YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

March 7, 1991

New Mexico Energy & Minerals Department
Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504

Attention: David Catanach

Dear Mr. Catanach,

Enclosed please find our application for authorization to inject for the Eddy GR State #1 located in Section 16-23S-28E of Eddy County.

In order to expedite the processing of the attached C-108, we are submitting the application without water analyses for the nearby water wells. As soon as we get the fresh water samples analyzed, we will forward them to you.

Sincerely,

Brian Collins
Petroleum Engineer

BC/sj

Enclosures

STATE OF NEW MEXICO
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: ☐ Secondary Recovery ☐ Pressure Maintenance ☒ Disposal ☐ Storage
Application qualifies for administrative approval? ☐ yes ☐ no

II. Operator: Yates Petroleum Corporation

Address: 105 S. 4th Street, Artesia, NM 88210

Contact party: Brian Collins Phone: (505)748-1471

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: Brian Collins Title Petroleum Engineer

Signature: Brian Collins Date: March 7, 1991

* 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

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.

C-108
Application For Authorization To Inject
Yates Petroleum Corporation
Eddy "GR" State #1
E 16-23S-28E
Eddy County, New Mexico

I. The purpose of completing this well is to make a disposal well for produced Delaware Sand water into the Delaware Sand formation.

Yates Petroleum plans to convert this well to a water disposal well into the Delaware Sand.

II. Operator: Yates Petroleum Corporation
105 South Fourth Street
Artesia, NM 88210
Brian Collins (505) 748-1471

III. Well Data: See Attachment A

IV. This is not an expansion of an existing project.

V. See attached map, Attachment B

VI. No wells within the area of review penetrate the proposed injection zone.

VII. 1. Proposed average daily injection volume approximately 1000 BWPD.
Maximum daily injection volume approximately 5000 BWPD.

2. This will be a closed system.

3. Proposed average injection pressure-unknown.
Proposed maximum injection pressure--680 psi.

4. Sources of injected water would be produced water from the Delaware Sand. (Attachment C)

5. See Attachment C

VIII. 1. The proposed injection interval is the portion of the Delaware Sand formation consisting of porous sandstone from estimated depths of 3400' to 3494'.

2. Fresh water zones overlie the proposed injection formations at depths to approximately 404 feet. There are no fresh water zones underlying the formation.

IX. The proposed disposal interval may be acidized with 7-1/2% HCL acid, or 12-3 HF acid.

X. Logs were filed at your office when the well was drilled in 1979.

XI. No windmills exist within a one mile radius of the subject location. There are fresh water wells within a one mile radius of subject location. Water analyses of fresh water will be forwarded when analyses are completed.

XII. Yates Petroleum Corporation has examined geologic and engineering data and has found that there is no evidence of faulting in the proposed interval.

XIII. Proof of Notice

A. Certified letters sent to the surface owner and offset operators-attached. (Attachment D)

B. Copy of legal advertisement attached. (Attachment E)

XIV. Certification is signed.

Yates Petroleum Corporation
Eddy "GR" State #1
E 16-23S-28E

Attachment A
Page 1

III. Well Data

A. 1. Lease Name/Location:
Eddy "GR" State #1
E 16-23S-28E
2230' FNL & 660' FWL

2. Casing Strings:
a. Present Well Condition
20" 94# H40 @ 404' w/800 sx (circ)
13-3/8" 61#, 48#, S80, H40 @ 2601' w/1800 sx (circ)
9-5/8" 40#, 43.5#, 47#, 53.5#, N80, S95 CYS 95, P110 @ 9650' w/2550 sx (circ)
7" 26# S95 liner @ 9302-12710' w/250 sx

Present Status: P&A

3. Proposed well condition:
Casing same as above
3 1/2" 9.3 J55 or 2-7/8" 6.5 J55 plastic-coated injection tubing @ 3300'

4. Propose to use Guiberson or Baker plastic-coated or nickel-plated packer set at 3300'.

B. 1. Injection Formation: Delaware Sand

2. Injection Interval will be through perforations from approximately 3400-3494'.

3. Well was originally drilled as an exploratory Morrow gas well. Well will be Delaware Sand water disposal well (3400-3494') when work is completed.

4. Perforations:
a. 12356-12364' Morrow - Sqzd
12334-12341' Morrow - Sqzd
12284-12296' Morrow
12257-12266' Morrow - Sqzd
CIBP 12230' + 35' cmt.

b. 11955-11965' Atoka
11945-11952' Atoka
11240-11244' Atoka
11221-11228' Atoka
CIBP 11140' + 35' cmt.

