes/~~no~~)
 Source (formation name) Gallup and Morrison (Make-Up Water)
 Will anything be added to the water to be injected? (~~yes~~/no)
 What will those additives be? N/A

Geologic Data (all references to depths are below land surface)

Injection Interval: Top 1091 ; Bottom 1233 ; Effective Thickness Net 76'
 Formation name U.P. & Lower Gallup Lithology See Attachment 6
 Porosity (%) _____ Current Reservoir Pressure _____ Date _____
 Current Fluid Level in Well _____ ft. Date _____
 Permeability (md) _____
 Drill Stem Test Included: (~~YES~~) (NO)

Confining Zones: Thickness between injection zone and USDW Mancos Shale (No USDW) is conf. z
 Lithology See Attachment 6
 Cumulative shale 1089 ; thickest shale zone 1089 (interval)
 Faults: Are there any faults in the area of the well which penetrate the injection interval? (~~YES~~) (No)

Well Data: (all references to depths are below land surface)

Surface Elevation: 5500 (KB/GL) Total (Depth/Plugged Back Depth) 1252
 Date Drilled or to be drilled 9/24/58
 Type logs available on (this well/offset well): (By reference/included None Available)

Construction:	Size (in)	Depth Interval	Sacks of Cement	Hole Size	Cement Interval	How Determined
Surface Csg.	<u>8-5/8</u>	<u>137.99</u>				
Intermediate Csg.	<u>5-1/2</u>	<u>1285.15</u>				
Long String Csg.						
Liner						
Tubing	<u>2-3/8</u>	<u>1060</u>				

← See Well Schematic for Data →
 Facker type and depth A-D 1060

Other Perforated Intervals None

CDS LABORATORIES
SUTTLE STREET
BOX 2605
RANGO, CO 81302

ARCO OIL & GAS COMPANY
ATTN: GLEN DORAN
1816 E. MOJAVE STREET
FARMINGTON, NM 87401

DATE SAMPLE TAKEN: 8/12/87 9:40 AM
DATE SAMPLE REC'D: 8/12/87
REMARKS:
SUBMITTED BY:
FIELD: HORSESHOE GALLUP
HGU B* LEASE
NO. 5
INJECTION BLEEDER
BEFORE METER

SEPTEMBER 3, 1987

S ID# 5626

CHEMICAL and PHYSICAL PROPERTIES

Total Hardness as CaCO₃ 265 Mg/L
Total Alkalinity as CaCO₃ 1140 Mg/L

CONSTITUENT	Mg/Liter	Meq/Liter
Sodium as Na ⁺	4560	198.36
Potassium as K ⁺	17	0.43
Calcium - Ca ⁺⁺	81.4	4.06
Magnesium -- Mg ⁺⁺	27.5	2.26
Iron Total - Fe ⁺⁺ & Fe ⁺⁺⁺	0.5	0.00
Barium - Ba ⁺⁺		0.00
Strontium Total		0.00
POSITIVE SUB-TOTAL	4686	205.12
Chloride-(Cl ⁻)	4640	130.85
Bicarbonate-(HCO ₃ ⁻)	1120	18.36
Sulfate-(SO ₄ ⁼)	1540	32.06
Carbonate-(CO ₃ ⁼)	132	4.40
Hypochlorite-(OH ⁻)	0	0.00
NEGATIVE SUB-TOTAL	7432	185.66
Total Dissolved Solids	11100 mg/L	
Total Suspended Solids	mg/L	
	8.47 units	
Specific Gravity	1.008 @ 73 F.	
Resistivity	64 ohm-cm	
Hardness	%	
Oil & Grease	mg/L	
Color	%	
DO	102mg/L	
PO ₄	132mg/L	
ALKALINITY TENDENCY - LANGELIER		
SATURATION INDEX @ 25 C	1.54	
API @ 25 C	14.7	

APPROVED BY: _____
DR. JOE ROWDEN, DIRECTOR

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CDS LABORATORIES
SUTTLE STREET
BOX 2605
RANGO, CO 81302

ARCO OIL & GAS COMPANY
ATTN GLEN DORAN
1816 E. MOJAVE STREET
FARMINGTON, NM 87401

R. R. R. R. R.
DATE SAMPLE TAKEN: 8/12/87 9:50 AM
DATE SAMPLE REC'D: 8/12/87
REMARKS:
SUBMITTED BY:
FIELD: HORSESHOE GALLUP B" LEASE
INJECTION WELL 17
CASING BLEEDER

PTENBER 3, 1987

S ID# 5625

CHEMICAL and PHYSICAL PROPERTIES

Total Hardness as CaCO₃ 342 Mg/L
Total Alkalinity as CaCO₃ 1240 Mg/L

CONSTITUENT	Mg/Liter	Meq/Liter
Sodium as Na ⁺	4110	178.78
Potassium as K ⁺	17	.43
Calcium - Ca ⁺⁺	81.4	4.06
Magnesium -- Mg ⁺⁺	27.5	2.26
Iron Total - Fe ⁺⁺ & Fe ⁺⁺⁺	1.5	0.00
Barium - Ba ⁺⁺		0.00
Sulfate Total		0.00
CHLORIDE SUB-TOTAL	4236	185.54
Chloride-(Cl ⁻)	4550	123.31
Bicarbonate-(HCO ₃ ⁻)	1200	19.67
Sulfate-(SO ₄ ⁼)	1900	39.56
Carbonate-(CO ₃ ⁼)	156	5.19
Hypochlorite-(OCl ⁻)	0	0.00

CHLORIDE SUB-TOTAL 7806 192.73

Total Dissolved Solids 11200 mg/L
Total Suspended Solids mg/L
Brix 8.34 units
Specific Gravity 1.008 @ 70 F.
Resistivity 64 ohm-cm
Hardness 342 mg/L
Oil & Grease mg/L
Color %
pH 7.4
Total Hardness 342 mg/L

