



STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
HOBBS DISTRICT OFFICE

4/23/96

GOVERNOR

POST OFFICE BOX 1980
HOBBS, NEW MEXICO 88241-1980
(505) 393-6161

OIL CONSERVATION DIVISION
P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

WFI- 686
5/21/96

RE: Proposed:

MC _____
DHC _____
NSL _____
NSP _____
SWD _____
WFX _____
PMX _____

Gentlemen:

I have examined the application for the:

Newbourne Oil Co Hanley, 24 Federal #1-L 24-185-32e
Operator Lease & Well No. Unit S-T-R

and my recommendations are as follows:

OK

Yours very truly,

Jerry Sexton
Supervisor, District 1

/ed

APPLICATION FOR AUTHORIZATION TO INJECT

- I. Purpose: ☒ Secondary Recovery ☐ Pressure Maintenance ☐ Disposal ☐ Storage
Application qualifies for administrative approval? ☒ yes ☐ no
- II. Operator: Mewbourne Oil Company
Address: P. O. Box 7698, Tyler, Texas 75711
Contact party: Kevin Mayes Phone: (903) 561-2900
- 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 R-9737-A
- 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: Kevin Mayes Title: Project Engineer
Signature: Kevin Mayes Date: April 15, 1996
- 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.

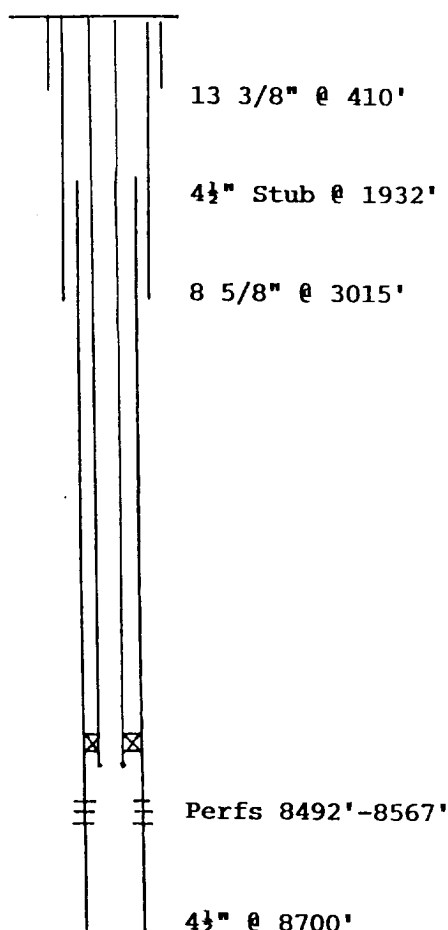
ITF III OF NEW MEXICO OCD FORM C-108

INJECTION WELL DATA SHEET

Mewbourne Oil Company		Hanley "24" Federal	
OPERATOR	LEASE		
1	2310' FSL, 330' FWL	24	18S 32E
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP RANGE
Lea County, New Mexico			

Schematic

Tabular Data



Surface Casing

Size 13 3/8 " Cemented with 400 av.
 TOC Surface feet determined by Circulated
 Hole size 17 1/2"

Intermediate Casing

Size 8 5/8 " Cemented with 800 av.
 TOC Surface feet determined by Circulated
 Hole size 12 1/4"

Long string

Size 4 1/2 " Cemented with 1525 av.
 TOC 1950 feet determined by Free Point
 Hole size 7 7/8"
 Total depth 8700'