Cement Plug 9350-9250'; RBP 6698'+ 35'cmt.

c. 6458-6462' Bone Spring
6400-6404' Bone Spring
6358-6362' Bone Spring
6332-6336' Bone Spring
6292-6296' Bone Spring
6250-6254' Bone Spring
6194-6198' Bone Spring
CIBP 6150' + 12 sx "C"

Cement Plug 3647-3514'
Cement Plug 2640-2507'
Cement Plug 404-271'
Cement Plug 62'- surface

5. Next higher (shallower) oil or gas zone within 2 miles--None
Next lower (deeper) oil or gas zone within 1/2 mile--Delaware Sand

ATTACHMENT A

CURRENT STATUS

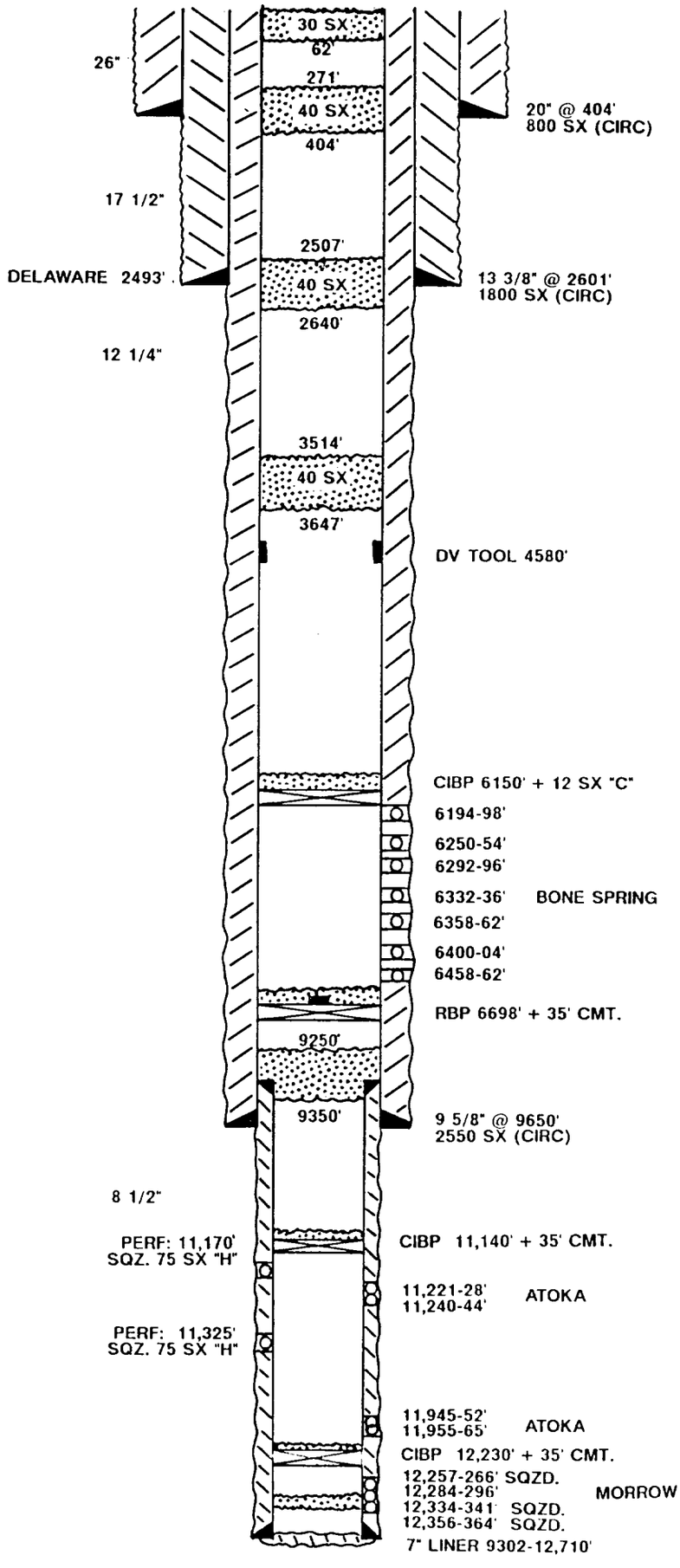
