STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
HOBBS DISTRICT OFFICE

6/19/95

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

WFX-673

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

Gentlemen:

I have examined the application for the:

Newbourne Oil Co Quercho Plains BS Sand Unit #2-A 26-18s-32e
Operator Lease & Well No. Unit S-T-R

and my recommendations are as follows:

OK Jerry Sexton

Yours very truly,

Jerry Sexton
Supervisor, District 1

/ed

MEWBOURNE OIL COMPANY

P.O. BOX 7698
TYLER, TEXAS 75711
903 - 561-2900
FAX 903 - 561-1870

June 9, 1995

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
NO. P 151 907 850

State of New Mexico
Oil Conservation Division
P. O. Box 1980
Hobbs, New Mexico 88240

Re: Application for Authority to Inject
Querecho Plains Queen Associated Pool
Lea County, New Mexico

Gentlemen:

Attached is Mewbourne Oil Company's application requesting approval to inject water into the referenced formation. Any objections to the application should be filed with the Oil Conservation Division, P. O. Box 2088, Santa Fe, New Mexico 87501-2088 within fifteen (15) days.

If you have any questions regarding this application, please contact me at (903) 561-2900.

Very truly yours,

K. M. Calvert

K. M. Calvert
Engineering Manager, Secondary Recovery

KMC:gt
Attachments

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501

FORM C-108
Revised 7-1-81

APPLICATION FOR AUTHORIZATION TO INJECT

I. Purpose: [X] Secondary Recovery [ ] Pressure Maintenance [ ] Disposal [ ] Storage
Application qualifies for administrative approval? [X] yes [ ] no

II. Operator: Mewbourne Oil Company

Address: P.O. Box 7698 Tyler, Texas 75711

Contact party: Ken Calvert 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? [X] yes [ ] no
If yes, give the Division order number authorizing the project R-10151.

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: K. M. Calvert Title Manager-Secondary Recovery

Signature: K. M. Calvert Date: June 9, 1995

* 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.

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

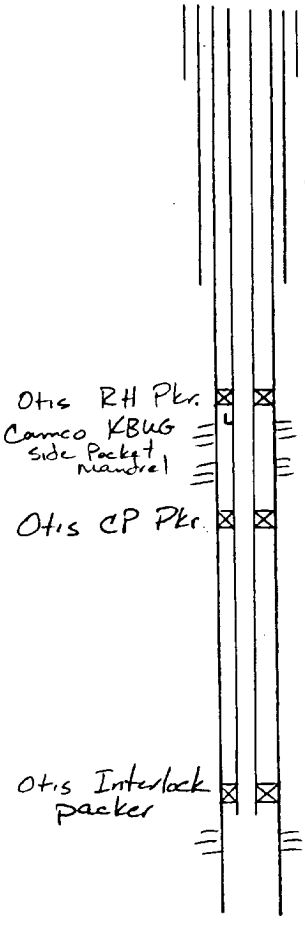
INJECTION WELL DATA SHEET

MEWBOURNE OIL COMPANY (OPERATOR) BURTON FEDERAL (LEASE)

(*) (WELL NO.) 660' FNL 660' FEL (FOOTAGE LOCATION) 26 (SECTION) 18S (TOWNSHIP) 32E (RANGE)

(*) Querecho Plains QA Sand Unit No. 30 & QPBSSU 11-2

Schematic



Tabular Data

Surface Casing
Size 11 3/4" Cemented with 485 sx.
TOC Surface feet determined by Circulation.
Hole size 15"

Intermediate Casing
Size 8 5/8" Cemented with 2100 sx.
TOC Surface feet determined by Circulation.
Hole size 11"

Long string 700 sx 1st
Size 4 1/2" Cemented with 500 sx. 2nd
TOC 3202' feet determined by Calculation
Hole size 7 7/8"
Total depth 8700'