ALKALINE TENDENCY (LANGELIER)
SATURATION INDEX @ 25 C 1.44
pH @ 25 C 7.4

APPROVED BY: _____
DR. JOE BOWDEN, DIRECTOR

*These are the
results of the anal-
yses of water
samples taken
at HGH.
Glen*

This Laboratory report may not be published or used for
advertising or in connection with advertising of any kind
without prior written permission from CDS Laboratories.
Results are based on analysis made at the time samples

5 LABORATORIES
SUTTLE STREET
BOX 2605
PANGO, CO 81302

ARCO OIL & GAS COMPANY
ATTN: GLEN DORAN
1816 E. MOJAVE STREET
FARMINGTON, NM 87401

DATE SAMPLE TAKEN: 8/12/87 9:13 AM
DATE SAMPLE REC'D: 8/12/87
REMARKS:
SUBMITTED BY:
FIELD: HORSESHOE GALLUP
HGU B* LEASE
WATER PLANT
#1 PUMP DISCHARGE

SEPTEMBER 3, 1987

S ID# 5627

CHEMICAL and PHYSICAL PROPERTIES

Total Hardness as CaCO₃ 325 Mg/L
Total Alkalinity as CaCO₃ 1360 Mg/L

CONSTITUENT	Mg/Liter	Meq/Liter
Sodium as Na ⁺	4720	205.32
Potassium as K ⁺	17.2	.44
Calcium - Ca ⁺⁺	70.4	3.51
Magnesium -- Mg ⁺⁺	27.5	2.26
Iron Total - Fe ⁺⁺ & Fe ⁺⁺⁺	1.5	0.00
Strontium - Sr ⁺⁺		0.00
Barium Total		0.00

POSITIVE SUB-TOTAL 4835 211.53

Chloride-(Cl ⁻)	5120	144.36
Carbonate-(HCO ₃ ⁻)	1340	21.96
Sulfate-(SO ₄ ⁼)	1640	34.14
Carbonate-(CO ₃ ⁼)	156	5.19
Hydroxide-(OH ⁻)		0.00

NEGATIVE SUB-TOTAL 8156 205.55

Total Dissolved Solids 11700 mg/L
Total Suspended Solids mg/L
Total Solids 2.44 units
Specific Gravity 1.008 @ 70 F.
Resistivity 51 ohm-cm
pH 7
Oil & Grease mg/L
Color
DO 30mg/L
BOD 150mg/L

SLIING TENDENCY LANGELIER
SATURATION INDEX @ 25 C 1.51
pH @ 25 C 7.71

APPROVED BY: _____
DR. JOE BOWDEN, DIRECTOR

This Laboratory report may not be published or used for
advertising or in connection with advertising of any kind
without prior written permission from COS Laboratories.
Results are based on analysis made at the time samples

HORSESHOE GALLUP UNIT #1

CONVERSION PROCEDURE

1. MIRU pulling unit.
2. POH w/rods and pump. POH w/tbg.
3. RIH w/cone bit and csg scraper. Clean out to PBTD at 1252'. POH tbg, csg scraper and bit.
4. RIH w/2-3/8" tbg and Baker Mode "AD-1" tension pkr at 1060'.
5. Hook up wellhead, flow meters, injection lines; and valves for reading both injection pressures.

NOTE: Existing casing and cementing, as described in the Construction Procedure File and Attachments 3B, are sufficient to satisfy application requirements. Attachments 4A and 4B are the original cementing records. As the regulation in 40 CFR 146.22(c) provides, where no USDW is endangered and the casing/cementing conforms with rules that existed at the time the well was completed, the casing/cementing will be satisfactory to comply with the UIC regulations.

HORSESHOE GALLUP UNIT #1

GEOLOGY AND HYDROGEOLOGY

Enclosed here is a narrative description and diagrams describing the geology and hydrogeology of the Horseshoe Gallup Field's area. The injection zone, the confining strata, and other overlaying strata are included. Based on the information supplied here in these Attachments and the geological literature supporting the attachments, it is clear no Underground Source of Drinking Water (USDW), as defined in 40 CFR 144.3 and 146.02, exists in the area of concern.

Geologic and Hydrogeological Attachments

- 2A - Narrative description on geology of area and determination of no USDW in the area by ARCO geologist, Jim Perkins.
- 2B - Basis for fracture gradient of injection zone by ARCO reservoir engineer, Bill Severns. This data also supports the injection pressure at which the well will operate.
- 2C - Large view of cross section index of San Juan Basin, showing location of cross section diagram is ATTACHMENT 2D.
- 2D - Regional Cross Section of geology near Horseshoe Gallup field.
- 2E - Cross Section of injection zone specifically showing HSGU #1.



Date: March 2, 1988

Subject: Use of ARCO's Navajo #1 (#1 Horseshoe Gallup) SE SE
32, T31N, R16W for injector well - Geologic
Discussion

From/Location: J. M. Perkins - MIO 1303 *Perkins*

Telephone:

To/Location: W. C. Severns - MIO 1325

In response to your request regarding the suitability of the #1 Navajo (#1 Horseshoe Gallup) as a water injection well, the following brief geologic discussion is presented. The electric log from the #1 Navajo (SE SE Section 32, T31N, R16W) shows that the well was spud in Tertiary-Quaternary units that are composed of interbedded sands, gravels and shales ranging from completely unconsolidated to well indurated. In this area these deposits are dissected and generally drained of groundwater, and are not considered a major source of water. These deposits overlie the Cretaceous Mancos shale in the area of this well and are estimated to be about 180 feet thick.

