

# STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION AZTEC DISTRICT OFFICE

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

BOX 2	CONSERVATION DIVISION 2088 A FE, NEW MEXICO 87501		
DATE_	5-12-89		
RE:	Proposed MC Proposed DNC Proposed NSL Proposed SWD Proposed WFX Proposed PMX		
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Gent	lemen:	<u> </u>	
l ha	ve examined the application	dated 5-//-89	
		HEASESHEE CALLUF CUTTEL Lease and Well No.	32-3/0-/602 Unit, S-T-R
and	my recommendations are as fo	ollows:	
H	Afraire		
Your	s truly,		
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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.

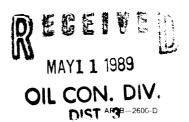
Sincerely,

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,

C. T. Stilwell

Environmental Engineer

Julie Tillider

CTS:pjk

Attachment

cc: David Catanack

NMOCD - Sante Fe

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- 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:
  - 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, sucks of cement used, hule size, top of cement, and how such top was determined.
  - 4 description of the tubing to be used including its size, libing material, not 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.

- 8. The following must be submitted for each injection well covered by this application. 411 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.

#### OIL CONSERVATION DIVISION POST OFFICE BOX 2008 STATE LAND OFFICE BLADING BANTA PE NEW MEXICO 87501

FORM C-108 Revised 7-1-81

1.	Purpose: X Secondary Recovery Pressure Maintenance Dimposit Storage Application qualifies for administrative approval? X jes Inu
11.	Operator: ARCO Oil and Gas Company
	Address: P.O. Box 1610, Midland, TX 79702
	Contact party: Chuck Stilwell Phone: (915) 688-5651
II.	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 necessory.
IV.	Is this an expansion of an existing project? X yes no If yes, give the Division order number authorizing the project
٧.	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 whice 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.
II.	Attach data on the proposed operation, including:
	<ol> <li>Proposed average and maximum daily rate and volume of fluids to be injected;</li> <li>Whether the system is open or closed;</li> <li>Proposed average and maximum injection pressure;</li> <li>Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and</li> <li>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.).</li> </ol>
III.	Attach appropriate geological data on the injection zone including appropriate lithologication, neological 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.
χ.	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 $N/A$ available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
III.	Applicants for disposal wells must make an affirmative statement that they have N/A 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.
11.	Applicants must complete the "Proof of Notice" section on the reverse side of this form.
IV.	Certification
	I hereby certify that the information submitted with this application is true and correcto the best of my knowledge and belief.
	Name: C. T. Stilwell Title Environmental Engineer
	Signature: (liuck Heave) Date: 5/8/89

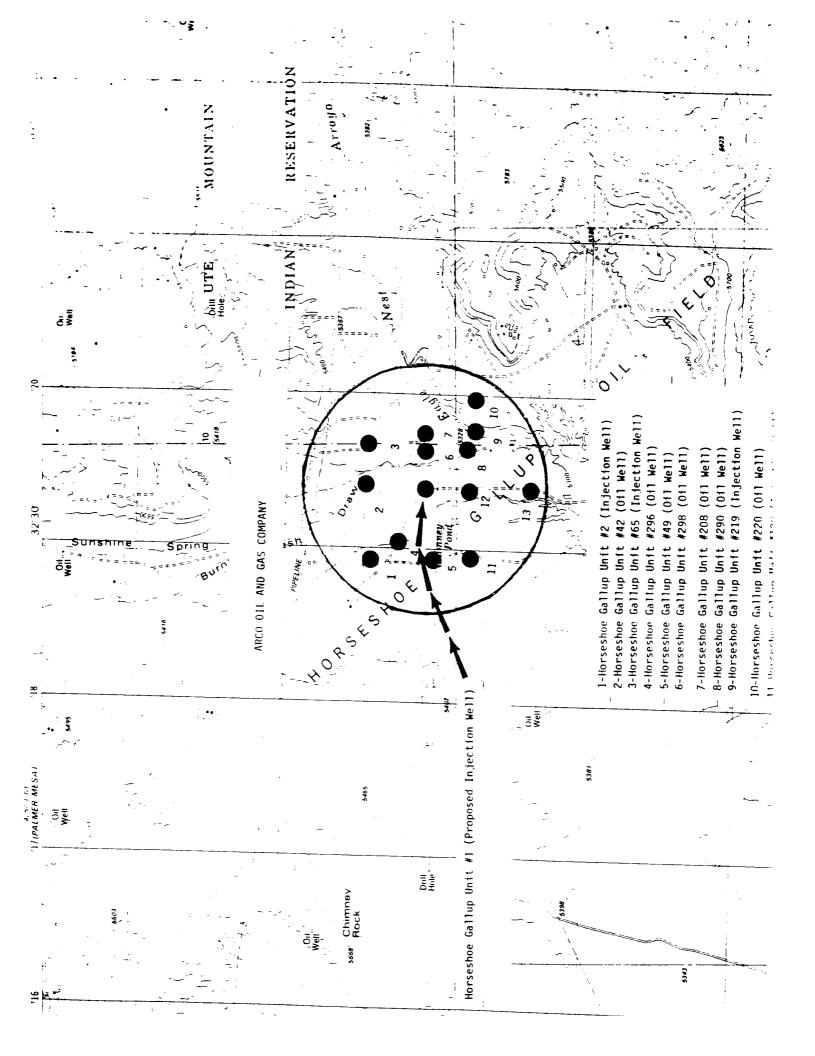
#### Explanation for Map of Project Area Horseshoe Gallup Unit

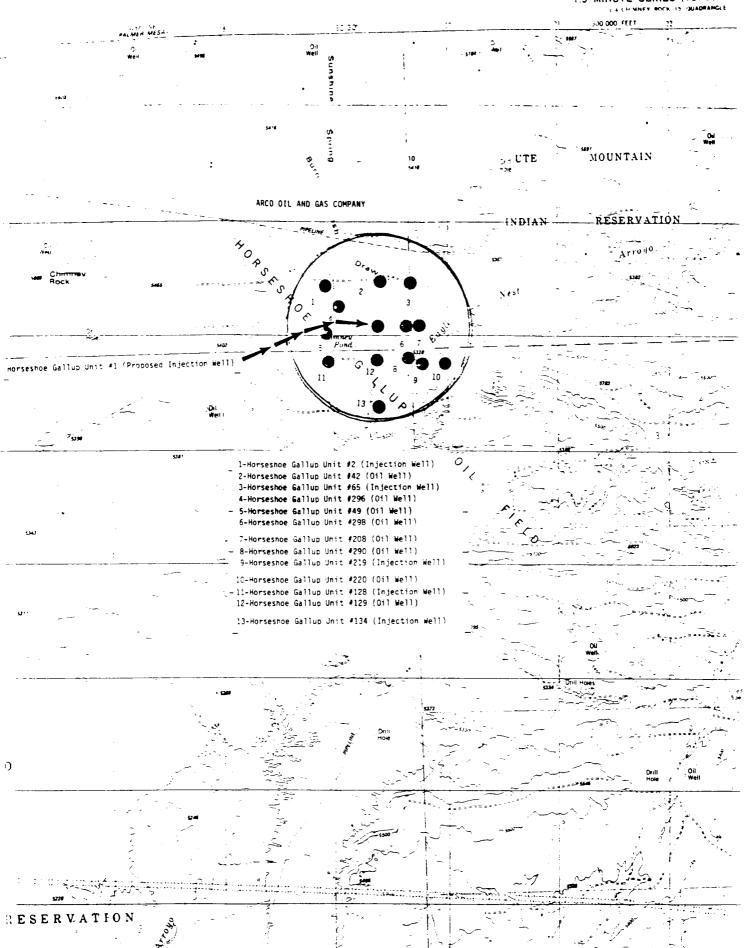
#### Required Information Existing on Map

- Surface bodies of water consist of dry washes.
   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.





#### 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.

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

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

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REMEDIAL ACTION PROPOSED:
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	\$	TUPS # [
NAME OF USGS TOPO MAP ATTAC	HED WITH SURFACE FEATURE	ES [Chimney Rock
RADIUS OF INFLUENCE:		() )2)6)4)0) F1.
ALL WELLS IN PROJECT AREA:	See USGS Map	
TRIBAL WELL NO [ ] ] ] ]	PWSI	
WELL NAME/WUPS NO [H ]O [R ]S	ESHIOE GALLUT	וַ יִּוּנְּדִּי דִיוֹרִאוּטֹיְ יִכְּ
WELLTYPE (MARK ONE ONLY)	WELLSTATUS (MARK ONE ONLY)	WELL USE (MARK ONE ONLY)
( )WW WATER WELL ( )WA ARTESIAN WELL ( )WS SPRING ( )OW OBSERVATION WELL ( )GS GAS WELL ( )OP OIL PRODUCTION ( )MW MINERAL WELL ( )IN INJECTION ( )ER ENHANCED RECOVERY ( )DH DRY HOLE		( )IND INDUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTH OTHER
TRIBAL WELL NO TO THE STATE OF		OF INFLUENCE:
WELL NAME OTHER NO THIS GIV	= '2 '9 8 '	
W E L L T T P E (MARK ONE ONLY)	WELL STATUS (MARK ONE ONLY)	WELL SE (MARK ONE ONLY)
( ) WW WATER WELL ( ) WA ARTESIAN WELL ( ) WS SPRING ( ) OW CESERVATION WELL ( ) GS GAS WELL (X) OF CIL PRODUCTION ( ) MW MINERAL WELL ( ) IN INJECTION ( ) ER ENHANCED RECOVERY ( ) DH DRY HOLE	(X)ACT ACTIVE ( )INA INACTIVE ( )AFA AFANDONEL	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTORY ( )INT INTUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTE OTHER
QUAD NO TITLE W	EST MIL	ES SOUTE
NE SE SW NW/NE SE SW NW/NE 10 acre 40 acre 16	SE SW NW [3]3] [T]3] 0 acre SECT. TOWN	SHIP RANGE
APPROXIMATE LOCATION [2:0]	MITILIEIST WESTI	0; F; ; F; A; R; M; I; N; G; T; O N

LATITUDE[]] LONGITUDE[]]]
UTM COORDINATES: X(east) [ ] ] ] ] Y(north) [ ] ] ] ] ZONE [ ] ]
DISTANCE FROM INJECTION WELL:
Ft. ( )N ( )S $(1) \times (1) \times (1$
LEGAL CONTACT: NAME (A)R)COO) (O)INL) N&) NG) A S > C > O > M > P > A > N > Y > S > S
ADDRESS P [0]   B [0 [X]   [1] 6] 1] 0]
COMPLETED:// TOTAL DEPTH: [ ] ] FT. FROM / S.
WORKOVERS://;// PLUGGED://_
1. CASING PERFORATED FROM [ ] 1 FT TO FT OPENING TYPE [
2. CASING PERFORATED FROM [ ] ] ] FT TO [ ] 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
See department well database for further information. Available information for this well was submitted to your department in 1987.

	W	PS # [ ]
NAME OF USGS TOPO MAP ATTAC	HED WITH SURFACE FEATURES	[Chimney Rock
RADIUS OF INFLUENCE:		() \2\6\4\0\ FI.
ALL WELLS IN PROJECT AREA:	See USGS Map	
TRIBAL WELL NO [ ] ] ]	PWSID	
WELL NAME/WUPS NO [H]O R S	ESHIOE GALLU?	U:N:I:1 = 11 ! ! !
WELL TYPE (MARK ONE ONLY)	WELLSTATUS (MARK ONE ONLY)	WELLUSE (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	( )ABA ABANDONED	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTOCK ( )IND INDUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTH OTHER
TRIBAL WELL NO THE NO THIS G U	PWSID	
WELLITYPE (MARK ONE ONLY)	WELL STATUS (MARE ONE ONLY)	WELLUSE (MARR ONE ONLY)
( )WW WATER WELL ( )WA ARTESIAN WELL ( )WS SPRING ( )OW OBSERVATION WELL ( )GS GAS WELL (X)OF OIL PRODUCTION ( )MW MINERAL WELL ( )IN INJECTION ( )ER ENHANCED RECOVERY ( )DH DRY HOLE	(X)ACT ACTIVE ( )INA INACTIVE ( )AFA ABANDONEL	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTOIR ( )INI INTUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTH OTHER
QUAD NO TO MILES V		
NE SE SW NW/NE SE SW NW/NE 10 acre 40 acre 10	SE SW NW [3]3 [T 3 ] 50 acre SECT. TOWNS	N) 1 1
APPROXIMATE LOCATION [2]0	M: I'L'E'S' 'W'E'S T! 'C	F) F)AIRIMIT NIGIT O

[ ] LATITUDE           LONGITUDE
UTM COORDINATES: X(east) Y(north) ZONE
DISTANCE FROM INJECTION WELL:
Ft. ( )N ( )S $(-)1121010$ Ft. ( X)E ( )W
LEGAL CONTACT: NAME (ANRICION NONTE 180 G) A ST CHONMYPHANNIYS ST
ADDRESS P 101 16 0 0 1 1 6 1 0
COMPLETED: / / TOTAL DEPTH: [ ] ] FT. FROM / S.
WORKOVERS: /_/; / PLUSGED: /_/_
1. CASING PERFORATED FROM [ ] 1 1 TO [ ] TO
2. CASING PERFORATED FROM TO TO TO TO THE TO THE TOTAL OPENING TYPE TO
3. CASING PERFORATED FROM [ ] ] FT TO[ ] ] ] FT OPENING TYPE [
4. CASING PERFORATED FROM [ ] ] FT TO[ ] ] PT OPENING TYPE [ ]
5. CASING PERFORATED FROM [1] FT TO[1] FT OPENING TYPE [1] opening codes: f=fractured rock, l=louvered or snutter-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
See department well database for further information. Available information for this well was submitted to your department in 1987.

	WUP	S # [
NAME OF USGS TOPO MAP ATTACH	ED 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 THOUR IS TO	SHOE GALLUP	U1N 11
WELL TYPE (MARK ONE ONLY)	WELLSTATUS (MARK ONE ONLY)	WELLUSE (MARK ONE ONLY)
( )WA ARTESIAN WELL	( )ACT ACTIVE (X)INA INACTIVE ( )ABA ABANDONED	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTOCK ( )IND INDUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTH OTHER
ALL WELLS PENETRATING INJECT	ION ZONE WITHIN RADIUS OF	INFLUENCE:
TRIBAL WELL NO	PWSID [	
WELL NAME OTHER NO THIS GOUL	# 21910	
WELLITTPE (MARK ONE ONLY)	WELL STATUS (MARE ONE ONLY)	WELLUSE (MARR ONE ONLY)
( )WW WATER WELL ( )WA ARTESIAN WELL ( )WS SPRING ( )OW OBSERVATION WELL ( )GS GAS WELL	(X)ACT ACTIVE ( )INA INACTIVE ( )AFA ABANDONEL	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTORY
(X)OF CIL PRODUCTION ( )MW MINERAL WELL ( )IN INJECTION ( )ER ENHANCED RECOVERY ( )DH DRY HOLE		( )INT INTUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTE OTHER
(X)OF CIL PRODUCTION ( )MW MINERAL WELL ( )IN INJECTION ( )ER ENHANCED RECOVERY ( )DH DRY HOLE  OUAD NO [ ] MILES WE	SI MILES	( ) INI INTUSTRIAL MINING ( ) REC RECREATION ( ) MUN MUNICIPAL ( ) OTH OTHER
(X)OF CIL PRODUCTION ( )MW MINERAL WELL ( )IN INJECTION ( )ER ENHANCED RECOVERY ( )DH DRY HOLE	SI MILES  E SW (NW) []4] [T] 3 [O N]  acre SECT. TOWNSHI	( ) INI INTUSTRIAL MINING ( ) REC RECREATION ( ) MUN MUNICIPAL ( ) OTH OTHER  SOUTH [ 17.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.

LATITUDE[ ] ] LONGITUDE[ ] ] ] ]
UTM COORDINATES: X(east) [ ] ] ] Y(north) [ ] ] ] ] ZONE [ ] ]
DISTANCE FROM INJECTION WELL:
10:00.0. Ft. ( )N ( X)S ( X)S ( X)E ( )W
LECAL CONTACT: NAME (A)R)C)O) ONITE (B) G) A (S) C O'M)P)A'N'Y
ADDRESS P [0]   B [0] X   1   6   1   0
COMPLETED: / / TOTAL DEPTH: [ ] ] FT. FROM / S.
WORKEVERS: / / ;/_ PLUGGED:/_
1. CASING PERFORATED FROM [ ] TO [ ] FT TO [ ] FT OPENING TYPE [ ]
2. CASING PERFORATED FROM [ ] ]   FT TO [ ] FT OPENING TYPE [ ]
3. CASING PERFCRATED FROM [ ] ] FT TO [ ] FT OPENING TYPE [ ]
4. CASING PERFORATED FROM [ ] ' ] ] FT TO[ ] FT OPENING TYPE [ ]
5. CASING PERFORATED FROM [ ] FI TO[ ] ] FT OPENING TYPE [ ] opening codes: f=fractured rock, l=louvered or snutter-type screen, u=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
See department well database for further information. Available information for this well was submitted to your department in 1987.

AME OF USGS TOPO MAP ATTA	CHED WITH SURFACE FEATURES	Chimney Rock
ADIUS OF INFLUENCE:		( ) )2)6)4)0) FI.
LL WELLS IN PROJECT AREA:	See USGS Map	
RIBAL WELL NO [ ]	PWSID	
TELL NAME/WUFS NO [H]O]R	STETS HIDE IGNATURE UP	. inin.I.i≒ili . i
WELLTYPE (MARK ONE ONLY)	WELLSTATUS (MARK ONE ONLY)	WELLUSE (MARK ONE ONLY)
( )WW WATER WELL ( )WA ARTESIAN WELL ( )WS SPRING ( )OW OBSERVATION WELL ( )GS GAS WELL ( )()OP OIL PRODUCTION ( )MW MINERAL WELL ( )IN INJECTION ( )ER ENHANCED RECOVERY ( )DH DRY HOLE	( )ACT ACTIVE (X)INA INACTIVE ( )ABA ABANDONED	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTOCK ( )IND INDUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTH OTHER
ALL WELLS PENETRATING INJE	ECTION ZONE WITHIN RADIUS	OF INFLUENCE:
ALL WELLS PENETRATING INJE		OF INFLUENCE:
	PWSID	
TRIBAL WELL NO TO THE STATE OF	PWSID	
TRIBAL WELL NO THE NO THIS G  WELL NAME OTHER NO THIS G  WELL TYPE  (MARK ONE ONLY)  () WW WATER WELL () WA ARTESIAN WELL () WAS SPRING () OW OBSERVATION WELL () OF OIL PRODUCTION () MW MINERAL WELL () IN INJECTION (X) ER ENHANCED RECOVERY	WELLSTATUS  (MARK ONE ONLY)	WELLUSE (MARR ONE ONLY)  ( )DOM DOMESTIC ( )AGR AGRICULT.
TRIBAL WELL NO THER NO THIS G  WELL TYPE (MARK ONE ONLY)  () WW WATER WELL () WA ARTESIAN WELL () WA SPRING () OW CESERVATION WELL () OF CIL PRODUCTION () MW MINERAL WELL () IN INJECTION (X) ER ENHANCED RECOVERY () DH DRY HOLE	WELLSTATUS  (MARK ONE ONLY)  ( ) ACT ACTIVE  ( X) INA INACTIVE  ( ) ABA ABANDONEL	WELLUSE (MARK ONE CNLY)  ( )DOM DOMESTIC ( )AGR AGRICULT, LIVESTOCK ( )INT INTUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTE OTHER

LATITUDE LONGITUDE LONGITUDE
UTM COORDINATES: X(east) Y(north) ZONE
DISTANCE FROM INJECTION WELL:
( 1 0 0 0 Ft. ( )N (X )S ( 1 1 2 8 0 Ft. (X)E ( W
LECAL CONTACT: NAME (ANRYCYC) (COLUCY) A STOUR DYMYPYAYNYY COLUCY
ADDRESS P.[0] B.[0]X; 1]6]1]0
COMPLETED:/_/ TOTAL DEPTH: [ ] FT. FROM / S.
WORKCVERS:/_/_;/ PLUGGED:
1. CASING PERFORATED FROM [ ] FT TO FT OPENING TYPE [
2. CASING PERFORATED FROM [ ] FI TO FI OPENING TYPE [ ]
3. CASING PERFORATED FROM [ ] ] ] FT TO [ ] FT OPENING TYPE [ ]
4. CASING PERFORATED FROM []]   FT TO[]   FT OPENING TYPE []
5. CASING PERFORATED FROM [ ] PT TO[ ] 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, n=other
REMEDIAL ACTION PROPOSED:
( ) NR NO REMEDIAL ACTION PROPOSED ( ) PP PROPER PLUGGING ( ) OP OTHER PROPOSAL - SEE COMMENTS
See department well database for further information. Available information for this well was submitted to your department in 1987.

	wu	PS # [ ]
NAME OF USGS TOPO MAP ATTA	ACHED WITH SURFACE FEATURES	[Chimney Rock ]
ADIUS OF INFLUENCE:		( ) )2)6)4)0) FT.
ALL WELLS IN PROJECT AREA	: See USGS Map	
RIBAL WELL NO	PWSID	
WELL NAME/WUFS NO [H]O]R	SESHIOE GALLLUP	[U:N:I:T: : #]]
WELLTYPE (MARK ONE ONLY)	WELL STATUS (MARK ONE ONLY)	WELLUSE (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		( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTOCK ( )IND INDUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTH OTHER
ALL WELLS PENETRATING INJ	ECTION ZONE WITHIN RADIUS C	OF INFLUENCE:
WELL NAME OTHER NO THIS G	[U] [= [2][2][0]	
	WELL STATUS (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 ( )AEA ABANDONEL	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTORY ( )INT INTUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTE OTHER
QUAD NO [1] MILES	WEST MILES	S SOUTH [ ]
NE SE SW NW/NE SE SW NW/N 10 acre 40 acre	E SE SW (W) 1147 (T13 0) 160 acre SECT. TOWNS	NI II FR'I'6'WI I RANGE
APPROXIMATE LOCATION [210	· MEILLESS WESST: O	F JFARMINGTTO

[] \ LATITUDE[] ]   LONGITUDE[] ] ] ]
UTM COORDINATES: X(east)         Y(north)         ZONE
DISTANCE FROM INJECTION WELL:
(X) Ft. ( )N (X)S (X)S (X)E ( )W
LEGAL CONTACT: NAME <u>(ANRICIO) (ONITE (ANTIG</u> A SINCOMMYPYANNY
ADDRESS Pici [Bioix] [116]110
COMPLETED: / / TOTAL DEPTH: TT. FROM / S.
WORKOVERS://;//PUUGGED://
1. CASING PERFORATED FROM [ ] ] FT TO[ ] FT OPENING TYPE [
2. CASING PERFORATED FROM [] ] ] TO [] FT OPENING TYPE []
3. CASING PERFCRATED FROM [ ] ] ] TO [ ] ] ] FT OPENING TYPE [ ]
4. CASING PERFORATED FROM [ ] ] ]   FT TO[ ] ]   FT OPENING TYPE [ ]
5. CASING PERFORATED FROM [ ] ] FT TO[ ] 1 ] FT OPENING TYPE [ ] opening codes: f=fractured rock, l=louvered or snutter-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 PROPOSET ( ) PP PROPER PLUGGING ( ) OF OTHER PROPOSAL - SEE COMMENTS
See department well database for further information. Available information for this well was submitted to your department in 1987.

	भ	JPS # [
NAME OF USGS TOPO MAP ATTAC	HED WITH SURFACE FEATURES	[Chimney Rock
RADIUS OF INFLUENCE:		( ) \2\6\4\0\ FI.
ALL WELLS IN PROJECT AREA:	See USGS Map	
TRIBAL WELL NO	PWSID	
WELL NAME/WUPS NO [H]O R S	EZHIOE GALLO	
WELL TYPE (MARK ONE ONLY)	WELLSTATUS (MARK ONE ONLY)	WELLUSE (MARK ONE ONLY)
	( )ABA ABANDUNED	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTOCK ( )IND INDUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTH OTHER
ALL WELLS PENETRATING INJECTION TRIBAL WELL NO	PWSID	OF INFLUENCE:
WELL NAME OTHER NO THIS GOVE	* 1 2 8	
WELL TYPE (MARK CNE CNLY)	WELLSTATUS (MARK ONE ONLY)	
( ) WW WATER WELL ( ) WA ARTESIAN WELL ( ) WS SPRING ( ) OW CESERVATION WELL ( ) OS GAS WELL ( ) OF CIL PRODUCTION ( ) MW MINERAL WELL ( ) IN INJECTION (X) ER ENHANCED RECOVERY ( ) DH DRY HOLE	( )ACT ACTIVE (X)INA INACTIVE ( )AEA ABANDONEL	( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTOCK ( )INT INTUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTE OTHER
QUAD NO TOTAL	TEST MILE	s south [ ] ]
NE SE SW NW/NE SE SW NW NE 10 acre 40 acre 16	SE SW NW [15] [T] 3 0 Sect. TOWNS	N) ) )   [R'1'6'W']
APPROXIMATE LOCATION [2:0]		

...

LATITUDE     LONGITUDE
UTM COORDINATES: X(east) Y(north) Y(north) ZONE
DISTANCE FROM INJECTION WELL:
1000 Ft. ( )N (X )S (X )S ( )1440 Ft. ( )E (X)W
LEGAL CONTACT: NAME (ANRYCYON TONITE TEAT OF A STORE COMMYPHANNIY: )
ADDRESS P 10   B 10   X   11 6 1 1 0   1   1   1   1   1   1   1   1
COMPLETED:/_ / TOTAL DEPTH: [ ] ] ] FT. FROM / S.
WORKEVERS://;// PLUSGED://
1. CASING PERFORATED FROM [ ] TO TO TO THE TOTAL OPENING TYPE [ ]
2. CASING PERFORATED FROM [ ] ] FT TO 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[ ] ]   I   IFT 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 ( ) PF PROPER PLUGGING ( ) CF OTHER PROPOSAL - SEE COMMENTS
See department well database for further information. Available information for this well was submitted to your department in 1987.

	•	TEPS # [
NAME OF USGS TOPO MAP ATTA	CHED WITH SURFACE FEATURE	Chimney Rock
RADIUS OF INFLUENCE:		( ) 12)614)01 FT.
ALL WELLS IN PROJECT AREA:	See USGS Map	
TRIBAL WELL NO [ ] ] ]	PWSI	
WELL NAME/WUFS NO [H]O]R S	SESHIOE GALLUS	U1N7I77 #]1 ! '
WELL TYPE (MARK ONE ONLY)	WELLSTATUS (MARK ONE ONLY)	WELLUSE (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		( )DOM DOMESTIC ( )AGR AGRICULT. LIVESTOCK ( )IND INDUSTRIAL MINING ( )REC RECREATION ( )MUN MUNICIPAL ( )OTH OTHER
TRIBAL WELL NO		
WELL NAME OTHER NO HIS G	<del> </del>	
( ) WW WATER WELL ( ) WA ARTESIAN WELL ( ) WS SPRING ( ) OW OBSERVATION WELL	WELLSTATUS (MARK ONE ONLY)  (X) ACT ACTIVE ( ) INA INACTIVE ( ) ABA ABANDONEL	
( )GS GAS WELL (X)OF CIL PRODUCTION ( )MW MINERAL WELL ( )IN INJECTION ( :ER ENHANCED RECOVERY ( )OH DRY HOLE		MINING ( ) REC RECREATION ( ) MUN MUNICIPAL ( ) OTH OTHER
OUAD NO [ ] MILES	WEST MIL	ES SOUTE
NE SE SW NW NE SE SW NW NE 10 acre 40 acre		(R'1'6'W)  SHIP  RANGE
APPROXIMATE LOCATION [210]	MILLERS WESTT	0; F; ; F; A; R; M; I; N; G; T; O I

LATITUDE         LONGITUDE
UTM COORDINATES: X(east) Y(north) Y(north) ZONE
DISTANCE FROM INJECTION WELL:
1 1 0 0 0 Ft. ( )N (X )S ( )E ( )W
LEGAL CONTACT: NAME (A)RYCYON YONI'LY YEY YE. A SY COOMMYPYANNYYYY Y
ADDRESS P 101 '5'0'X' 11'6'1'0'
COMPLETED:/_ TOTAL DEPTH: FT. FROM / S.
WORKCVERS://_ ;// PLUGGED://_
1. CASING PERFORATED FROM [ ] TO TO TO THE TO THE TO THE TO THE TO THE TOTAL PROPERTY OF
2. CASING PERFORATED FROM []]
3. CASING PERFORATED FROM [ ] ] FT TO[ ] FT OPENING TYPE [ ]
4. CASING PERFORATED FROM [] 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
See department well database for further information. Available information for this well was submitted to your department in 1987.

LATITUDE LONGITUDE LONGITUDE
UTM COORDINATES: X(east) Y(north) ZONE
DISTANCE FROM INJECTION WELL:
<u> </u>
LEGAL CONTACT: NAME (ANRYCYO) STITE (BY 3 A ST C CHMYPNA NYY
ADDRESS P (0) (B)(0)X: (1)6)1)0)
COMPLETED: / / TOTAL DEPTH: [ FT. FROM / S.
WORKOVERS: / / ; _ / PLUSGED:
1. CASING PERFORATED FROM [ ] 1 TO FT TO FT OPENING TYPE [
2. CASING PERFORATED FROM [ ] FT TO FT OPENING TYPE [ ]
3. CASING PERFCRATED FROM [ ] FI TO FI OPENING TYPE [ ]
4. CASING PERFORATED FROM [ ] ]   FT TO[ ]   FT OPENING TYPE [ ]
5. CASING PERFORATED FROM [ ] ]   FT TO[ ]   I   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
See department well database for further information. Available information for this well was submitted to your department in 1987.

Operator ARCO Oil and Gas Company	We	11 Name: Horseshoe G	allup wall .	1
Completion Date: 9/24/58		660 Ft. F S L &	417 54 5	
		5€ 1 Section 32		16W
Surface Elevation 5500'		•		
Formation(s) Top/Bottom		SURFACE CASING	DATA	
from PBTD to surface:		Hole Size:	12-1/4	In
Manços Shale 0' / 1087'		Casing Size:	8-5/8	— In
<u>Upper Gallup 1090' / 1128'</u>	7	Weight:	24	 15,
Mancos Shale 1129' / 1189'		Length:	137.99	 Ft
<u>Lower Gallup</u> 1190'/ 1233'		Cement Type:	Class Common	_
Mancos Shale 1234'/		Amount:	75	Sx
		Additives:		_
/		Casing set at:	137.99	— Ft.
Tubing Size: 2-3/8 In.		Top of Cement:	0	– Ft.
		Method of		
Weight: 4.7 1b./Ft. Length: 1060 Ft.		Determination:	Circulated	_
Packer Type: AD-1 Tension Pkr	\$ 1 S	PRODUCTION CAS	ING DATA	
Set at: $\frac{1060}{1000}$ Ft.	3	Hole Size:	•	In.
Formation(s) perforated above		Casing Size:	5-1/2	In.
packer:		Weight:	14	 _1b/
None to		Length:	1285.15	Ft.
' to'	87	Cement Type:	Class reg. p	ozmi
Formation(s) perforated below packer:	13 1	Amount:	150	Sx.
Upper Gallup 1091 • to 1094 •	13 9	Additives:		-
Upper Gallup 1099 • to 1128 •		Casing Set at:	1285.15	– Ft.
Lower Gallup 1192 · to 1233 ·		Top of Cement:	450	– Ft.
Open hole below production casing from N/A to		Method of Determination:	Calculation	_
Formation(s) present in open hole:		PBTD: 1252'		_
N/A	# 22	PER TD: 1285		
	To terosai	NOTE: All dept ground level.  used make notat give height of level.	If KB depths a ions on diagra	are am &

Cementing Records for Surface Casing

# THE ATLANTIC REFINING COMPANY LOG: DRILLING WELL WORKOVER LOG: DRILLING WELL WORKOVER LOGICAL SECTION OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS

Name towe same as snown in permit to drill	Designation	er Dr	10 C	·
D Horseshee	CONTRACTOR	0	101	_
E HOLE /2/4 REDUCED AT	KIND OF TO			<u> </u>
D OF FUEL BUTANE FURNISHED BY Con track	FROM	110. 0	F HOURS	
TER FURNISHED BY Correction FROM FROM			F HOURS	TOU
PORMATION OF CORE	DATA AT END OF TOUR	TOUR 1	TOUR 1	41/
PROM TO CORE INTERPRETATION MUST BE SIGNED	DRILL PIPE IN USE: SIZE		1.1-	45
Finished rigging up	LENGTH DRILL COLLARS		9014	59.
d soudded @ 1030 mg 9-9-58	LENGTH DRILL PIPE	<u> </u>	1 4	18.
T SPICE CHAICAC SALE	KELLY DOWN		10 7	142.
10 187 STALLT JANU	DRILL BIT: SERIAL NO.		RTIEL	
107 143	DRILL BIT: NUMBER		1-1	
	MAKE		HTC	175
Duld 12 14" hale to 143 SLA			050	05
	CORE BARREL: KIND			
R. U 4 mm 8 3/7 D.D. (agen)	SIZE			
as follows by to top	CORE BIT: SERIAL NO.			
11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CORE BIT: NUMBER	-		
1 - Larking 11 00,00 500 - 31.9	KIND		<u> </u>	
1 1 + 4 11 0.0 21 33 1000	SIZE			
1- Lankin 8 1/2" Flast Collar - 1.5	31 Madding Mood 1011			14
2 - The oslo"0 b 24 # J-55 Casi, 95.2	7 DEGREES OFF		AMOUNT	Zy AM
130.1	WUD HATERIAL: KIND	AMOUNT	LAMOUNT	
7 15 7 69 50	1			
RNB to 8 18 Collar 18	<u> </u>			=======================================
Care Set @ 137.9	CHEMICAL: KIND	AMOUNT	AMOUNT	AM.
	1	_ !		
	2		+	-1:
K.U. + could hole K.U. Howco	3	_ <del></del>		+
of comented case, w/ 75 sacks Commo	<u> </u>			
Court solus 200 caking shlowich	MUD TYPE	<del></del>		<del>- †                                   </del>
court of	MUD WEIGHT  VISCOSITY: 1500 € IN			
	i quart OUT	1		-11-
Comet did Not circulate Top	WATER LOSS: œ			11
of ole To3'. W.O. C - Thours Clerk	PILTER CAKE	. /n·	/12	11-
The law ground	LAND FOR COM	PANY REPRESE	NTATIVE ONLY	H
E PRINCE PARTY CONTRACTOR CONTRAC	DRILLING		-+	<del>-+   </del>
Washed Mud on V & plants 13kg	CORING			<del></del>
count around top of Surtice Carry	DST. OPEN HOLE			20
		= ==		
	5			
D.F6C J.Z9	CASING & WOC			-
Unit Flow - GL - L. 05	OOMPLETING		-	+
7- 210 61 - 7.32	Z COMPLETING LOSS CIRCULATION			
	F PISHING			<u> </u>
KI, FRKI-90.				
6C- 5332				
6C- 5332	CO. TIME W/DP	· -	Libla da Caman	ay on day
GC- 5332	CO. TIME W/DP	ntative. Time cha	rgeator to Campio	
Concise explanation of all delays and reasons therefor SHALL be indicated by each drille basis SHALL be fully explained.	CO. TIME w/DP  CO. TIME w/o /DP  er and verified by Company represe			
TOUR No. 1 FROM 7.00 H M TO Z' 200 M DRILLING HRS. TR	CO. TIME W/DP		OTHER:	
basis SHALL be fully explained	CO. TIME w/DP  CO. TIME w/o /DP  er and verified by Company represe			
TOUR No. 1 FROM 7.00 H M TO 7.00 W DRILLING HRS. TR	CO. TIME w/DP  CO. TIME w/o /DP  er and verified by Company representations.  RIPPING HRS. REPAIR		OTHER:	
TOUR NO. 1 FROM Z'O EM TO Z'O M DRILLING HRS. TR	CO. TIME w/DP  CO. TIME w/o /DP  er and verthed by Company representations.  RIPPING HRS. REPAIR  SIGNED	HRS.	OTHER.	
TOUR No. 2 FROM 100 DM TO KING DRILLING HRS. TR	CO. TIME w/DP  CO. TIME w/o /DP  er and verified by Company representations.  RIPPING HRS. REPAIR	HRS.	OTHER:	
TOUR NO. 1 FROM Z'O H M TO Z'O M DRILLING HRS. TR	CO. TIME w/DP  CO. TIME w/o /DP  er and verthed by Company representations.  RIPPING HRS. REPAIR  SIGNED	HRS.	OTHER.	
TOUR No. 2 FROM 1. DO DA TO H. I DRILLING HRS. TR	CO. TIME w/DP  CO. TIME w/o /DP  er and verthed by Company representations.  RIPPING HRS. REPAIR  SIGNED	HRS.	OTHER.	Delg.
TOUR No. 2 FROM 1. DO DA TO H. I DRILLING HRS. TR	CO. TIME W/DP  CO. TIME W/O /DP  rand verified by Company representations  RIPPING HRS. REPAIR  SIGNED  RIPPING HRS. REPAIR  SIGNED	RS HRS.	OTHER.	Delg.
TOUR No. 2 FROM JOB DW TO KIND DRILLING HRS. TR	CO. TIME W/DP  CO. TIME W/O /DP  ET and vertied by Company representations  CIPPING HRS. REPAIR  SIGNED  RIPPING HRS. REPAIR  A CO / O SO / O SO A M	RS HRS.	OTHER.	DRII
TOUR No. 1 FROM TO TO TO TO THE DRILLING HRS. TR	CO. TIME W/DP  CO. TIME W/O /DP  rand verified by Company representations  RIPPING HRS. REPAIR  SIGNED  RIPPING HRS. REPAIR  SIGNED	RS HRS.	OTHER.	DRIL
TOUR No. 1 FROM TO TO TO TO THE DRILLING HRS. TR	CO. TIME W/DP  CO. TIME W/O /DP  CO. TIME W/O /D	RS HRS.	OTHER.	DRILL Derig. 1. L DRILL Services
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	τ.	THE ATL	ANTIC REF	INING COMPANY	for i	nting Reco Long Stri	ng Casi
	•	ac DDITI	NG WELL	IN WORKOY	VER 🦳 '	Joing Ser in	9 043
		(M2+ 11H(1.1.1)			*		
		LOG: DICILLIA	ID is reached, if well is plu	igged back carry TD and Pingged Back	k Depth, each tour)		
==:::	. 1		TRAC	/	_ DATI	9-15-	58
ASE.	Name N	o be same as shown in permit to drill	IRAC	Designation	er 130%		
ELD_	Horse Sh	or Gallup	-/ >	CONTRACTOR	1	01	
ZR H	10LE 778	REDUCED A	T 143 -	EIND OF TO	OLS_Fare	Koran	
	OF FUEL Betar	FURNISHED BY	inair	FROM	NO. OF 1	HUURS	<del></del> -
	R FURNISHED BY	Currains	FROM		NO. OF 1	HOURS 24	
R L	DEPTH	PORMATION (	OR CORE	DATA AT END OF TOUR	TOUR 1	TOUR 1	TOUR
	PROM TO	CORE INTERPRETATION		DRILL PIPE IN USE. SIZE	-		
<u> </u>	12857	-p.		LENGTH DRILL COLLARS		i	
	Fin's hed	1 running 5/2	" Casing	LENGTH DRILL PIPE  KELLY DOWN	i		
	ankin Fla	1.56	1.20	11			
-4	C'1' 12	DEC Car	29.69	DRILL BIT: SERIAL NO.			
78	- 3/~ /4-	J 33 000	1. 35				
_{	Carken Flo	at Collan		MAKE	:	1	
1	F 5/2 14"	J.55 Com	1245.5		<u> </u>		
2	TALLE	<u> </u>	1277.8			<del></del>	
	RICE to	(so Ld Fla	7.3	SIZE :- CORE BIT: SERIAL NO.		<del></del>	-
-	-11 "	0 116	1285.10				
_	-5/	- Just G		- KIND			<u>.</u>
_		<u> </u>	0 -	SIZE	<u> </u>		
	K. U. 4 4	aditions hole	. K. U	STRAIGHT HOLE TEST AT			<del></del>
H	vuco +	commend care	, with	DEGREES OFF	AMOUNT	AMOUNT .	AMOUN
	17 000	mayled ariv	005 M.X	MUD MATBRIAL: MIND		·	
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-	Cemerte	J. H.				ANOTHER PARTY	ANOUN
. r	1-11-1-	we was for	a good	CHEMICAL: KINI	AMOUNT	AMOUNT	, A E O U
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				4			
	7.0	pressure to 30	copy K	MUD TYPE			
	- Action	Production	<del>-</del>				
		. KIL Semule		MUD WEIGHT VISCOSITY: 1500 cc 15		- <del>-</del>	
	rigged	B+R Servi	u- 40 d				
_	rand to	uperation sur	very from	VISCOSITY: 1500 cc IN I quart OUT			
	rand tes	1249 - Indice	very from	VISCOSITY: 1500 cc IN 1 quart OUT  PH  WATER LOSS: cc  FILTER CAKE	/32*	/32*	
-;	rand ten	12 49 Tudica	very from	VISCOSITY: 1500 cc IN 1 quart OUT  PH  WATER LOSS: cc  FILTER CAKE	/32* PANY REPRESENT.	/32*	
	rand ten	12 49' Indica	very from	VISCOSITY: 1500 cc IN 1 quart OUT  PH  WATER LOSS: cc  FILTER CAKE	,	/32*	/
	rand ten	1249' Indice	very from	VISCOSITY: 1500 cc IN 1 quart OUT  PH  WATER LOSS: cc  FILTER CAKE  FOR COM  DRILLING	,	/32*	/
	rand ten	1249' Indice	very from	PH WATER LOSS: cc FILTER CAKE  POR COM  DRILLING	PANY REPRESENT	/32*	/
	rand ten	12 49' Indice	very from	VISCOSITY: 1500 cc IN 1 quart OUT  PH  WATER LOSS: cc  FILTER CAKE  POR COM  DRILLING  CORING  DST. OPEN HOLE  E LOGGING	PANY REPRESENT.	/32*	/
		1249' Indice	very from	PH WATER LOSS: cc FILTER CAKE  FOR COM DRILLING CORING  DST. OPEN HOLE LOGGING CASING & WOC	PANY REPRESENT.	/32*	7
		1249' Indice	very from	PH WATER LOSS: cc FILTER CAKE  FOR COM  DRILLING  CORING  EDST. OPEN HOLE  LOGGING  CASING & WOC  COWNTIME	PANY REPRESENT.	/32*	<i>j</i>
		1249' Indice	very from	PH WATER LOSS: cc FILTER CAKE  POR COM  DRILLING  CORING  DST. OPEN HOLE  LOGGING  CASING & WOC  COMPLETING  COMPLETING	PANY REPRESENT.	/32*	7
		1249' Indice	very from	PH WATER LOSS: cc FILTER CAKE  FOR COM  DRILLING  CORING  EDST. OPEN HOLE  LOGGING  CASING & WOC  COWNTIME	PANY REPRESENT.	/32*	7
		1249' Indice	very from keep to p	PH WATER LOSS: 60 FILTER CAKE  FOR COM  DRILLING CORING  WE DEST. OPEN HOLE E LOGGING CASING & WOC  COMPLETING COMPLETING LOSS CIRCULATION	PANY REPRESENT.	/32*	
		12 ug' Indice	Les top	PH WATER LOSS: 60 FILTER CAKE  FOR COM  DRILLING CORING  WE DOST. OPEN HOLE COMPLETING COMPLETING COMPLETING CO. TIME W.DP  CO. TIME W.DP	PANY REPRESENT.	/33* ATIVE ONLY	7
	Concise explanation of al	12 49 Tardice  12 450	Les top	PH WATER LOSS: 60 FILTER CAKE  FOR COM  DRILLING CORING  WE DOST. OPEN HOLE COMPLETING COMPLETING COMPLETING CO. TIME W.DP  CO. TIME W.DP	PANY REPRESENT.	/33* ATIVE ONLY	7
- b	Concrse explanation of al	Il desays and reasons therefor SHALL	be indicated by each drive	PH WATER LOSS: cc FILTER CAKE  FOR COM  DRILLING CORING  DST. OPEN HOLE  LOGGING  CASING & WOC  COMPLETING  LOSS CIRCULATION  FISHING  CO. TIME w/DP  CO. TIME w/DP  CO. TIME w/OP  CO. TIME w/O /DP  Er and venned by Company represen	PANY REPRESENT.	/33* ATIVE ONLY	7
_ b	Concise explanation of al	Il delays and reasons therefor SHALL plained.  PM TO 7:00 4 M DRILL	be indicated by each driller.  ING. HRS. TR	PH WATER LOSS: 60 FILTER CAKE  FOR COM  DRILLING CORING  WE DOST. OPEN HOLE COMPLETING COMPLETING COMPLETING CO. TIME W.DP  CO. TIME W.DP	PANY REPRESENT.	/32° ATIVE ONLY	on day rate
b	Concrse explanation of al	Il desays and reasons therefor SHALL plained.  PMTO 7:00 4M DRILL  JENES 5/4 (45)	be indicated by each drain.  ING HRS. TR	PH WATER LOSS: 60 FILTER CAKE  FOR COM  DRILLING CORING  DST. OPEN HOLE  LOGGING  CASING & WOC  COMPLETING  LOSS CIRCULATION FISHING  CO. TIME W/DP  CO. TIME W/O /DP  er and verined by Company representation  EXIPPING  HRS. REPAIRS	PANY REPRESENT.	/32° ATIVE ONLY	on day rate
b	Concrse explanation of al	il desays and reasons therefor SHALL plained.  PMTO 7:00 4M DRILL  JENES 5/4 (MS)	be indicated by each driller.  ING. HRS. TR	PH  WATER LOSS: cc  FILTER CAKE  FOR COM  DRILLING  CORING  DST. OPEN HOLE  LOGGING  CASING & WOC  COMPLETING  LOSS CIRCULATION  FISHING  CO. TIME w/o /DP  er and verined by Company represent	PANY REPRESENT.	/32° ATIVE ONLY	on day rate
00	Concise explanation of all beauties SHALL be fully explored to the following of the followi	Il desays and reasons therefor SHALL plained.  PMTO 7:00 4M DRILL  JENSON F. F.	be indicated by each driller.  ING HRS. TR  THE JOST LA	PH  WATER LOSS: 60  FILTER CAKE  FOR COM  DRILLING  CORING  LOGGING  CASING & WOC  COMPLETING  COMPLETING  CO. TIME W/DP  CO. TIME W/O /DP  er and verined by Company representation  EIPPING  HRS REPAIRS  139  143  153  154  155  150  PH  WATER LOSS: 60  FOR COM  DRILLING  CORING  COTINE W/O  COMPLETING  CO. TIME W/O /DP  Er and verined by Company representation  EIPPING  HRS REPAIRS	PANY REPRESENT.	/32° ATIVE ONLY	on day rate
000	Concrse explanation of al	II delays and reasons therefor SHALL plained.  PMTO 7:00 AM DRILL  JETTS 5'/2 CAS 1'	be indicated by each drilled.  ING. HRS. TR  THE JOST J.	PH WATER LOSS: cc FILTER CAKE  FOR COM  DRILLING CORING  DST. OPEN HOLE  LOGGING  CASING & WOC  COMPLETING  LOSS CIRCULATION  FISHING  CO. TIME w/DP  CO. TIME w/DP  CO. TIME w/OP  ET and venned by Company represent  EIPPING  HRS REPAIRS  SIGNED	PANY REPRESENT.	Die to Company	on day rate
00	Concise explanation of all basis SHALL be fully explanation of the second of the secon	Il desays and reasons therefor SHALL plained.  PMTO 7:00 4M DRILL  JENSON F. F.	be indicated by each driller.  ING HRS. TR  THE JOST LA	PH WATER LOSS: cc FILTER CAKE  FOR COM  DRILLING CORING  DST. OPEN HOLE  LOGGING  CASING & WOC  COMPLETING  LOSS CIRCULATION  FISHING  CO. TIME w/DP  CO. TIME w/DP  CO. TIME w/OP  ET and venned by Company represent  EIPPING  HRS REPAIRS  SIGNED	HRS. OTI	Die to Company	on day rate
TOU	Concise explanation of all basis SHALL be fully explanation of the second of the secon	Il desays and reasons therefor SHALL plained.  PMTO 7:00 4M DRILL  MTO M DRILL	be indicated by each driller.  ING HRS. TR  THE JOST LA	PH WATER LOSS: cc FILTER CAKE  FOR COM  DRILLING CORING  DST. OPEN HOLE  LOGGING  CASING & WOC  COMPLETING  LOSS CIRCULATION  FISHING  CO. TIME w/DP  CO. TIME w/DP  CO. TIME w/OP  ET and venned by Company represent  EIPPING  HRS REPAIRS  SIGNED	PANY REPRESENT.	Die to Company	on day rate
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100	Concise explanation of all basis SHALL be fully explanation of the second of the secon	Il delays and reasons therefor SHALL plained.  PMTO TO DRILL  MTO M DRILL	be indicated by each drilled.  ING HRS. TR  THE STATE OF STATE  LING HRS. T	VISCOSITY: 1500 cc is 1 quart OUT  PH  WATER LOSS: cc  FILTER CAKE  FOR COM  DRILLING  CORING  EDST. OPEN HOLE  CASING & WOC  CASING & WOC  COMPLETING  ELOSS CIRCULATION  FISHING  CO. TIME w/DP  CO. TIME w/DP  CO. TIME w/DP  TO. TIME w/DP  TO. TIME w/DP  SIGNED  SIGNED  FISHING  REPAIRS  SIGNED  RIPPING  HRS. REPAIR  REPAIR	HRS. OTI	Jar's ATIVE ONLY  One to Company HER:	on day rate
100	Concrese explanation of all basis SHALL be fully explanation of all basis SHALL be fully explanation of the second	II delays and reasons therefor SHALL plained.  PMTOM DRILL  MTOM DRILL  MTOM DRILL	be indicated by each drained.  ING HRS. TR  THE TOOTS INC.  LING HRS. T	PH WATER LOSS: 60 FILTER CAKE  FOR COM DRILLING CORING W DST. OPEN HOLE COMPLETING COMPLETING LOSS CIRCULATION FISHING CO. TIME w/O /DP CO. TIME w/O /DP CO. TIME w/O /DP CO. TIME w/O /DP CO. TIME w/O /DP CO. TIME W/O /DP	HRS. OTI	Jar's ATIVE ONLY  One to Company HER:	on day rate  On day rate  DRILLER  DRILLER  Or Grant G
100	Concrese explanation of all basis SHALL be fully explanation of all basis SHALL be fully explanation of the second	II delays and reasons therefor SHALL plained.  PMTOM DRILL  MTOM DRILL  MTOM DRILL	be indicated by each drained.  ING HRS. TR  THE TOOTS INC.  LING HRS. T	VISCOSITY: 1500 cc is 1 quart OUT  PH  WATER LOSS: cc  FILTER CAKE  FOR COM  DRILLING  CORING  EDST. OPEN HOLE  CASING & WOC  CASING & WOC  COMPLETING  ELOSS CIRCULATION  FISHING  CO. TIME w/DP  CO. TIME w/DP  CO. TIME w/DP  TO. TIME w/DP  TO. TIME w/DP  SIGNED  SIGNED  FISHING  REPAIRS  SIGNED  RIPPING  HRS. REPAIR  REPAIR	HRS. OTI	Jar's ATIVE ONLY  One to Company HER:	DRILLER
Total	Concrete explanation of all basis SHALL be fully explained by the state of the stat	II delays and reasons therefor SHALL plained.  PMTOM DRILL  MTOM DRILL  MTOM DRILL	be indicated by each drained.  ING HRS. TR  THE JUNE LING HRS. T	VISCOSITY: 1500 cc in 1 quart OUT  PH  WATER LOSS: cc  FILTER CAKE  FOR COM  DRILLING  CORING  W DST. OPEN HOLE  LOGGING  CASING & WOC  COMPLETING  LOSS CIRCULATION  FISHING  CO. TIME w/OP  CO. TIME w/OP  CO. TIME w/O /DP  ET and venned by Company represent  RIPPING  HRS REPAIRS  SIGNED  SIGNE	HRS. OT	THER.	on day rate  2//150  DRILLER  DRILLER

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Permit #

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	rene ikkikkiki	XXXXXXXX	MAXW Conve	rsion)		
Type Injection Well:	( LON / SNO / 111		V	·		
Injection: (Continuous,	/EXXXXXX					
THISECTION.						
		-1	365			
Approximate # day	s operation	g/year	303	Mariana	1:00	
Rate (B/D): Avera	a <b>e</b> 300			Maximum		
Wellhead pressure	Incil: Au	erane SO	)	Maximum	900	
Melluggo biessnie	( 431 / - 74	E, 29 E	1 000	Loalucas	included.	(VES MINN)
Wellhead pressure Fluid: TDS 11100 Source (formation	pom	Sp. 6r	1.000	_^'''	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(2 c s) year
Source (formation	name) Ga	llup and M	orrison (Mal	ke- <u>Up Wat</u>	<u>er)</u>	
Will anything be	added to t	he water t	o be inject	ed? (XXXXX	(no)	
Will anything be		-9 N/A	o pe ingue	• • • • • • • • • • • • • • • • • • • •	•	
What will those a	dditives D	e: <u>N/A</u>				
				_		
Geologic Data (all ref	erences to	depths ar	e below lan	id surfaci	₽)	
Peologic para (all le	C / C / C C C C C C C C C C C C C C C C		•			Net 76'
				Effecti	. Thicknes	e Chore 1/12
Injection Interva	1: Top 1	091 _; Bot	.tom <u>1233</u> :	EILECTI	se interner	13 61022 145
Injection interval Formation na Porosity (%)	me II P %	lower Gall	up Lithole	gy See A	<u>ttachment</u>	<u> </u>
TO THE COLUMN	<u> </u>	scoot Pass	TUDIT PERS	ure	Date	
Porosity (%)		itent vest	יים ויין ויין	1	<u> </u>	
	Curre	nt fluid i	SAST JU ME	'		·
Permeability	/ (md)					
Drill Stem 7	200 100 100	OC TWEE	( <u>/N</u> 0 )			
Drill Stem	est includ	ieu. (NAAA	, ()		Mancos	Shale
				4 11	es (u den	M =
Confining Zones:	Thickness	hetween '	injection 20	one and U	SOM (NO DENA	v 15 cont. 4
Continue zones.	200	Attachmer	nt 6			-
Confining Zones: Lithology Cumulative	JCC	Accucianci	15 0 CT	7000	1080	(interval)
Cumulative :	shale 108	<u> </u>	FUICKEST 300	2011	1000	
Cumulative : Faults: Are there	any fault	is in the	area of the	Mell Mul	ch penetra	te fue
ininction	n intervali	CONTEXENT				
injectio.	11166. 401.	(				
Well Data: (all refe	rences to (	depths are	peich raud	SUFTACE,		
Surface Elevatio	• EEOO	(KB/GI)	Total (Dept	h/Plugged	l Back Dept	h) 1252
Surface Lievatio	n: 5500 -	(	(50 C)	,	•	
Date Drilled or	to be arii	led <u>9/24</u>	<u>/ 58</u>	75	<del></del>	يد الممام
Date Drilled or Type logs availa	ble on (th	is well/of	fset well):	(By rete	erence/inci	noso <u>Noŭe</u>
tabe inde exeris	D. C. O		•	-		Available
				•	C	How
	Size	Nepth	Sacks of	Hole	Cement	
	-	Interval	Cement	Size	Interval	Detemined
Construction:				<del></del>		
Surface (SO.	8 <b>-</b> 5/8	137.99				

Injection: (Continuous/Lyxixx) Approximate # days operating/year\_\_\_\_ Rate (B/D): Average 300 Wellhead pressure (psi): Average S Fluid: TDS 11100 pom Sp. Gr. Source (formation name) Gallup and Will anything be added to the water What will those additives be? N/A Geologic Data (all references to depths a Injection Interval: Top 1091; Bo Formation name U.P. & Lower Gal
Porosity (%) Current Res
Current Fluid Permeability (md) Drill Stem Test Included: (XX) Confining Zones: Thickness between Lithology See Attachme Cumulative shale 1089 : Faults: Are there any faults in the injection interval? XXXXX No Well Data: (all references to depths ar Surface Elevation: 5500 \_\_ (KB/GL) Date Drilled or to be orilled 9/2 Type logs available on (this well/o Depth Size Interval (in) Construction: Surface Csg. 137.99 8**-5/**8 Intermediate Csg. Long String Csg. Liner Facker type and depth A-D 1060 1060 2-3/8 Tubing Other Perforated Intervals None

3 LABORATORIES SUTTLE STREET BOX 2605 RANGO, CO 81302 ATTN GLEN DORAN 1816 E. MOJAVE STREET FARMINGTON, NM 87401

ARCO DIL & GAS COMPANY 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

PTEMBER 3, 1987

S ID# 5626

EMICAL and PHYSICAL PROPERTIES

----ital Hardness as CaCO3 265 Mg/L 1140 Mg/L tal Alkalinity as CaCO3

NSTITUENT	Mg/Liter	Meq/Liter
Edium as Na+	4560	198.36
Stassium as K+	17	
ilcium - Ca++	81.4	
ianesium Ma++	27.5	2.26
on Total - Fe++ & Fe+++	<.5	0.00
rium - Ba++		0.00
romium Total		0.00
SITIVE SUB-TOTAL	4686	205.12
loride-(Cl-)	4640	130.85
carbonate+(HEDS-)	1120	18.36
!fate-(S04=)	1540	32.06
rbonate-(CO3=	102	4.40
draxide-(OH-)	0	9.00
ISATIVE SUB-TOTAL	7432	:35.66
rtal Dissolved Schids	11100	mg/L
tal Suspended Sollas		mg/L
•	8.47	units
ecific Gravit,	1.008	₹ 75 F.
sistivity	64	ohm-cm 24 0
<b>⊣20</b>		• • • • • • • • • • • • • • • • • • •
l & Grease		mg/L
vcol		7.
:0	102	mq/L
2	132	mg/L
ALING TENDENS - LANGELIER		
SATURATION INSERF & 25 C	1.54	
1F1 # 25 C	34.7	

PROVED BY: DR. JOE BOWDEN, DIRECTOR

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ARCO OIL & GAS COMPANY 3 LABORATORIES ATTN GLEN DORAN SUTTLE STREET 1816 E. MOJAVE STREET REMARKS: FARMINGTON, NM 87401 SUBMITTED BY: BOX 2605

DATE SAMPLE TAKEN: 8/12/87 9:50 AM DATE SAMPLE REC'D:8/12/87

K. Kumin

0.00

0.00

0.00

FIELD: HORSESHOE GALLUP B" LEASE INJECTION WELL 17

CASING BLEEDER

PTEMBER 3, 1987

RANGO, CO 81302

S ID# 5625

rium - Ba++

romium Total

drokide-(OH-)

2

### EMICAL and PHYSICAL PROPERTIES

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

Mq/Liter Meg/Liter **YSTITUENT** ------178.73 4110 cium as Na+ . 43 17 tassium as K+ 4.06 icium - Ca++ 81.4 27.5 2.26 gnesium -- Mg++  $\dot{0}$ ,  $\dot{0}\dot{0}$ on Total - Fe++ & Fe+++ √ . 5

4236 195.54 SITIVE SUB-TOTAL

123.31 4550 loride-(Cl-) 19.67 carbonate-(HCG3-) 1200 39.56 1fate-(\$04=) 1900 5.19 156 rbonate-(COS=)

Ó

94aq/L

192.73 780a CBATIVE SUB-TOTAL

11200 mg/L tal Dissolved Bolids mg/L tal Suspended Boilds 8.34 units

1.008 & 73 F. acitic Gravit. o4 ahm−cm -515t1v1t/

7. **-10** mo/L . & Grease /col \*

108mg/L ALING TEMBENCY (LANGELIER 1.44

EATERATION INCER) @ 25 C 27.5 18: 4 15 5

DR. JUE BOWDEN. DIRECTOR

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5 LABORATURIES SUTTLE STREET BOX 2605 PANGO, CO 81302 ATTN GLEN DORAN 1816 E. MOJAVE STREET FARMINGTON, NM 87401

ARCO OIL & GAS COMPANY 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

PTEMBER 3, 1987

S ID# 5627

EMICAL and PHYSICAL PROPERTIES

----tal Hardness as CaCO3 tal Hardness as CaCO3 325 Mg/L tal Alkalinity as CaCO3 1360 Mg/L

VSTITUENT	Mg/Liter	Meq/Liter	
:dlum as Na+	4720	205.32	
itassium as K+	17.2	. 4 4	
ilcium - Ca++	70.4	3.51	
-inesium Ma++	27.5	1.26	
on Total - Ferr & Ferry	. <b>.</b> 5	$\phi$ , $\partial \dot{\theta}$	
rium - Sa++		0.00	
romium Total		0.00	
ISITIVE SUB-TOTAL	4835	211.53	
loride-(Cl-)	5100	144.35	
carbonate+«HCDD+»	1340	21.95	
fate-(S04=)	1540	34.14	
roonate-(COJ=	155	5.19	
droxide-(OH-)	•	0.00	
GATIVE SUB-TITAL	8156	205.5°	
tal Dissolved Solids	11770 mg/L		
ital Suspended Soilds	નવુ 'દ		
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is Laborator, report may not be published or used for vertising or in connection with advertising of any kind thout prior written permission from EDS Laboratories. raults 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.

#### ARCO Oll and Gas Company

#### Internal Correspondence



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

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 Creataceous 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 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.

## ARCO Oil and Gas Company

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

RECEIVE

MAR 16 1988

Environmental Satety & Trans-

# FOUR CORNERS GEOLOGICAL SOCIETY MEMOIR BOOK

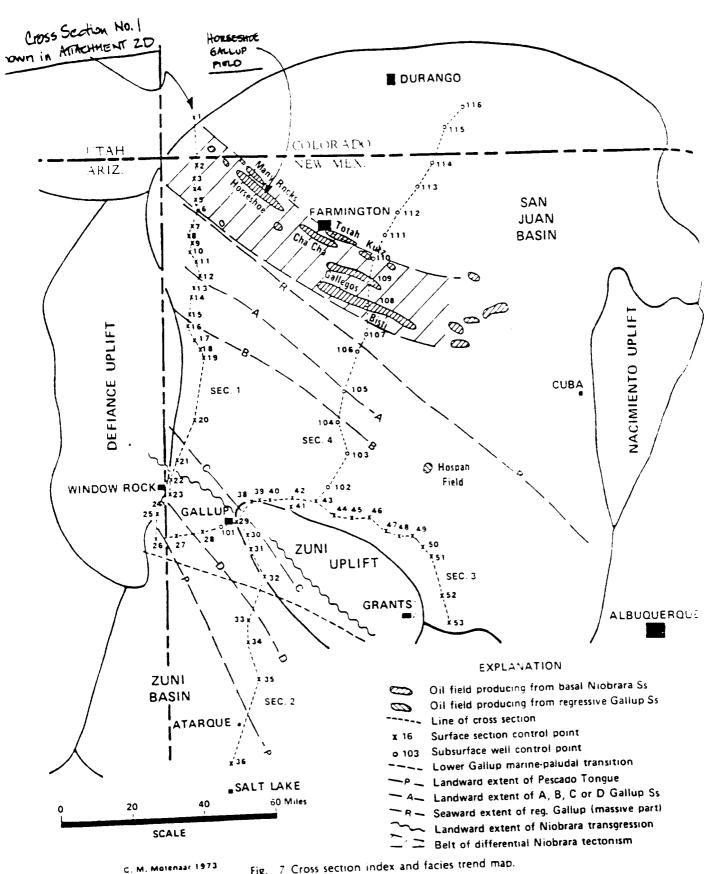


Fig. 7 Cross section index and facies trend map.

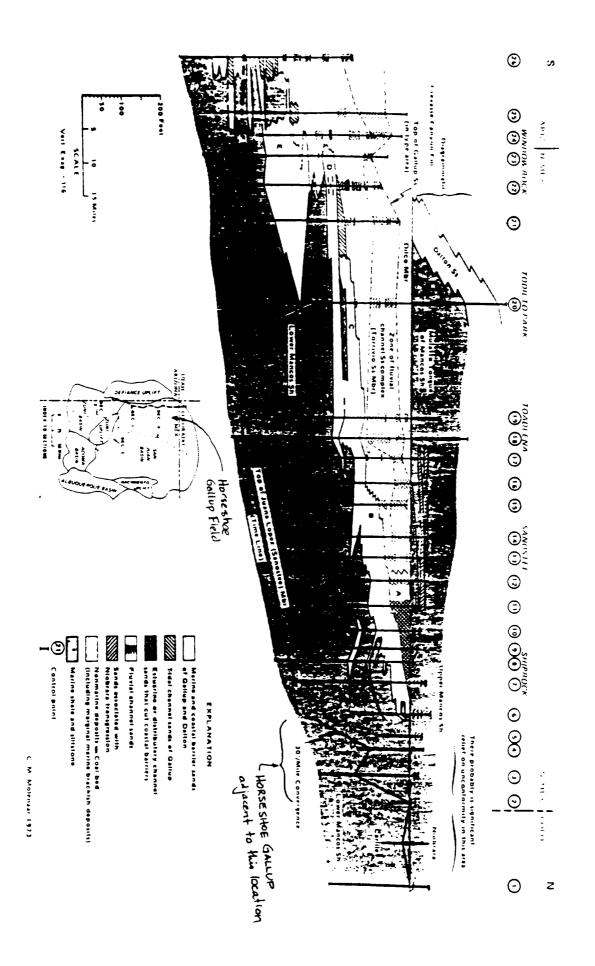


Fig. 8 Cross section No. 1: West side of San Juan Basin.

4-SEC.32-T3IN-RI6W NAVAJO 4 WIIC REF CO UPPER ZONE OWER ZONE SE/4 SE/4-SEC 32-T3IN-RIGW ATLANTIC REF CO NAVAJO I 152 NE/4 SE/4-SEC 4-T30N-RIGW HORSESHOE CANYON I EPNG PRODUCTS CO SE/4 SW/4-SEC.3-T30N-R16W HORSESHOE CANYON 4 EPNG PRODUCTS CO Navajo #1 8 A Cross Section of Injection Zone SW/4 NE /4-SEC.10-T 30N-R16W PAN AMERICAN PET. AIDLIN "A" 3

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

CROSS-SECTION TRACES

SHOWN ON FIG.

LONGITUDAL CROSS-SECTION A-A'

HORSESHOE - GALLUP UNIT

ARCO Oil and Gas Company

<>

FIGURE 10

Central District Midland, Texas

# 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.
- 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.

# 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, 3200-16, 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 Bone Con.,

Other Oil and Gas and Geothermal Leasing Authorities as Applicable CIL AND GAS ☐ GEOTHERMAL RESOURCES CHECK ONE CHECK ONE: X SURETY BOND KNOW ALL BY THESE PRESENTS THAT \_\_\_\_ATLANTIC RICHFIELD COMPANY, a Delaware corporation (name) Post Office Box 2819, Dallas, Texas 75221 raddressi UNITED PACIFIC INSURANCE COMPANY, a Washington corporation as principal, and \_\_\_\_\_\_ Fourner. 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 CASH or ☐ NEGOTIABLE SECURITIES IN THE FORM OF (CHECK ONE) KNOW ALL BY THESE PRESENTS. That \_\_\_\_\_ (name) \_\_\_\_\_, as obligor, is held and firmly (address) bound unto the United States of America in the sum of \_\_\_\_ \_\_\_\_\_ doilars (\$ \_\_\_\_ . lawful money of the United States which sum hav be noreused 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 piedges as security therefore United States negotiable securities or cash, of a pay value equal to the amount specified. The obligor pursuant to the authority conferred by Section 1 of the Act of September 13, 1982 (3) U.S.C. 9303), does hereby constitute and appoint the Secretary of the Interior to act as his 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 form in this bond and the instruments) granting rights and interests in Federal lands, must be paid to the obligor. The obligor hereby for himself herself, any neits, executors, administrators, successors, and assigns only and severally, ratifies and confirms whatever the Secretary shall do by virtue of these presents. The principal surery 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 form in this the principal series shall apply this dome of the Secretary shall have been able to the secretary shall apply the containing as serious as secretary shall apply the bond and the instruments granting rights and interests in Federal lands. In the case of any default in the performance of the unditions and stipulations of such undertaking, it is agreed "at 15 for a Personal Bond, the Secretary shall have full power to assign, appropriate, apply or transfer the apposit 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 a with a reservation of the oil and geothermal deposits to the United States; (3) any lessee, permittee, or contractor, under a lease, permit, or resource sale contract usined, or to relieve 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 and 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 known in the contractors of the cont 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 benalf 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.

PR.A WIDE BOND - The terms and conditions of all leaves, 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 exponence duty organized under the level of the State of Westington, does hereby make, constitute and appoint

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

ns true and lawful Attorney-in-Fact, to make, execute, seel 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 seeled and attested by one other of such officers, and hereby retifies 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 VIL. 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 velidity of any bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof.
- 3. Attorneys-in-Fect shell have power and authority to execute affedavits 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 stated by factimile 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 faculture seat shall be valid and binding upon the Company and any such acres so executed and certified by facsimite signatures and facsimite 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 23rd devot June 19 mai to be hereto affixed, this

STATE OF Washington

COUNTY OF

King

June

. 19 8 7 personally appeared

Charles B. Schmalz

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

My Commission Expires:

May 15

1990

Assistant Secretary of the UNITED PACIFIC INSURANCE COMPANY, do hereby certify that the 1. Lawrence W. Carlstrom ove and foregoing is a true and correct copy of a Power of Attorney executed by mid 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

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 <u>/s/ James A. Middleton</u>

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 Assistant Secretary

Atlantic Richfield Company

a Delaware corporation

# UNITED 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. C. Box 2819, Dallas, TX 75221
as principal, and United Pacific Insurance Company
of One Dallas Centre, Dallas, Texas 75201 <sub>as</sub> 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 19.87
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 prospecting 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 suret hereto.
WHEREAS the principal and suret. I 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 suret. hereby waive. 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 commitment 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 compensatory royalty payment, or otherwise, this bond to remain in full force and effect notwithstanding.
WHEREAS the principal and suret.y 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 suret, or either of them, from any liability under this bond; and
WHEREAS the principal and suret 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 suret, 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. de, thereunder, for the government of sade 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 i	is \$ 750.00 ; the total premi	ım paid
3 \$ 750.00		
Signed and sealed in the presence of—		
TITNESSES*		
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	Donald H. Lipper Attorney-In-	_
o Douglas & Miland	Donald H. Lipper Attorney-In-	Fact
One Dallas Centre, Dallas TX	·	
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<b>\</b>	Commissioner of Indian	A fairs.
1	PRINTING OFFICE: 19/7—0-413466	<b>~</b>

# 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, seel and deliver for and on its behalf, and as its act and deed anything and all the second s	_
undertakings of Suretyship,	:d
and to bind the UNITED PACIFIC INSURANCE COMPANY thereby as fully and to the same extent as if such bonds and undertakings and other writing obligatory in the nature thereof were signed by an Executive Officer of the UNITED PACIFIC INSURANCE COMPANY and seeled and attested by on other of such officers, and hereby ratifies and confirms all that its said Attorney(s)-in-Fact may do in pursuance hereof.	5
This Power of Attorney is granted under and by authority of Article VII of the 8y-Laws of UNITED PACIFIC INSURANCE COMPANY which became effective September 7, 1978, which provisions are now in full force and effect, reading as follows:	n
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<ol> <li>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 execut on behalf of the Company, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and ib to remove any such Attorney-in-Fact at any time and revoke the power and authority given to him.</li> </ol>	_
<ol><li>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 Compeny, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof The corporate seal is not necessary for the velidity of any bonds and undertakings, recognizances, contracts of indemnity and other writings obligators in the nature thereof.</li></ol>	
<ol> <li>Attorneys-in-Fact shall have power and authority to execute affidavits required to be attached to bonds, recognizances, contracts of indemity or other conditional or obligatory undertakings and they shall also have power and authority to cartify the financial statement of the Company and to copies of the By-Laws of the Company or any article or section thereof.</li> </ol>	<b>⊢</b> 3
This power of attorney is signed and sealed by factimile under and by authority of the following Resolution adopted by the Board of Directors o 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 no been amended or repealed:	if It
"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."	
ASST.  ASST.  ASST.  ASST.  MASST.  ASST.  A	•
UNLIED PACIFIC TRSUBANCE COMPANY  ASST. Vice President	
STATE OF Pennsylvania COUNTY OF Philadelphia	
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 forgoing 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 of the By-Laws of said Company, and the	•
Assolution, set forth therein, are still in full force.	
Wy Commission Expires:	
May 24 .1986  Notary Public in and for State of Pennsylvania  Residing at Philadelphia	
P. D. Crossetta	
bove 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 orce and effect.	
NUMERICA MULTIPOS IN THE STATE OF THE STATE	
WITNESS WHEREUP, I have hereunto set my hand and arbitred the seak of said Company this 12th day of United 1307	
351 151	

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