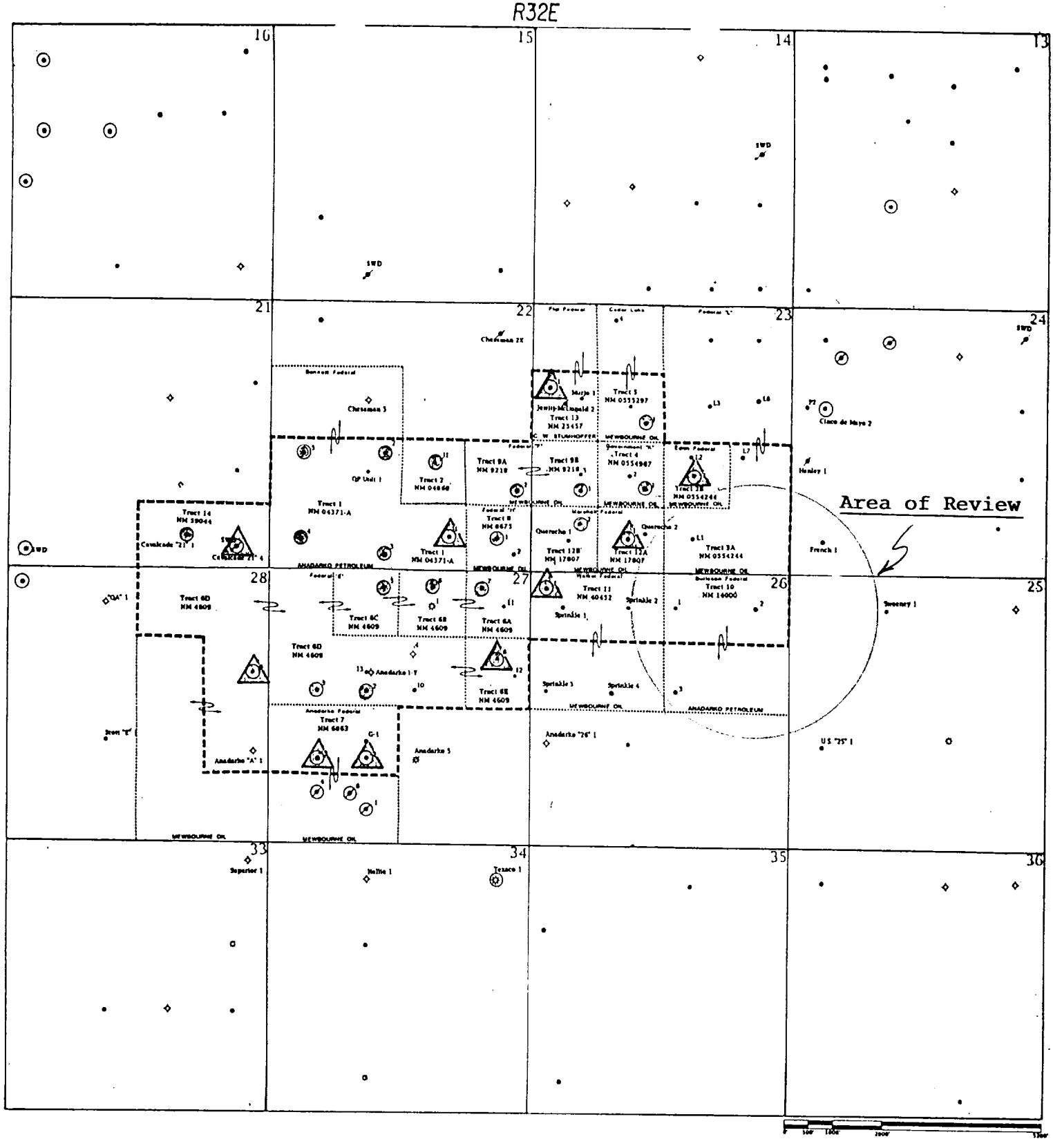
Injection interval
8515 feet to 8584 feet
(perforated or open-hole, indicate which)

Tubing size 2 3/8" lined with Polyethylene (material) set in a various (brand and model) packer at _____ feet

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation Queen, Penrose and Bone Spring
2. Name of Field or Pool (if applicable) Querecho Plains
3. Is this a new well drilled for injection? [ ] Yes [X] No
   If no, for what purpose was the well originally drilled? Oil production
4. 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) The well is currently injecting water into the Bone Spring. This application seeks permission to inject into the Bone Spring and Queen.
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.
   Above = Yates/Seven Rivers
   Below = Bone Spring Carbonate