The Mancos Formation extends from about 180' to the Horseshoe Gallup pay, 1090' deep. Within this interval there are no water-bearing units. This unit, as it occurs in this area, is described in the USGS Water Supply Paper 1576-G (1966) as follows:

"The Mancos is relatively impermeable and is not a major aquifer....The Mancos serves as a thick confining layer over the Dakota and hence water in the Dakota is under artesian pressure" (p.G39)

Since the well in question does not penetrate the Dakota, there is little potential for contamination of this regional aquifer.

This well appears to be entirely suitable for water injection since 1.) The surface formations are discontinuous [and will, for the most part, be cased off from the injected water] and 2.) the upper Mancos shale is considered to be a confining, impermeable unit incapable of serving as an aquifer.

Please contact me if you need further information or assistance.

JP:jw

ARCO Oil and Gas Company

Internal Correspondence



Date: March 8, 1988

Subject: Fracture Gradient Horseshoe Gallup #1
Horseshoe Gallup Unit
San Juan County, New Mexico

From/Location: W. C. Severns - MIO 1325

Telephone: 688-5286

To/Location: C. T. Stilwell - MIO 1556

As you requested, I attempted to estimate the fracture gradient of the Gallup formation penetrated by the Horseshoe Gallup Unit #1. Horseshoe Gallup Unit #1 injection operations are proposed into the two sand bodies productive in the Horseshoe Gallup Unit: the upper and lower Gallup sands. Based on two step rate tests (one in upper Gallup and one in lower Gallup) performed in 1983, the fracture gradient should be between 1.05 and 1.10 psi/ft. These are the most recent step rate tests. However, please be aware that since 1986 field operations have changed significantly with many producers and injectors being shut-in. These changes may have affected reservoir pressure and as formation parting pressure is a function of reservoir pressure, it too may have been affected.

Also, attached is a memo from J. M. Perkins, ARCO geologist, stating that no major fresh water sources are penetrated by the Horseshoe Gallup Unit #1. Based on my understanding gained from our past conversations, this minimal risk of ground water contamination may make an exact fracture gradient value unnecessary.

If you have any questions, please call me.

W. C. Severns
Engineer

WCS/lal
Attachment

cc: J. H. Roam - MIO 1302
S. M. O'Malley - MIO 1315
P. D. Willette - MIO 1308
J. M. Perkins - MIO 1303

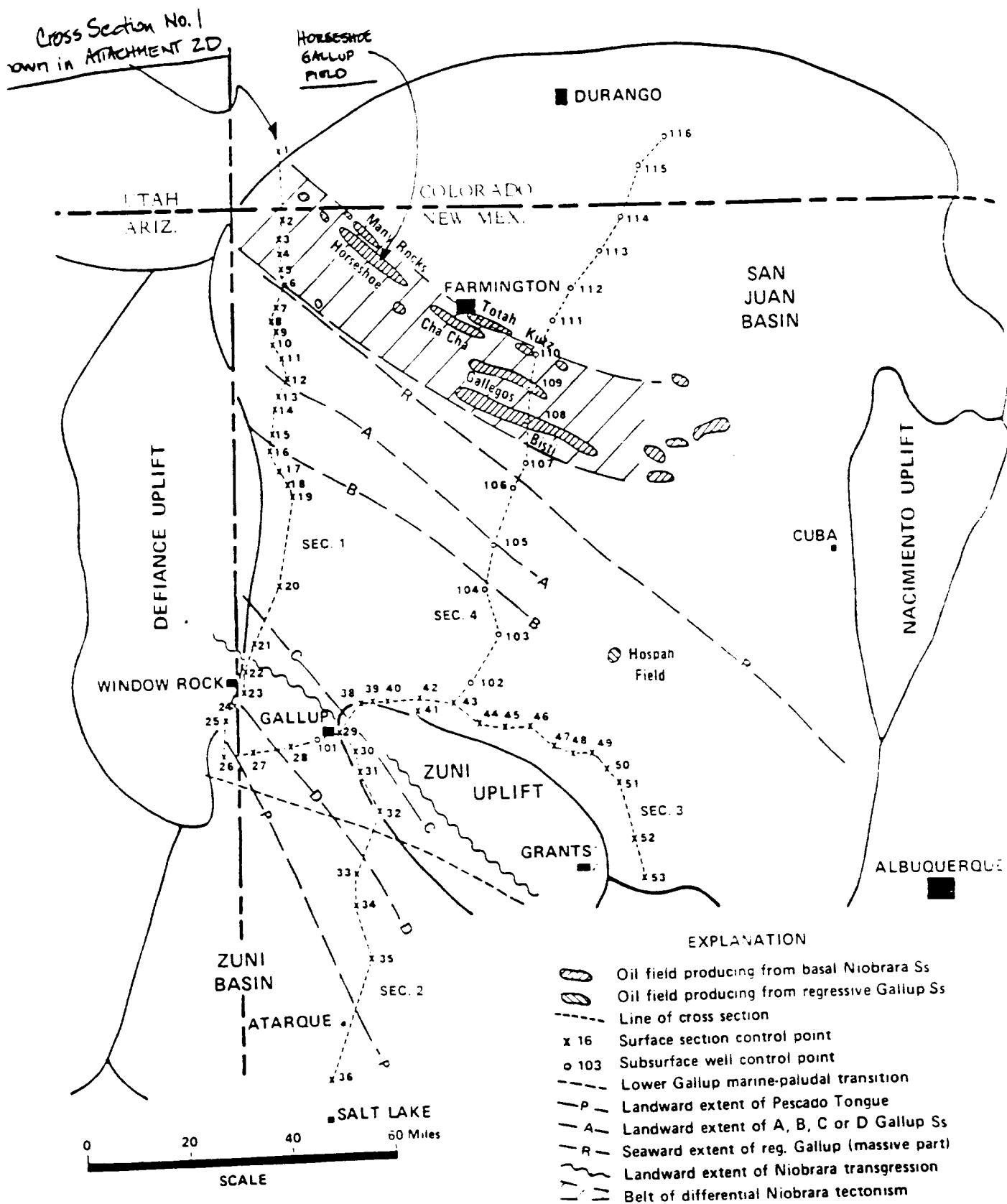
RECEIVED

MAR 16 1988

Environmental Safety & Training

FOUR CORNERS GEOLOGICAL SOCIETY MEMOIR BOOK

32



C. M. Molenaar 1973

Fig. 7 Cross section index and facies trend map.