YATES PETROLEUM CORPORATION

EDDY GR STATE #1

E - 16 - 23S - 28E

2230' FNL & 660' FWL

EDDY CO., NEW MEXICO



-SKETCH NOT TO SCALE-

ATTACHMENT A

PROPOSED

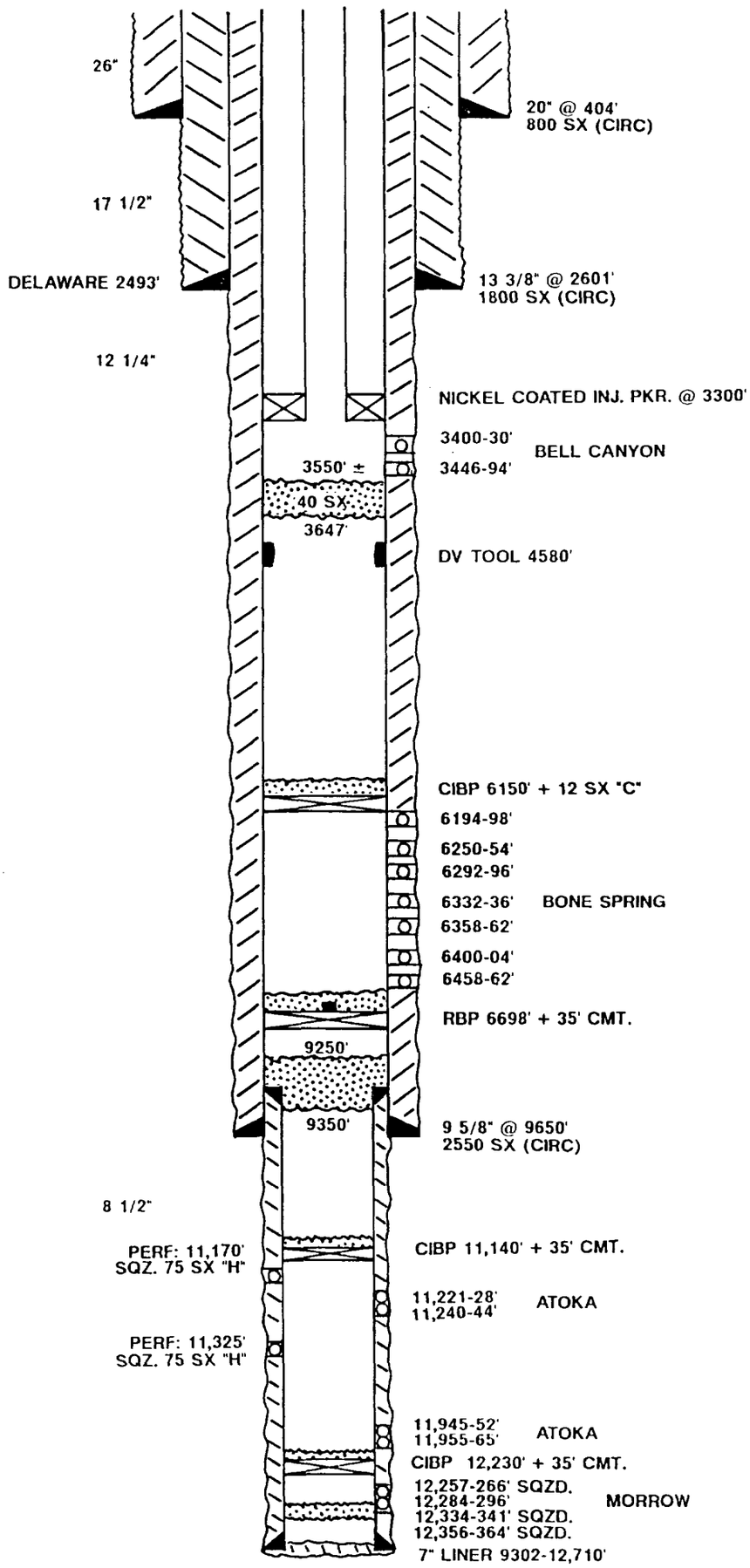
YATES PETROLEUM CORPORATION

EDDY GR STATE #1

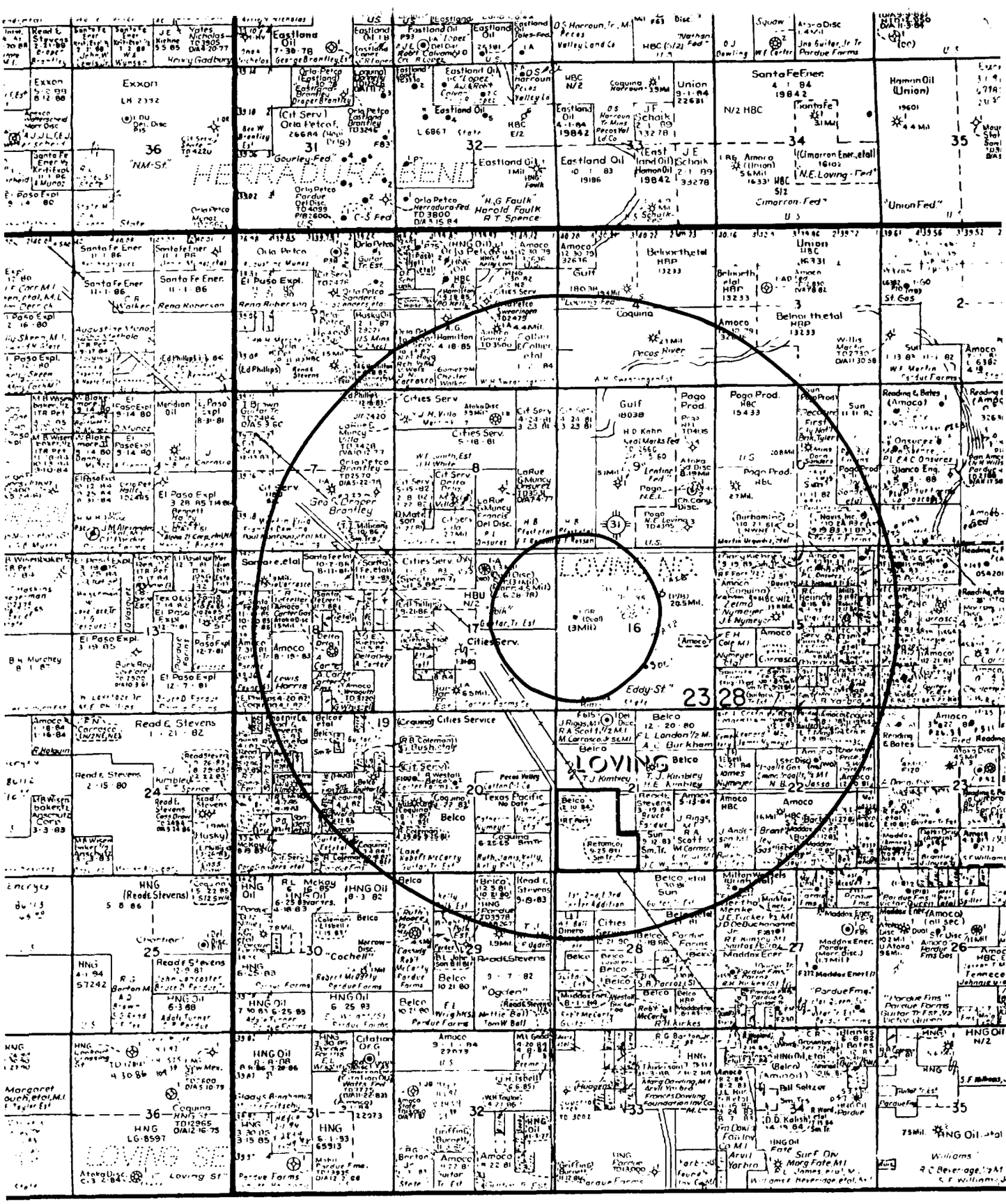
E - 16 - 23S - 28E

2230' FNL & 660' FWL

EDDY CO., NEW MEXICO



-SKETCH NOT TO SCALE-



YATES PETROLEUM CORPORATION

EDDY "GR" STATE #1

PROPOSED SALT WATER DISPOSAL WELL

SEC 16-T23S-28E

2230'FNL & 660'FWL

EDDY COUNTY, NEW MEXICO

ATTACHMENT B

ATTACHMENT C

Halliburton Services Lab Report

Artesia, NM

No. W577,578
Date 10-12-90

To: Yates Petroleum
105 South 4th Street
Artesia, NM 88210

Submitted by
Well No. Loving AIB #1
Formation Delaware
County

Date Rec.
Depth 6000+
Field
Source Swab

	10-11-90	10-12-90
Resistivity	0.58 @ 70	0.055 @ 70
Specific Gravity	1.13 @ 70	1.1498 @ 70
pH	7.0	7.0
Calcium	19350	19567
Magnesium	2600	3031
Chlorides	125000	136000
Sulfates	200	1600
Bicarbonates	1500	92
Soluable Iron	500	100
KCL	0	2%