Mewbourne Oil Company
Tyler, Texas

EXHIBIT "A"

○ Wells With Queen Production

QUERECHO PLAINS QUEEN
ASSOCIATED SAND UNIT
Unit Boundary and Tracts

Revised 9/15/93
KEVIN MATH KEVBID 7/16/93 Revised 11/15/93 SN

ITEM VI OF NEW MEXICO FORM C-108
WELLS WITHIN REVIEW AREA WHICH PENETRATE THE 1ST BONE SPRING SAND
QPBSSU 11-2 (O.H. BURLESON FED NO. 2)

OPERATOR	LEASE/WELL	LOCATION	TYPE	CONSTRUCTION	TOP OF CEMENT	DATE DRILLED	TD	COMPLETION & COMMENTS
MEWBOURNE OIL CO.	QPBSSU 3-1 (O.H. FED L#1)	T18S, R32E, SEC 23 660 FSL, 1980 FEL	OIL	13 3/8 @ 459' CMT W/ 400 SX 8 5/8 @ 4345' CMT W/ 1700 SX 5 1/2 @ 9050' CMT W/ 1050 SX	SURFACE(V) SURFACE(V) 3814'	4/22/86	9050'	OPEN PERFS 8474'-8538'
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 4780' (CBL)	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'
MEWBOURNE OIL CO.	QPBSSU 11-1 (O.H. BURLESON FED #1)	T18S, R32E, SEC 26 660 FNL, 2310 FEL	OIL	11 3/4 @ 350' CMT W/ 485 SX 8 5/8 @ 2800' CMT W/ 2250 SX 4 1/2 @ 8700' CMT W/ 1205 SX DV TOOL @ 5986	SURFACE(V) SURFACE(V) 3586'	11/2/85	8700'	OPEN PERFS 8512'-8572'
MEWBOURNE OIL CO.	QPBSSU 12D-2 (O.H. SPRINKLE FED #2) old(WALKER FED #1)	T18S, R32E, SEC 26 660 FNL, 1980 FWL	OIL	8 5/8 @ 547' CMT W/ 400 SX 5 1/2 @ 8711' CMT W/ 1950 SX	SURFACE(V) SURFACE(V)	10/3/85	8711'	RE-ENTRY OF D&A WELL OPEN PERFS 8542'-8574'
ANADARKO PETROLEUM	BURLESON #3	T18S, R32E, SEC 26 2310 FNL, 2310 FEL	OIL	11 3/4 @ 350' CMT W/ 485 SX 8 5/8 @ 2804' CMT W/ 2000 SX 4 1/2 @ 8729' CMT W/ 1700 SX	SURFACE SURFACE 2281'	1/26/86	8730'	PERF & TEST 8547'-8616' RET @ 8566' PROD 8547'-8557' PB TO 8475' OPEN PERFS 5652'-5667'

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
QPBSSU 11-2 (O.H. BURLESON FEDERAL NO 2)

ITEM VII (1) The maximum injection rate should not exceed 800 bwpd.

ITEM VII (2) The injection system will be operated as a closed system.

ITEM VII (3) Based on .20 psi/ft the maximum injection pressure should not exceed 800 psi.

ITEM VII (4) The source of injection water for the subject well will be the Querecho Plains Bone Spring Sand Unit. The source of water for the Bone Spring Unit is fresh water supplied by the city of Carlsbad, Delaware produced water, Bone Spring produced water and Queen produced water. A copy of these water analyze is attached.

ITEM VII (5) Not applicable.

ITEM VIII OF NEW MEXICO OCD FORM C-108
GEOLOGIC DATA ON THE INJECTION ZONE & UNDERGROUND DRINKING WATER
QPBSSU 11-2 (O.H. BURLESON FEDERAL NO 2)

The zone being targeted for water injection is the Queen/Penrose sands at depths from 4005'-4264'. The Queen/Penrose sands are a sequence of well consolidated sandstone, siltstone, and shale strata of Permian Guadalupe age cemented with calcareous material. An eleven percent porosity cut off is use to determine net pay as porosity less than eleven percent is considered impermeable at the existing and proposed reservoir pressure and reservoir fluid regimes. Impermeable shale deposits exist above and below the targeted sands. All injected fluids should remain in the reservoir with the exception of cycling to the surface though wellbores.