APPLY TO ALL		SPECIAL	
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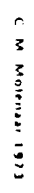
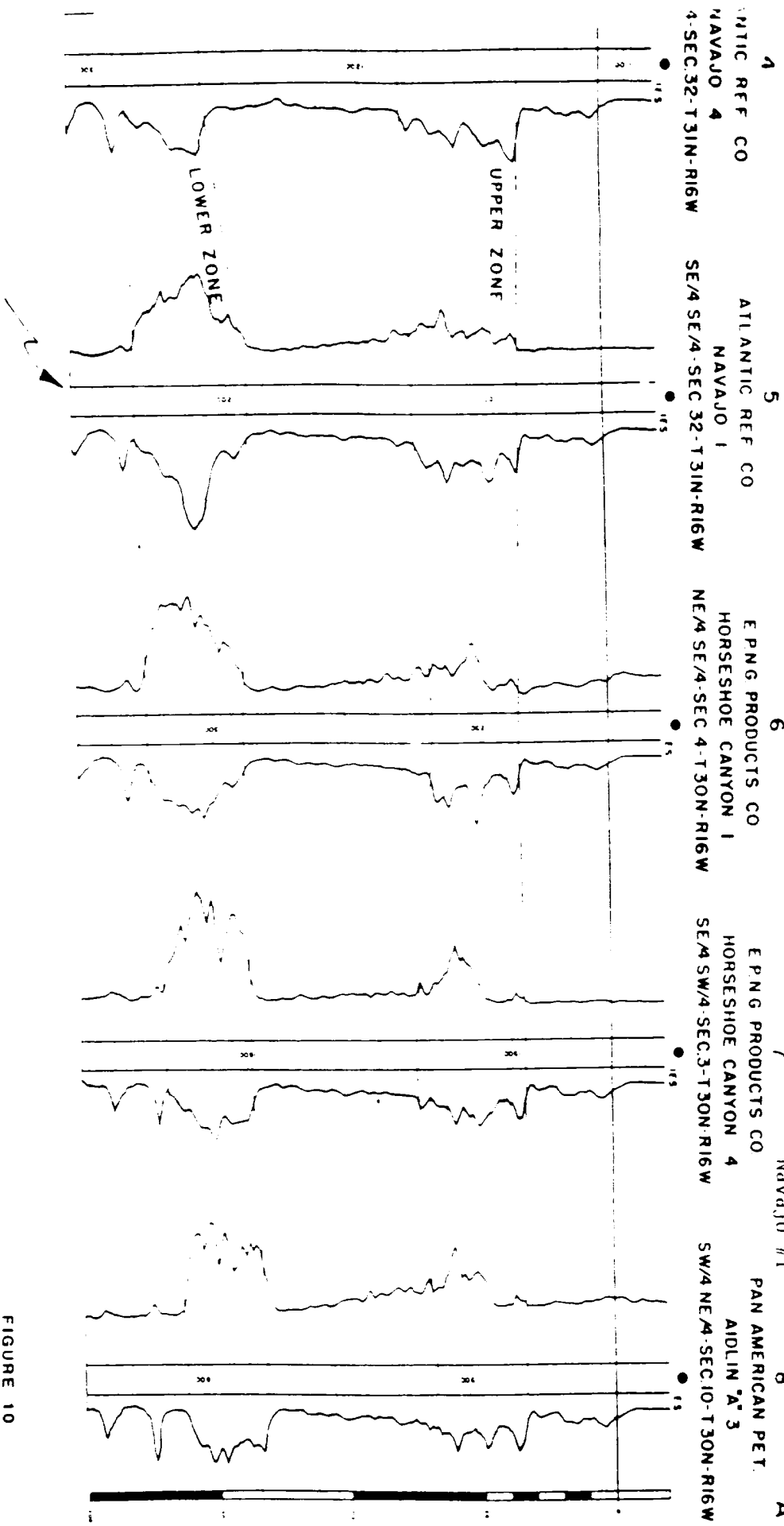


Fig. 8 Cross section No. 1: West side of San Juan Basin.

Cross Section of Injection Zone
Horseshoe Gallup #1 Originally Named Navajo #1



Cross Section of Horseshoe Gallup Unit #1
(originally named Navajo Well #1)

ATICO Oil and Gas Company Central District Midland, Texas Division of Exploration	
HORSESHOE-GALLUP UNIT San Juan Co., New Mexico	
LONGITUDINAL CROSS-SECTION A-A'	
CROSS-SECTION TRACES SHOWN ON FIG. 7	
Date Drawn By Checked By Date	Date Drawn By Checked By Date

ATTACHMENT 8

HORSESHOE GALLUP #1 WELL

VERIFICATION OF NOTICE GIVEN TO LANDOWNER

As required by 40 CFR 147.3002, notice was sent to the Navajo Indian Tribe, which is the sole surface and mineral owner in the area. This notice was in the form of a letter to The Navajo Nation, at the address below:

The Navajo Nation
Navajo EPA
P.O. Box 308
Window Rock, Navajo Nation Arizona

No tenants or operators other than ARCO are within one-half mile of the HSGU #1 Well. At the suggestion of Mr. Raymond Roessel of the UIC Department of the Navajo EPA, the notice was sent to the Navajo EPA.

HORSESHOE GALLUP #1

ALTERNATIVE PROOF OF MECHANICAL INTEGRITY

1. To demonstrate there is no significant fluid movement through channels adjacent to the well bore, enclosed are cementing records (Attachment 4A). This demonstration is sufficient to satisfy the regulatory requirement, as stated in 40 CFR 146.08, because of the fact no Underground Source of Drinking Water (as defined in UIC regulations, see ATTACHMENT 6 for proof) exists near the HSGU #1 Well.
2. To demonstrate there are no significant leaks in the casing, tubing or packer, monitoring will be performed showing the absence of significant changes in the relationship between injection pressures and low injection low rate as allowed by 40 CFR 146.08(b)(3). Additionally, the casing-casing annulus pressure will be monitored. This "Bradenhead" monitoring is currently being done successfully in existing injection wells in the Horseshoe Gallup Field. See the specific monitoring procedures below.

This demonstration, with no initial annulus pressure test, is justified because no USDW exists as explained in ATTACHMENT 6.

MONITORING PROCEDURES

1. The casing-casing annulus pressure, injection pressures, and injection flow rates will be recorded weekly by the operator in the field. More frequent observations of the well will be made on the operator's routine rounds in the field.
2. The observations and data recorded in 1. above will be analyzed for any abnormal increase or decrease which may indicate a leak in the well's casing.
3. Weekly values of the casing-casing annulus, injection pressures, and injection flow rates will be summarized in a report to the Navajo's UIC office. This report will be submitted annually, starting one year after the permit's issuance.
4. Data on cumulative volume of water injected into the well will be available in BLM's Monthly Report of Operations (BLM Form 3160-3). This report will be sent to the Navajo UIC office upon request.

ATTACHMENT 9 (Cont'd)

NOTE: The above procedure satisfies the following:

- a. UIC Monitoring Requirements described in 40 CFR 146.23(b); and
- b. UIC Mechanical Integrity demonstration in 40 CFR 146.08(b)(1) for proof of no significant leaks in the casing, tubing, or packer. The second Mechanical Integrity demonstration in 40 CFR 146.08(c)(2) is satisfied by submitting the cementing records (ATTACHMENTS 4A and 4B). These are sufficient demonstrations given the fact no Underground Sources of Drinking Water exist in the area.

ATTACHMENT 10

HORSESHOE GALLUP #1 WELL

PROOF OF FINANCIAL RESPONSIBILITY

Attached are copies of two nationwide bonds which Atlantic Richfield Company (ARCO Oil and Gas Company is a division of Atlantic Richfield) has secured for activity on BLM and Indian lands. One or both of these bonds should satisfy the Financial Responsibility requirements of the UIC regulations.

Form 3000-4
(June 1987)
(Formerly
3104-1, 3104-2, 3104-8,
3106-4, 3200-12,
3200-13, 3200-16)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

OIL AND GAS OR GEOTHERMAL LEASE BOND

Act of February 25, 1920 (30 U.S.C. 181 et seq.)
Act of August 7, 1947 (30 U.S.C. 351-359)
Department of the Interior Appropriations Act, FY 1981 (94 Stat. 2959)
Act of December 24, 1970 (30 U.S.C. 1001-1025)
Other Oil and Gas and Geothermal Leasing Authorities as Applicable

Bond Number

U-630642

Lease Serial Number (For Individual Bond Only)

CHECK ONE - ☒ OIL AND GAS ☐ GEOTHERMAL RESOURCES

CHECK ONE:

☒ SURETY BOND

KNOW ALL BY THESE PRESENTS THAT ATLANTIC RICHFIELD COMPANY, a Delaware corporation

(name)

Post Office Box 2819, Dallas, Texas 75221

(address)

as principal, and UNITED PACIFIC INSURANCE COMPANY, a Washington corporation

(name)

505 North Brand Boulevard, Glendale, California 91203

(address)

are held and firmly bound unto the United States of America in the sum of ONE HUNDRED FIFTY THOUSAND AND NO/100-----

dollars (\$ 150,000.00-----).

lawful money of the United States, which may be increased or decreased by a rider hereto executed in the same manner as this bond.

☐ PERSONAL BOND

IN THE FORM OF (CHECK ONE) ☐ CASH or ☐ NEGOTIABLE SECURITIES

KNOW ALL BY THESE PRESENTS That _____

(name)

of _____, as obligor, is held and firmly

(address)

bound unto the United States of America in the sum of _____

dollars (\$ _____), lawful money of the United States which sum may be

increased or decreased by a rider hereto executed in the same manner as this bond.

The obligor, in order to more fully secure the United States in the payment of the aforesaid sum, hereby pledges as security therefore United States negotiable securities or cash, of a par value equal to the amount specified.

The obligor, pursuant to the authority conferred by Section 1 of the Act of September 13, 1982 (31 U.S.C. 9303), does hereby constitute and appoint the Secretary of the Interior to act as his attorney. The interest accruing on the United States securities deposited, in the absence of any default in the performance of any of the conditions, or stipulations set forth in this bond and the instrument(s) granting rights and interests in Federal lands, must be paid to the obligor. The obligor hereby for himself, his heirs, executors, administrators, successors, and assigns, jointly and severally, ratifies and confirms whatever the Secretary shall do by virtue of these presents.

The principal surety shall apply this bond or the Secretary shall transfer this deposit as security for the faithful performance of any and all of the conditions and stipulations as set forth in this bond and the instruments granting rights and interests in Federal lands. In the case of any default in the performance of the conditions and stipulations of such undertaking, it is agreed that, for a Surety Bond, the surety principal shall apply the bond or any portion thereof; (2) for a Personal Bond, the Secretary shall have full power to assign, appropriate, apply or transfer the deposit or any portion thereof, to the satisfaction of any damages, assessments, late payment charges, penalties, or deficiencies arising by reason of such default.

This bond is required for the use and benefit of: (1) the United States; (2) the owner of any of the land subject to the coverage of this bond, who has a statutory right to compensation in connection with a reservation of the oil and gas and geothermal deposits to the United States; (3) any lessee, permittee, or contractor, under a lease, permit, or resource sale contract issued, or to be issued, by the United States covering the same land subject to this bond, covering the use of the surface or the prospecting for, or the development of other mineral deposits in any portion of such land to be paid to the United States. For such payment, well and truly to be made, we bind ourselves and each of our heirs, executors, administrators, successors, and assigns, jointly and severally.

CHECK ONE

☒ NATIONWIDE BOND - This bond shall cover all operations conducted on Federal land by or on behalf of the principal obligor in the United States except the National Petroleum Reserve in Alaska (NPR-A) and provided a rider is obtained, coverage of multiple exploration operations

☐ STATEWIDE BOND - This bond shall cover all operations conducted on Federal land by or on behalf of the principal obligor except the NPR-A and, provided a rider is obtained, and shall cover multiple explorations within the single State of _____

☐ INDIVIDUAL BOND - This bond shall cover all operations conducted by or on behalf of the principal obligor on the single lease identified by serial number above

NATIONAL PETROLEUM RESERVE IN ALASKA (NPR-A) BOND - This bond shall cover

☐ NPR-A LEASE BOND - The terms and conditions of a single lease.

☐ NPR-A WIDE BOND - The terms and conditions of all leases, and provided a rider is obtained, coverage of multiple exploration operations.

UNITED PACIFIC INSURANCE COMPANY

HEAD OFFICE, FEDERAL WAY, WASHINGTON

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, That the UNITED PACIFIC INSURANCE COMPANY, a corporation duly organized under the laws of the State of Washington, does hereby make, constitute and appoint

W. C. DOYLE of LOS ANGELES, CALIFORNIA -----

its true and lawful Attorney-in-Fact, to make, execute, seal and deliver for and on its behalf, and as its act and deed

ANY AND ALL BONDS AND UNDERTAKINGS OF SURETYSHIP -----

and to bind the UNITED PACIFIC INSURANCE COMPANY thereby as fully and to the same extent as if such bonds and undertakings and other writings obligatory in the nature thereof were signed by an Executive Officer of the UNITED PACIFIC INSURANCE COMPANY and sealed and attested by one other of such officers, and hereby ratifies and confirms all that its said Attorney(s)-in-Fact may do in pursuance hereof.

This Power of Attorney is granted under and by authority of Article VII of the By-Laws of UNITED PACIFIC INSURANCE COMPANY which became effective September 7, 1978, which provisions are now in full force and effect, reading as follows.

ARTICLE VII - EXECUTION OF BONDS AND UNDERTAKINGS

1 The Board of Directors, the President, the Chairman of the Board, any Senior Vice President, any Vice President or Assistant Vice President or other officer designated by the Board of Directors shall have power and authority to (a) appoint Attorneys-in-Fact and to authorize them to execute on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and (b) to remove any such Attorney-in-Fact at any time and revoke the power and authority given to him.

2 Attorneys-in-Fact shall have power and authority, subject to the terms and limitations of the power of attorney issued to them, to execute and deliver on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof. The corporate seal is not necessary for the validity of any bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof.

3 Attorneys-in-Fact shall have power and authority to execute affidavits required to be attached to bonds, recognizances, contracts of indemnity or other conditional or obligatory undertakings and they shall also have power and authority to certify the financial statement of the Company and to copies of the By Laws of the Company or any article or section thereof.

This power of attorney is signed and sealed by facsimile under and by authority of the following Resolution adopted by the Board of Directors of UNITED PACIFIC INSURANCE COMPANY at a meeting held on the 5th day of June, 1979, at which a quorum was present, and said Resolution has not been amended or repealed.

"Resolved, that the signatures of such directors and officers and the seal of the Company may be affixed to any such power of attorney or any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached."

IN WITNESS WHEREOF, the UNITED PACIFIC INSURANCE COMPANY has caused this present to be signed by its Vice President, and its corporate seal to be hereto affixed, this 23rd day of June 19 87



UNITED PACIFIC INSURANCE COMPANY

Charles B. Schmalz
Vice President

STATE OF Washington }
COUNTY OF King }

On this 23rd day of June, 19 87, personally appeared Charles B. Schmalz

to me known to be the Vice-President of the UNITED PACIFIC INSURANCE COMPANY, and acknowledged that he executed and attested the foregoing instrument and affixed the seal of said corporation thereto, and that Article VII, Section 1, 2, and 3 of the By-Laws of said Company, and the Resolution, set forth therein, are still in full force.

My Commission Expires:

May 15, 1990



Pamela Young
Notary Public in and for State of Washington
Residing at Tacoma

I, Lawrence W. Carlstrom, Assistant Secretary of the UNITED PACIFIC INSURANCE COMPANY, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney executed by said UNITED PACIFIC INSURANCE COMPANY, which is still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Company this 3rd day of February 19 88



I, JAMES R. COFFEE, Assistant Secretary of ATLANTIC RICHFIELD COMPANY, a Delaware corporation, hereby certify that the following is a true copy of a Power of Attorney executed on August 1, 1985, in favor of J. D. HENRY, by ATLANTIC RICHFIELD COMPANY, a Delaware corporation, acting by and through its authorized officers, JAMES A. MIDDLETON, Senior Vice President, and DAVID ASTON, Assistant Secretary.

POWER OF ATTORNEY

[GENERAL]

KNOW ALL MEN BY THESE PRESENTS:

That ATLANTIC RICHFIELD COMPANY, a corporation duly organized under the laws of the State of Delaware, does hereby make, constitute and appoint for a term commencing on the date hereof and expiring on August 1, 1988, J. D. HENRY, its true and lawful attorney for it and in its name and behalf to execute any contract, agreement, release, assignment, lease, conveyance, deed, transfer of real or personal property and any other instrument, in the name and on behalf of ATLANTIC RICHFIELD COMPANY, which he may deem necessary or proper in connection with the business of ATLANTIC RICHFIELD COMPANY. The said J. D. HENRY, as Attorney in Fact, is empowered to execute, acknowledge and deliver any such instruments or documents as fully as if special authority had been granted in each particular case by the Board of Directors of ATLANTIC RICHFIELD COMPANY.

EXECUTED as of the 1st day of August, 1985.

ATTEST:

ATLANTIC RICHFIELD COMPANY

/s/ David Aston
David Aston
Assistant Secretary

By /s/ James A. Middleton
James A. Middleton
Senior Vice President

I further certify that such Power of Attorney remains in force and effect as of the date of this certification.

WITNESS MY HAND AND SEAL this 9th day of February, 1988.

James R. Coffee
James R. Coffee
Assistant Secretary
Atlantic Richfield Company
a Delaware corporation

Form 5-156
Oct. 1936UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

NATIONWIDE OIL AND GAS LEASE BOND

KNOW ALL MEN BY THESE PRESENTS, That we, Atlantic Richfield Company
A Delaware corporation, of P. O. Box 2819, Dallas, TX 75221
as principal..., and United Pacific Insurance Company
of One Dallas Centre, Dallas, Texas 75201, as surety..., are held and firmly bound unto the
United States of America in the sum of seventy-five thousand dollars (\$75,000), lawful money of the
United States, for the payment of which, well and truly to be made, we bind ourselves and each of us, our
and each of our heirs, successors, executors, administrators, and assigns, jointly and severally, firmly by
these presents.

Sealed with our seals and dated this 12th day of June, 1987

The condition of this obligation is such that whereas the said principal... has heretofore or may
hereafter enter into or otherwise acquire an interest in oil and gas mining leases and oil and gas prospect-
ing permits of various dates and periods of duration covering lands or interests in lands held by the United
States in trust for individual Indians, or tribes or bands of Indians, or subject to restrictions against
alienation without the consent of the Secretary of the Interior or his authorized representative, which
leases and permits have been or may hereafter be granted or approved by the Secretary of the Interior
or his authorized representative, and the identification of which herein is expressly waived by both prin-
cipal... and surety... hereto.

WHEREAS the principal... and surety... agree that the coverage of this bond shall extend to and
include all extensions and renewals of leases and permits covered by this bond, such coverage to continue
without any interruption due to the expiration of the term set forth therein.

WHEREAS the surety... hereby waives any right to notice of any modification of any such lease
or permit, or obligation thereunder whether effected by extension of time for performance, by commit-
ment of such lease to unit, cooperative, or communitization agreement, by waiver, suspension, or change
in rental, except an increase thereof, by minimum royalty payment, except an increase thereof, by com-
pensatory royalty payment, or otherwise, this bond to remain in full force and effect notwithstanding.

WHEREAS the principal... and surety... agree that the neglect or forbearance of the obligee of
any such lease or permit in enforcing the payment of any rental or royalty or the performance of any
other covenant, condition, or agreement of any such lease or permit shall not in any way release the prin-
cipal... and surety..., or either of them, from any liability under this bond; and

WHEREAS the principal... and surety... agree that in the event of any default under any such lease
or permit, the obligee may prosecute any claim, suit, action, or other proceeding against the principal...
and surety..., or either of them, without the necessity of joining the other.

Now, if the said principal... herein shall faithfully carry out and observe all the obligations assumed
in said leases and permits to which Atlantic Richfield Company

tions made, or which shall be . . . Je, thereunder, for the government of . . . and intercourse with Indian tribes, and all rules and regulations that have been or shall hereafter be lawfully prescribed by the Secretary of the Interior relative to said oil and gas mining leases and permits, and shall in all particulars comply with the provisions of said leases, permits, rules and regulations, then this obligation shall become null and void; otherwise, to remain in full force and effect.

The rate of premium charged on this bond is \$ 750.00 ; the total premium paid is \$ 750.00

Signed and sealed in the presence of—

WITNESSES*

Linda Buchanan
P.O. P.O. Box 2819, Dallas, TX 75221

Susan Strickland
P.O. P.O. Box 2819, Dallas, TX 75221

Diane McCallon
P.O. One Dallas Centre, Dallas TX

Douglas E. Miland
P.O. One Dallas Centre, Dallas TX

P.O. as to [SEAL]

P.O.

P.O. as to [SEAL]

P.O.

as to Atlantic Richfield Company [SEAL]
By *J. M. Huey*
ATTEST:

as to United Pacific Insurance Company [SEAL]
By *Donald H. Lipper*
Donald H. Lipper Attorney-In-Fact

*Two witnesses to each signature.

DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
Washington 25, D. C.

_____, 19____

Approved:

Commissioner of Indian Affairs.

UNITED PACIFIC INSURANCE COMPANY

HOME OFFICE, FEDERAL WAY, WASHINGTON

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, That the UNITED PACIFIC INSURANCE COMPANY, a corporation duly organized under the laws of the State of Washington, does hereby make, constitute and appoint Donald H. Lipper of Dallas, Texas

its true and lawful Attorney-in-Fact, to make, execute, seal and deliver for and on its behalf, and as its act and deed any and all bonds and undertakings of Suretyship, _____

and to bind the UNITED PACIFIC INSURANCE COMPANY thereby as fully and to the same extent as if such bonds and undertakings and other writings obligatory in the nature thereof were signed by an Executive Officer of the UNITED PACIFIC INSURANCE COMPANY and sealed and attested by one other of such officers, and hereby ratifies and confirms all that its said Attorney(s)-in-Fact may do in pursuance hereof.

This Power of Attorney is granted under and by authority of Article VII of the By-Laws of UNITED PACIFIC INSURANCE COMPANY which became effective September 7, 1978, which provisions are now in full force and effect, reading as follows:

ARTICLE VII - EXECUTION OF BONDS AND UNDERTAKINGS

1. The Board of Directors, the President, the Chairman of the Board, any Senior Vice President, any Vice President or Assistant Vice President or other officer designated by the Board of Directors shall have power and authority to (a) appoint Attorneys-in-Fact and to authorize them to execute on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and (b) to remove any such Attorney-in-Fact at any time and revoke the power and authority given to him.

2. Attorneys-in-Fact shall have power and authority, subject to the terms and limitations of the power of attorney issued to them, to execute and deliver on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof. The corporate seal is not necessary for the validity of any bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof.

3. Attorneys-in-Fact shall have power and authority to execute affidavits required to be attached to bonds, recognizances, contracts of indemnity or other conditional or obligatory undertakings and they shall also have power and authority to certify the financial statement of the Company and to copies of the By-Laws of the Company or any article or section thereof.

This power of attorney is signed and sealed by facsimile under and by authority of the following Resolution adopted by the Board of Directors of UNITED PACIFIC INSURANCE COMPANY at a meeting held on the 5th day of June, 1979, at which a quorum was present, and said Resolution has not been amended or repealed:

"Resolved, that the signatures of such directors and officers and the seal of the Company may be affixed to any such power of attorney or any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached."

IN WITNESS WHEREOF, the UNITED PACIFIC INSURANCE COMPANY has caused these presents to be signed by its Vice President, and its corporate seal to be hereto affixed, this 14th day of November 1984

Asst.

UNITED PACIFIC INSURANCE COMPANY

Asst. Vice President

STATE OF Pennsylvania
COUNTY OF Philadelphia } ss.



On this 14th day of November 1984, personally appeared Enrico J. Pennisi, Jr. Asst.

to me known to be the Vice-President of the UNITED PACIFIC INSURANCE COMPANY, and acknowledged that he executed and attested the foregoing instrument and affixed the seal of said corporation thereto, and that Article VII, Section 1, 2, and 3 of the By-Laws of said Company, and the Resolution, set forth therein, are still in full force.

My Commission Expires:

May 24, 1986



Notary Public in and for State of Pennsylvania

Residing at Philadelphia

I, P. D. Crossetta

Assistant Secretary of the UNITED PACIFIC INSURANCE COMPANY, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney executed by said UNITED PACIFIC INSURANCE COMPANY, which is still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Company this 12th day of June 1987



I, JAMES R. COFFEE, Assistant Secretary of ATLANTIC RICHFIELD COMPANY, a Delaware corporation, hereby certify that the following is a true copy of a Power of Attorney executed on August 1, 1985, in favor of J. D. HENRY, by ATLANTIC RICHFIELD COMPANY, a Delaware corporation, acting by and through its authorized officers, JAMES A. MIDDLETON, Senior Vice President, and DAVID ASTON, Assistant Secretary.

POWER OF ATTORNEY

[GENERAL]

KNOW ALL MEN BY THESE PRESENTS:

That ATLANTIC RICHFIELD COMPANY, a corporation duly organized under the laws of the State of Delaware, does hereby make, constitute and appoint for a term commencing on the date hereof and expiring on August 1, 1988, J. D. HENRY, its true and lawful attorney for it and in its name and behalf to execute any contract, agreement, release, assignment, lease, conveyance, deed, transfer of real or personal property and any other instrument, in the name and on behalf of ATLANTIC RICHFIELD COMPANY, which he may deem necessary or proper in connection with the business of ATLANTIC RICHFIELD COMPANY. The said J. D. HENRY, as Attorney in Fact, is empowered to execute, acknowledge and deliver any such instruments or documents as fully as if special authority had been granted in each particular case by the Board of Directors of ATLANTIC RICHFIELD COMPANY.

EXECUTED as of the 1st day of August, 1985.

ATTEST:


ATLANTIC RICHFIELD COMPANY

/s/ David Aston
David Aston
Assistant Secretary

By /s/ James A. Middleton
James A. Middleton
Senior Vice President

I further certify that such Power of Attorney remains in force and effect as of the date of this certification.

WITNESS MY HAND AND SEAL this 13th day of August, 1987.


James R. Coffee
Assistant Secretary
Atlantic Richfield Company
a Delaware corporation

PLUGGING AND ABANDONMENT PROCEDURE

- 1) MIRU. RIH below the bottom perforation w/tbg open ended. Pump sufficient cement inside casing to cover top perforation by 50'.
- 2) POH w/tbg. GIH w/wireline and perforate casing as specified by New Mexico Oil Commission. Perf approximately 20 ft. below surface csg. bottom. Number of shots should be sufficient to allow cement squeeze. POH w/wireline. GIH w/tbg. open ended. Squeeze cement to provide plug inside and outside of casing to surface.
- 3) POH w/tbg. Cut casing one foot below ground level. Weld a blind flange to casing, and weld a dry hole marker on blind flange. Fill hole and move off.
- 4) Rehabilitate location and access road using stipulations supplied by the Bureau of Land Management.
- 5) Estimated cost of P/A: \$5,000