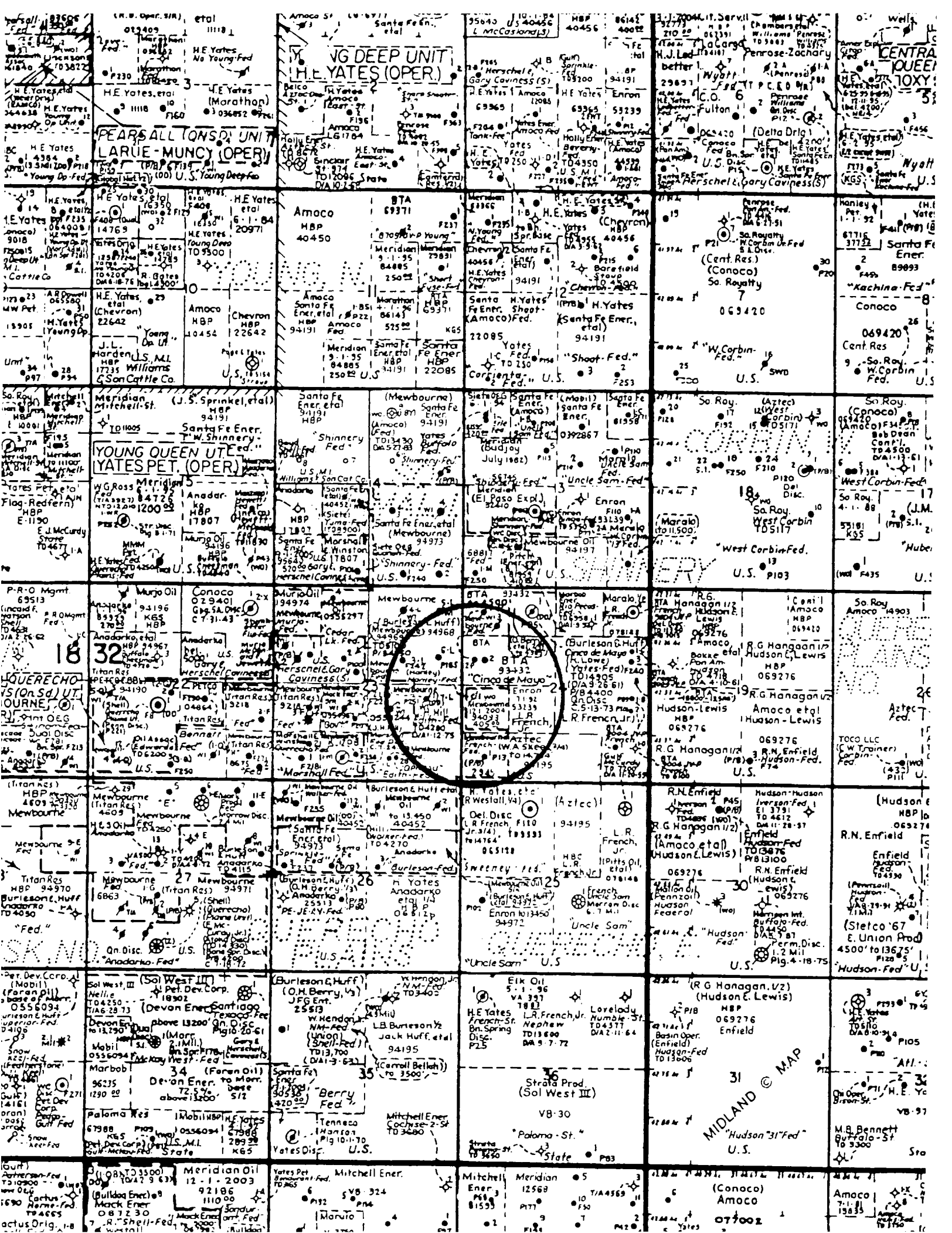
Injection interval

8492 feet to 8567 feet
 (perforated or open-hole, indicate which)

Tubing size 2 3/8" lined with Polyethylene set in a
 (material)
Otis Perma-latch packer at 8392 feet
 (brand and model)
 (or describe any other casing-tubing seal).

Other Data

- Name of the injection formation 1st Bone Spring Sand
- Name of field or Pool (if applicable) Querecho Plains
- In this a new well drilled for injection? ☐ Yes ☒ No
 If no, for what purpose was the well originally drilled? 1st Bone Spring
Oil Production - Well was plugged in September 1992
- 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) No
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.
Above - Delaware
Below - 2nd Bone Spring Carbonate



ITEM VI OF NEW MEXICO FORM C-108
WELLS WITH-IN REVIEW AREA WHICH PENETRATE THE 1ST BONE SPRING SAND
QUERECHO PLAINS BONE SPRINGS SAND UNIT