Based on communications with the New Mexico State Engineer's Roswell office (Ken Fresquez) and OCD files at Hobbs there appears to be eleven fresh water wells within T18S & R32E. None of these wells are within the area of review. The deepest of these wells has a total depth of 700'. 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 Queen/Penrose.

ITEMS IX THROUGH XII
QPBSSU 11-2 (O.H. BURLESON FEDERAL NO 2)

ITEM IX. The Queen and Penrose will both be acidized and fracture stimulated at the time of completion.

ITEM X. All logging and test data for the existing wellbores already 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 700' and shallower. No contamination of this drinking water should occur as all existing wellbores which penetrate the Queen/Penrose in the proposed area are completed or plugged in a manner to prevent communication from our flood to these water strata.

ITEM XII. After reviewing the geology of the Queen/Penrose strata in a one and one-half mile radius around the proposed injector, no evidence appears of fractures or any hydrologic connection between the target sands and any overlying or underlying strata.

CAPROCK LABORATORIES, INC.
3312 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 cacium carbonate and calcium sufate 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 decreaces 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.

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

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : MEWBOURNE OIL CO.
Lease : FEDERAL E
Well No.: #5 T.B.
Job No.: 9205032

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

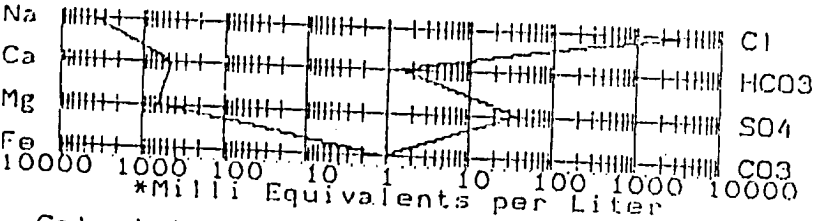
ANALYSIS

		MG/L.	EQ. WT.	*MEQ/L
1.	pH	6.100		
2.	Specific Gravity 60/60 F.	1.171		
3.	$CaCO_3$ 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^{+}) (Calculated)	94,120	/ 23.0 =	4,092.17
10.	Barium (Ba^{++})	0.0		
	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
	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 Ω/m		

5214

LOGARITHMIC WATER PATTERN

*meq/L.



*Milli Equivalents per Liter

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

Analyst

Remarks and Comments:

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

WATER ANALYSIS REPORT

SAMPLE

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

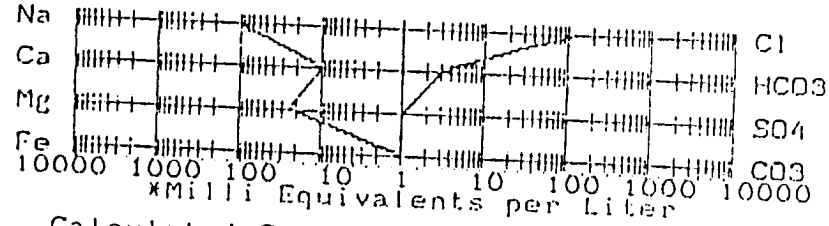
Sample Loc. :
Date Sampled :
Attention :
Analysis No. : 3

ANALYSIS

			MG/L	EQ. WT.	*MEQ/L
1.	pH		9.100		
2.	Specific Gravity 60/60 F.		0.996		
3.	$CaCO_3$ Saturation Index	@ 80 F.	+1.548		
		@ 140 F.	+2.388		
	Dissolved Gasses				
4.	Hydrogen Sulfide		0.0		
5.	Carbon Dioxide		Not Determined		
6.	Dissolved Oxygen		Not Determined		
	Cations				
7.	Calcium	(Ca^{++})	200	/ 20.1 =	9.95
8.	Magnesium	(Mg^{++})	304	/ 12.2 =	24.92
9.	Sodium	(Na^{+}) (Calculated)	2,507	/ 23.0 =	109.00
10.	Barium	(Ba^{++})	6	/ 68.7 =	0.09
	Anions				
11.	Hydroxyl	(OH^{-})	0	/ 17.0 =	0.00
12.	Carbonate	(CO_3^{--})	0	/ 30.0 =	0.00
13.	Bicarbonate	(HCO_3^{-})	183	/ 61.1 =	3.00
14.	Sulfate	(SO_4^{--})	50	/ 48.8 =	1.02
15.	Chloride	(Cl^{-})	4,963	/ 35.5 =	139.80
16.	Total Dissolved Solids		8,213		
17.	Total Iron (Fe)		1	/ 18.2 =	0.05
18.	Total Hardness As $CaCO_3$		1,752		
19.	Resistivity @ 75 F. (Calculated)		0.685 /cm.		