Respectfully Submitted

Eric Jacobson
Field Engineer

ATTACHMENT D

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

March 7, 1991

CERTIFIED RETURN RECEIPT

Amoco Production Co.
Amoco Building
1670 Broadway 70162
Denver, CO 80202

Gentlemen:

Enclosed please find a copy of form C-108 (Application for Authority to Inject) on Yates' Eddy GR State #1 located in Unit E of Section 16-T23S-R28E.

Should you have any questions, please feel free to contact me at (505) 748-1471.

Sincerely,

Brian Collins
Petroleum Engineer

BC/sj

Enclosure

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

March 7, 1991

CERTIFIED RETURN RECEIPT

Chevron USA, Inc.
P.O. Box 1150
Midland, TX 79702

Gentlemen:

Enclosed please find a copy of form C-108 (Application for Authority to Inject) on Yates' Eddy GR State #1 located in Unit E of Section 16-T23S-R28E.

Should you have any questions, please feel free to contact me at (505) 748-1471.

Sincerely,

Brian Collins
Petroleum Engineer

BC/sj

Enclosure

MARTIN YATES, III
1912 - 1985
FRANK W. YATES
1936 - 1986

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

S. P. YATES
CHAIRMAN OF THE BOARD
JOHN A. YATES
PRESIDENT
PEYTON YATES
EXECUTIVE VICE PRESIDENT
RANDY G. PATTERSON
SECRETARY
DENNIS G. KINSEY
TREASURER

March 7, 1991

CERTIFIED RETURN RECEIPT

Graham Resources, Inc.
P.O. Box 62731
New Orleans, LA 70162

Gentlemen:

Enclosed please find a copy of form C-108 (Application for Authority to Inject) on Yates' Eddy GR State #1 located in Unit E of Section 16-T23S-R28E.

Should you have any questions, please feel free to contact me at (505) 748-1471.

Sincerely,

Brian Collins

Brian Collins
Petroleum Engineer

BC/sj

Enclosure

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

March 7, 1991

CERTIFIED RETURN RECEIPT

Pogo Producing Company
P.O. Box 2504
Houston, TX 77252

Gentlemen:

Enclosed please find a copy of form C-108 (Application for Authority to Inject) on Yates' Eddy GR State #1 located in Unit E of Section 16-T23S-R28E.

Should you have any questions, please feel free to contact me at (505) 748-1471.

Sincerely,

Brian Collins

Brian Collins
Petroleum Engineer

BC/sj

Enclosure

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

March 7, 1991

Artesia Daily Press
503 W. Main
Artesia, NM 88210

Gentlemen,

Yates Petroleum Corporation desires to place a public notice in your newspaper for one day. The notice is enclosed.

Please place this notice in your paper Sunday, March 10, 1991 and forward a copy of it along with your billing as soon as possible to:

Yates Petroleum Corporation
105 S. 4th Street
Artesia, NM 88210
Attn: Brian Collins

If you have any questions, please contact me at 748-1471, Ext. 180. Thank you for your cooperation in this matter.

Sincerely,

Brian Collins

Brian Collins
Petroleum Engineer

BC/sj

Enclosure

Attachment E

Legal Notice

Yates Petroleum Corporation, 105 South Fourth Street, Artesia, NM 88210, has filed form C-108 (Application for Authorization to Inject) with the New Mexico Oil Conservation Division seeking administrative approval for an injection well. The proposed well, the "Eddy GR State #1" located 2230' FNL & 660' FWL of Section 16, Township 23 South, Range 28 East of Eddy County, New Mexico, will be used for saltwater disposal. Disposal waters from the Delaware Sand will be re-injected into the Delaware Sand at a depth of 3400-3494 feet with a maximum pressure of 680 psi and a maximum rate of 5000 BWPD.

All interested parties opposing the aforementioned must file objections or requests for a hearing with the Oil Conservation Division, P. O. Box 2088, Santa Fe, NM 87501, within 15 days. Additional information can be obtained by contacting Brian Collins at (505) 748-1471.

MARTIN YATES, III
1912 - 1985
FRANK W. YATES
1936 - 1986

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210
TELEPHONE (505) 748-1471

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PEYTON YATES
EXECUTIVE VICE PRESIDENT
RANDY G. PATTERSON
SECRETARY
DENNIS G. KINSEY
TREASURER

March 8, 1991

New Mexico Oil Conservation Division
Energy & Minerals Department
P.O. Box 2088
Santa Fe, 87504

Attention: David Catanach

Dear Mr. Catanach,

Enclosed please find the water analyses needed to complete our application for authorization to inject for the Eddy GR State #1.

If I can be of any further assistance, please notify me.

Sincerely,

Brian Collins

BC/sj

Enclosure

WATER ANALYSIS REPORT

Company	: YATES PET.	Date	: 3-8-91
Address	: ARTESIA	Date Sampled	: 3-7-91
Lease	: CARTER WATER WELL	Analysis No.	: 1
Well	: 1		
Sample Pt.	: UNKNOWN		

	ANALYSIS		mg/L		* meq/L
1.	pH	7.2			
2.	H2S	NO			
3.	Specific Gravity	1.000			
4.	Total Dissolved Solids		1376.5		
5.	Suspended Solids		NR		
6.	Dissolved Oxygen		NR		
7.	Dissolved CO2		NR		
8.	Oil In Water		NR		
9.	Phenolphthalein Alkalinity (CaCO3)				
10.	Methyl Orange Alkalinity (CaCO3)				
11.	Bicarbonate	HCO3	329.0	HCO3	5.4
12.	Chloride	Cl	140.0	Cl	3.9
13.	Sulfate	SO4	500.0	SO4	10.4
14.	Calcium	Ca	140.0	Ca	7.0
15.	Magnesium	Mg	29.2	Mg	2.4
16.	Sodium (calculated)	Na	238.2	Na	10.4
17.	Iron	Fe	0.0		
18.	Barium	Ba	0.0		
19.	Strontium	Sr	0.0		
20.	Total Hardness (CaCO3)		470.0		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

7	*Ca <----- *HCO3	5
2	*Mg -----> *SO4	10
10	*Na -----> *Cl	4

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	5.4	437
CaSO4	68.1	1.6	108
CaCl2	55.5		
Mg(HCO3)2	73.2		
MgSO4	60.2	2.4	145
MgCl2	47.6		
NaHCO3	84.0		
Na2SO4	71.0	6.4	455
NaCl	58.4	3.9	231

REMARKS: 120-140 DEEP

Petrolite Oilfield Chemicals Group

Respectfully submitted,
LEE MALLETT

SCALE TENDENCY REPORT

Company	: YATES PET.	Date	: 3-8-91
Address	: ARTESIA	Date Sampled	: 3-7-91
Lease	: CARTER WATER WELL	Analysis No.	: 1
Well	: 1	Analyst	: LEE MALLETT
Sample Pt.	: UNKNOWN		

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

S.I. =	0.2	at	60 deg. F	or	16 deg.	C
S.I. =	0.2	at	80 deg. F	or	27 deg.	C
S.I. =	0.3	at	100 deg. F	or	38 deg.	C
S.I. =	0.4	at	120 deg. F	or	49 deg.	C
S.I. =	0.5	at	140 deg. F	or	60 deg.	C

****

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)
Calcium Sulfate

S =	1189	at	60 deg. F	or	16 deg	C
S =	1207	at	80 deg. F	or	27 deg	C
S =	1199	at	100 deg. F	or	38 deg	C
S =	1190	at	120 deg. F	or	49 deg	C
S =	1180	at	140 deg. F	or	60 deg	C

Petrolite Oilfield Chemicals Group

Respectfully submitted,
LEE MALLETT

B/C

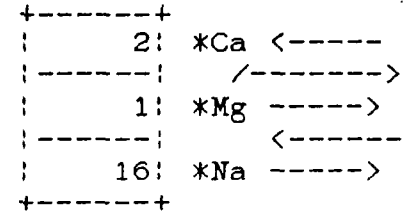
WATER ANALYSIS REPORT

Company	: YATES PET.	Date	: 3-8-91
Address	: ARTESIA	Date Sampled	: 3-7-91
Lease	: CURTIS SKEEN	Analysis No.	: 1
Well	: 1		
Sample Pt.	: UNKNOWN		

	ANALYSIS		mg/L		* meq/L
1.	pH	7.8			
2.	H2S	NO			
3.	Specific Gravity	1.000			
4.	Total Dissolved Solids		1302.9		
5.	Suspended Solids		NR		
6.	Dissolved Oxygen		NR		
7.	Dissolved CO2		NR		
8.	Oil In Water		NR		
9.	Phenolphthalein Alkalinity (CaCO3)				
10.	Methyl Orange Alkalinity (CaCO3)				
11.	Bicarbonate	HCO3	268.0	HCO3	4.4
12.	Chloride	Cl	170.0	Cl	4.8
13.	Sulfate	SO4	450.0	SO4	9.4
14.	Calcium	Ca	36.0	Ca	1.8
15.	Magnesium	Mg	7.3	Mg	0.6
16.	Sodium (calculated)	Na	371.6	Na	16.2
17.	Iron	Fe	0.0		
18.	Barium	Ba	0.0		
19.	Strontium	Sr	0.0		
20.	Total Hardness (CaCO3)		120.0		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter



Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	1.8	146
CaSO4	68.1		
CaCl2	55.5		
Mg(HCO3)2	73.2	0.6	44
MgSO4	60.2		
MgCl2	47.6		
NaHCO3	84.0	2.0	168
Na2SO4	71.0	9.4	666
NaCl	58.4	4.8	280

REMARKS: DOMESTIC

Petrolite Oilfield Chemicals Group

Respectfully submitted,
LEE MALLETT

SCALE TENDENCY REPORT

Company	: YATES PET.	Date	: 3-8-91
Address	: ARTESIA	Date Sampled	: 3-7-91
Lease	: CURTIS SKEEN	Analysis No.	: 1
Well	: 1	Analyst	: LEE MALLETT
Sample Pt.	: UNKNOWN		

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

S.I. =	0.1	at	60 deg. F	or	16 deg. C
S.I. =	0.2	at	80 deg. F	or	27 deg. C
S.I. =	0.3	at	100 deg. F	or	38 deg. C
S.I. =	0.3	at	120 deg. F	or	49 deg. C
S.I. =	0.4	at	140 deg. F	or	60 deg. C

****

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)
Calcium Sulfate

S =	999	at	60 deg. F	or	16 deg C
S =	1012	at	80 deg. F	or	27 deg C
S =	1000	at	100 deg. F	or	38 deg C
S =	991	at	120 deg. F	or	49 deg C
S =	983	at	140 deg. F	or	60 deg C

Petrolite Oilfield Chemicals Group

Respectfully submitted,
LEE MALLETT

BK

WATER ANALYSIS REPORT

Company	: YATES PET.	Date	: 3-8-91
Address	: ARTESIA	Date Sampled	: 3-7-91
Lease	: CURTIS SKEEN	Analysis No.	: 1
Well	: 1		
Sample Pt.	: UNKNOWN		

	ANALYSIS		mg/L		* meq/L
1.	pH	7.8			
2.	H2S	NO			
3.	Specific Gravity	1.000			
4.	Total Dissolved Solids		1302.9		
5.	Suspended Solids		NR		
6.	Dissolved Oxygen		NR		
7.	Dissolved CO2		NR		
8.	Oil In Water		NR		
9.	Phenolphthalein Alkalinity (CaCO3)				
10.	Methyl Orange Alkalinity (CaCO3)				
11.	Bicarbonate	HCO3	268.0	HCO3	4.4
12.	Chloride	Cl	170.0	Cl	4.8
13.	Sulfate	SO4	450.0	SO4	9.4
14.	Calcium	Ca	36.0	Ca	1.8
15.	Magnesium	Mg	7.3	Mg	0.6
16.	Sodium (calculated)	Na	371.6	Na	16.2
17.	Iron	Fe	0.0		
18.	Barium	Ba	0.0		
19.	Strontium	Sr	0.0		
20.	Total Hardness (CaCO3)		120.0		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

2	*Ca <----- *HCO3	4
	/------->	
1	*Mg -----> *SO4	9
	<---------/	
16	*Na -----> *Cl	5

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	1.8	146
CaSO4	68.1		
CaCl2	55.5		
Mg(HCO3)2	73.2	0.6	44
MgSO4	60.2		
MgCl2	47.6		
NaHCO3	84.0	2.0	168
Na2SO4	71.0	9.4	666
NaCl	58.4	4.8	280

REMARKS: DOMESTIC

Petrolite Oilfield Chemicals Group

Respectfully submitted,
LEE MALLETT

SCALE TENDENCY REPORT

Company	: YATES PET.	Date	: 3-8-91
Address	: ARTESIA	Date Sampled	: 3-7-91
Lease	: CURTIS SKEEN	Analysis No.	: 1
Well	: 1	Analyst	: LEE MALLETT
Sample Pt.	: UNKNOWN		

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

S.I. =	0.1	at	60 deg. F	or	16 deg.	C
S.I. =	0.2	at	80 deg. F	or	27 deg.	C
S.I. =	0.3	at	100 deg. F	or	38 deg.	C
S.I. =	0.3	at	120 deg. F	or	49 deg.	C
S.I. =	0.4	at	140 deg. F	or	60 deg.	C

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CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)
Calcium Sulfate

S =	999	at	60 deg. F	or	16 deg	C
S =	1012	at	80 deg. F	or	27 deg	C
S =	1000	at	100 deg. F	or	38 deg	C
S =	991	at	120 deg. F	or	49 deg	C
S =	983	at	140 deg. F	or	60 deg	C

Petrolite Oilfield Chemicals Group

Respectfully submitted,
LEE MALLETT

WATER ANALYSIS REPORT

Company	: YATES PET.	Date	: 3-8-91
Address	: ARTESIA	Date Sampled	: 3-7-91
Lease	: CARTER WATER WELL	Analysis No.	: 1
Well	: 1		
Sample Pt.	: UNKNOWN		

	ANALYSIS		mg/L		* meq/L
1.	pH	7.2			
2.	H2S	NO			
3.	Specific Gravity	1.000			
4.	Total Dissolved Solids		1376.5		
5.	Suspended Solids		NR		
6.	Dissolved Oxygen		NR		
7.	Dissolved CO2		NR		
8.	Oil In Water		NR		
9.	Phenolphthalein Alkalinity (CaCO3)				
10.	Methyl Orange Alkalinity (CaCO3)				
11.	Bicarbonate	HCO3	329.0	HCO3	5.4
12.	Chloride	Cl	140.0	Cl	3.9
13.	Sulfate	SO4	500.0	SO4	10.4
14.	Calcium	Ca	140.0	Ca	7.0
15.	Magnesium	Mg	29.2	Mg	2.4
16.	Sodium (calculated)	Na	238.2	Na	10.4
17.	Iron	Fe	0.0		
18.	Barium	Ba	0.0		
19.	Strontium	Sr	0.0		
20.	Total Hardness (CaCO3)		470.0		

PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter

7	*Ca <----- *HCO3	5
	/------->	
2	*Mg -----> *SO4	10
	<---------/	
10	*Na -----> *Cl	4

Saturation Values Dist. Water 20 C

CaCO3	13 mg/L
CaSO4 * 2H2O	2090 mg/L
BaSO4	2.4 mg/L

Compound	Equiv wt	X meq/L	= mg/L
Ca(HCO3)2	81.0	5.4	437
CaSO4	68.1	1.6	108
CaCl2	55.5		
Mg(HCO3)2	73.2		
MgSO4	60.2	2.4	145
MgCl2	47.6		
NaHCO3	84.0		
Na2SO4	71.0	6.4	455
NaCl	58.4	3.9	231

REMARKS: 120-140 DEEP

Petrolite Oilfield Chemicals Group

Respectfully submitted,
LEE MALLETT

SCALE TENDENCY REPORT

Company	: YATES PET.	Date	: 3-8-91
Address	: ARTESIA	Date Sampled	: 3-7-91
Lease	: CARTER WATER WELL	Analysis No.	: 1
Well	: 1	Analyst	: LEE MALLETT
Sample Pt.	: UNKNOWN		

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
CaCO3 Scaling Tendency

S.I. =	0.2	at	60 deg. F	or	16 deg.	C
S.I. =	0.2	at	80 deg. F	or	27 deg.	C
S.I. =	0.3	at	100 deg. F	or	38 deg.	C
S.I. =	0.4	at	120 deg. F	or	49 deg.	C
S.I. =	0.5	at	140 deg. F	or	60 deg.	C

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CALCIUM SULFATE SCALING TENDENCY CALCULATIONS
(Skillman-McDonald-Stiff Method)
Calcium Sulfate

S =	1189	at	60 deg. F	or	16 deg	C
S =	1207	at	80 deg. F	or	27 deg	C
S =	1199	at	100 deg. F	or	38 deg	C
S =	1190	at	120 deg. F	or	49 deg	C
S =	1180	at	140 deg. F	or	60 deg	C

Petrolite Oilfield Chemicals Group

Respectfully submitted,
LEE MALLETT