OPERATOR	LEASE/WELL	LOCATION	TYPE	CONSTRUCTION	TOP OF CEMENT	DATE DRILLED	TD	COMPLETION & COMMENTS
MEWBOURNE OIL CO.	QPBSSU 3-5 (O/H FED L #5)	T18S, R32E, SEC 23 660 FNL, 660 FEL	OIL	13 3/8 @ 460' CMT W/ 400 SX 8 5/8 @ 4330' CMT W/ 1575 SX 5 1/2 @ 8650' CMT W/ 1275 SX	SURFACE(V) SURFACE(V) 2763'	4/17/88	8650'	OPEN PERFS 8430'-8574'
MEWBOURNE OIL CO.	QPBSSU 3-3 (O/H FED L #3)	T18S, R32E, SEC 23 1980 FNL, 1650 FEL	OIL	13 3/8 @ 450' CMT W/ 416 SX 8 5/8 @ 4315' CMT W/ 1700 SX 5 1/2 @ 8698' CMT W/ 1475 SX	SURFACE(V) SURFACE(V) 1342'	6/19/87	8698'	PERF & TEST 8598'-8610' CIBP @ 8585' OPEN PERFS 8446'-8530'
MEWBOURNE OIL CO.	QPBSSU 3-6 (O/H FED L #6)	T18S, R32E, SEC 23 1880 FNL, 660 FEL	OIL	13 3/8 @ 448' CMT W/ 475 SX 8 5/8 @ 4330' CMT W/ 1575 SX 5 1/2 @ 8650' CMT W/ 1400 SX	SURFACE(V) SURFACE(V) SURFACE(V)	7/24/88	8650'	OPEN PERFS 8436'-8520'
MEWBOURNE OIL CO.	QPBSSU 3-7 (O/H FED L #7) (O/H EDITH FED #1)	T18S, R32E, SEC 23 2310 FSL, 990 FEL	OIL	8 5/8 @ 356' CMT W/ 250 SX 5 1/2 @ 8670' CMT W/ 4630 SX	SURFACE(V) SURFACE(V)	5/14/88	8670'	DEEPEN FROM OTD @ 4281' (1975) OPEN PERFS 8485'-8552'
MEWBOURNE OIL CO.	QPBSSU 3-2 (O/H FED L #2)	T18S, R32E, SEC 23 2310 FSL, 2030 FEL	OIL	13 3/8 @ 441' CMT W/ 450 SX 8 5/8 @ 4293' CMT W/ 1800 SX 5 1/2 @ 8750' CMT W/ 925 SX	SURFACE(V) SURFACE(V) 3538'(CBL)	10/14/86	8750'	OPEN PERFS 8458'-8531'
MEWBOURNE OIL CO.	QPBSSU 2A-1 (O/H FED P #1)	T18S, R32E, SEC 24 660 FNL, 660 FWL	OIL	13 3/8 @ 452' CMT W/ 450 SX 8 5/8 @ 4347' CMT W/ 1600 SX 5 1/2 @ 8680' CMT W/ 1425 SX	SURFACE(V) SURFACE(V) 2100'	3/31/89	8680'	OPEN PERFS 8473'-8545'
MEWBOURNE OIL CO.	QPBSSU 2A-2 (O/H FED P #2)	T18S, R32E, SEC 24 1980 FNL, 330 FWL	OIL	13 3/8 @ 430' CMT W/ 450 SX 8 5/8 @ 4330' CMT W/ 1950 SX 5 1/2 @ 8725' CMT W/ 1425 SX	SURFACE SURFACE 1618'	8/05/89	8725'	OPEN PERFS 8468'-8524'
MEWBOURNE OIL CO.	QPBSSU 6-1 (O/H FRENCH FED #1)	T18S, R32E, SEC 24 660 FSL, 660 FWL	OIL	11 3/4 @ 350' CMT W/ 725 SX 8 5/8 @ 2800' CMT W/ 2000 SX 4 1/2 @ 8700' CMT W/ 780 SX	SURFACE SURFACE 5742'	2/15/86	8700'	PERF & PROD 8534'-8568' CIBP @ 8440' OPEN PERFS 6650'-6670' SQZ 6650'-6670' W/ 219SX CLEAN OUT TO 8654' OPEN PERFS 8534'-8568'

NOTE: TOP OF CEMENT IS CALCULATED WITHOUT COMPENSATION FOR COLLARS AND USES 75% FOR EXCESS.
CALCULATIONS ASSUME SLURRY YIELDS OF 1.32 CUFT/SX FOR SURFACE AND INTERMEDIATE CASING, AND
1.08 CUFT/SX FOR PRODUCTION CASING. V=VISUAL & CBL=CMT BOND LOG.

ITEM VII OF NEW MEXICO OCD FORM C-108
DATA ON PROPOSED OPERATIONS
QUERECHO PLAINS BONE SPRING SAND UNIT

- ITEM VII (1) Proposed maximum injection rate is 500 bwpd.
- ITEM VII (2) The injection system will be operated as a closed system.
- ITEM VII (3) The proposed maximum injection pressure is 2000 psi. Said pressure is the same approved for fourteen injection wells currently in operation at the unit per Division Order R-9737-A.
- ITEM VII (4) The source of injection water for the subject unit will be fresh water supplied by the City of Carlsbad's Double Eagle system, Delaware produced water, Queen produced water and recycled Bone Spring produced water. These waters have been the source used at the unit for two and a half (2 1/2) years with no problems.
- ITEM VII (5) Not applicable.

ITEM VIII OF NEW MEXICO OCD FORM C-108
GEOLOGIC DATA ON THE INJECTION ZONE & UNDERGROUND DRINKING WATER
QUERECHO PLAINS BONE SPRINGS SAND UNIT

The zone being targeted for water injection at Querecho Plains is the First Bone Spring sand at depths from 8328'-8620' in the well Federal L NO. 4, Section 23, T18S, R32E. The First Bone Spring sands are a sequence of well consolidated sandstone, siltstone, and shale strata, with localized carbonate deposition, of Permian age cemented with calcareous material. An eight percent porosity cut off is used to determine net pay as porosity less than eight percent is considered impermeable at the existing and proposed reservoir pressure and reservoir fluid regimes. Net pay isopach maps contained in the engineering report portion of the unit plan show the areal extent of the targeted sands. Impermeable carbonate deposits exist above and below the targeted sands thus defining the permeable limits of the reservoir. All injected fluids should remain in the reservoir with the exception of cycling to the surface through wellbores.

Based on communications with the New Mexico State Engineer's Roswell office (Ken Fresquez) and OCD files at Hobbs there appears to be only one fresh water well within T18S & R32E. This well's total depth was 270' and is located in the NW, NW, SE, SE, NW of section 20. The source strata tapped by this well is the Triassic "Red Beds" and the only other strata Mr. Fresquez referred to as potentially fresh was the Alluvium which is shallower than the "Red Beds". There are no known fresh water strata underlying the Bone Spring.

ITEMS IX THROUGH XII OF NEW MEXICO OCD FORM C-108
QUERECHO PLAINS BONE SPRING SAND UNIT

- ITEM IX. This well has an existing fracture stimulation. It is anticipated that the well may need an acid clean up after re-entry.
- ITEM X. All logging and test data for the existing wellbore exists on file with the state of New Mexico Oil Conservation Division (OCD) and will not be resubmitted with this application.
- ITEM XI. As stated in ITEM VIII, it appears the only strata within one mile of our proposed injector which contains water of possible drinking quality is confined to 270' and shallower. No contamination of this drinking water should occur as all existing wellbores which penetrate the Bone Spring have surface casing set at a minimum depth of 350' with cement completely circulated behind this casing from setting depth to surface. In addition and to the best of my knowledge there are no fresh water wells within one mile of our proposed injectors.
- ITEM XII. After reviewing the geology of the Bone Spring Sand strata in a one and one-half mile radius around the proposed unit area, no evidence appears of fractures or any hydrologic connection between the target sands and any overlying or underlying strata.

C. ROCK LABORATORIES, INC.
1312 BANKHEAD HIGHWAY
MIDLAND, TEXAS 79701
(915) 689 - 7252

May 21, 1992

Mewburne Oil Company
P. O. Box 7698
Tyler, Texas 75711

Attention: Kevin Mays

Subject: Water Compatibility Study

Gentlemen:

Presented in this report are the final results of a water compatibility study performed on 5 samples of produced water provided to this laboratory by Core Laboratory on behalf of Mewburne Oil Company. API Water Analysis was performed on each of the samples to determine their ionic characteristics. Based on these analyses, the scaling tendency with respect to calcium carbonate and calcium sulfate were calculated and reported on May 19, 1992 (our Job Number 9205032). The samples were physically mixed to determine if precipitates would form. Turbidity was measured as percent transmittance on each of the combinations at 420 nanometers wavelength on a Milton Roy Model 601 Spectrophotometer.

The turbidity data are presented in this report and indicated ~~that~~ that the water from the Federal "E" #5 tank battery (Queen Formation) and the water from the Cedardrake Federal #4 well formed precipitates when combined in the ratios tested (very slight decreases in transmittance were observed). Additional analyses were performed on the waters to determine their barium concentrations and are also presented in this report. Based on calculations from theoretical combinations, all of the waters have a tendency to form both calcium carbonate and calcium sulfate scale on their own and these tendencies do not increase when mixed. The fresh water from Double Eagle and the Delaware produced water from the Cedardrake Federal #4 well both have barium and therefore presents the possibility of barium sulfate scale formation when combined with waters high in sulfate.

In conclusion, based on all of the analyses and physical combinations of these waters, the Delaware produced water from the Jewitt Feed #1 appears to be the most compatible water to the Bone Springs water from the Federal "L" lease.

Respectfully yours,



James L. Pritchard, Lab Manager
Caprock Laboratories, Inc.

CAPROCK LABORATORIES, INC.
3312 BANKHEAD HIGHWAY
MIDLAND, TEXAS 79701
(915) 689 - 7252

COMPANY: MEWBURNE OIL COMPANY JOB NUMBER: 9205032

SAMPLE NUMBER	SAMPLE DESCRIPTION
1	FEDERAL "E" #5 T.B. (QUEEN FORMATION)
2	JEWITT FEED #1 (DELAWARE FORMATION)
3	DOUBLE EAGLE (FRESH WATER)
4	CEDARDRAKE FEDERAL #4 (DELAWARE FORMATION)
5	FEDERAL "L" LEASE (DOME SPRINGS FORMATION)

MIXTURE	TURBIDITY, % TRANS. @ 420 μ M
1-5	96.6
2-5	100.
3-5	100.
4-5	99.5
1-2-5	94.3
1-3-5	95.3
1-4-5	98.8
2-3-5	100.
2-4-5	98.8
3-4-5	99.7
ALL	97.7

WATER ANALYSIS REPORT

SAMPLE

Oil Co. :
 Lease : DOUBLE EAGLE
 Well No. : FRESH WATER
 Job No. : 9205032

Sample Loc. :
 Date Sampled :
 Attention :
 Analysis No. : 3

ANALYSIS

1. pH
2. Specific Gravity 60/60 F. 9.100
3. CaCO₃ Saturation Index @ 80 F. 0.996
 @ 140 F. +1.548
 @ 140 F. +2.388

MG/L EQ. WT. *MEQ/L

Dissolved Gasses

4. Hydrogen Sulfide
 5. Carbon Dioxide
 6. Dissolved Oxygen
- 0.0
 Not Determined
 Not Determined

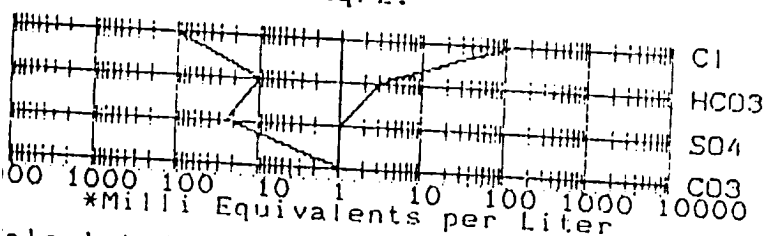
Cations

7. Calcium (Ca⁺⁺)
 8. Magnesium (Mg⁺⁺)
 9. Sodium (Na⁺)
 10. Barium (Ba⁺⁺) (Calculated)
- | | | | |
|-------|---|--------|--------|
| 200 | / | 20.1 = | 9.95 |
| 304 | / | 12.2 = | 24.92 |
| 2,507 | / | 23.0 = | 109.00 |
| 6 | / | 68.7 = | 0.09 |

Anions

11. Hydroxyl (OH⁻)
 12. Carbonate (CO₃⁻)
 13. Bicarbonate (HCO₃⁻)
 14. Sulfate (SO₄⁻)
 15. Chloride (Cl⁻)
 16. Total Dissolved Solids
 17. Total Iron (Fe)
 18. Total Hardness As CaCO₃
 19. Resistivity @ 75 F. (Calculated) 0.685 /cm.
- | | | | |
|-------|---|--------|--------|
| 0 | / | 17.0 = | 0.00 |
| 0 | / | 30.0 = | 0.00 |
| 183 | / | 61.1 = | 3.00 |
| 50 | / | 48.8 = | 1.02 |
| 4,963 | / | 35.5 = | 139.80 |
| 8,213 | | | |
| 1 | / | 18.2 = | 0.05 |
| 1,752 | | | |

LOGARITHMIC WATER PATTERN



Calculated Calcium Sulfate solubility in this brine is 2,814 mg/L. at 90 F.

 Analyst
 Remarks and Comments:

PROBABLE MINERAL COMPOSITION

COMPOUND	EQ. WT.	X	*meq/L =	mg/L.
Ca(HCO ₃) ₂	81.04		3.00	243
CaSO ₄	68.07		0.94	64
CaCl ₂	55.50		6.02	334
Mg(HCO ₃) ₂	73.17		0.00	0
MgSO ₄	60.19		0.00	0
MgCL ₂	47.62		24.92	1,187
NaHCO ₃	84.00		0.00	0
NaSO ₄	71.03		0.00	0
NaCl	58.46		108.87	6,364

LABORATORIES, INC.