LOGARITHMIC WATER PATTERN

*meq/L.



*Milli Equivalents per Liter

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

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

Analyst

Remarks and Comments:

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

WATER ANALYSIS REPORT

SAMPLE

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

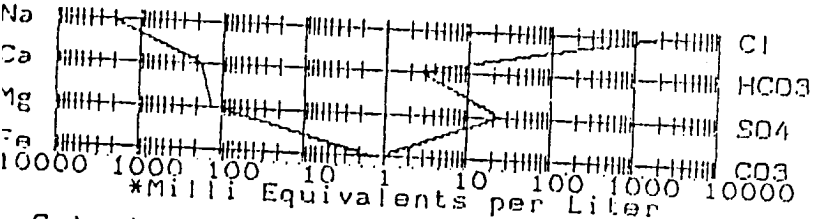
Sample Loc. : BONE SPRINGS PROD. WATER
Date Sampled :
Attention :
Analysis No. : 5

ANALYSIS

			MG/L.	EQ. WT.	*MEQ/L
1.	pH		7.550		
2.	Specific Gravity 60/60 F.		1.110		
3.	$CaCO_3$ 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^{+}) (Calculated)	52,547	/ 23.0 =	2,284.65
10.	Barium	(Ba^{++})	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.



*Milli Equivalents per Liter

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

nalyst

emarks and Comments:

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

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : MEWBOURNE OIL CO.
Lease : CEDARDRAKE FEDERAL
Well No.: #4
Job No.: 9205032

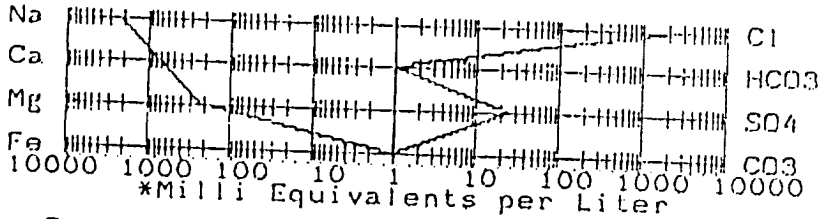
Sample Loc. : DELAWARE PROD. WATER
Date Sampled :
Attention :
Analysis No. : 4

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

*meq/L.



*Milli Equivalents per Liter

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

Analyst

Remarks and Comments:

CAPROCK LABORATORIES, INC.
3312 Bankhead Hwy.
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

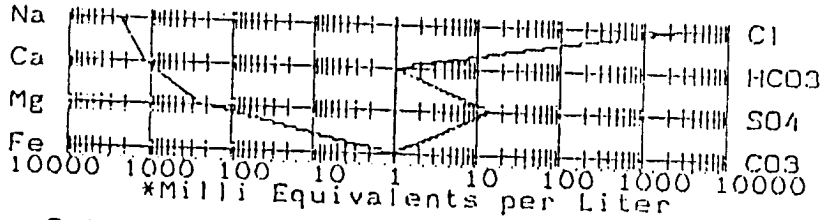
Sample Loc. : DELAWARE PROD.
Date Sampled :
Attention :
Analysis No. : 2

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^{+})	(Calculated)	52,902	/ 23.0 =	2,303.57
10.	Barium (Ba^{++})		0.0		
	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		213,608		
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

*meq/L.



*Milli Equivalents per Liter

Calculated Calcium Sulfate solubility in this brine is 590 mg/L. at 90 F.

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

Analyst

Remarks and Comments: