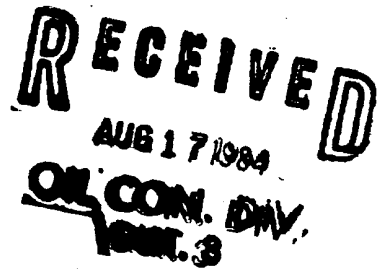


A. R. "Al" Kendrick

P. O. Box 516 • AZTEC, NEW MEXICO 87410 • (505) 334-2555

August 16, 1984

Oil Conservation Division
Box 2088
Santa Fe, New Mexico 87501



Re: Application for Authority to Inject.
James L. Ludwick
Navajo 17 #2
990' FNL 1650' FWL, C-17-T19N-R5W
McKinley County, New Mexico

Gentlemen:

Enclosed in duplicate are Forms C-108, Application for Authority to Inject, along with the following support data:

1. Map A showing all wells and leases within two miles of the subject well.
2. Map B showing detail within one-half mile of the subject well.
3. Well Data for all wells shown on Maps A and B.
4. List of leasehold owners for all leases shown on Maps A and B.
5. Schematic drawings of all wells (3) within one-half mile of the subject well which penetrated the proposed injection zone.
6. Data Sheet showing miscellaneous data.
7. A copy of the legal advertisement published in The Gallup Independent regarding this application.
8. A copy of a water analysis of water to be injected.
9. A list of all leasehold owners within one-half mile and the surface owners who signed the lease according to the file in the Bureau of Land Management office in Farmington, New Mexico.

All owners shown in item 9 were mailed a copy of this application by certified mail.

If additional information is needed, please contact me.

Yours very truly,

AR Kendrick
A. R. Kendrick

Enclosures as stated

DISTRIBUTION

All parties named in item 9 by certified mail plus:

Oil Conservation Division
1000 Rio Brazos Road
Aztec, New Mexico 87410

Bureau of Land Management
Caller Service 4104
Farmington, New Mexico 87499

RECEIVED
AUG 17 1984
OIL CON. DIV.
DIST. 3

APPLICATION FOR AUTHORIZATION TO INJECT

- I. Purpose: ☐ Secondary Recovery ☐ Pressure Maintenance ☒ Disposal ☐ Storage
Application qualifies for administrative approval? ☒ yes ☐ no
- II. Operator: James L. Ludwick
Address: c/o A. R. Kendrick, Box 516, Aztec, New Mexico 87410
Contact party: A. R. Kendrick Phone: (505) 334-2555
- 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.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- 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: A. R. Kendrick Title Agent
Signature: *AR Kendrick* Date: August 16, 1984
- * 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. Electric Log submitted December 31, 1958 by Douglas Corporation.

DISPOSITION: Original and one copy to Santa Fe with one copy to the appropriate Division

III. WELL DATA

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

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

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

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

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

XIV. PROOF OF NOTICE

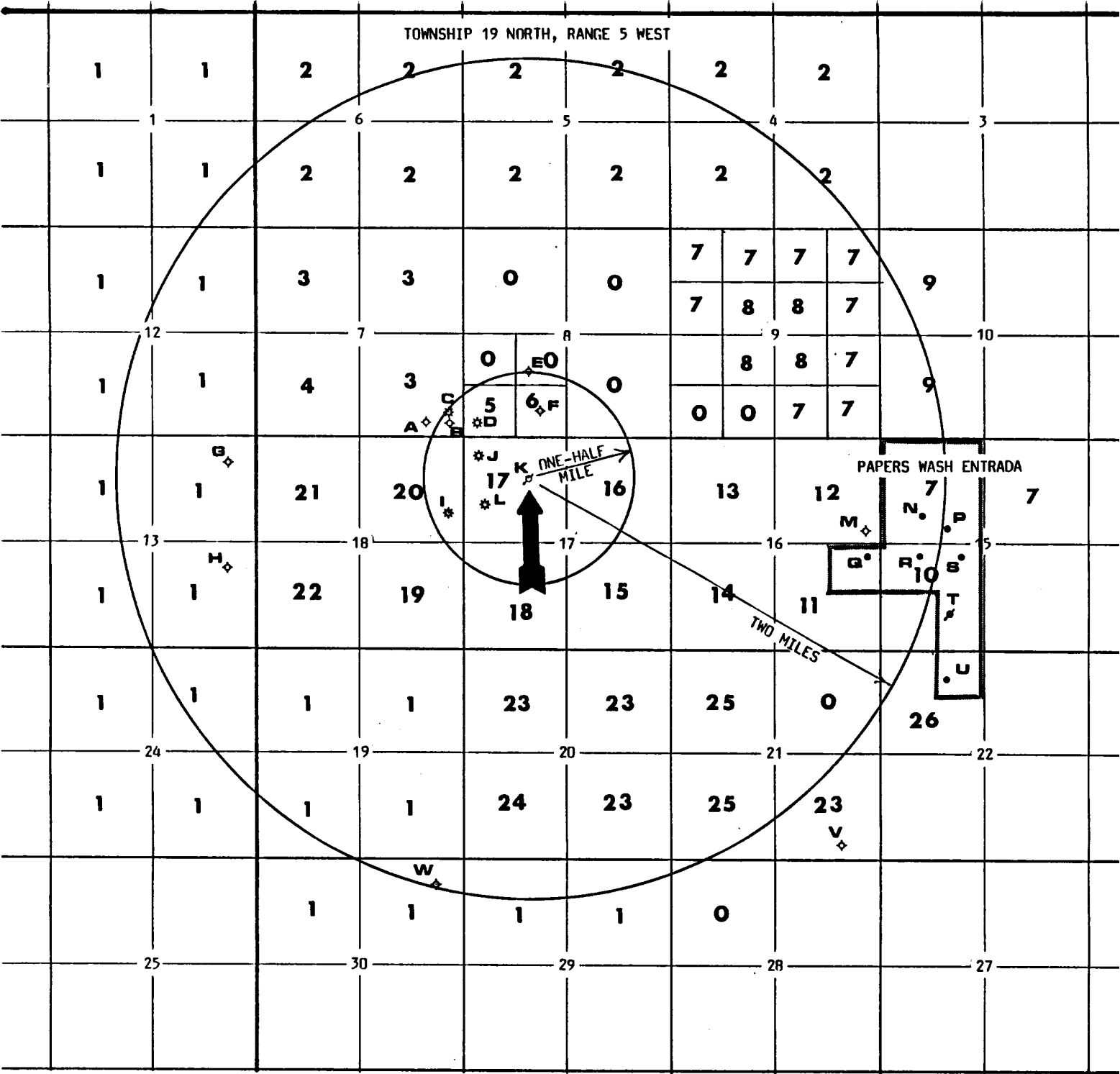
All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

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

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

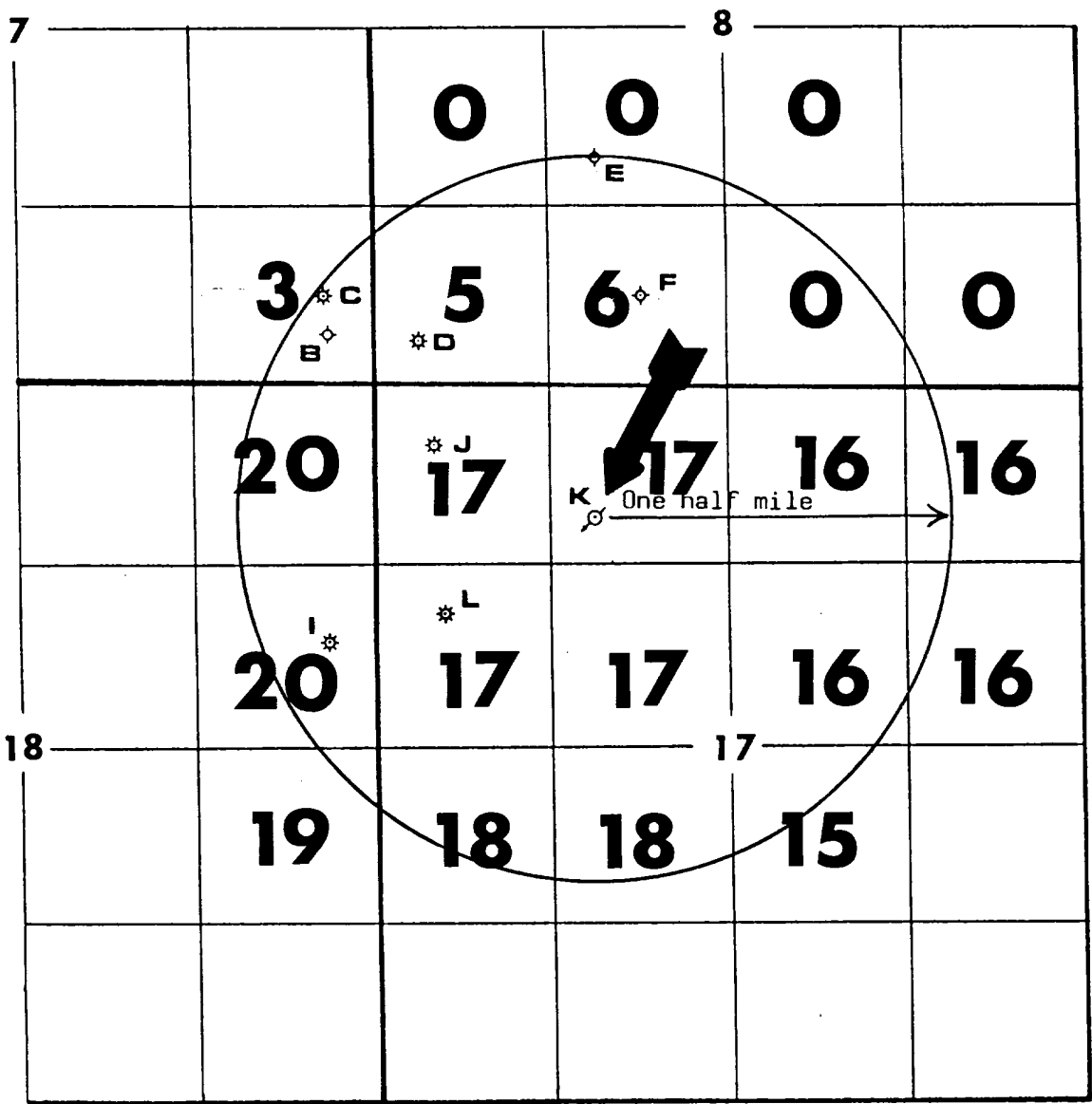


L E G E N D

17 Tract of interest - number relates to leasehold interest

K Well of interest - letter relates to well identity

DETAIL WITHIN ONE-HALF MILE OF PROPOSED INJECTION WELL



TOWNSHIP 19 NORTH RANGE 5 WEST

L E G E N D

- 17** Tract of interest - number relates to leasehold interest
- K** Well of interest - letter relates to well identity

MAP **B**

WELL DATA

RECEIVED

AUG 17 1984

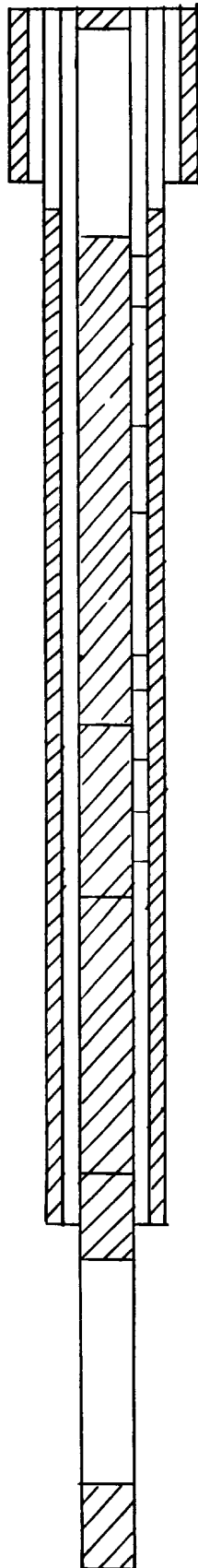
OIL CON. DIV.
DIST. 3

A	Caswell Silver	Federal A #1-7	P & A 1957
	330' FSL 990' FEL Section 7, 19N, R5W		T.D. 2168
B	Gaddis Mining Company	Federal A #2-7	P & A 1960
	330' FSL 330' FEL Section 7, 19N, R5W		T.D. 3450'
C	James L. Ludwick	Ludwick #1	Completed 1984
	660' FSL 360' FEL Section 7, 19N, R5W		T.D. 2105'
D	James L. Ludwick	Federal 8 #4	Re-entry
	330' FSL 330' FWL Section 8, 19N, R5W		T.D. 2123'
	Formerly Caswell Silver - P & A 1962		
E	Caswell Silver and	Federal #2-8	P & A 1957
	Douglas Corporation		T.D. 2200'
	1650' FSL 1650' FWL Section 8, 19N, R5W		
F	Reynolds Mining Corp.	Federal #1	P & A 1958
	660' FSL 1980' FWL Section 8, 19N, R5W		T.D. 4720'
G	Sinclair Oil & Gas Co.	S.F. 181 Star Lake #1	P & A 1961
	660' FNL 660' FEL Section 13, 19N, R6W		T.D. 4437'
H	Gardner Bros. Drilling Co.	Belknap Santa Fe #1	P & A 1962
	Formerly Otto Reynolds		T.D. 3438'
	1980' FSL 660' FEL Section 13, 19N, R6W		
I	James L. Ludwick	Indian 18 #1	Completed 1983
	1865' FNL 330' FEL Section 18, 19N, R5W		
J	James L. Ludwick	Indian 17 #1	Re-entry
	Formerly Caswell Silver		P & A 1962
	430' FNL 430' FWL Section 17, 19N, R5W		T.D. 1949'
K	James L. Ludwick	Navajo #2-17	Re-entry
	Formerly Caswell Silver		P & A 1959
	990' FNL 1650' FWL Section 17, 19N, R5W		T.D. 4377'
	PROPOSED INJECTION WELL		
L	James L. Ludwick	Indian 17 #3	Completed 1984
	1650' FNL 530' FWL Section 17, 19N, R5W		T.D. 1949'
M	Dome Petroleum Corp.	State 2-16-19-5 #2	P & A 1979
	2310' FNL 330' FEL Section 16, 19N, R5W		T.D. 5383'
N	Texaco, Inc.	Federal 15 #2	Papers Wash Entrada
	1980' FNL 990' FWL Section 15, 19N, R5W		
P	Texaco, Inc.	Federal 15 #1	Papers Wash Entrada
	2210' FNL 1650' FWL Section 15, 19N, R5W		
Q	Texaco, Inc.	Navajo Allotted 16 #1	Papers Wash Entrada
	2310' FSL 330' FEL Section 16, 19N, R5W		
R	Texaco, Inc.	Navajo Allotted 15 #4	Papers Wash Entrada
	2310' FSL 990' FWL Section 15, 19N, R5W		
S	Texaco, Inc.	Navajo Allotted 15 #3	Papers Wash Entrada
	2310' FSL 2000' FWL Section 15, 19N, R5W		
T	Texaco, Inc.	Navajo Allotted 15 #6	Papers Wash Entrada
	890' FSL 1650' FWL Section 15, 19N, R5W		
	INJECTION WELL		
U	Texaco, Inc.	Navajo Allotted A #1	Papers Wash Entrada
	700' FNL 1650' FWL Section 22, 19N, R5W		
V	Cities Service Company	Federal M #1	P & A 1982
	330' FSL 990' FEL Section 22, 19N, R5W		T.D. 5492'
W	Davis Oil Company	Paperthin #1	P & A 1971
	660' FNL 660' FEL Section 30, 19N, R5W		T.D. 4285'

LEASEHOLD INTERESTS

- 0 Open - unleased or lease expired.
- 1 Santa Fe Railroad - company owned.
- 2 NM-33908 Champlin Petroleum 50%, Norcen Petroleum, Inc. 25%, Joan Chorney 25%; Box 1257, Englewood, CO 80150
- 3 NM-33382 Chace Oil Co., Inc., 313 Washington Avenue, S.E., Albuquerque, NM 87108
- 4 N00-C-14-20-5551 Filon Exploration Corporation
- 5 NM-53365 Harry Strain, Box 323, Dora, NM 88115 - Now James L. Ludwick
- 6 NM-44459 John A. Yates, 207 So. Forth, Artesia, NM 88210
- 7 NM 4953 Dome Petroleum Corp. 38.375%, Elf Aquitaine, Inc. 28.125%, Natural Gas Pipeline Co. of America 25%, Trend Exploration, Ltd. 7.5%; 1600 Broadway, Suite 1500, Denver, CO 80202
- 8 N00-C-14-20-5565 Gulf Oil Corporation, Box 1150, Midland, TX 79702
- 9 NM-31905 Santa Fe, Energy Co. One Security Park, 7200 I-40 West, Amarillo, TX 79106
- 10 N00-C-14-20-5377 Aquitaine Oil Corporation
- 11 N00-C-14-20-5379 Aquitaine Oil Corporation
- 12 LG-2871-1 Billie Robinson, Box 1281, Santa Fe, NM 87504
- 13 N00-C-14-20-5526 Cities Service Company, Box 300, Tulsa, OK 74102
- 14 N00-C-14-20-5378 Aquitaine Oil Corporation
- 15 N00-C-14-20-5529 Cities Service Company
- 16 N00-C-14-20-5527 Cities Service Company
- 17 N00-C-14-20-5528 Cities Service Company
- 18 N00-C-14-20-5530 Cities Service Company
- 19 N00-C-14-20-5532 Cities Service Company
- 20 N00-C-14-20-5531 Cities Service Company
- 21 N00-C-14-20-5552 Filon Exploration Corporation
- 22 N00-C-14-20-5533 Cities Service Company
- 23 NM-26658 Cities Service Company
- 24 NM-34187 Champlin Petroleum Co. 50%, Norcen Petroleum, Inc. 25%, Raymond Chorney 25%; 401 Lincoln Tower Bldg., Denver, CO 80202
- 25 NM-29559 Gulf Oil Corporation, Box 1150, Midland, TX 79702
- 26 N00-C-14-20-3484 Tenneco Oil Company, Box 3119, Englewood, CO 80155

Gaddis Mining Company
 Federal A #2-7
 330' FSL 330' FEL
 P-7-19N-5W

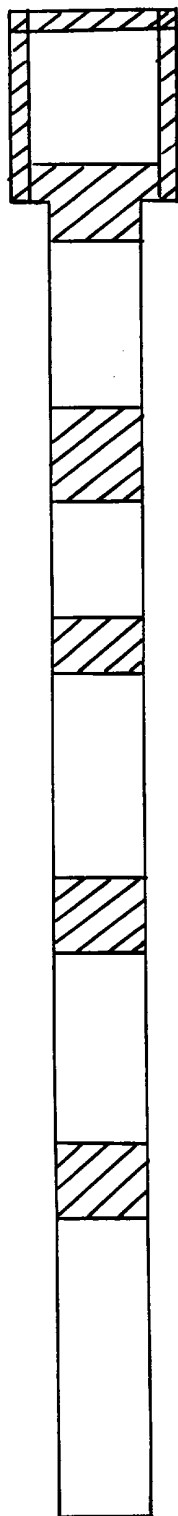


Surface Plug.

- 96' Surface Casing Shoe.
- 500-1900' Cement plug.
- 560-562' Fresh water.
- 578-580' Fresh water.
- 1508-1512' Fresh water.
- 1588-1594' Fresh water.
- 1846-1852' Fresh water.
- 1852-1864' Show of gas - TSTM. MESAVERDE INTERVAL
- 1900' Base of Cement Plug. Baker Plug.
- 1915-1920' Water.
- 1942-1948' Water.
- 1951-1953' Water.
- 2052' Baker Plug.
- 2245' 5½" Casing shoe.
- 2250' Base of Cement plug.
- 3300' Top of Cement Plug.
- 3450' Total Depth.

GALLUP INTERVAL

Reynolds Mining Corporation
 Star Lake (Federal) #1
 660' FSL 1980' FWL
 N-8-19N-5W



— Surface Plug.

— 275' TOC inside casing.

— 319' 10 3/4" casing shoe.

— 340' Base of plug.

— 1550' Cement plug.

— 1680'

— 2100' Cement plug.

— 2200'

— 3250' Cement plug.

— 3315'

— 4225' Cement plug.

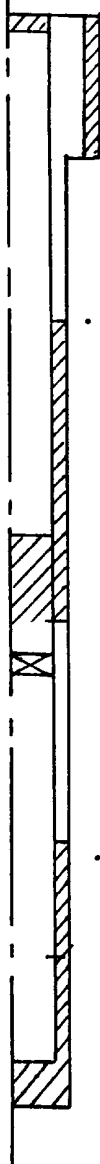
— 4290'

— 4720' Total Depth.

INJECTION WELL DATA SHEET

OPERATOR	LEASE	WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
James L. Ludwick	Navajo 17	2	990' FNL 1650' FWL	17	19N	5W

Schematic



- Surface Plug
- 68' 8 5/8" Casing Shoe.
- 800' TOC outside casing.
- 2100' TOC inside casing.
- 2300' Perf for cementing.
- 2400' Bridge plug.
- 3200' TOC 1st stage.
- 4286 to 4296' - Tested Dakota formation.
- 4320' 4 1/2" casing shoe.
- 4329' Total Depth.

Tabular Data

Surface Casing

Size 8 5/8 " Cemented with 50 sx.
 TOC Surface feet determined by Observation
 Hole size 12 1/4"

Intermediate Casing

Size NONE " Cemented with sx.
 TOC feet determined by
 Hole size

Long string

Size 4 1/2 " Cemented with 450 sx.
 TOC 800 feet determined by Temp. survey.
 Hole size 6 3/4"
 Total depth 4329'

Injection interval

2950 + feet to 3250+ feet (Perforations)
 (perforated or open-hole, indicate which)

Tubing size 2 3/8" lined with plastic set in a
 (material)
Baker Model G (Tension set) packer at 2945' + feet.
 (brand and model)
 (or describe any other casing-tubing seal).

Other Data

- Name of the injection formation Gallup
- Name of Field or Pool (if applicable) Un-named
- Is this a new well drilled for injection? ☐ Yes ☒ No
 If no, for what purpose was the well originally drilled? Wildcat oil well attempt
for production from the Dakota formation.
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) Yes, tested the Dakota formation from 4286 to 4296'. Set a bridge plug @ 2400', perforated @ 2375', cemented w/200 sx leaving 275' of cement in casing. TOC 1st stage = 3200', 2nd stage = 800'.
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. Un-named Mesaverde gas zone @ 1850 to 1950' overlying the proposed injection zone. Papers Wash Entrada Pool lies one and one-half miles east. Produced water is injected in the Gallup formation in the Papers Wash area.

DATA SHEET

Water System:

1. The average daily rate of injection is planned to be approximately 600 barrels; the maximum is planned to be 1200 barrels per day.
2. The system is planned to be a closed system.
3. Proposed injection pressures will not exceed 570 psi. It is believed that the initial injections will be at gravity flow.
4. The water to be injected will be produced water from the Mesaverde formation in the immediate vicinity of the subject well.
5. A water sample from the proposed disposal zone is not available; however, the zone is currently being used for disposal of water produced in the Papers Wash Entrada Pool approximately two miles east of the subject well in the well coded "T" on the enclosed map. A copy of an analysis of the produced water is enclosed.

Geology:

The proposed injection zone is the Gallup formation which occurs from 2950 to 3246 feet of depth in the subject well.

A copy of the Electric Log was filed with the Oil Conservation Division's District Office in 1958 when the well was drilled.

The injection zone will be acidized to clean the porosity near the wellbore.

There are no known fresh water wells within two miles of the subject well.

I have studied the geologic and engineering data of the area and find no evidence of any open faults or other hydrologic conditions between the disposal zone and any underground source of drinking water.

Affidavit of Publication

STATE OF NEW MEXICO,

) ss

COUNTY OF MCKINLEY

Ruby Walter being duly sworn upon oath, deposes and says:

As Legal Clerk of the Gallup Independent, a newspaper published in and having a general circulation in McKinley County, New Mexico, and in the City of Gallup, therein: that this affiant makes this affidavit based upon personal knowledge of the facts herein sworn to. That the publication, a copy of which is hereto attached was published in said newspaper during the period and time of publication and said notice was published in the newspaper proper, and not in a supplement thereof,

for one time, the first publication being on the

30 day of July, 19 84 the

second publication being on the _____ day of

_____, 19 _____ the third publication

on the _____ day of _____, 19 _____

and the last publication being on the _____ day of

_____, 19 _____

That such newspaper, in which such notice or advertisement was published, is now and has been at all times material hereto, duly qualified for such purpose, and to publish legal notices and advertisements within the meaning of Chapter 12, of the statutes of the State of New Mexico, 1941 compilation.

Ruby Walter
Affiant.

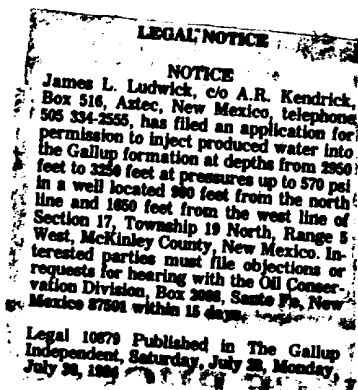
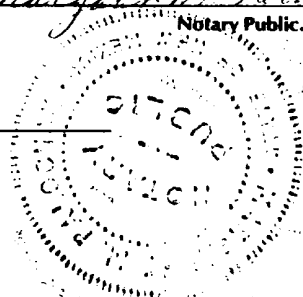
Sworn and subscribed to before me this 3 day of

August, A.D., 19 84

Margaret M. Palorha K
Notary Public.

My commission expires

8-27-85



API FORM 45-1

API WATER ANALYSIS REPORT FORM

Company <u>JAMES L. LUDWICK</u>		Sample No. <u>1</u>	Date Sampled <u>6/5/84</u>
Field <u>Undes. Mesa Verde</u>	Legal Description <u>Sec. 17, T19N, R5W</u>	County or Parish <u>McKinley</u>	State <u>NM</u>
Lease or Unit <u>Indian</u>	Well <u>1-18</u>	Depth <u>1750</u>	Formation <u>Menefee</u>
Type of Water (Produced, Supply, etc.) <u>Produced</u>		Sampling Point <u>wellhead</u>	Water, B/D <u>water</u>
		Sampled By <u>JL</u>	

DISSOLVED SOLIDS

CATIONS	mg/l	me/l	ppm
Sodium, Na (calc.)	<u>2827</u>	<u>122.9</u>	
Calcium, Ca	<u>0</u>	<u>0</u>	
Magnesium, Mg	<u>27</u>	<u>2.3</u>	
Barium, Ba	<u>57</u>	<u>1.4</u>	

ANIONS

Chloride, Cl	<u>3214.2</u>	<u>139.7</u>
Sulfate, SO ₄	<u>25.0</u>	<u>0.5</u>
Carbonate, CO ₃	<u>180.0</u>	<u>6.0</u>
Bicarbonate, HCO ₃	<u>1921.5</u>	<u>31.5</u>
Hydroxide	<u>0</u>	<u>0</u>

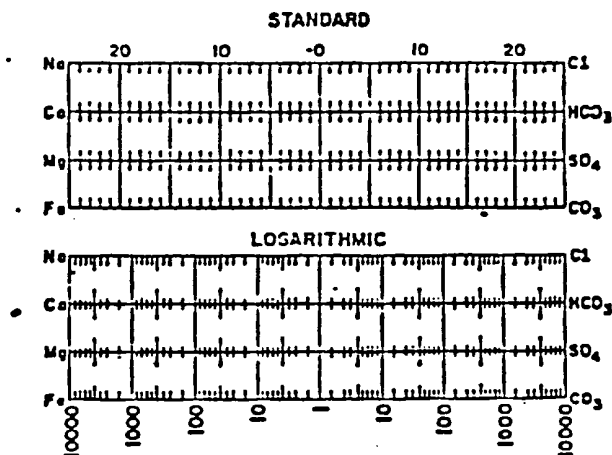
Total Dissolved Solids (calc.)
8251.7

Iron, Fe (total) - 0 -
Sulfide, as H₂S - 0 -

OTHER PROPERTIES

pH	<u>8.3</u>
Specific Gravity, 60/60 F.	<u>1.005</u>
Resistivity (ohm-meters) <u>70 F.</u>	<u>0.81</u>

WATER PATTERNS — me/l



REMARKS & RECOMMENDATIONS:

ANALYST: Clay Terry

THE WESTERN COMPANY OF NORTH
AMERICA, FARMINGTON, N.M.
(505) 327-6222

Please refer any questions to: Clay Terry, District Engineer or
Tom Burris, Field Engineer.

OWNERS WITHIN ONE-HALF MILE RADIUS
OF PROPOSED INJECTION WELL

LEASEHOLD OWNERS:

Chace Oil Company
313 Washington, S.E.
Albuquerque, New Mexico 87108

James L. Ludwick
Box 70
Farmington, New Mexico 87499

John A. Yates
207 South Fourth Street
Artesia, New Mexico 88210

Cities Service Company
Box 300
Tulsa, Oklahoma 74102

Bureau of Land Management
Box 1449
Santa Fe, New Mexico 87501

SURFACE OWNERS: NW $\frac{1}{4}$ Section 17, T19N, R5W, McKinley County, New Mexico

Hose Antonio Toledo
aka Hosteen Naltsos C#9337
or his heirs in care of:

Grace Toledo
aka Mrs. Kaiser Toledo C#9370
Torreon Trading Post
Cuba, New Mexico 87013

* Bureau of Indian Affairs
Box 328
Crownpoint, New Mexico 87313
Attention: Superintendent

Rose Ignacio C#107612
General Delivery
Cuba, New Mexico 87013

Mrs. Juan Sandoval
aka Dez Bah C#39340
Box 132
Cuba, New Mexico 87013

Leonard Ignacio C#107613
General Delivery
Cuba, New Mexico 87013

Betty T. Whitehorse
aka Betty Toledo C#89323
Torreon Trading Post
Cuba, New Mexico 87013

Irene Pinto Ignacio
aka Irene Pinto C#95153
General Delivery
Cuba, New Mexico 87013

* As agent for any other surface owner.