3312 Bankhead Hwy.
Midland, Texas 79701
(915) 689-7252
FAX (915) 689-0130

WATER ANALYSIS REPORT

AMPLE

Co. : MEWBORNE OIL CO.
lease : FEDERAL E
I No. : #5 T.B.
b No. : 9205032

Sample Loc. : QUEEN PENCOSSE PROD. WATER
Date Sampled :
Attention :
Analysis No. : 1

ANALYSIS

1. pH 6.100
2. Specific Gravity 60/60 F. 1.171
3. CaCO₃ Saturation Index @ 80 F. +1.948
@ 140 F. +2.648

Dissolved Gasses

4. Hydrogen Sulfide 0.0
5. Carbon Dioxide Not Determined
6. Dissolved Oxygen Not Determined

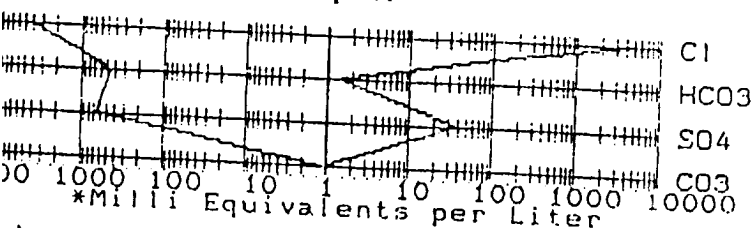
Cations

- | | | | |
|---|--------|----------|----------|
| 7. Calcium (Ca ⁺⁺) | 8,978 | / 20.1 = | 446.67 |
| 8. Magnesium (Mg ⁺⁺) | 8,266 | / 12.2 = | 677.54 |
| 9. Sodium (Na ⁺) | 94,120 | / 23.0 = | 4,092.17 |
| 10. Barium (Ba ⁺⁺) (Calculated) | 0.0 | | 5214 |

Anions

- | | | | |
|--|------------|----------|----------|
| 11. Hydroxyl (OH ⁻) | 0 | / 17.0 = | 0.00 |
| 12. Carbonate (CO ₃ ⁻) | 0 | / 30.0 = | 0.00 |
| 13. Bicarbonate (HCO ₃ ⁻) | 85 | / 61.1 = | 1.39 |
| 14. Sulfate (SO ₄ ⁻) | 1,950 | / 48.8 = | 39.96 |
| 15. Chloride (Cl ⁻) | 183,647 | / 35.5 = | 5,173.15 |
| 16. Total Dissolved Solids | 297,046 | | |
| 17. Total Iron (Fe) | 22 | / 18.2 = | 1.21 |
| 18. Total Hardness As CaCO ₃ | 56,450 | | |
| 19. Resistivity @ 75 F. (Calculated) | 0.001 /cm. | = | 1.21 |

LOGARITHMIC WATER PATTERN



Calculated Calcium Sulfate solubility in this brine is 1,232 mg/L. at 90 F.

PROBABLE MINERAL COMPOSITION			
COMPOUND	EQ. WT.	X	*meq/L = mg/L.
Ca(HCO ₃) ₂	81.04	1.39	113
CaSO ₄	68.07	39.96	2,720
CaCl ₂	55.50	405.32	22,495
Mg(HCO ₃) ₂	73.17	0.00	0
MgSO ₄	60.19	0.00	0
MgCl ₂	47.62	677.54	32,265
NaHCO ₃	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl	58.46	4,090.30	239,119

yst

arks and Comments:

WATER ANALYSIS REPORT

SAMPLE

Co. : MEWBOURNE OIL CO.
 Lease : FEDERAL L LEASE
 Well No. :
 Job No. : 9205032

Sample Loc. : BONE SPRINGS PROD. WATER
 Date Sampled :
 Attention :
 Analysis No. : 5

ANALYSIS

1. pH 7.550 ✓
 2. Specific Gravity 60/60 F. 1.110 ✓
 3. CaCO₃ Saturation Index @ 80 F. +0.842
 @ 140 F. +1.722

Dissolved Gasses

4. Hydrogen Sulfide 0.0
 5. Carbon Dioxide Not Determined
 6. Dissolved Oxygen Not Determined

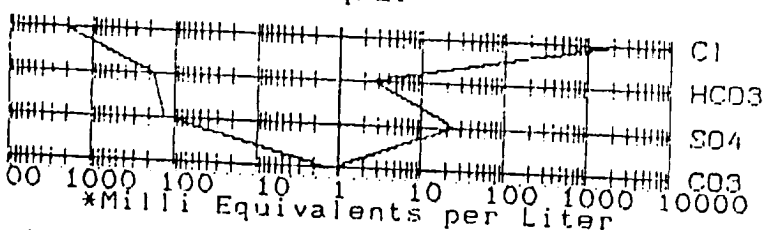
Cations

7. Calcium (Ca ⁺⁺)	3,527 ✓	/ 20.1 =	175.47
8. Magnesium (Mg ⁺⁺)	1,556	/ 12.2 =	127.54
9. Sodium (Na ⁺)	52,547	/ 23.0 =	2,284.65
10. Barium (Ba ⁺⁺)	(Calculated)		
	Not Determined		

Anions

11. Hydroxyl (OH ⁻)	0	/ 17.0 =	0.00
12. Carbonate (CO ₃ ⁻)	0	/ 30.0 =	0.00
13. Bicarbonate (HCO ₃ ⁻)	159	/ 61.1 =	2.60
14. Sulfate (SO ₄ ⁻)	1,300	/ 48.8 =	26.64
15. Chloride (Cl ⁻)	90,760 ✓	/ 35.5 =	2,556.62
16. Total Dissolved Solids	149,849		
17. Total Iron (Fe)	28	/ 18.2 =	1.51
18. Total Hardness As CaCO ₃	15,214		
19. Resistivity @ 75 F. (Calculated)	0.037 /cm.		

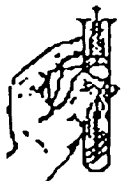
LOGARITHMIC WATER PATTERN
 *meq/L.



Calculated Calcium Sulfate solubility in this brine is 4,032 mg/L. at 90 F.

PROBABLE MINERAL COMPOSITION			
COMPOUND	EQ. WT.	X *meq/L	= mg/L.
Ca(HCO ₃) ₂	81.04	2.60	211
CaSO ₄	68.07	26.64	1,813
CaCl ₂	55.50	146.23	8,116
Mg(HCO ₃) ₂	73.17	0.00	0
MgSO ₄	60.19	0.00	0
MgCl ₂	47.62	127.54	6,074
NaHCO ₃	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl	58.46	2,282.85	133,455

Analyst: K. P. R.
 Remarks and Comments:



CAPROCK LABORATORIES, INC.

3312 Bankhead Hwy.
Midland, Texas 79701
(915) 689-7252
FAX (915) 689-0130

WATER ANALYSIS REPORT

SAMPLE

1 Co. : MEWBOURNE OIL CO.
Lease : CEDARDAKE FEDERAL
11 No. : #4
ob No. : 9205032

Sample Loc. : DELAWARE PROD. WATER
Date Sampled :
Attention :
Analysis No. : 4

ANALYSIS

	MG/L	EQ. WT.	*MEQ/L
1. pH	6.900		
2. Specific Gravity 60/60 F.	1.148		
3. CaCO ₃ Saturation Index @ 80 F.	+0.668		
@ 140 F.	+1.778		

Dissolved Gasses

4. Hydrogen Sulfide	0.0
5. Carbon Dioxide	Not Determined
6. Dissolved Oxygen	Not Determined

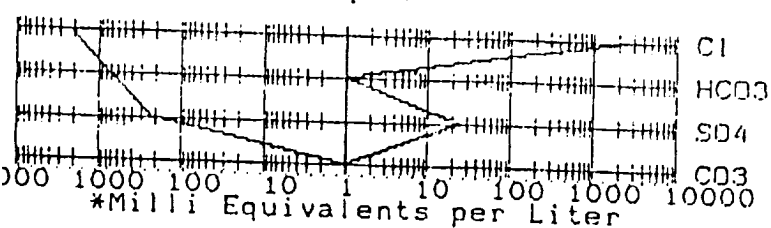
Cations

7. Calcium (Ca ⁺⁺)	14,749	/ 20.1 =	733.78
8. Magnesium (Mg ⁺⁺)	2,674	/ 12.2 =	219.18
9. Sodium (Na ⁺) (Calculated)	49,932	/ 23.0 =	2,170.96
10. Barium (Ba ⁺⁺)	22	/ 68.7 =	0.32

Anions

11. Hydroxyl (OH ⁻)	0	/ 17.0 =	0.00
12. Carbonate (CO ₃ ⁻)	0	/ 30.0 =	0.00
13. Bicarbonate (HCO ₃ ⁻)	49	/ 61.1 =	0.80
14. Sulfate (SO ₄ ⁻)	1,300	/ 48.8 =	26.64
15. Chloride (Cl ⁻)	109,904	/ 35.5 =	3,095.89
16. Total Dissolved Solids	178,630		
17. Total Iron (Fe)	18	/ 18.2 =	0.99
18. Total Hardness As CaCO ₃	47,843		
19. Resistivity @ 75 F. (Calculated)	0.014 /cm.		

LOGARITHMIC WATER PATTERN

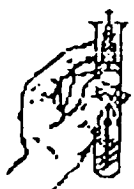


Calculated Calcium Sulfate solubility in this brine is 1,111 mg/L. at 90 F.

PROBABLE MINERAL COMPOSITION			
COMPOUND	EQ. WT.	X	*meq/L = mg/L.
Ca(HCO ₃) ₂	81.04	0.80	65
CaSO ₄	68.07	26.32	1,792
CaCl ₂	55.50	706.66	39,220
Mg(HCO ₃) ₂	73.17	0.00	0
MgSO ₄	60.19	0.00	0
MgCl ₂	47.62	219.18	10,437
NaHCO ₃	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl	58.46	2,170.05	126,861

Tyst *KD*

arks and Comments:



CAPROCK LABORATORIES, INC.

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Midland, Texas 79701
(915) 689-7252
FAX (915) 689-0130

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : MANZANO OIL
Lease : JEWITT FEED
Well No. : #1
Job No. : 9205032

Sample Loc. : DELAWARE PROD.
Date Sampled :
Attention :
Analysis No. : 2

ANALYSIS

- | | MG/L | EQ. WT. | *MEQ/L |
|---|------|---------|-----------------|
| 1. pH | | | 6.550 |
| 2. Specific Gravity 60/60 F. | | | 1.165 ✓ |
| 3. CaCO ₃ Saturation Index @ 80 F. | | | +1.052 |
| | | | @ 140 F. +2.812 |

Dissolved Gasses

- | | |
|---------------------|----------------|
| 4. Hydrogen Sulfide | 0.0 |
| 5. Carbon Dioxide | Not Determined |
| 6. Dissolved Oxygen | Not Determined |

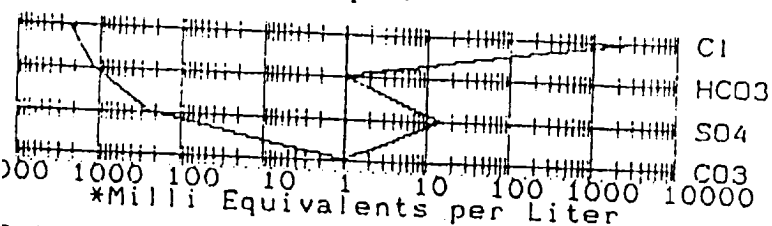
Cations

- | | | | |
|----------------------------------|----------|----------|----------|
| 7. Calcium (Ca ⁺⁺) | 24,529 ✓ | / 20.1 = | 1,220.35 |
| 8. Magnesium (Mg ⁺⁺) | 2,772 | / 12.2 = | 227.21 |
| 9. Sodium (Na ⁺) | 52,982 | / 23.0 = | 2,303.57 |
| 10. Barium (Ba ⁺⁺) | 0.0 | | |
| (Calculated) | | | |

Anions

- | | | | |
|--|------------|----------|----------|
| 11. Hydroxyl (OH ⁻) | 0 | / 17.0 = | 0.00 |
| 12. Carbonate (CO ₃ ⁻) | 0 | / 30.0 = | 0.00 |
| 13. Bicarbonate (HCO ₃ ⁻) | 61 | / 61.1 = | 1.00 |
| 14. Sulfate (SO ₄ ⁻) | 750 | / 48.8 = | 15.37 |
| 15. Chloride (Cl ⁻) | 132,594 ✓ | / 35.5 = | 3,735.04 |
| 16. Total Dissolved Solids | 213,688 | | |
| 17. Total Iron (Fe) | 15 | / 18.2 = | 0.84 |
| 18. Total Hardness As CaCO ₃ | 72,665 | | |
| 19. Resistivity @ 75 F. (Calculated) | 0.001 /cm. | | |

LOGARITHMIC WATER PATTERN



PROBABLE MINERAL COMPOSITION			
COMPOUND	EQ. WT.	X *meq/L	= mg/L.
Ca(HCO ₃) ₂	81.04	1.00	81
CaSO ₄	68.07	15.37	1,046
CaCl ₂	55.50	1,203.98	66,821
Mg(HCO ₃) ₂	73.17	0.00	0
MgSO ₄	60.19	0.00	0
MgCl ₂	47.62	227.21	10,820
NaHCO ₃	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl	58.46	2,303.85	134,683

Tyst.

arks and Comments: