



May 12, 1977

75

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87501

Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
~~Commission Order~~ R-2969 entered in
Case No. 3302, concerning Atlantic
~~Richfield Company~~ - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart Water-
flood project.

Yours very truly,

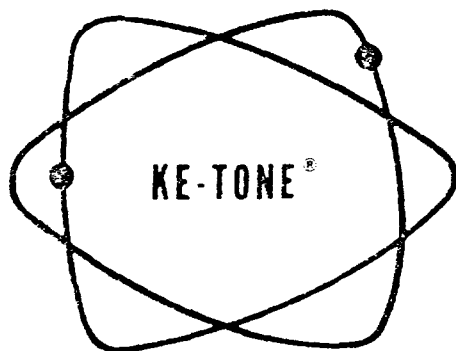
L. C. Hudry

L. C. Hudry

LCH/mt

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, NM 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, NM 87501



UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH

HOBBS, NEW MEXICO 88240

P. O. BOX 1499

ALL ORDERS MUST BE PREPAID

Company Atlantic Richfield
Field Shugart
Lease Swearingen Waterflood
Type of Sample Sweet - Waterflood

Sampling Date 5-6-77

WATER ANALYSIS

IONIC FORM

Calcium (Ca++)
Magnesium (Mg++)
Sodium (Na+)
Iron (Total)

(CALCULATED)

me/l *	mg/l *
149.40	2,988
261.48	3,138
593.71	36,639

Bicarbonate (HCO₃-)
Carbonate (CO₃-)
Hydroxide (OH-)
Sulphate (SO₄-)
Chloride (Cl-)

10.00	610
Not	Found
Not	Found
91.09	4,375
1,903.50	67,500

Total Dissolved Solids

115,250

7.35 pH @ 68 °F

Dissolved Solids on Evap. at 103° - 105° C

Hardness as Ca CO₃

Carbonate Hardness as CaCO₃ (temporary)

Non-Carbonate Hardness as CaCO₃ (permanent)

Alkalinity as CaCO₃

Specific Gravity @ 68° F 1.080

410.88	20,544
10.00	500
400.88	20,044
10.00	500

* mg/l = milligrams per Liter

* me/l = milliequivalents per Liter

CaCO₃ Scaling Index positive @ 86°F. (1.33)

CaSO₄ Scaling Index positive (0.07)

Makes Water Work

BEFORE EXAMINER UTZ

OIL CONSERVATION COMMISSION

EXHIBIT NO. 2

CASE NO. 3302

SWEARINGEN CUEEN

SHUGART POOL

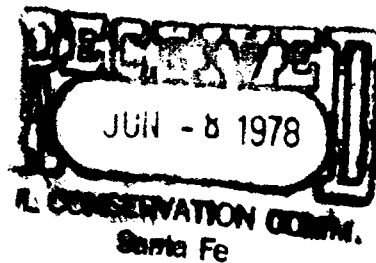
Eddy County, New Mexico

Exhibit No 2

24 Hour Initial Potential				June, 1965 Daily Production			
Well	Completion Date	Oil	Water	Oil	Water	Gas M.C.F.	
Section 11-T-18-S, R-31-E							
Atlantic Johnson Federal 1	4-4-39	30	0	1.8	0	---	
Section 14-T-18-S, R-31-E							
Atlantic Swearingen "A" Federal 1	1-20-39	73	0	1.2	0	3.1	
Atlantic Swearingen "A" Federal 2	9-13-39	20	0	1.2	0	---	
Atlantic Swearingen "A" Federal 3	9-13-39	10	0	.2	0	---	
Atlantic Swearingen "A" Federal 4	2-28-49	25	0	.2	0	---	
Atlantic Swearingen "A" Federal 5	8-29-55	120	0	.7	.4	---	
Atlantic Swearingen "A" Federal 6	5-25-57	170	0	5.1	.3	16.2	
Atlantic Swearingen "A" Federal 7	7-25-58	100	0	3.7	.1	11.1	
Atlantic Swearingen "B" Federal 1	11-15-52	60	0	2.6	.1	3.9	
Atlantic Swearingen "B" Federal 2	1-31-57	400	0	1.5	0	6.8	
Atlantic Swearingen "B" Federal 3	11-21-57	250	0	3.0	.1	13.8	
Atlantic Swearingen "B" Federal 4	9-22-59	100	0	5.7	.4	6.6	
Atlantic Swearingen "B" Federal 5	10-24-61	55	0	5.5	.3	9.0	
				32.4	1.7	70.5	

AtlanticRichfieldCompany

North American Producing Division
New Mexico-Arizona District
P.O. Box 1710
Hobbs, New Mexico 88240
Telephone 505 393 7163



June 7, 1978

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Case file

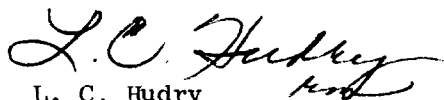
Attn: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced Water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen Shugart waterflood
project.

Yours very truly,


L. C. Hudry
Senior Operations Engineer

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

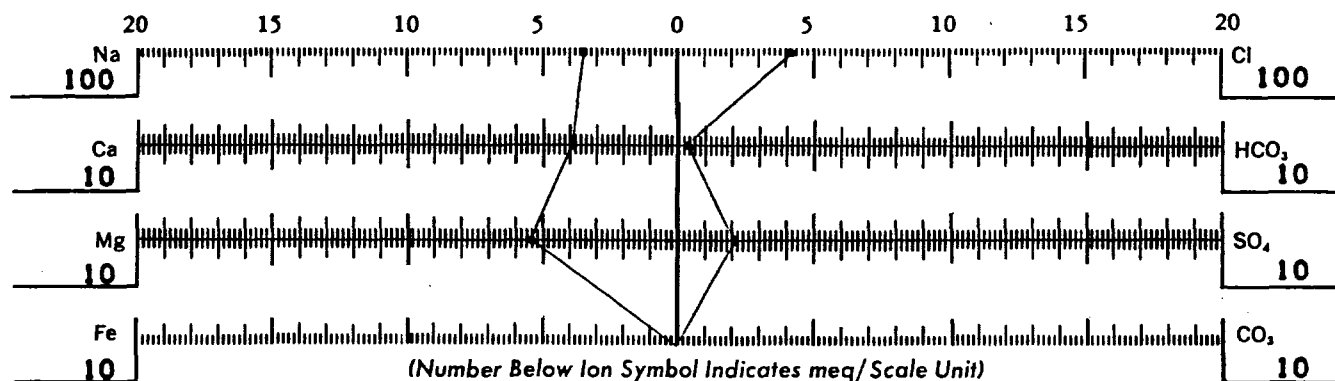
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen Waterflood Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water
Date Collected 5-13-78 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-7343 Specific Gravity 1.0192 pH 7.7
Total Dissolved Solids 25684 Resistivity (Ohmmeters at 68° F.) .191 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>25684</u>	
Sodium (Calc.)	<u>8120</u>	<u>353.1</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>0</u>	<u>0.</u>
Calcium	<u>772</u>	<u>38.5</u>
Magnesium	<u>650</u>	<u>53.4</u>
Chloride	<u>14900</u>	<u>420.2</u>
Bicarbonate	<u>232</u>	<u>3.8</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>1010</u>	<u>21.0</u>

TOTAL IRON 12

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F
Calcium Sulfate Stability at 95° F
Concentration 21.01 meq/l.
Barium Sulfate Stability at 95° F
Concentration _____ meq/l.

.49
Calc. Solubility 57.15 meq/l.
Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	
Calcium _____ as _____	
Magnesium _____ as _____	
Sulfate _____ as _____	
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate (Quan.) _____	
(Qual.) _____	

Scaling Tendency POS.
Percent Saturation 36.76
Percent Saturation _____

REMARKS

Atlantic Richfield Company

North American Producing Division
New Mexico-Arizona District
P.O. Box 1710
Hobbs, New Mexico 88240
Telephone 505 393 7163



June 7, 1978

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attn: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced Water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen Shugart waterflood
project.

Yours very truly,


L. C. Hudry
Senior Operations Engineer

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

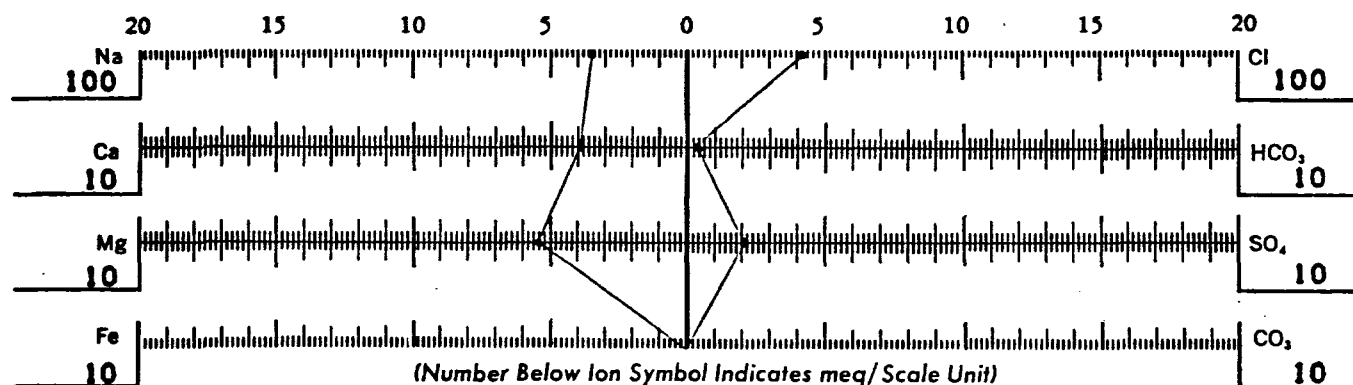
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen Waterflood Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water
Date Collected 5-13-78 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-7343 Specific Gravity 1.0192 pH 7.7
Total Dissolved Solids 25684 Resistivity (Ohmmeters at 68° F.) .191 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>25684</u>	
Sodium (Calc.)	<u>8120</u>	<u>353.1</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>0</u>	<u>0.</u>
Calcium	<u>772</u>	<u>38.5</u>
Magnesium	<u>650</u>	<u>53.4</u>
Chloride	<u>14900</u>	<u>420.2</u>
Bicarbonate	<u>232</u>	<u>3.8</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>1010</u>	<u>21.0</u>

TOTAL IRON 12

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F

.49

Calcium Sulfate Stability at 95°F

Concentration 21.01 meq/l.

Calc. Solubility 57.15 meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

Scaling Tendency

POS.

Percent Saturation

36.76

Percent Saturation

REMARKS

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	as _____
Calcium	as _____
Magnesium	as _____
Sulfate	as _____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

AtlanticRichfieldCompany

North American Producing Division
New Mexico-Arizona District
P.O. Box 1710
Hobbs, New Mexico 88240
Telephone 505 393 7163



01, 1978

See file

3302

January 17, 1978

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,


L. C. Hudry

LCH:ac
Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

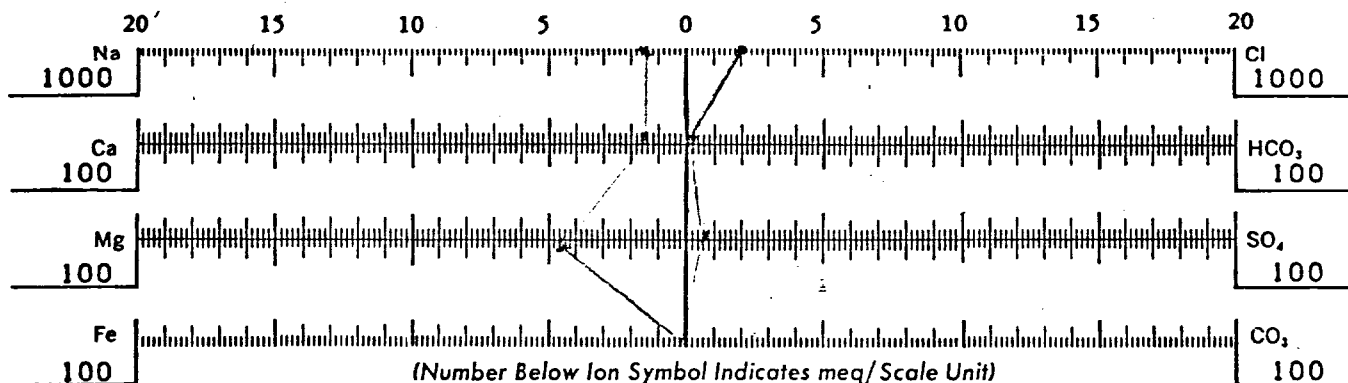
Client ATLANTIC RICHFIELD COMPANY

Field Shugart Field County Eddy State New Mexico
Lease Swearingen Waterflood Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water Sample
Date Collected See letter dated 12-1-77 by Bob R. Kelley

REPORT OF WATER ANALYSIS

Lab. Number A-7139 Specific Gravity 1.0792 pH 7.0
Total Dissolved Solids 119627 Resistivity (Ohmmeters at 68° F.) .068 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>119627</u>	
Sodium (Calc.)	<u>33800</u>	<u>1469.4</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>10</u>	<u>.1</u>
Calcium	<u>3510</u>	<u>175.1</u>
Magnesium	<u>5810</u>	<u>477.6</u>
Chloride	<u>72200</u>	<u>2036.0</u>
Bicarbonate	<u>717</u>	<u>11.8</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>3580</u>	<u>74.5</u>

TOTAL IRON 5

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F	<u>.80</u>	Scaling Tendency	<u>POS.</u>
Calcium Sulfate Stability at 95° F			
Concentration <u>74.46</u> meq/l.	Calc. Solubility <u>70.40</u> meq/l.	Percent Saturation	<u>100.00</u>
Barium Sulfate Stability at 95° F			
Concentration <u>.15</u> meq/l.	Calc. Solubility <u>0.</u> meq/l.	Percent Saturation	<u>100.00</u>

REMARKS

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	as _____
Calcium	as _____
Magnesium	as _____
Sulfate	as _____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____ (Qual.) _____

AtlanticRichfieldCompany

North American Producing Division
New Mexico-Arizona District
P.O. Box 1710
Hobbs, New Mexico 88240
Telephone 505 393 7163



September 1, 1978

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results of laboratory analysis of the latest produced water sample from the Swearingen Shugart waterflood project.

Yours very truly,

L. C. Hudry

LCH:ac
Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



Home Office 707 N. Leech, P. O. Box 1499 / Hobbs, NM 88240 / Ph. 505/393-7751, TWX 910/986-0010

Company Atlantic Richfield

Field Loco Hills

Lease Swearinger Water Flood

Sampling Date 8-30-78

Type of Sample

WATER ANALYSIS

IONIC FORM	me/l *	mg/l *
Calcium (Ca++)	150.74	3,015
Magnesium (Mg++)	238.78	2,865
Sodium (Na+)	(CALCULATED) 1,519.07	34,923
Iron (Total)		6
Bicarbonate (HCO ₃)	10.10	616
Carbonate (CO ₃ -)	Not	Found
Hydroxide (OH-)	Not	Found
Sulphate (SO ₄ -)	93.69	4,500
Chloride (Cl -)	1,804.80	64,000
Total Dissolved Solids		109,919
7.3 ph c 68 °F		
Dissolved Solids on Evap. at 103° - 105° C		
Hardness as Ca CO ₃	389.52	19,476
Carbonate Hardness as CaCO ₃ (temporary)	10.10	505
Non-Carbonate Hardness as CaCO ₃ (permanent)	379.42	18,971
Alkalinity as CaCO ₃	10.10	505
Specific Gravity c 68° F 1.075		

* mg/l = milligrams per Liter

* me/l = milliequivalents per Liter

CaCO₃ Scaling Index positive @ 86° F. (0.88)

CaSO₄ Scaling Index positive (0.32)



March 30, 1977

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,


L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

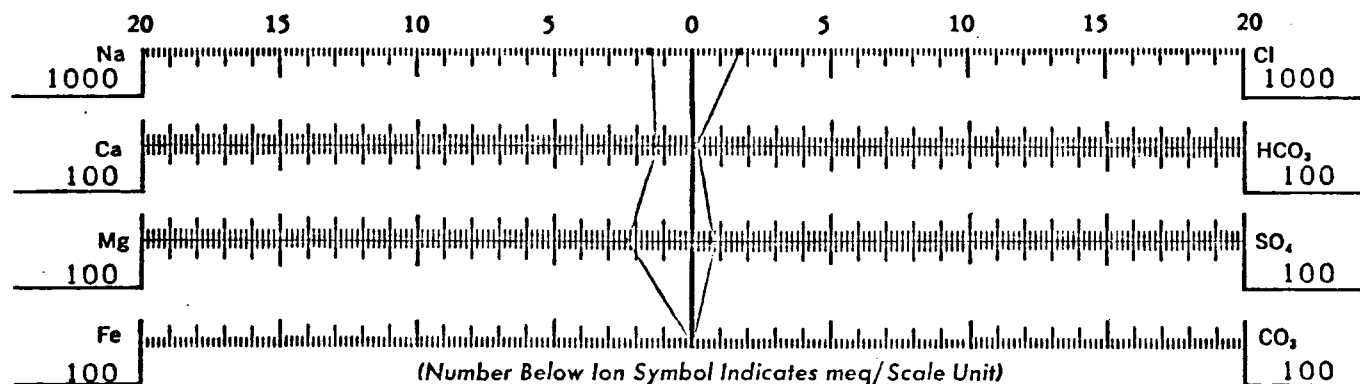
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen Waterflood Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water Sample
Date Collected Letter from Cecil Johnson 2-23-77 by Cecil Johnson

REPORT OF WATER ANALYSIS

Lab. Number A-6801 Specific Gravity 1.0759 pH 5.8
Total Dissolved Solids 105623 Resistivity (Ohmmeters at 68° F.) .084 Hydrogen Sulfide PRESENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	105623	
Sodium (Calc.)	33300	1446.0
Iron (Dissolved)	363	13.0
Barium	-	-
Calcium	2890	144.2
Magnesium	2900	238.4
Chloride	63000	1776.6
Bicarbonate	210	3.4
Carbonate	0	0.
Sulfate	2960	61.6

TOTAL IRON 586

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F	<u>-1.18</u>	Scaling Tendency	<u>NEG.</u>
Calcium Sulfate Stability at 95°F			
Concentration <u>61.57</u> meq/l.	Calc. Solubility <u>72.68</u> meq/l.	Percent Saturation	<u>84.71</u>
Barium Sulfate Stability at 95° F			
Concentration _____ meq/l.	Calc. Solubility _____ meq/l.	Percent Saturation	_____

REMARKS

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	_____
Calcium _____ as _____	_____
Magnesium _____ as _____	_____
Sulfate _____ as _____	_____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

Atlantic Richfield Company **North American Producing Division**
New Mexico-Arizona District
Post Office Box 1710
Hobbs, New Mexico 88240
Telephone 505 393 7160



March 30, 1977

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

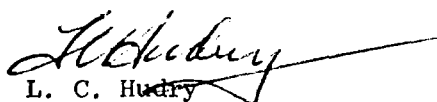
Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,


L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

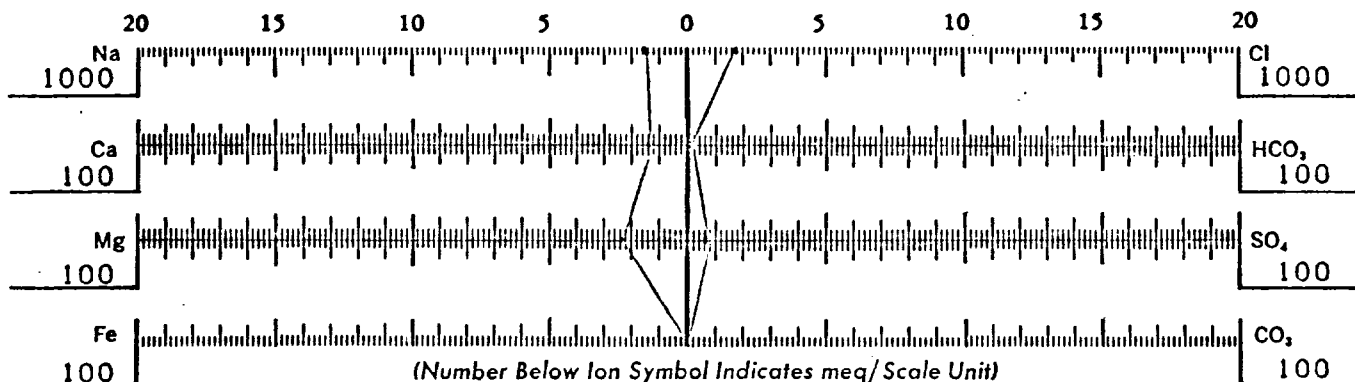
PRODUCTION PROPERTIES, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Shugart Lease Swearingen Waterflood Well No. _____
 Formation _____ Depth _____ Perf. _____
 Source of Sample Produced Water Sample
 Date Collected Letter from Cecil Johnson 2-23-77 by Cecil Johnson

REPORT OF WATER ANALYSIS

Lab. Number A-6801 Specific Gravity 1.0759 pH 5.8
 Total Dissolved Solids 105623 Resistivity (Ohmmeters at 68° F.) .084 Hydrogen Sulfide PRESENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>105623</u>	
Sodium (Calc.)	<u>33300</u>	<u>1446.0</u>
Iron (Dissolved)	<u>363</u>	<u>13.0</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2890</u>	<u>144.2</u>
Magnesium	<u>2900</u>	<u>238.4</u>
Chloride	<u>63000</u>	<u>1776.6</u>
Bicarbonate	<u>210</u>	<u>3.4</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>2960</u>	<u>61.6</u>

TOTAL IRON 586

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F	<u>-1.18</u>	Scaling Tendency	<u>NEG.</u>
Calcium Sulfate Stability at 95°F			
Concentration <u>61.57</u> meq/l.	Calc. Solubility <u>72.68</u> meq/l.	Percent Saturation	<u>84.71</u>
Barium Sulfate Stability at 95° F			
Concentration _____ meq/l.	Calc. Solubility _____ meq/l.	Percent Saturation	_____

REMARKS

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	
Calcium _____ as _____	
Magnesium _____ as _____	
Sulfate _____ as _____	
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

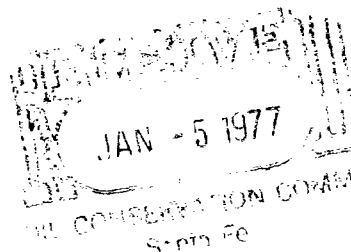
North American Producing Division

New Mexico Producing District

Post Office Box 1731

Albuquerque, New Mexico 87103

Telephone (505) 426-3141



January 4, 1977

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87501

Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,


L. C. Hudry

LCH/rd
Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, NM 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, NM 87501

PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

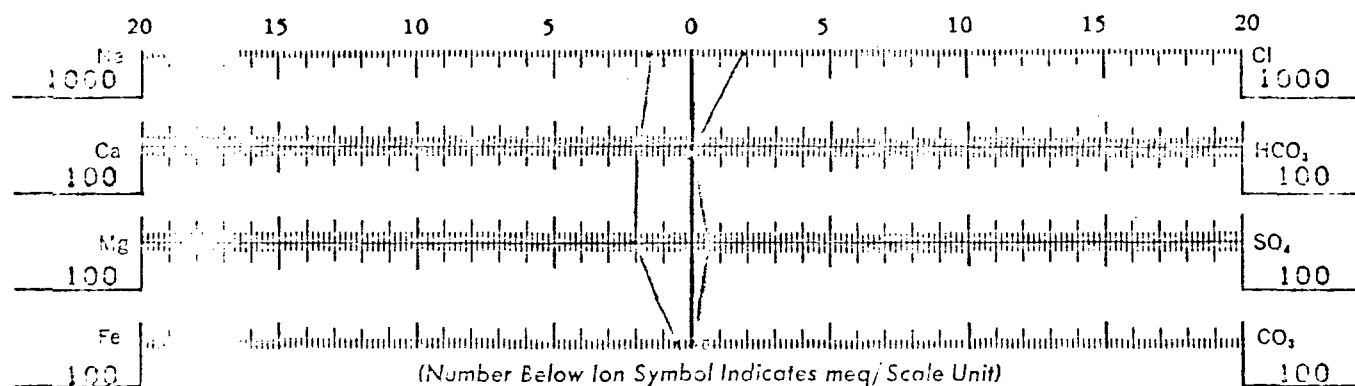
RECEIVED
JAN - 5 1977

Client Atlantic Richfield Company County Eddy State New Mexico
Field Shugart Lease _____ Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Swearingen Waterflood
Date Collected _____ by _____

REPORT OF WATER ANALYSIS

Lab. Number A-6728 Specific Gravity 1.0753 pH 5.5
Total Diss. Solids 107916 Resistivity (Ohmmeters at 68° F.) .085 Hydrogen Sulfide PRESENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (mg/l)	107916	
Sodium (mg/l)	32500	1412.0
Iron (mg/l)	1570	56.4
Barium	-	-
Calcium	3770	188.1
Magnesium	2730	224.4
Chloride	64900	1830.2
Sulfate	46	.8
Carbonate	0	0.
Silica	2400	49.9
TOTAL	2100	

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	
Oil (Solvent Soluble)	
Acid Solubles	
Iron	as
Calcium	as
Magnesium	as
Sulfate	as
Organic (Ignition Loss)	
Acid Insolubles	
Sand & Clay	
Barium Sulfate	(Quan.)
	(Qual.)

SCALING TENDENCY

Calc. Stability Index at 77° F	-1.98	Scaling Tendency	NEG.
Calc. Solubility at 95°F			
on 49.92 meq/l.	Calc. Solubility 57.89 meq/l.	Percent Saturation	86.23
on			
on			
on			

REMARKS



Case
3302

STATE OF NEW MEXICO

STATE ENGINEER OFFICE

SANTA FE

S. E. REYNOLDS
STATE ENGINEER

September 21, 1965

ADDRESS CORRESPONDENCE TO:
STATE CAPITOL
SANTA FE, NEW MEXICO 87501

MAIN

SEP 22 AH 8 11

Mr. A. L. Porter, Jr.
Secretary-Director
Oil Conservation Commission
Santa Fe, New Mexico

Dear Mr. Porter:

Reference is made to the application of Atlantic Refining Company which seeks approval of the Swearingen Waterflood Project consisting of 720 acres in Sections 11 and 14, Township 18 South, Range 31 East which was the subject of Case 3302 heard on September 8, 1965.

This office offers no objection to the granting of the application provided:

(1) ✓

The coupon method of measuring corrosion is used from inception of injection and reports furnished to the Oil Conservation Commission and the State Engineer Office, giving the results of the examination of the coupons every three months.

(2) ✓

An inhibited fluid is used in the annulus between the casing and tubing.

(3) ✓

The Oil Conservation Commission and the State Engineer Office are immediately notified when re-injection of produced water commences and are furnished an analysis of the produced water every sixty days for the first six months, following commencement of use of produced water and at longer intervals after the end of the six-month period.

- ✓ 4. The disposal of produced water into unlined pits shall be limited to one-half barrel per day per well. ✓

✓ 5. Any changes in the casing, tubing or cement program from the plans submitted at the hearing, with respect to the injection wells, shall be approved by the Oil Conservation Commission and the State Engineer Office prior to use.

Yours truly.

S. E. Reynolds
State Engineer

FEI/ma

By: *Frank E. Irby*
Frank E. Irby
Chief
Water Rights Div.

CLARENCE E. HINKLE
W. E. BONDURANT, JR.
S. B. CHRISTY IV
LEWIS C. COX, JR.
PAUL W. EATON, JR.
CONRAD E. COFFIELD
HAROLD L. HENSLEY, JR.
MICHAEL R. WALLER

LAW OFFICES
HINKLE, BONDURANT & CHRISTY
HINKLE BUILDING
ROSWELL, NEW MEXICO

August , 1965

MAILED
JUL 30 1965
AM 7 10
OF COUNSEL: HIRAM M. DOW
TELEPHONE 622-6510
AREA CODE 505
POST OFFICE Box 10

Oil Conservation Commission
Box 2088
Santa Fe, New Mexico

Gentlemen:

We enclose in triplicate application of The Atlantic Refining Company for approval of the Swearingen Water Flood Project in the Shugart Pool. We would like to have this matter set down for hearing at the first examiner's hearing in September, which we assume will be September 8.

We are sending a complete copy of the application to the State Engineer.

Yours sincerely,

HINKLE, BONDURANT & CHRISTY

By 

CEH:cs

Enc.

cc: State Engineer

cc: The Atlantic Refining Company

DOCKET MAILED

Date 



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Exhibit No. 7

BEFORE EXAMINER **UTZ**
OIL CONSERVATION COMMISSION
apls EXHIBIT NO. 7
CASE NO. 3302

P. O. Drawer U
Artesia, New Mexico 88210

May 25, 1965

The Atlantic Refining Company
P. O. Box 1978
Roswell, New Mexico

Re: Swearingen Waterflood Project
Shugart Pool, T. 18 S., R. 31 E.
Eddy County, New Mexico

Gentlemen:

Your letter of May 17, 1965, requests approval to institute a waterflood of the Queen formation in the Shugart Pool, T. 18 S.; R. 31 E., Eddy County, New Mexico. Atlantic has 100% working interest of the project area which involves 720 acres consisting of Federal leases Las Cruces 029388(b), described as the E/2 SE $\frac{1}{4}$ sec. 11, Las Cruces 047633(a), described as the NE $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, and N/2 SE $\frac{1}{4}$ sec. 14, and Las Cruces 047633(b), described as the N/2 NW $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ and S/2 SE $\frac{1}{4}$ sec. 14, T. 18 S., R. 31 E. There are no other lands involved in the project area.

You propose to operate the project on a lease basis and to flood on an 80 acre five-point pattern. There are 13 wells involved, six of which are to be converted to water injection. Only the Queen formation will be flooded, which is at an average of 3500 feet.

The proposed plan for operating your Swearingen Waterflood Project in the area outlined above is satisfactory to this office and hereby approved subject to approval by the New Mexico Oil Conservation Commission and the following:

1. This project will be operated in compliance with the New Mexico Oil Conservation Commission regulations governing waterflood operations.
2. When this project is expanded to involve other operators and interests, the correlative rights of all concerned will be protected and therefore cooperative agreements will be negotiated when injection wells are introduced along lease lines.
3. Appropriate notices and reports to drill new wells and to convert existing wells to water injection will be submitted for approval prior to commencing the work. Duplicate copies of a monthly progress report are to be submitted showing the volume of water

injected and average pressures for each injection well and monthly oil and water production for the producing wells in the project area.

Sincerely yours,

A handwritten signature in cursive script, reading "Robert L. Beekman". The signature is written in dark ink and is positioned above the printed name.

Robert L. Beekman
Acting District Engineer

RLB:gs

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

September 28, 1965

Mr. Clarence Hinkle
Hinkle, Bondurant & Christy
Attorneys at Law
Post Office Box 10
Roswell, New Mexico

Dear Sir:

Enclosed herewith is Commission Order No. R-2969, entered in Case No. 3302, approving the Atlantic Refining Company Swearingen-Shugart Waterflood Project.

Injection of water is to be through the six authorized water injection wells, which shall be equipped with tubing and packers, said packers being set within 100 feet of the uppermost perforation or in the case of open-hole completions, within 100 feet of the casing shoe.

Approval is also contingent upon the following conditions:

1. The coupon method of measuring corrosion is used from inception of injection and reports furnished to the Oil Conservation Commission and the State Engineer Office, giving the results of the examination of the coupons every three months.
2. An inhibited fluid is used in the annulus between the casing and tubing.
3. The Oil Conservation Commission and the State Engineer Office are immediately notified when re-injection of produced water commences and are furnished an analysis of the produced water

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

-2-

every sixty days for the first six months, following commencement of use of produced water and at longer intervals after the end of the six-month period.

4. Any changes in the casing, tubing or cement program from the plans submitted at the hearing, with respect to the injection wells, shall be approved by the Oil Conservation Commission and the State Engineer Office prior to use.

As to allowable, our calculations indicate that when all of the authorized injection wells have been placed on active injection, the maximum allowable which this project will be eligible to receive under the provisions of Rule 701-E-3 is 546 barrels per day, provided that any leases which have any variation in ownership have been consolidated or pooled or otherwise covered by some kind of agreement authorizing transfer of allowables.

Please report any error in this calculated maximum allowable immediately, both to the Santa Fe office of the commission and the appropriate district proration office.

In order that the allowable assigned to the project may be kept current, and in order that the operator may fully benefit from the allowable provisions of Rule 701, it behooves him to promptly notify both of the aforementioned commission offices by letter of any change in the status of wells in the project area, i.e., when active injection commences, when additional injection or producing wells are drilled, when additional wells are acquired through purchase or unitization, when wells have received a response to water injection, etc.

Your cooperation in keeping the Commission so informed as to the status of the project and the wells therein will be appreciated.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/DSN/ir

cc: Mr. Frank Irby

Oil Conservation Commission - Artesia, New Mexico

ATLANTIC**THE ATLANTIC REFINING COMPANY**

INCORPORATED - 1870

PETROLEUM PRODUCTS

November 15, 1965

NORTH AMERICAN PRODUCING DEPARTMENT
NEW MEXICO - ARIZONA DISTRICTS. L. SMITH, DISTRICT MANAGER
JACK BIARD, DISTRICT LANDMAN
E. R. DOUGLAS, DISTRICT GEOLOGIST
A. D. KLOXIN, DISTRICT DRG. & PROD. SUP'T.
M. D. ROBERTS, DISTRICT GEOPHYSICIST
W. P. TOMLINSON, DISTRICT ENGINEER
B. R. WARE, DISTRICT ADMINISTRATIVE SUP'V.

SECURITY NATIONAL BANK BLDG.

MAILING ADDRESS
P. O. BOX 1978
ROSWELL, NEW MEXICONew Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter

Re: Swearingen-Shugart Waterflood
Order No. R-2969

Gentlemen:

This is to advise that the final three injection wells in the Swearingen-Shugart Waterflood Project are now in service. This makes a total of six injection wells in the project. Information concerning the first three wells was contained in our letter to you dated November 9, 1965.

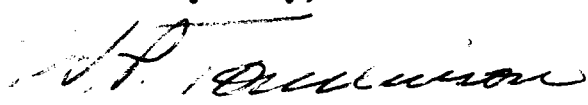
All of the injection wells are completed so that injection is down tubing and below a packer. The casing annulus is filled with inhibited water and corrosion coupons are installed in the well heads on wells A-6 and B-3. Coupons are also installed in the injection manifold.

Below are data on the final three injection wells.

Well Name	Packer Setting Depth	Depth of Casing Shoe	Top of Perforations	Date Injection Started
Swearingen "B" No. 3	3312'	3661'	3378'	November 10
Swearingen "A" No. 6	3351'	3512'	3443'	November 9
Johnson Federal #1	3270'	3347'	O.H.	November 9

We trust that this information will satisfy your needs. If you desire additional data please advise.

Yours very truly,


W. P. Tomlinson

EMP:jcb

ATLANTIC**THE ATLANTIC REFINING COMPANY**

INCORPORATED - 1870

PETROLEUM PRODUCTS

November 9, 1965

NORTH AMERICAN PRODUCING DEPARTMENT
NEW MEXICO - ARIZONA DISTRICTS. L. SMITH, DISTRICT MANAGER
JACK BIARD, DISTRICT LANDMAN
E. R. DOUGLAS, DISTRICT GEOLOGIST
A. D. KLOXIN, DISTRICT DRG. & PROD. SUP'T.
M. D. ROBERTS, DISTRICT GEOPHYSICIST
W. P. TOMLINSON, DISTRICT ENGINEER
B. R. WARE, DISTRICT ADMINISTRATIVE SUP'V.

SECURITY NATIONAL BANK BLDG.

MAILING ADDRESS
P. O. BOX 1978
ROSWELL, NEW MEXICONew Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter

Re: Swearingen-Shugart Waterflood
Order No. R-2969

Dear Sir:

The Atlantic Refining Company started injecting water into the Swearingen Shugart Waterflood Project on November 6, 1965. We are currently injecting into the Swearingen "A" No. 5 and the Swearingen "B" No. 4. Injection is down tubing and below a packer. The casing tubing annulus is filled with inhibited water and corrosion coupons were installed in the well head on key wells.

The Swearingen "A" No. 3 has been completed for injection and we will start injecting into it immediately. The following table shows packer setting depth, depth of casing shoe and top of perforations for the three wells that have been completed to date for injection. This information indicates compliance with provisions of your letter dated September 28, 1965, on this subject.

	<u>Packer Setting Depth</u>	<u>Depth of Casing Shoe</u>	<u>Top of Perforations</u>
Swearingen "A" No. 3	3152'	3230'	O. H.
Swearingen "A" No. 5	3390'	3470'	O. H.
Swearingen "B" No. 4	3411'	3540'	3490'

The other three injection wells are being converted presently and we will forward completion data on them as soon as they are completed.

Yours very truly,

A handwritten signature in dark ink, appearing to read 'W. P. Tomlinson', written in a cursive style.

W. P. Tomlinson

VRC:jcb

cc: United States Geological Survey
Attention: Mr. J. A. Knauf
P. O. Drawer U
Artesia, New Mexico

New Mexico Oil Conservation Commission
Attention: Mr. M. L. Armstrong
P. O. Drawer DD
Artesia, New Mexico

OIL CONSERVATION COMMISSION

P. O. BOX 2088

SANTA FE, NEW MEXICO

April 28, 1966

**The Atlantic Refining Company
P. O. Box 1978
Roswell, New Mexico**

Attention: Mr. W. P. Tomlinson

Administrative Order CTB-156

Gentlemen:

Reference is made to your application dated January 17, 1966, for administrative approval of an exception to Rule 309-A of the Commission Rules and Regulations to permit the commingling of oil production from your Swearingen "A" Lease comprising the NE/4, SE/4 NW/4, and N/2 SE/4 of Section 14, and your Swearingen "B" Lease comprising the N/2 NW/4, SW/4 NW/4, SW/4, and S/2 SE/4 of Section 14, and your Johnson Federal Lease comprising the E/2 SE/4 of Section 11, all in Township 18 South, Range 31 East, NMPM, Shugart Pool, Eddy County, New Mexico. The United States Geological Survey has consented to the commingling from the aforesaid leases until such time as the total production reaches 440 barrels per day; all overriding royalty owners have agreed to the commingling as evidenced by executed overriding royalty pooling agreements which were received in this office April 28, 1966. It is our understanding that each of the leases will share in the production from the waterflood on the commingled acreage on the basis of the number of wells located on each lease as compared to the total number of wells (13) on all the leases.

OIL CONSERVATION COMMISSION

P. O. BOX 2088

SANTA FE, NEW MEXICO

-2-

April 28, 1966

The Atlantic Refining Company
Roswell, New Mexico

Administrative Order CTB-156

C
O
P
Y

Under the authority granted me pursuant to Rule 309-B, The Atlantic Refining Company is hereby authorized to commingle the above-described production as proposed, subject to the applicable provisions of the Commission "Manual for the Installation and Operation of Commingling Facilities."

As the result of the pooling agreements, the 546 barrels per day stated in our letter of September 28, 1965, as the maximum allowable which this project would be eligible to receive under the provisions of Rule 701-E-3, provided that the leases were consolidated, will now be considered as the effective maximum.

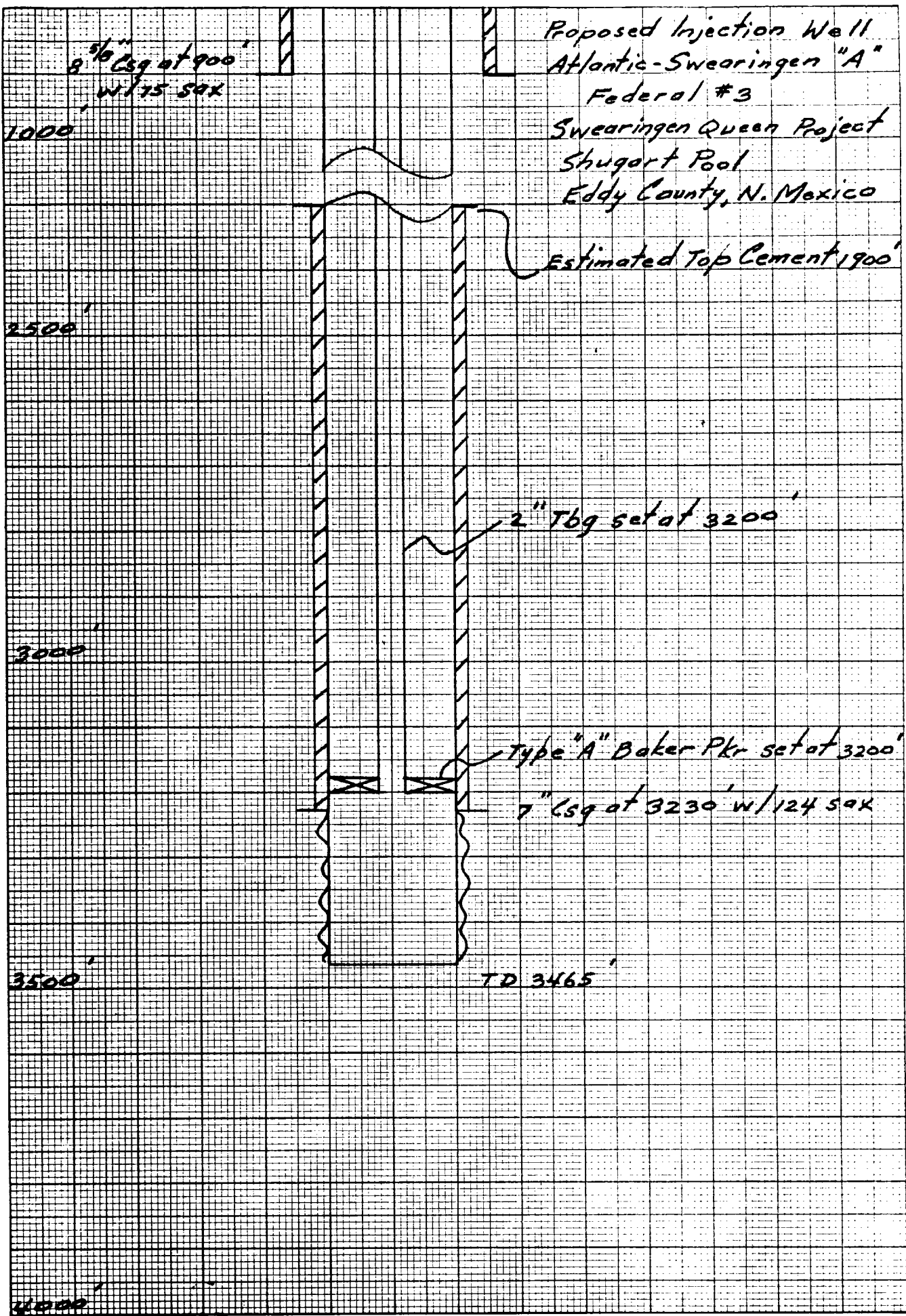
Very truly yours,

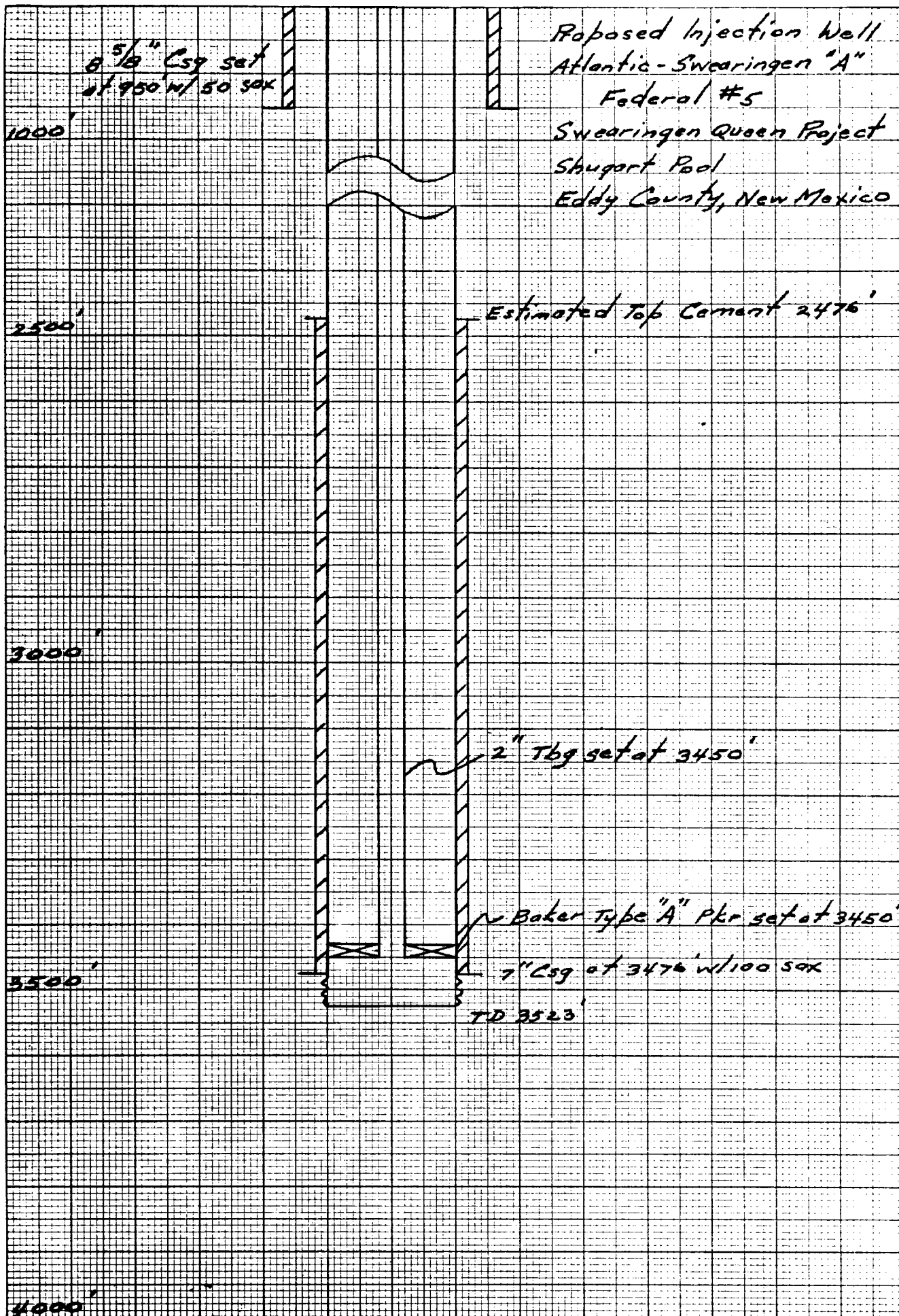
A. L. PORTER, Jr.
Secretary-Director

ALP/DSN/esr

cc: Oil Conservation Commission - Artesia
Oil & Gas Engineering Committee - Hobbs
United States Geological Survey - Roswell

EXHIBIT "B"





5/8" CS9 at 778'
w/ 50 SOX

Proposed Injection Well
Atlantic-Swearingen "A"
Federal #6

Swearingen-Queen Project
Shugart Pool
Eddy County, N. Mex.

900'

2300'

Est Top Cement 2462'

3000'

2" Tbg set at 3400'

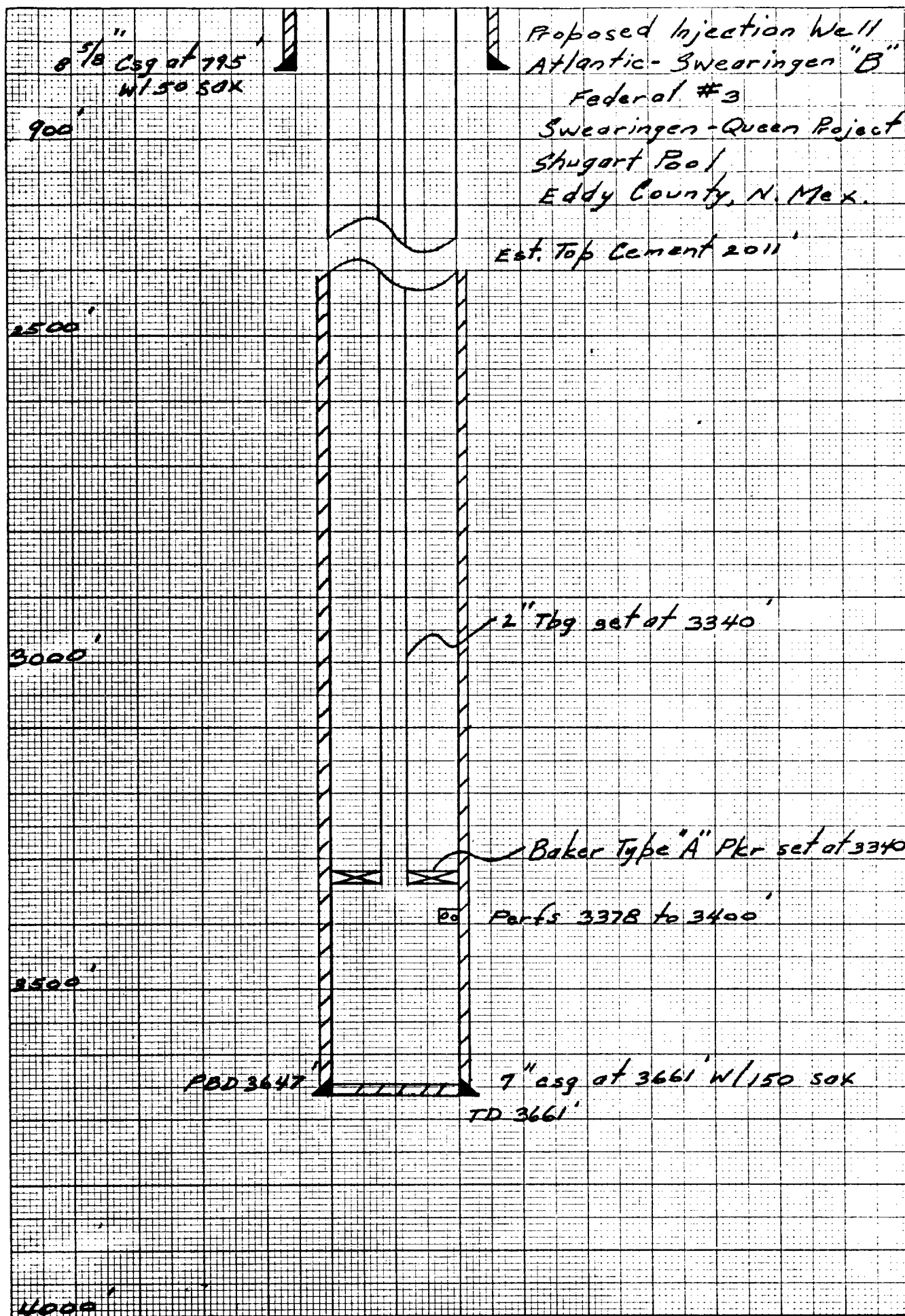
Baker Type "A" Pkr set at 3400'

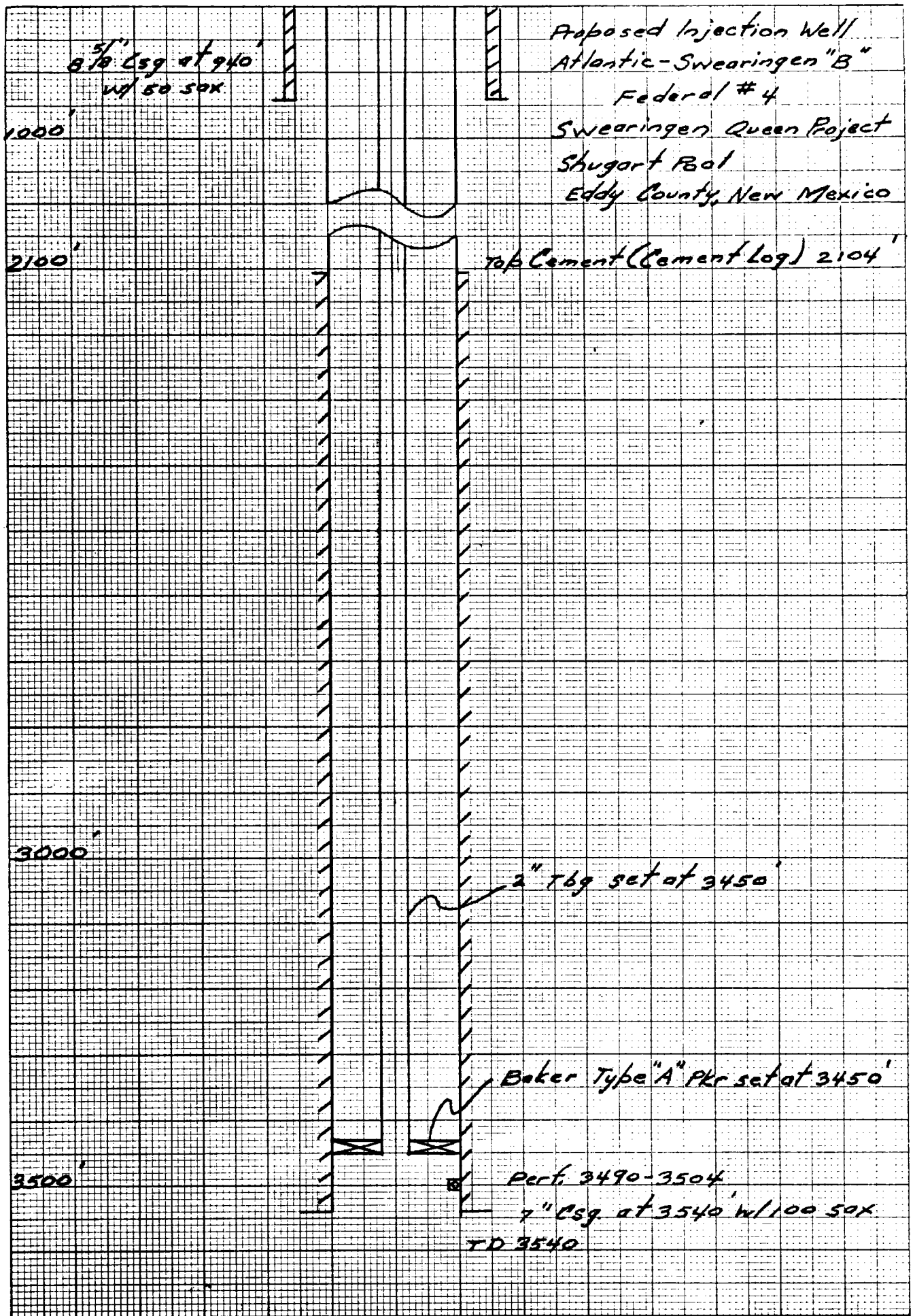
Pkrs 3443' to 3464'

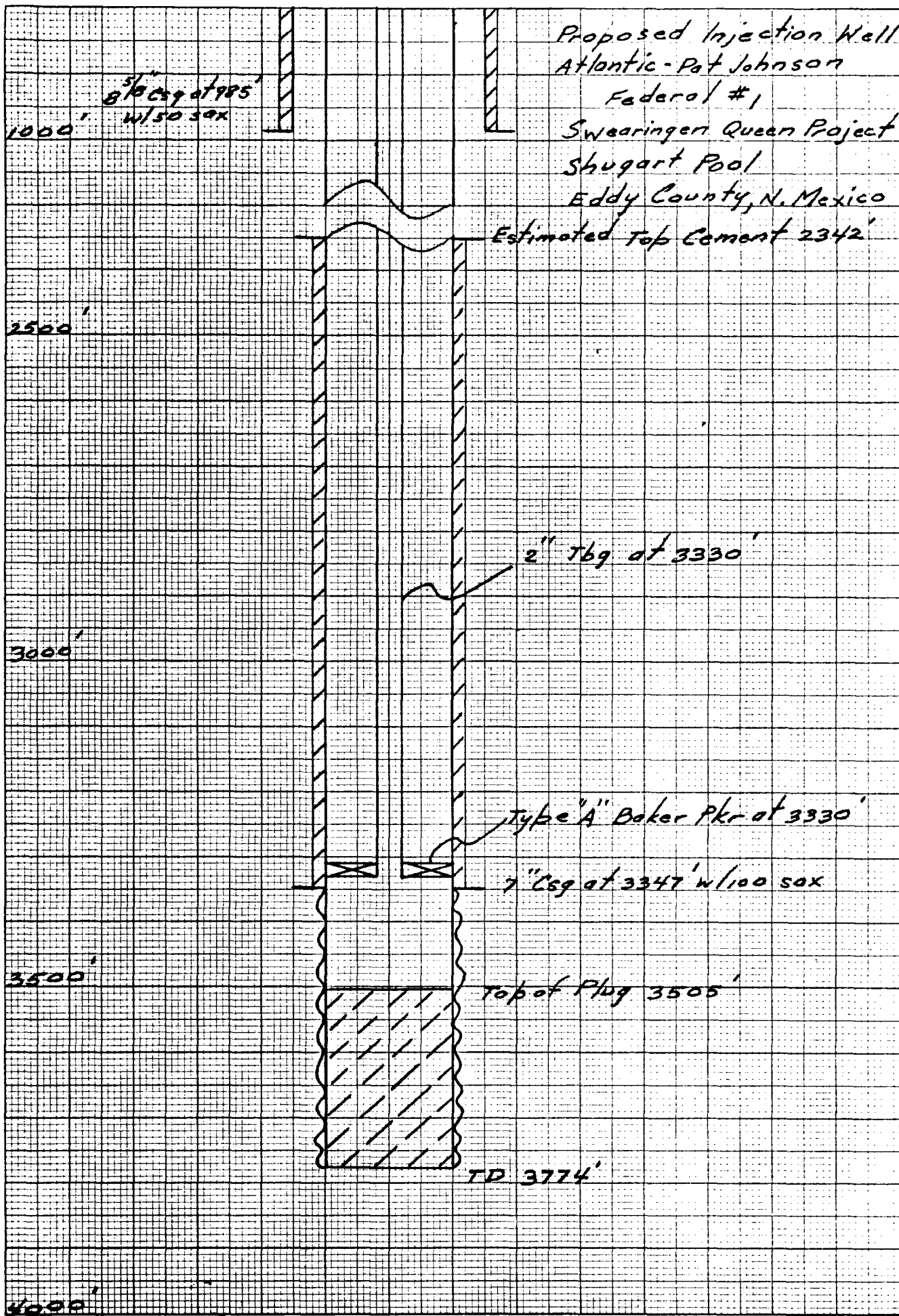
3500'

7" CS9 at 3512' w/ 100 SOX
TD 3512'

4000'







By: Frank E. Irby, Chief
Water Rights Div.



March 26, 1976

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87501

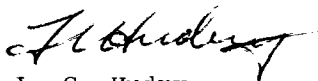
Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,


L. C. Hudry

LCH/rd

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, NM 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, NM 87501

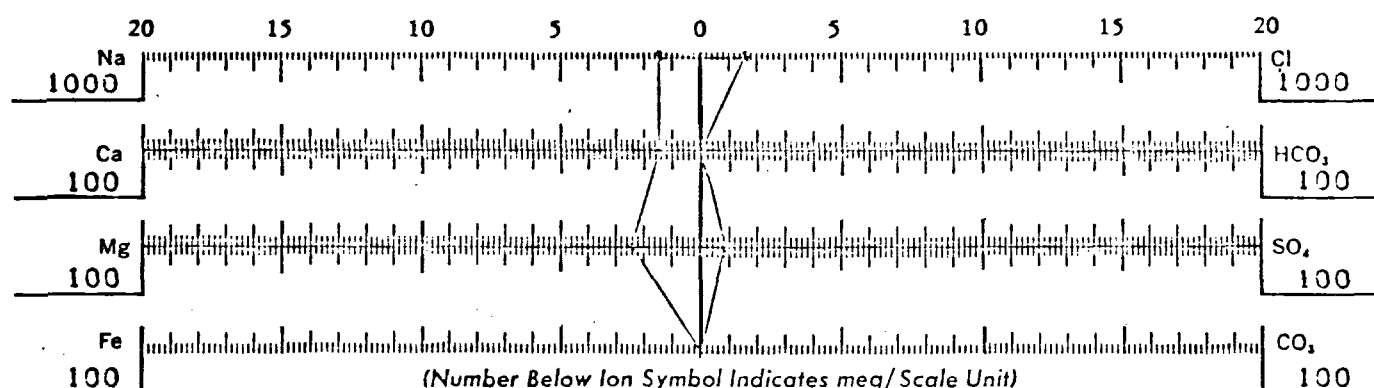
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Shugart Lease Swearingen Waterflow Well No. _____
 Formation _____ Depth _____ Perf. _____
 Source of Sample Produced Water
 Date Collected Letter dated 2-23-72 by James Cagburn

REPORT OF WATER ANALYSIS

Lab. Number A-6369 Specific Gravity 1.0743 pH 6.5
 Total Dissolved Solids 105696 Resistivity (Ohmmeters at 68° F.) .022 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>105696</u>	
Sodium (Calc.)	<u>33400</u>	<u>1450.5</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2890</u>	<u>144.2</u>
Magnesium	<u>2930</u>	<u>240.8</u>
Chloride	<u>61600</u>	<u>1737.1</u>
Bicarbonate	<u>676</u>	<u>11.1</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4200</u>	<u>87.4</u>

TOTAL IRON 14

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F
 Calcium Sulfate Stability at 95° F
 Concentration 87.36 meq/l.
 Barium Sulfate Stability at 95° F
 Concentration _____ meq/l.

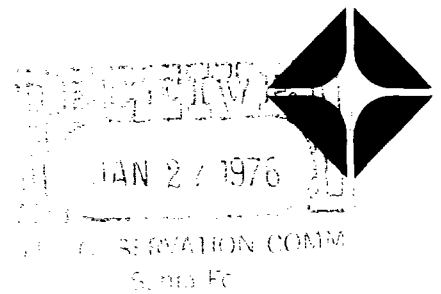
.03
 Calc. Solubility 81.72 meq/l.
 Calc. Solubility _____ meq/l.

Scaling Tendency POS.
 Percent Saturation 100.00
 Percent Saturation _____

REMARKS

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	
Calcium _____ as _____	
Magnesium _____ as _____	
Sulfate _____ as _____	
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate (Quan.) _____	
(Qual.) _____	



January 26, 1976

New Mexico Oil Conservation Commission
P.O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry

LCH:mt

Attachment

cc: New Mexico Oil Conservation Commission
P.O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

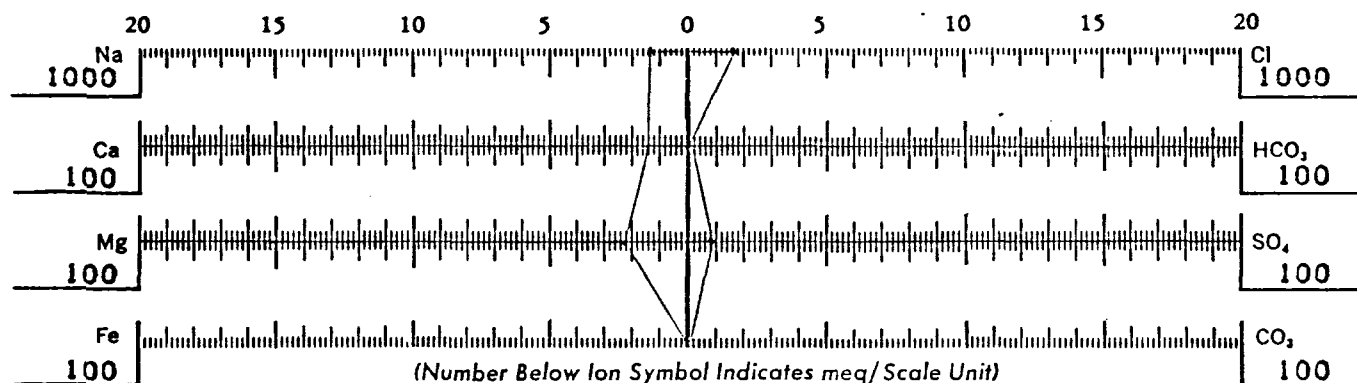
Client Atlantic Richfield Company

County Eddy State New Mexico
Field Shugart Lease Swearingen Water Well No. _____
Formation _____ Depth _____ Flood _____ Perf. _____
Source of Sample Produced Water Sample
Date Collected _____ by _____

REPORT OF WATER ANALYSIS

Lab. Number A-6300 Specific Gravity 1.0734 pH 6.4
Total Dissolved Solids 103418 Resistivity (Ohmmeters at 68° F.) .090 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>103418</u>	
Sodium (Calc.)	<u>32600</u>	<u>1419.1</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2880</u>	<u>143.7</u>
Magnesium	<u>2820</u>	<u>231.8</u>
Chloride	<u>60000</u>	<u>1692.0</u>
Bicarbonate	<u>878</u>	<u>14.4</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4240</u>	<u>88.2</u>

TOTAL IRON 16

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F .03
Calcium Sulfate Stability at 95° F
Concentration 88.19 meq/l.
Barium Sulfate Stability at 95° F
Concentration _____ meq/l.

Calc. Solubility 81.73 meq/l.
Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	as _____
Calcium	as _____
Magnesium	as _____
Sulfate	as _____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____ (Qual.) _____

Scaling Tendency POS.
Percent Saturation 100.00
Percent Saturation _____

REMARKS



September 26, 1975

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order N-2969 entered in
Case No. 3302 concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

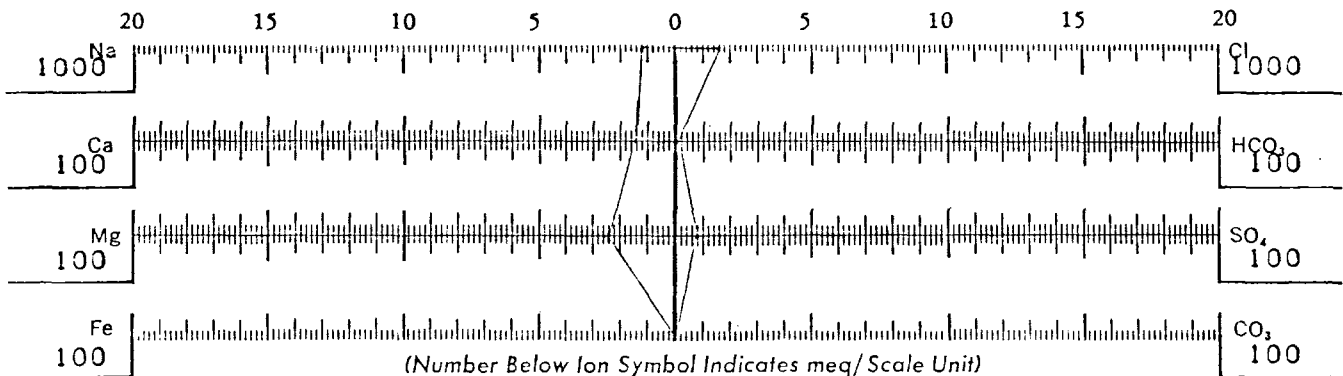
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water
Date Collected _____ by _____

REPORT OF WATER ANALYSIS

Lab. Number A-6236 Specific Gravity 1.0688 pH 7.1
Total Dissolved Solids 99110 Resistivity (Ohmmeters at 68° F.) .103 Hydrogen Sulfide Present

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	99110	
Sodium (Calc.)	30700	1335.0
Iron (Dissolved)	0	0.
Barium		
Calcium	2910	145.2
Magnesium	2930	240.8
Chloride	57300	1615.9
Bicarbonate	1020	16.7
Carbonate	0	0.
Sulfate	4250	88.4

TOTAL IRON 1800

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F	<u>.77</u>	Scaling Tendency	<u>POS.</u>
Calcium Sulfate Stability at 95°F			
Concentration <u>88.40</u> meq/l.	Calc. Solubility <u>80.47</u> meq/l.	Percent Saturation	<u>100.00</u>
Barium Sulfate Stability at 95° F			
Concentration _____ meq/l.	Calc. Solubility _____ meq/l.	Percent Saturation	_____

REMARKS



September 27, 1974

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,



L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS

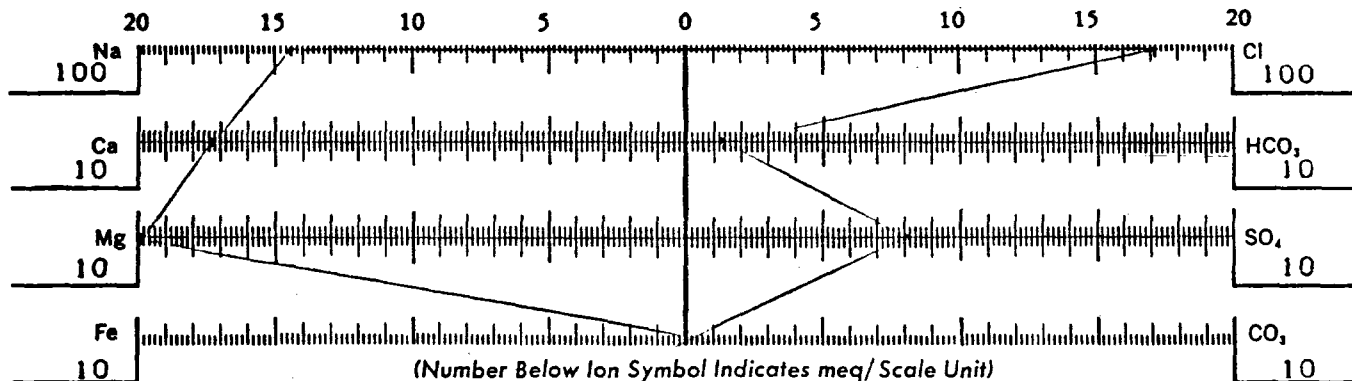
DIVISION OF SONICS INTERNATIONAL, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water
Date Collected 8-12-74 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-5638 Specific Gravity 1.0738 pH 7.1
Total Dissolved Solids 104835 Resistivity (Ohmmeters at 68° F.) .088 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>104835</u>	
Sodium (Calc.)	<u>33200</u>	<u>1442.3</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>3470</u>	<u>173.1</u>
Magnesium	<u>2430</u>	<u>199.7</u>
Chloride	<u>61000</u>	<u>1720.2</u>
Bicarbonate	<u>805</u>	<u>13.2</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>3930</u>	<u>81.7</u>

TOTAL IRON 2

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F
Calcium Sulfate Stability at 95° F
Concentration 81.74 meq/l.
Barium Sulfate Stability at 95° F
Concentration _____ meq/l.

Calc. Solubility 69.81 meq/l.
Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	_____
Calcium _____ as _____	_____
Magnesium _____ as _____	_____
Sulfate _____ as _____	_____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	_____
(Quan.) _____	_____
(Qual.) _____	_____

Scaling Tendency PAS.
Percent Saturation 100.00
Percent Saturation _____

REMARKS



June 12, 1974

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



June 12, 1974

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



7/6

June 12, 1974

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Corrosion Coupon Results as per
~~Commission Order R-2969~~ entered
in Case No. 3302, concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood
Project

Gentlemen:

As per the above order, we submit the results
of laboratory analyses of the latest exposed
corrosion coupons.

Yours very truly,


L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



*File
Case
3302*

March 7, 1974

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

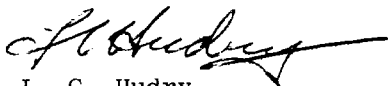
Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,


L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



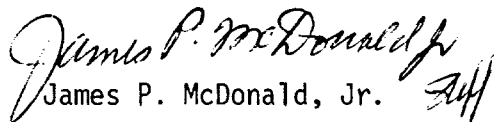
Date: February 22, 1974
To: Mr. James Cogburn - Hobbs, New Mexico
From: James P. McDonald, Jr. - Room E131 PRC, Dallas, Texas
Subject: Water Analysis
Swearingen Lease Waterflood
Shugart Field, Eddy County, New Mexico

Letter: 40-130

Attached is a water analysis (A-5373) on produced water collected in January 1974 from the Swearingen Lease.

This sample was collected in compliance with the request by the New Mexico Oil Conservation Commission for analysis to be made quarterly on this produced water.

A copy of the attached invoice approved for payment has been sent to Accounts Payable.


James P. McDonald, Jr.

JPM/jc

PRODUCTION PROFITS

DIVISION OF SONICS INTERNATIONAL, INC.

Petroleum Service Laboratory

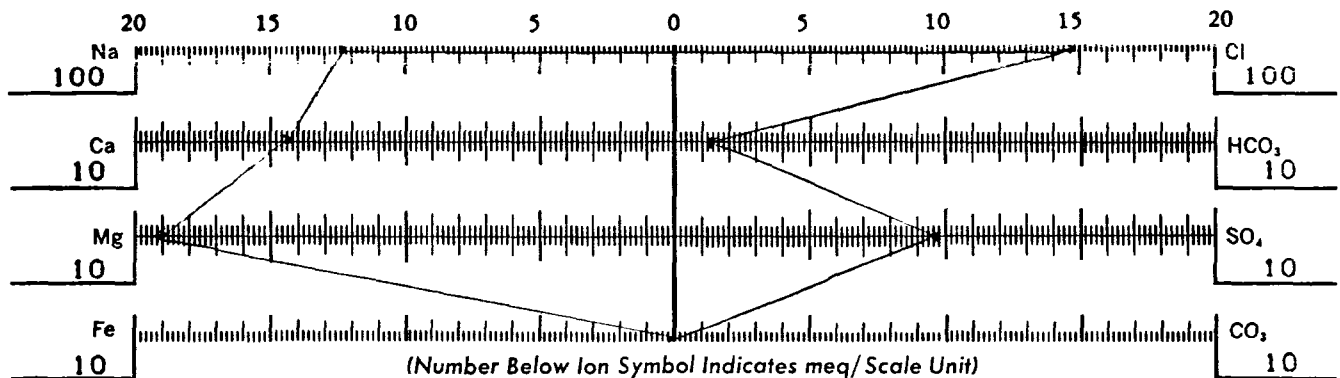
DALLAS, TEXAS

Client Atlantic Richfield Company County Eddy State New Mexico
 Field Shugart Lease Swearingen Waterflood Well No. _____
 Formation _____ Depth _____ Perf. _____
 Source of Sample _____
 Date Collected Rec: 2-1-74 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-5373 Specific Gravity 1.0638 pH 7.4
 Total Dissolved Solids 91438 Resistivity (Ohmmeters at 68° F.) .098 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>91438</u>	
Sodium (Calc.)	<u>28600</u>	<u>1242.6</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2890</u>	<u>144.2</u>
Magnesium	<u>2350</u>	<u>193.2</u>
Chloride	<u>52100</u>	<u>1469.2</u>
Bicarbonate	<u>798</u>	<u>13.1</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4700</u>	<u>97.8</u>

TOTAL IRON 2

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F	<u>.92</u>	Scaling Tendency	<u>P0S.</u>
Calcium Sulfate Stability at 95°F			
Concentration <u>97.76</u> meq/l.	Calc. Solubility <u>82.30</u> meq/l.	Percent Saturation	<u>100.00</u>
Barium Sulfate Stability at 95° F			
Concentration _____ meq/l.	Calc. Solubility _____ meq/l.	Percent Saturation	_____

REMARKS

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	
Calcium _____ as _____	
Magnesium _____ as _____	
Sulfate _____ as _____	
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____



December 18, 1973

Case No. 3302

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

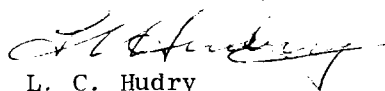
Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,


L. C. Hudry

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS

DIVISION OF SCHLUMBERGER INTERNATIONAL, INC.

Petroleum Service Laboratory

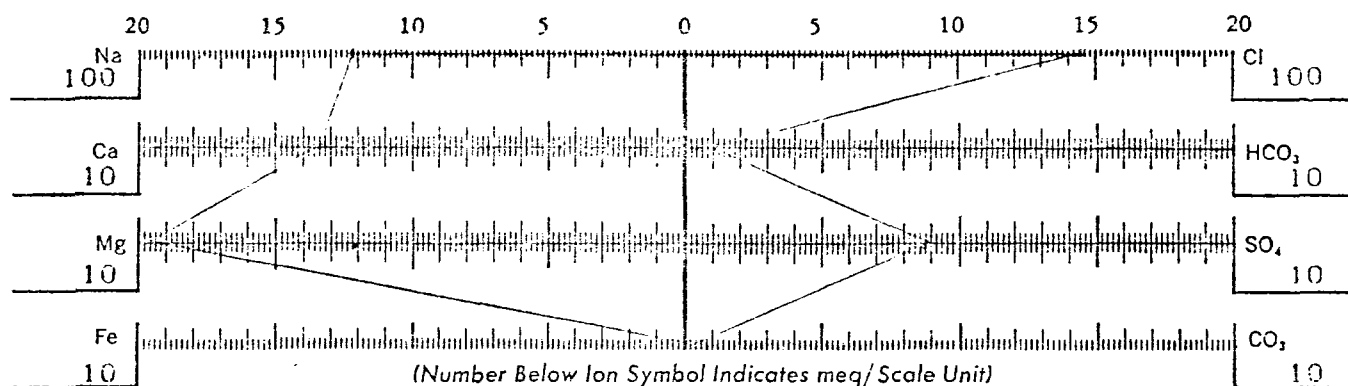
DALLAS, TEXAS

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Shugart Lease Swearingen Well No. _____
 Formation _____ Depth _____ Perf. _____
 Source of Sample Produced Water
 Date Collected Rec: 11-6-73 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-5295 Specific Gravity 1.0644 pH 7.2
 Total Dissolved Solids 89864 Resistivity (Ohmmeters at 68° F.) .101 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>89864</u>	
Sodium (Calc.)	<u>28200</u>	<u>1225.3</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2700</u>	<u>134.7</u>
Magnesium	<u>2390</u>	<u>196.5</u>
Chloride	<u>51700</u>	<u>1457.9</u>
Bicarbonate	<u>634</u>	<u>10.4</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4240</u>	<u>88.2</u>

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F

.58

Calcium Sulfate Stability at 95° F

Concentration 88.19 meq/l.

Calc. Solubility 81.81 meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	<u>as</u>
Calcium	<u>as</u>
Magnesium	<u>as</u>
Sulfate	<u>as</u>
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

Scaling Tendency

PSS.

Percent Saturation

100.00

Percent Saturation

REMARKS



Case No. 3302

November 9, 1973

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

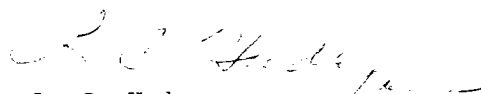
Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 entered
in Case No. 3302, concerning
Atlantic Richfield Company
Swearingen Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analyses of the latest exposed
corrosion coupons.

Yours very truly,


L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)		TYPE ATTACK
		Dates	Days		Volume		
<u>Supply Water</u> (Bar-type Stations at Water Plant)							
West Leg of Manifold	E-861	11-6-65--12-2-65	26	800 BWPD	0.2978	5.2	Surface roughened
	E-862				0.3018	5.2	Scattered shallow pits.
	E-873	12-2-65--3-2-66	90	1244 BWPD	1.0252	5.0	Scattered Attack w/ a few deposits & gouges
East Leg of Manifold							
	E-863	11-6-65--12-2-65	26	1200 BWPD	0.2642	4.5	Even etch w/some edge
	E-864				0.2538	4.3	attack & minor pitting
	E-875	12-2-65--3-2-66	90	1244 BWPD	0.8430	4.2	Scattered attack w/ a few deep pits & gouges

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (mpy)	TYPE ATTACK
		Dates	Days	Volume			
Water Injection Wells (Bar-type Stations at Wellhead)							
A-6 WIW	E-855	11-13-65--1-18-66	66	450 BWPD	0.9738	6.5	General corrosion w/broad shallow pits.
	E-866				0.9628	6.5	
	E-869	1-18-66--3-2-66	43	478 BWPD	0.3820	4.0	Scattered Pitted Areas.
B-3 WIW	E-867	11-13-65--1-18-65	66	288 BWPD	0.7034	4.7	Even etch w/areas of surface roughening
	E-868				0.8032	5.4	
		E-827	1-18-66--3-2-66	43	271 BWPD	0.2265	2.4



Atlantic Richfield Company
Formerly
THE ATLANTIC REFINING COMPANY
INCORPORATED - 1870
PETROLEUM PRODUCTS

June 14, 1966

NORTH AMERICAN PRODUCING GROUP
NEW MEXICO - ARIZONA DISTRICT

S. L. SMITH, DISTRICT MANAGER
JACK BIARD, DISTRICT LANDMAN
E. R. DOUGLAS, DISTRICT GEOLOGIST
A. D. KLOXIN, DISTRICT DRG. & PROD. SUP'T.
M. D. ROBERTS, DISTRICT GEOPHYSICIST
W. P. TOMLINSON, DISTRICT ENGINEER
B. R. WARE, DISTRICT ADMINISTRATIVE SUP'V.

SECURITY NATIONAL BANK BLDG.
MAILING ADDRESS
P. O. BOX 1978
ROSWELL, NEW MEXICO 88201

State of New Mexico
Oil Conservation Commission
Santa Fe, New Mexico

Attention: Mr. Dan Nutter

Re: Swearingen Pool Waterflood

Gentlemen:

Several weeks ago I furnished you with copies of Overriding Royalty Pooling Agreements executed by all overriding royalty owners except Tenneco Oil Company. We now enclose a ratification which has been executed by Tenneco, Continental Oil Company, and New York Life Insurance Company. Tenneco felt this was only proper inasmuch as they owned a common interest with Continental which was not reflected in the division order, and New York Life held a mortgage on a portion of the royalty. This apparently is a result of the Delhi-Taylor purchase. At any rate, we now have instruments signed by all of the owners. This should close your file.

Yours very truly,

ATLANTIC RICHFIELD COMPANY

Fred N. Millsap, Jr.
Land Department

FM/dlm
Encl.

RECEIVED
JUN 15 AM 7 53

SWEARINGEN LEASE WF, SHUGART FLP, NEW MEXICO

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

AUG 11 PM

<u>LOCATION</u>	<u>COUPON NUMBER</u>	<u>EXPOSURE</u>		<u>WEIGHT LOSS (gms)</u>	<u>CORROSION RATE (MPY)</u>	<u>TYPE ATTACK</u>
		<u>Dates</u>	<u>Days</u>			
<u>Supply Water (Bar-type Stations at Water Plant)</u>	E-863	11/6/65--12/2/65	26	1200 (BWPd)	0.2642	4.5
	E-864				0.2538	4.3
						Even etch w/some edge attack & minor pitting.
<u>East Leg of Manifold</u>	E-875	12/2/65--3/2/66	90	1244	0.8430	4.2
						Scattered attack w/a few deep pits & gouges.
	E-876	12/2/65--4/15/66	134	See Remarks	1.1316	3.7
						Scattered attack w/gouges & pitting.
	E-992	4/15/66--7/12/66	88	"	0.8301	4.2
						Scattered attack w/some deep pits
	E-999	5/25/66--7/12/66	48	"	0.3564	3.3
						Scattered attack w/pitted areas.

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

<u>LOCATION</u>	<u>COUPON NUMBER</u>	<u>EXPOSURE</u>			<u>WEIGHT LOSS (gms)</u>	<u>CORROSION RATE (MPY)</u>	<u>TYPE ATTACK</u>
		<u>Dates</u>	<u>Days</u>	<u>Volume (BWPD)</u>			
<u>Supply Water (Bar-type Stations at Water Plant)</u>	E-861	11/6/65--12/2/65	26	800	0.2978	5.2	Surface roughened
	E-862				0.3018	5.2	Scattered shallow pits.
<u>West Leg of Manifold</u>	E-873	12/2/65--3/2/66	90	1244	1.0252	5.0	Scattered attack w/a few deep pits & gouges.
	E-874	12/2/65--4/15/66	134	See Remarks	1.1030	3.6	Scattered attack w/gouges & pitting
	E-990	4/15/66--7/12/66	88	"	0.7201	3.6	Scattered attack w/pitted areas.
	E-1000	5/25/66--7/12/66	48	"	0.3612	3.4	Scattered attack w/some deep pits.

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

<u>LOCATION</u> <u>Water Injection Wells</u> <u>(Bar-type Stations at Wellhead)</u>	<u>COUPON NUMBER</u>	<u>EXPOSURE</u>			<u>WEIGHT LOSS</u> <u>(gms)</u>	<u>CORROSION RATE</u> <u>(MPY)</u>		<u>TYPE</u> <u>ATTACK</u>
		<u>Dates</u>	<u>Days</u>	<u>Volume</u> <u>(BWPD)</u>				
<u>B-3 WIW</u>	E-867	11/13/65--1/18/66	66	288	0.8032	5.4		Even etch w/area of surface roughening.
	E-868				0.7034	4.7		
	E-872	1/18/66--3/2/66	43	271	0.2265	2.4		Scattered shallow pits w/general corrosion at end
	E-871	1/18/66--4/15/66	87	See Remarks	0.7359	3.7		Scattered attack w/a few deep pits & broad areas of no attack on one side.
	E-995	4/15/66--7/12/66	88	"	0.7289	3.7		Scattered attack w/deep pits.
	E-998	5/25/66--7/12/66	48	"	0.4276	4.0		Even etch w/areas of deep pits.

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days	Volume (BWPD)			
Water Injection Wells (Bar-type Stations at Wellhead)	E-865	11/13/65--1/18/66	66	450	0.9738	6.5	General corrosion w/broad shallow pits.
	E-866				0.9628	6.5	
	E-869	1/18/66--3/2/66	43	478	0.3820	4.0	Scattered pitted areas.
A-6 WIW	E-870	1/18/66--4/16/66	88	See Remarks	0.5915	3.0	Scattered pitted areas w/some broad, deep pits.
	E-996	4/15/66--7/12/66	88	"	0.9469	4.8	Scattered attack w/some sharp, deep pits.
	E-997	5/25/66--7/12/66	48	"	0.5154	4.8	Scattered attack w/some pitting & broad areas no attack.

3302

August 17, 1966

Atlantic Richfield Company
P. O. Box 1978
Roswell, N. M.

Attn. Mr. W. P. Tomlinson

Gentlemen:

Receipt of a copy of your letter to the Oil Conservation Commission dated August 10, 1966 and the attached results of your coupon tests in the Swearingen-Shugart Waterflood Project are gratefully acknowledged.

FBI/ma
cc-Oil Conservation Commission

Yours truly,

S. E. Reynolds
State Engineer

By:

Frank E. Irby
Chief
Water Rights Div.

'66 AUG 18 AM 7



February 17, 1967

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

File 3302

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
in Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

WPT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico

New Mexico State Engineers Office
State Capitol
Santa Fe, New Mexico
Attention: Mr. Frank Irby

SWEARINGEN LEASE WF, SHUGART FLD., NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days	Volume (BW)			
<u>Water Injection Wells</u>							
(Bar-type Stations at Wellhead)	F-148	10/7/66--11/18/66	42	See Remarks	0.0756	0.81	Even etch w/isolate sharp pits.
	F-149				0.0727	0.78	
<u>A-6 WTW</u>	F-186	11-18-66--1-24-67	67	15, 596	0.0202	0.13	Even etch with small area of
	F-187				0.0199	0.13	minor attack.

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days	Volume (BW)			
Water Injection Wells							
(Bar-type Stations at Wellhead)	F-150	10/7/66--11/18/66	42	See Remarks	0.0551	0.58	Even etch w/ scattered pitted areas.
	F-151				0.0669	0.71	
B-3 WIN							
	F-184	11-18-66--1-24-67	67	3,921	0.0046	0.030	Even etch
	F-185				0.0045	0.030	

WATER INJECTION SYSTEM

Page

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days	Volume (BW) See remarks		
Supply Water (Bar-type Stations at Water Plant)	F-144	10/7/66-11/18/66	42	0.0608	0.64	Scattered attack w/minor pitting.
	F-145			0.0635	0.68	
WEST LEG OF MANIFOLD	F-190	11-18-66-1-24-67		59,749	0.0243	
	F-191				0.0301	Even etch with scattered areas of minor pits.

SWEARINGEN LEASE WF, SHUGART FLD., NEW MEXICO

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

<u>LOCATION</u>	<u>COUPON NUMBER</u>	<u>EXPOSURE</u>			<u>WEIGHT LOSS (gms)</u>	<u>CORROSION RATE (MPY)</u>	<u>TYPE ATTACK</u>
		<u>Dates</u>	<u>Days</u>	<u>Volume (BW) Sec remarks.</u>			
<u>Supply Water (Bar-type Stations at Water Plant)</u>	F-146	10/7/66--11/18/66	42		0.1160	1.2	Scattered attack w/pits.
	F-147				0.1335	1.4	
<u>PAST LOG OF MANIFOLD</u>	F-188	11-18-66--1-24-67	67	59,749	0.0080	0.053	Even etch.
	F-189				0.0076	0.050	



6. 3766
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter, Jr.

Re: Swearingen Waterflood Project
Shugart Pool
Eddy County, New Mexico

Gentlemen:

This is to advise you that as of February 13, 1967, Swearingen "A" No. 3 Water Injection Well has been shut-in pending further evaluation. We did this because the well has failed to take any appreciable volume of water since its conversion to injection in November, 1965, even though available surface pressure has ranged as high as 1450 psi. It is concluded that the indicated low permeability in the vicinity of this well will be an effective barrier to the migration of oil to the north.

Attached is a map showing the location of the subject well with respect to the project. If any additional information is desired please let us know.

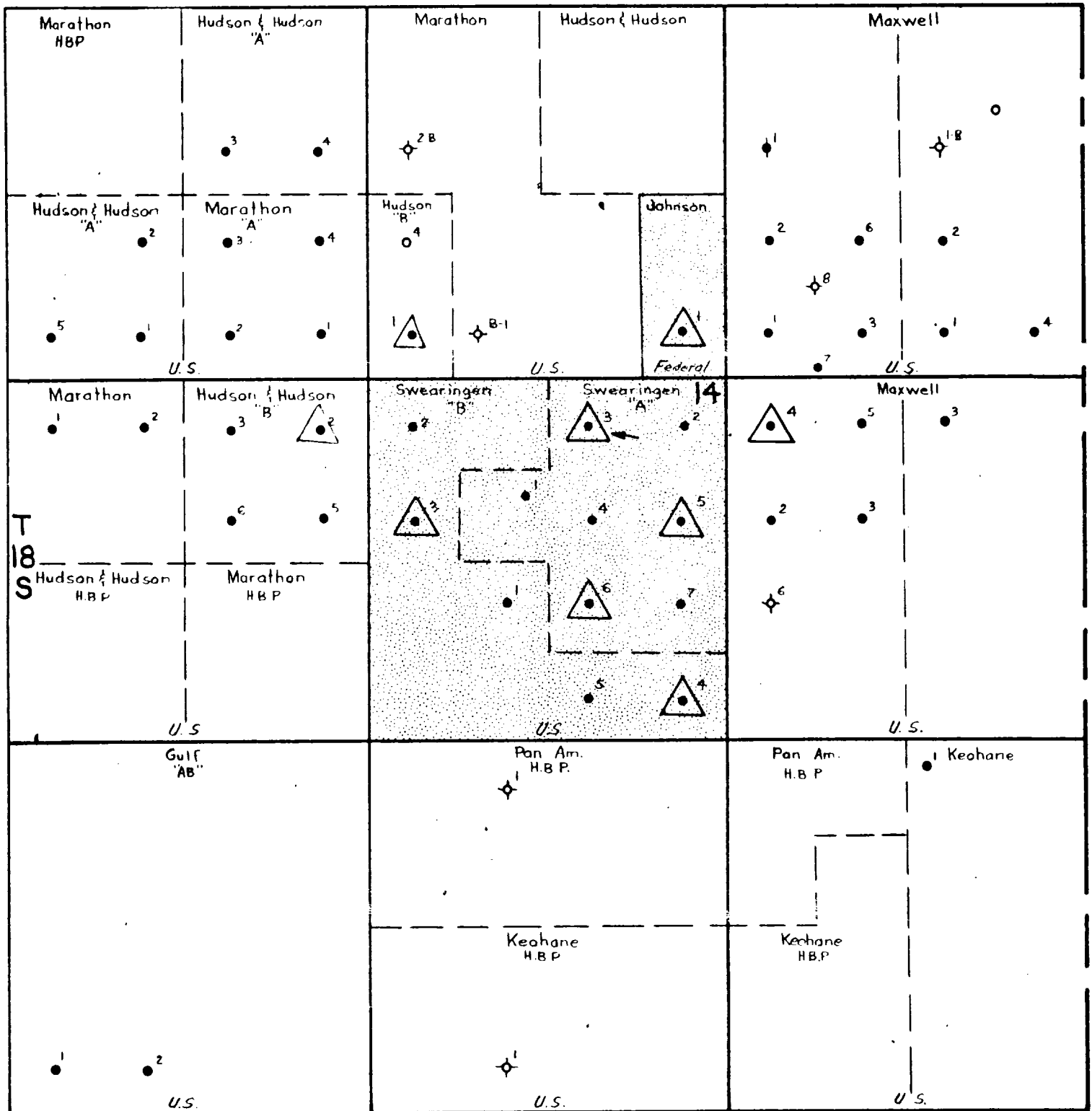
Yours very truly,

W. P. Tomlinson

WPT:jcb

Attachment

cc: U.S.G.S.
P. O. Drawer "U"
Artesia, New Mexico
Attention: Mr. J. A. Knauf



Shugart Queen Field
SWEARINGEN PROJECT
Eddy Co. N. Mex.



11/4/66 2 401 PM

November 4, 1966

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
in Case #3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analysis of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

WPT:jcb

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico
Attention: Mr. Frank Irby

11 11 11 4. 1071 99

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION Water Injection Wells (Bar-type Stations at Wellhead)	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days			
B-3 WIW	E-867	11/13/65--1/18/66	66	288	0.8032	5.4
	E-868				0.7034	4.7
						Even etch w/areas of surface roughening.
B-3 WIW	E-872	1/18/66--3/2/66	43	271	0.2265	2.4
						Scattered shallow pits w/general corrosion at ends
	E-871	1/18/66--4/15/66	87	See Remarks	0.7359	3.7
						Scattered attack w/a few deep pits & broad areas of no attack on one side.
	E-995	4/15/66--7/12/66	88	"	0.7289	3.7
						Scattered attack w/deep pits.
	E-998	5/25/66--7/12/66	48	"	0.4276	4.0
						Even etch w/areas of deep pits to .025"
	E-1	7/12/66--10/7/66	87	"	0.6863	3.5
						Scattered pitted attack w/areas of deep pits to .025"

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days	Volume (BWPD)			
Supply Water (Bar-type Stations at Water Plant)	E-861	11/6/65--12/2/65	26	800	0.2978	5.2	Surface roughene
	E-862				0.3018	5.2	Scattered shallow pits.
West Leg of Manifold	E-873	12/2/65--3/2/66	90	1244	1.0252	5.0	Scattered attack w/a few deep pit & gouges.
	E-874	12/2/65--4/15/66	134	See Remarks	1.1030	3.6	Scattered attack w/gouges & pitti
	E-990	4/15/66--7/12/66	88	"	0.7201	3.6	Scattered attack w/pitted areas.
	E-1000	5/25/66--7/12/66	48	"	0.3612	3.4	Scattered attack w/some deep pits
	F-3	7-12-66--10-7-66	87	See Remarks	0.6167	3.2	Severe attack w/sharp deep pits to .025"

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

<u>LOCATION</u>	<u>COUPON NUMBER</u>	<u>EXPOSURE</u>			<u>WEIGHT LOSS (gms)</u>	<u>CORROSION RATE (MPY)</u>	<u>TYPE ATTACK</u>
		<u>Dates</u>	<u>Days</u>	<u>Volume ($\frac{1}{2}$WPD)</u>			
<u>Supply Water (Bar-type Stations at Water Plant)</u>	E-863	11/6/65--12/2/65	26	1200	0.2642	4.5	Even etch w/some edge attack & minor pitting.
	E-864				0.2538	4.3	
<u>East Leg of Manifold</u>	E-875	12/2/65--3/2/66	90	1244	0.8430	4.2	Scattered attack w/a few deep pit & gouges.
	E-876	12/2/65--4/15/66	134	See Remarks	1.1316	3.7	Scattered attack w/gouges & pitting.
	E-992	4/15/66--7/12/66	88	"	0.8301	4.2	Scattered attack w/some deep pits
	E-999	5/25/66--7/12/66	48	"	0.3564	3.3	Scattered attack w/pitted areas.
	F-4	7/12/66--10/7/66	87	"	0.3395	1.7	Scattered attack w/sharp pits.

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

<u>LOCATION</u>	<u>COUPON NUMBER</u>	<u>EXPOSURE</u>			<u>WEIGHT LOSS</u>	<u>CORROSION RATE</u>	<u>TYPE ATTACK</u>
		<u>Dates</u>	<u>Days</u>	<u>Volume (BWPD)</u>	<u>(gms)</u>	<u>(MPY)</u>	
<u>Water Injection Wells (Bar-type Stations at Wellhead)</u>	E-865	11/13/65--1/18/66	66	450	0.9738	6.5	General corrosion
	E-866				0.9628	6.5	w/broad shallow pits.
<u>A-6 WIW</u>	E-869	1/18/66--3/2/66	43	478	0.3820	4.0	Scattered pitted areas.
	E-870	1/18/66--4/16/66	88	See Remarks	0.5915	3.0	Scattered pitted areas w/some broad, deep pits.
	E-996	4/15/66--7/12/66	88	"	0.9469	4.8	Scattered attack w/some sharp, deep pits.
	E-997	5/25/66--7/12/66	48	"	0.5154	4.8	Scattered attack w/some pitting & broad areas no attack.
	F-2	7/12/66--10/7/66	87	"	1.1922	6.1	Severe attack w/sharp deep pits to .020"

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 978

Albuquerque, New Mexico 86201

Telephone: 505-622-4041

W. P. Tomlinson

Director



December 19, 1966

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico

Attention: Mr. A. L. Porter, Jr.
Director Secretary

Re: Corrosion Coupon Results as per
~~Commission Order R-2969~~ Entered
in Case No. 3302, Concerning
~~Atlantic Richfield Company~~
Swearingen-Shugart Waterflood Project

File

DEC 21 1966

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

W. P. Tomlinson

WPT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico
Attention: Mr. Frank Irby

SWEARINGEN LEASE WF, SHUGART FLD., NEW MEXICO

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days			
<u>Water Injection</u>						
<u>Wells</u>						
(Bar-type Stations at Wellhead)	F-150	10/7/66--11/18/66	42	See Remarks	0.0551	0.58
	F-151				0.0669	0.71
						Even etch w/ scattered pitted areas.

SWEARINGEN LEASE WF, SHUGART FLD., NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

<u>LOCATION</u>	<u>COUPON NUMBER</u>	<u>EXPOSURE</u>		<u>WEIGHT LOSS (gms)</u>	<u>CORROSION RATE (MPY)</u>	<u>TYPE ATTACK</u>
		<u>Dates</u>	<u>Days</u>	<u>Volume (BW)</u>		
<u>Water Injection</u> <u>Wells</u> <u>(Bur-type</u> <u>Stations at</u> <u>Wellhead)</u>						
	F-148	10/7/66--11/18/66	42	See	0.0756	0.81
				Remarks		
	F-149				0.0727	0.78
						Even etch w/isolated sharp pits.

A-6 WIW

SWTARINGEN LEASE WF, SHUGART FLD, NEW MEXICO

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	CORROSION TYPE ATTACK
		Dates	Days	Volume (BW) See remarks.			
Supply Water (Bar-type Stations at Water Plant)	F-144	10/7/66--11/18/66	42		0.0608	0.64	Scattered attack
	F-145				0.0635	0.68	w/minor pitting.

WEST LEG
OF MANIFOLD

SWEARINGEN LEASE WF, SMIIGART FLD., NEW MEXICO

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (Gms)	CORROSION RATE (MPY)		TYPE ATTACK
		Dates	Days	Volume (BW) See remarks.			
Supply Water (Bar-type Stations at Water Plant)	F-146	10/7/66-11/18/66	42	0.1160	1.2		Scattered attack w/pits.
	F-147			0.1335	1.4		

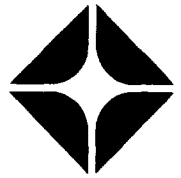
LAST LEG OF
MANIFOLD

Atlantic Richfield Company

North American Producing Division
New Mexico-Arizona District
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

W. P. Tomlinson
District Engineer

67 MAY 23 AM 8 06



May 22, 1967

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter, Jr.
Secretary Director

file

Re: Corrosion Coupon Results as per
~~Commission Order R-2069 Entered in~~
Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson
W. P. Tomlinson

WPT:jcb

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico
Attention: Mr. Frank Irby

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE OF ATTACK
		Dates	Days	Volume (BW) See remarks			
Supply Water (base-type Stations at Water Plant)	F-146	10/7/66--11/18/66	42		0.1160	1.2	Scattered attack w/pits.
	F-147				0.1335	1.4	
	F-188	11-18-66--1-24-67	67	59,749	0.0080	0.053	Even etch.
BASE FFG OF WANTEFOLD	F-189				0.0076	0.050	
	F-300	1-24-67--3-22-67	57	36,099	0.0166	0.13	Even etch. w/few small areas of
	F-301				0.0160	0.12	attack

SEWARTSON LEASE INC., SHINGARE FLD., NEW MEXICO

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION		TYPE ATTACK
		Dates	Days	Volume (BW) Sec remarks		RATE (MPY)		
Supply Water (base-type stations at Water Plant)	F-144	10/7/66--11/18/66	42		0.0608	0.64	Scattered attack w/minor pitting	
	F-145				0.0635	0.68		
WEST LEG OF MANIFOLD	F-130	11-18-66--1-24-67		59,749	0.0243	0.16	Even etch with scattered areas of minor pits.	
	F-131				0.0301	0.20		
	F-298	1-24-67--3-22-67	57	36,099	0.1060	0.82	Scattered attack w/gouges & pitting	
	F-299				0.1521	1.18		

SWEATINGEN LEASE, NE, SUGAR FIELD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK	
		Dates	Days				Volume (BW)
Water Injection Wells							
(base-type stations at Wellhead)	F-148	10/7/66--11/18/66	42	See Remarks	0.0756	0.81	Even etch w/isolate sharp pits.
	F-149				0.0727	0.73	
A-6 WTW	F-186	11-18-66--1-24-67	67	15,596	0.0202	0.13	Even etch with small area of minor attack.
	F-187				0.0199	0.13	
	F-302	1-24-67--3-22-67	57	18,041	0.1378	1.07	Scattered pitted areas w/some deep pits
	F-305				0.1663	1.29	

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (Gms)	CORROSION RATE (MPY)		TYPE ATTACK
		Dates	Days	Volume (BW)			
Water Injection Wells (Inlet-type stations at Wellhead)	F-150	10/7/66--11/18/66	42	See Remarks	0.0551	0.58	Even etch w/ scattered pitted areas.
	F-151				0.0669	0.71	
F-3 VIEW	F-184	11-18-66--1-24-67	67	3,921	0.0046	0.030	Even etch
	F-185				0.0045	0.030	
	F-303	1-24-67--3-22-67	57	3,558	0.0225	0.17	Even etch. w/scattered areas of very minor attack
	F-304				0.0237	0.18	



August 4, 1967

New Mexico Oil Conservation Commission
P.O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A.L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
in Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W.P. Tomlinson

WPT/mm

Attachments

cc: New Mexico Oil Conservation Commission
P.O. Drawer "DD"
Artesia, New Mexico

New Mexico State Engineers Office
State Capitol
Santa Fe, New Mexico
Attention: Mr. Frank Irby

67 AUG 7 AM 17

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	CORROSION TYPE ATTACK
	Dates	Days	Volume (BW) ; See remarks.			
COUP. BY WATER (Flow-type station at water plant)						
F-146	10/7/66--11/18/66	42		0.1160	1.2	Scattered attac w/pits.
F-147				0.1335	1.4	
PLATE RING OF NANOGLID						
F-188	11-18-66--1-24-67	67	59,749	0.0080	0.053	Even etch.
F-189				0.0076	0.050	
F-300	1-24-67--3-22-67	57	36,099	0.0166	0.13	Even etch. w/f small areas of attack
F-301				0.0166	0.12	
F-280	3-22-67--5-19-67	58	61,649	0.0515	0.39	Scattered pitte attack w/some deep pits
F-316				0.0456	0.35	

'67 AUG 7 AM 8:17

WATER INJECTION SYSTEM

INDEX

COUPON
NUMBER

EXPOSURE

DatesDays

Volume

WEIGHT
LOSS
(gms)

CORROSION
RATE
(MPY)

AUG
TITLE
ATTACK

Handy Water (Bore-type Station at Water Plant)

F-244
F-245

10/7/66--11/18/66

42

(BW)
See
remarks.

0.0608
0.0635

0.64
0.68

Scattered attap
w/minor pittin

WILLIAM
OF ABERFORD

F-191
F-190

11-18-66--1-24-67

59,749

0.0243
0.0301

0.16
0.20

Even etch with scattered area of minor pits.

F-298
F-299

1-24-67--3-22-67

57

36,099

0.1060
0.1521

0.82
1.18

Scattered attac
w/gouges & pitt

F-314
F-315

3-22-67--5-19-67

၆၀

67,649

0.2565
0.2249

1.96
1.72

Overall Fitting
attack

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (Gms)	CORROSION RATE (MPY)	TYPE OF ATTACK
		Dates	Days	Volume (BW)			
Water Injection Well 118 (but-type connections at wellhead)	F-150	10/7/66--11/18/66	42	See Remarks	0.0551	0.58	Even etch w/ scattered pitted areas.
	F-151				0.0009	0.71	
	F-184	11-18-66--1-24-67	67	3,921	0.0046	0.030	Even etch
1-3 ATM	F-185				0.0045	0.030	
	F-303	1-24-67--3-22-67	57	3,558	0.0225	0.17	Even etch. w/scattered areas of very minor attack
	F-304				0.0237	0.18	
	F-319	3-22-67--5-19-67	58	3,211	0.0148	0.11	Even etch w/ several areas of slight attack
	F-320				0.0146	0.11	

SWEARINGEN LEASE WF, SUGART FLD., NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)	ATTACK TYPE
	Dates	Days Volume (BW)			
WATER INJECTION F-148 F-149	10/7/66--11/18/66	42 See Remarks	0.0756 0.0727	0.81 0.78	Even etch w/isolate sharp pits.
A-6 WIM F-186 F-187	11-18-66--1-24-67	67 15,596	0.0202 0.0199	0.13 0.13	Even etch with small area of minor attack.
F-302 F-305	1-24-67--3-22-67	57 18,041	0.1378 0.1663	1.07 1.29	Scattered pitted areas w/some deep pits
F-317 F-318	3-22-67--5-19-67	58 19,597	0.2564 0.2365	1.96 1.81	Scattered areas of pitting

Atlantic Richfield Company North American Producing Division
New Mexico-Arizona District
Post Office Box 1972
Albuquerque, New Mexico 88201
Telephone 505 222 4011



W. P. Tomlinson
District Engineer

November 2, 1967

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
in Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

NOV 3 1967

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson
W. P. Tomlinson

W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico
Attention: Mr. Frank Irby

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

Page

COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
	Dates	Days	Volume (BW) ; See remarks.		
Supply Water (Bar-type Stations at Water Plant)					
F-146	10/7/66--11/18/66	42	0.1160	1.2	Scattered attack w/pits.
F-147			0.1335	1.4	
WASTE TRG OF MANIFOLD					
F-188	11-18-66--1-24-67	67	0.0080	0.053	Even etch.
F-189			0.0076	0.050	
F-300	1-24-67--3-22-67	57	0.0166	0.13	Even etch. w/few small areas of attack
F-301			0.0160	0.12	
F-280	3-22-67--5-19-67	58	0.0515	0.39	Scattered pitted attack w/some deep pits
F-316			0.0456	0.35	
F-292	5-19-67--7-21-67	63	0.0821	0.58	Scattered areas of attack w/some areas of minor pitting.
F-293			0.0810	0.57	
F-515	7-21-67--9-21-67	62	0.0384	0.27	Scattered areas of pitting attack
F-518			0.0312	0.22	

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

Page

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (Gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days	Volume (BW) Remarks			
Supply Water (Duc-type Stations at Water Plant)	F-144	10/7/66--11/18/66	42	See remarks	0.0608	0.64	Scattered attack w/minor pitting.
	F-145				0.0635	0.68	
WSP LEG OF MANIFOLD	F-190	11-18-66--1-24-67		59,749	0.0243	0.16	Even etch with scattered areas
	F-191				0.0301	0.20	of minor pits.
	F-298	1-24-67--3-22-67	57	36,099	0.1060	0.82	Scattered attack
	F-299				0.1521	1.18	w/gouges & pitting
	F-314	3-22-67--5-19-67	58	61,649	0.2565	1.96	Overall pitting
	F-315				0.2249	1.72	attack
	F-294	5-19-67--7-21-67	63	51,173	0.1902	1.34	Scattered attack
	F-295				0.1844	1.30	
	F-516	7-21-67--9-21-67	62	64,618	0.0473	0.34	Scattered areas
	F-517				0.0423	0.30	of pitting attack

SWEARINGEN LEASE WF, SUGART LTD., NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION		TYPE ATTACK
		Dates	Days		Volume (BW)	RATE (MPY)	
Water Injection Wells							
(Bar-type Stations at Wellhead)	F-148	10/7/66--11/18/66	42	See Remarks	0.0756	0.81	Even etch w/isolated sharp pits.
	F-149				0.0727	0.78	
A-6 WTW							
	F-186	11-18-66--1-24-67	67	15,596	0.0202	0.13	Even etch with small area of minor attack.
	F-187				0.0199	0.13	
	F-302	1-24-67--3-22-67	57	18,041	0.1378	1.07	Scattered pitted areas w/some deep pits
	F-305				0.1663	1.29	
	F-317	3-22-67--5-19-67	58	19,597	0.2564	1.96	Scattered areas of pitting
	F-318				0.2365	1.81	
	F-250	5-19-67--7-21-67	63	20,472	0.1835	1.29	Scattered pitting attack w/sharp pits
	F-251				0.1793	1.26	
	F-519	7-21-67--9-21-67	62	19,963	0.2792	2.0	Scattered pitting attack w/some broad deep pits to 0.012"
	F-520				0.3182	2.3	

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (Gms)	CORROSION		TYPE ATTACK
		Dates	Days		Volume (BW)	RATE (MPY)	
Water Injection Wells							
(Burr-type Stations at Wellhead)	F-150	10/7/66--11/18/66	42	See Remarks	0.0551	0.58	Even etch w/ scattered pitted areas.
	F-184	11-18-66--1-24-67	67	3,921	0.0046	0.030	Even etch
	F-185				0.0045		
	F-303 F-304	1-24-67--3-22-67	57	3,558	0.0225 0.0237	0.17 0.18	Even etch. w/scattered areas of very minor attack
B-3 WTW	F-319 F-320	3-22-67--5-19-67	58	3,211	0.0148 0.0146	0.11 0.11	Even etch w/ several areas of slight attack
	F-252 F-253	5-19-67--7-21-67	63	3,150	0.0061 0.0061	0.04 0.04	Even etch.
	F-507 F-508	7-21-67--9-21-67	62	11,376	0.1419 0.1249	1.02 0.90	Scattered pitting attack w/some broad, deep pits to 0.008".

Atlantic Richfield Company

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

RECEIVED

'68 JAN 17 AM 13 39



January 16, 1968

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required by
Commission Order R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,

W. P. Tomlinson

JLT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS, INC.

Petroleum Service Laboratory

7101 CARPENTER FREEWAY

DALLAS, TEXAS

REPORT OF WATER ANALYSIS

SAMPLE NO. A-2132

TOTAL SOLIDS 135,878

CLIENT Atlantic Richfield Company

OPERATOR Atlantic Richfield Company

FIELD Saugart

COUNTY Lea

STATE New Mexico

LEASE AND WELL NO. Swearingen Waterflood

PROD. FORM.

SOURCE OF SAMPLE Water Treater

DEPTH: TOTAL

PERF.

SAMPLE OF: ☒ PRODUCED WATER

☐ INJECTION SYSTEM WATER

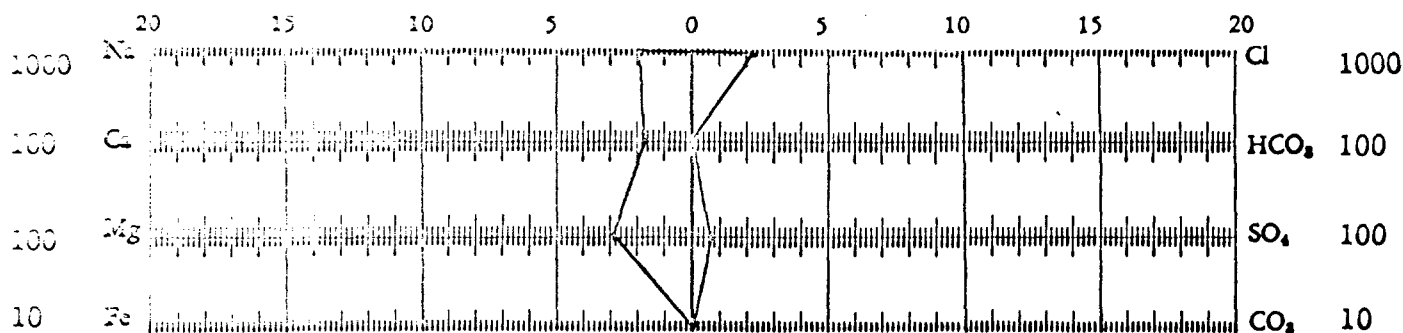
☐ OTHER

DATE COLLECTED 12-20-67 by Ed Ingram

ANALYST

MINERAL ANALYSIS PATTERN

(NUMBER BELOW ION NAME INDICATES MEQ./SCALE UNIT)



PRECIPITATED AND SUSPENDED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL UNDISSOLVED SOLIDS	
IRON OXIDE	
CALCIUM CARBONATE	
CALCIUM SULFATE	
MAGNESIUM CARBONATE	
BARIUM SULFATE	
SILICA	
ORGANIC	

PHYSICAL PROPERTIES

SP. GRAVITY	<u>1.094</u>
PH	<u>6.9</u>
RESISTIVITY	<u>0.075</u> OHMMETERS @ 68°
STABILITY INDEX	@ 41°F. _____
	@ 86°F. _____
CASO ₄ SOLUBILITY	@ 41°F. _____ MEQ/L
	@ 86°F. _____ MEQ/L
MAX. CASO ₄ POSSIBLE	_____ MEQ/L

DISSOLVED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL SOLIDS	(CALC.) <u>135,878</u>
SODIUM	(CALC.) <u>44,100</u>
IRON	(TOTAL) _____
MANGANESE	_____
BARIUM	_____
CALCIUM	<u>3,380</u>
MAGNESIUM	<u>3,430</u>
CHLORIDE	<u>81,200</u>
BICARBONATE	<u>198</u>
CARBONATE	<u>0</u>
SULFATE	<u>3,570</u>

DISSOLVED GASES

CONSTITUENT	MG/L (PPM)
HYDROGEN SULFIDE	_____
CARBON DIOXIDE	_____
OXYGEN	_____

REMARKS: The sample consisted of one 1 quart plastic bottle of water with tan precipitate.

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



December 18, 1967

New Mexico Oil Conservation Commission

P. O. Box 2038

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
in Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501
Attention: Mr. Frank Irby

MAIL ROOM

'67 DEC 20 AM 9 00

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days	Voluming (BW)			
Water Injection Well 19 (Unit-type Stations at Wellhead)	F-150	10/7/66--11/18/66	42	See Remarks	0.0551	0.58	Even etch w/ scattered pitted areas.
	F-151				0.0669	0.71	
	F-184	11-18-66--1-24-67	67	3,921	0.0046	0.030	Even etch
B-3 WIM	F-185				0.0045	0.030	
	F-303	1-24-67--3-22-67	57	3,558	0.0225	0.17	Even etch. w/scattered areas of very minor attack
	F-304				0.0237	0.18	
	F-319	3-22-67--5-19-67	58	3,211	0.0148	0.11	Even etch w/ several areas of slight attack
	F-320				0.0146	0.11	
	F-252	5-19-67--7-21-67	63	3,150	0.0061	0.04	Even etch.
	F-253				0.0061	0.04	
	F-507	7-21-67--9-21-67	62	11,376	0.1419	1.02	Scattered pitting attack w/some broad deep pits to 0.008". (equiv. to 47 MPY)
	F-508				0.1249	0.90	
	F-527	9/21/67--11/14/67	54	20,610	0.1656	1.40	Scattered pitting w/ pits to 0.012" (equiv. to approx. 80 MPY)
	F-528				0.1748	1.45	

SWEARTINGEN LEASE WP, SUGAR REED, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
		Dates	Days			
<u>Water Injection Wells</u>						
(Burr-type Stations at Wellhead)	F-148	10/7/66--11/18/66	42	See Remarks	0.0756	0.81
	F-149				0.0727	0.78
						Even etch w/isolated sharp pits.
A-6 WIM	F-186	11-18-66--1-24-67	67	15,596	0.0202	0.13
	F-187				0.0199	0.13
						Even etch with small area of minor attack.
	F-302	1-24-67--3-22-67	57	18,041	0.1378	1.07
	F-305				0.1663	1.29
						Scattered pitted areas w/some deep pits
	F-317	3-22-67--5-19-67	58	19,597	0.2564	1.96
	F-318				0.2365	1.81
						Scattered areas of pitting
	F-250	5-19-67--7-21-67	63	20,472	0.1835	1.29
	F-251				0.1793	1.26
						Scattered pitting attack w/sharp pits
	F-519	7-21-67--9-21-67	62	19,963	0.2792	2.0
	F-520				0.3182	2.3
						Scattered pitting attack w/some broad deep pits to 0.012" (equiv. to approx. 70 MPY)
	F-525	9/21/67--11/14/67	54	15,349	0.1817	1.50
	F-526				0.1647	1.40
						Scattered pitting w/pits to 0.010" (equiv. to approx. 70 MPY)

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

COUPON NUMBER	EXPOSURE		WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK
	Dates	Days Volume (BW) ?			
Supply Water (Base-type Stations at Water Plant)					
P-194	10/7/66--11/18/66	42 See remarks	0.0608	0.64	Scattered attack w/minor pitting.
P-195			0.0635	0.68	
WATER FLOW OF WATERFLOD					
P-190	11-18-66--1-24-67	59,749	0.0243	0.16	Even etch with scattered areas of minor pits.
P-191			0.0301	0.20	
P-298	1-24-67--3-22-67	57 36,099	0.1060	0.82	Scattered attack w/gouges & pitting
P-299			0.1521	1.18	
P-314	3-22-67--5-19-67	58 61,649	0.2565	1.96	Overall pitting
P-315			0.2249	1.72	attack
P-294	5-19-67--7-21-67	63 51,173	0.1902	1.34	Scattered attack
P-295			0.1844	1.30	
P-516	7-21-67--9-21-67	62 64,618	0.0473	0.34	Scattered areas of pitting attack
P-517			0.0423	0.30	
P-523	9/21/67--11/14/67	54 73,143	0.0988	0.82	Scattered areas of
P-524			0.0989	0.82	minor pitting

WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

LOCATION	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	CORROSION TYPE ATTACK
		Dates	Days	Volume (BW) Sec Remarks			
Supply Water (Bar-type Stations at Water Plant)	F-146	10/7/66--11/18/66	42		0.1160	1.2	Scattered attack w/pits.
	F-147				0.1335	1.4	
	F-188 F-189	11-18-66--1-24-67	67	59,749	0.0080 0.0076	0.053 0.050	Even etch.
JASCO CRG OF MANITOWOC	F-300 F-301	1-24-67--3-22-67	57	36,099	0.0166 0.0160	0.13 0.12	Even etch. w/few small areas of attack
	F-280 F-316	3-22-67--5-19-67	58	61,649	0.0545 0.0456	0.39 0.35	Scattered pitted attack w/some deep pits
	F-292 F-293	5-19-67--7-21-67	63	51,173	0.0821 0.0810	0.58 0.57	Scattered areas of attack w/some areas of minor pitting.
	F-515 F-518	7-21-67--9-21-67	62	64,618	0.0384 0.0312	0.27 0.22	Scattered areas of pitting attack
	F-521 F-522	9/21/67--11/14/67	54	73,143	0.0738 0.0899	0.61 0.74	Scattered areas of minor pitting

Atlantic Richfield Company

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



April 10, 1968

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
~~Commission Order R-2969 Entered~~
~~In Case No. 3302, Concerning~~
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

1968 APR 11 PM 1 11

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: West Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water F

REMARKS:

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-590 F-592	11/14/67--1/15/68	62	925,298	0.1577 0.1835	1.1 1.3	Overall shallow pitting
F-610	1/15/68-3/13/68	57		0.0399	0.32	Even etch w/ areas of minor pitting and pitting under holder blocks
F-611				0.0312	0.24	

CORROSION COUPON EXPOSURE RESULTS

Page

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: East Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water P

REMARKS:

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-591 F-593	11/14/67--1/15/68	62	925,298	0.1135 0.1152	0.82 0.83	Scattered minor pitting
F-612 F-613	1/15/68--3/13/68	57		Lost: Lost:		

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico
SYSTEM: Water Injection Sys

LOCATION: Water Injection Wells A
TYPE STATION: Bar Type at Wellhead
REMARKS:

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-594	11/14/67--1/15/68	62	226,523	0.1962	1.4	Scattered pitting attack to at least .008" (47MPY)
F-596				0.2005	1.4	
F-608	1/15--3/13-68	57		0.0651	0.51	Scattered pitting attack to at least .006" (38MPY)
F-609				0.0586	0.46	

Atlantic Richfield Company North American Producing Division
New Mexico-Arizona District
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

W. P. Tomlinson
District Engineer



March 19, 1968

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required by
Commission Order R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,

W. P. Tomlinson

JLT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

RECEIVED

8 MAR 20 AM 8 34

PRODUCTION PROFITS, INC.

Petroleum Service Laboratory

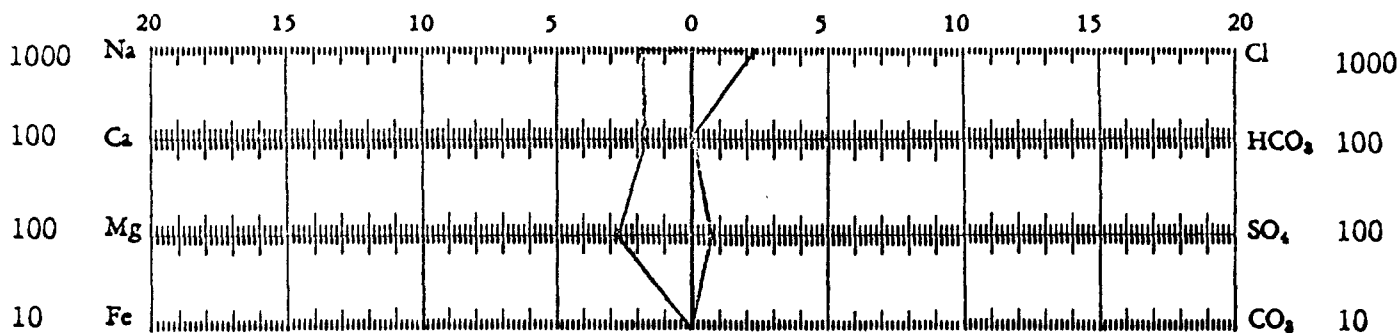
7101 CARPENTER FREEWAY

DALLAS, TEXAS

REPORT OF WATER ANALYSIS

SAMPLE NO. A-2146
TOTAL SOLIDS 132,998
CLIENT Atlantic Richfield Company OPERATOR Atlantic Richfield Company
FIELD Shugart COUNTY Lea STATE New Mexico
LEASE AND WELL NO. Swearinger PROD. FORM. _____
SOURCE OF SAMPLE Produced Water DEPTH: TOTAL _____ PERF. _____
SAMPLE OF: ☒ PRODUCED WATER ☐ INJECTION SYSTEM WATER ☐ OTHER ☐
DATE COLLECTED 1-10-68 by Ed Ingram ANALYST _____

MINERAL ANALYSIS PATTERN (NUMBER BELOW ION NAME INDICATES MEQ./SCALE UNIT)



PRECIPITATED AND SUSPENDED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL UNDISSOLVED SOLIDS	_____
IRON OXIDE	_____
CALCIUM CARBONATE	_____
CALCIUM SULFATE	_____
MAGNESIUM CARBONATE	_____
BARIUM SULFATE	_____
SILICA	_____
ORGANIC	_____

PHYSICAL PROPERTIES

SP. GRAVITY 1.092
PH 7.0
RESISTIVITY 0.07 OHMMETERS @ 68°
STABILITY INDEX @ 41°F _____
@ 86°F _____
CASO₄ SOLUBILITY @ 41°F _____ MEQ/L
@ 86°F _____ MEQ/L
MAX. CASO₄ POSSIBLE _____ MEQ/L

DISSOLVED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL SOLIDS (CALC.)	132,998
SODIUM (CALC.)	43,100
IRON (TOTAL)	-
MANGANESE	-
BARIUM	0
CALCIUM	3,380
MAGNESIUM	3,320
CHLORIDE	79,400
BICARBONATE	198
CARBONATE	0
SULFATE	3,600

DISSOLVED GASES

CONSTITUENT	MG/L (PPM)
HYDROGEN SULFIDE	Absent
CARBON DIOXIDE	_____
OXYGEN	_____

REMARKS: The sample was one 1 quart plastic bottle of water with a moderate amount of tan sediment solids. 760 MAR 20 AM 8 34

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



File

April 8, 1968

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.

Secretary-Director

Re: Produced Water Samples Required by
Commission Order No. 2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,

W. P. Tomlinson

JLT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

MAIN OFFICE

'68 APR 9 AM 8 30

PRODUCTION PROFITS, INC.

Petroleum Service Laboratory

7101 CARPENTER FREEWAY

DALLAS, TEXAS

REPORT OF WATER ANALYSIS

SAMPLE NO. A-2204

TOTAL SOLIDS 123,303

CLIENT Atlantic Richfield Company

OPERATOR Atlantic Richfield Company

FIELD Shugart

COUNTY Lea

STATE New Mexico

LEASE AND WELL NO. Swearingen

PROD. FORM.

SOURCE OF SAMPLE Produced Water

DEPTH: TOTAL

PERF.

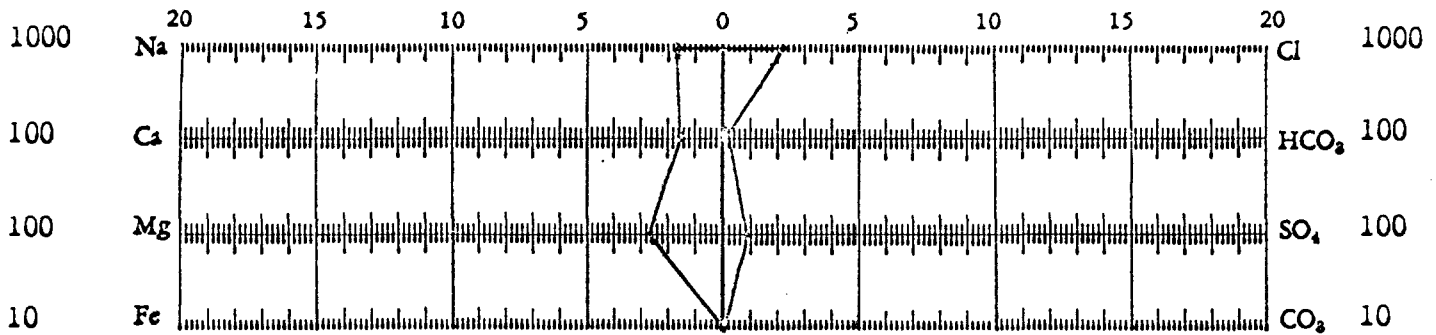
SAMPLE OF: PRODUCED WATER ☐ INJECTION SYSTEM WATER ☐ OTHER ☐

DATE COLLECTED 3-13-68 by Ed. Ingram

ANALYST

MINERAL ANALYSIS PATTERN

(NUMBER BELOW ION NAME INDICATES MEQ./SCALE UNIT)



PRECIPITATED AND SUSPENDED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL UNDISSOLVED SOLIDS	
IRON OXIDE	
CALCIUM CARBONATE	
CALCIUM SULFATE	
MAGNESIUM CARBONATE	
BARIUM SULFATE	
SILICA	
ORGANIC	

PHYSICAL PROPERTIES

SP. GRAVITY	<u>1.087</u>
PH	<u>7.1</u>
RESISTIVITY	<u>0.08</u> OHMMETERS @ 68°
STABILITY INDEX	@ 41°F
	@ 86°F
CASO ₄ SOLUBILITY	@ 41°F MEQ/L
	@ 86°F MEQ/L
MAX. CASO ₄ POSSIBLE	MEQ/L

DISSOLVED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL SOLIDS	(CALC.) <u>123,303</u>
SODIUM	(CALC.) <u>39,800</u>
IRON	(TOTAL) <u>-</u>
MANGANESE	<u>-</u>
BARIUM	<u>-</u>
CALCIUM	<u>3,170</u>
MAGNESIUM	<u>3,130</u>
CHLORIDE	<u>73,200</u>
BICARBONATE	<u>203</u>
CARBONATE	<u>0</u>
SULFATE	<u>3,800</u>

DISSOLVED GASES

CONSTITUENT	MG/L (PPM)
HYDROGEN SULFIDE	<u>Absent</u>
CARBON DIOXIDE	<u>MAIN OFF</u>
OXYGEN	

REMARKS: The sample was one 1 qt. plastic bottle of water with a small amount of tan sediment solids.

'68 APR 9 AM 8 30

Atlantic Richfield Company

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



December 20, 1967

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Re-injection of Produced Water
Swearingen Waterflood, Shugart Field
Eddy County, New Mexico

*File
Case 3302*

Gentlemen:

We are re-injecting produced water in the Swearingen Waterflood. An analysis of this water will be obtained soon and sent to you as required by Order R-2969.

Yours very truly,

W. P. Tomlinson

WPT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501
Attention: Mr. Frank Irby

United States Geological Survey
P. O. Drawer "U"
Artesia, New Mexico 88210
Attention: Mr. J. A. Knauf

RECEIVED

DEC 21 PM 1 32

AtlanticRichfieldCompany North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



February 15, 1968

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Corrosion Coupon Results as per
Commission Order B-2969 Entered
In Case No. 3302, Concerning
~~Atlantic Richfield Company~~
Swearingen-Shugart Waterflood Project

File

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501
Attention: Mr. Frank Irby

JLT:jcb

'68 FEB 16 AM 8 36

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico LOCATION: Water Injection Wells B-SYSTEM: Water Injection TYPE STATION: Bar Type at Wellhead

REMARKS:

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS	CORROSION RATE	TYPE ATTACK
		DAYS	VOLUME (BW)	(GMS)	(MPY)	
F-589	11/14/67--1/15/68	62	111,588	0.2797	2.0	Scattered pitting attack to at least .004" (24 MPY)
F-595				0.2724	2.0	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico
SYSTEM: Water Injection Sys

LOCATION: Water Injection Wells
TYPE STATION: Bar Type at Wellh
REMARKS:

COUPON NUMBER	DATES	EXPOSURE		WEIGHT		CORROSION		TYPE
		DAYS	VOLUME (BW)	LOSS (GMS)	RATE (MPY)	ATTACK		
F-594	11/14/67--1/15/68	62	226.523	0.1962	1.4			Scattered pitting attack to at least .008" (47MPY)
F-596				0.2005	1.4			

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: West Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water

REMARKS:

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-590	11/14/67--1/15/68	62	925,298	0.1577	1.1	Overall Shallow pitting
F-592				0.1835	1.3	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico
SYSTEM: Water Injection

LOCATION: East Header
TYPE STATION: Bar Type at Water
REMARKS:

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-591 F-593	11/14/67--1/15/68	62	925,298	0.1135 0.1152	0.82 0.83	Scattered minor pitting

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



June 6, 1968

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

JLT:JCB

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

'68 JUN 7 AM 8 41

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico
SYSTEM: Water Injection

LOCATION: Water Injection Wells
TYPE STATION: Bar Type at Wellh
REMARKS: On West Leg of system (

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE	
		DAYS	VOLUME (BW)			ATTACK	
F-589 F-595	11/14/67--1/15/68	62	111,588	0.2797 0.2724	2.0 2.0	Scattered pitting attack to at least .004" (24 MP	
F-614 F-615	1/15/68--3/13/68	57		0.0491 0.0509	0.38 0.40	Even etch	
F-810 F-811	3/13/68--5/15/68	63		0.0073 0.0061	0.05 0.04	Even etch	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: West Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water

REMARKS: Produced Water injecte
otherwise, inject supp

COUPON NUMBER	DATES	EXPOSURE		WEIGHT		CORROSION	
		DAYS	VOLUME (BW)	LOSS (GMS)	RATE (MPY)	TYPE	ATTACK
F-590	11/14/67--1/15/68	62	925,298	0.1577	1.1	Overall Shallow pitting	
F-592				0.1835	1.3		
F-610	1/15/68-3/13/68	57		0.0399	0.32		
F-611				0.0312	0.24	Even etch w/ areas of minor pitting and pitting under holder blocks	
F-814	3/13/68--5/15/68	63		0.2859	2.0	Scattered pitting to at least 0.004" (about 23 MPY)	
F-815				0.3650	2.6		

CORROSION COUPON EXPOSURE RESULTS

P

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico
SYSTEM: Water Injection

LOCATION: East Header
TYPE STATION: Bar Type at Water
REMARKS: Supply Water

COUPON NUMBER	DATES	EXPOSURE		WEIGHT		CORROSION		TYPE ATTACK
		DAYS	VOLUME (BW)	LOSS (GMS)	RATE (MPY)			
F-591 F-593	11/14/67--1/15/68	62	925,298	0.1135 0.1152	0.82 0.83			Scattered minor pitting
F-612 F-613	1/15/68--3/13/68	57		Lost Lost				
F-816 F-817	3/13/68--5/15/68	63		0.2567 0.4888	1.8 3.4			Scattered shallow pitting and gouges

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico

LOCATION: Water Injection Wells /

SYSTEM: Water Injection

TYPE STATION: Bar Type at Wellhead

REMARKS: On East Leg at System

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-594 F-596	11/14/67--1/15/68	62	226,523	0.1962 0.2005	1.4 1.4	Scattered pitting attack to at least .008" (47MPY)
F-608 F-609	1/15/68--3/13/68	57		0.0651 0.0586	0.51 0.46	Scattered pitting attack to at least .006" (38MPY)
F-812 F-813	3/13/68--5/15/68	63		0.1123 0.1179	0.78 0.85	Spotty etch w/some edge pitting

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



September 5, 1968

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

File

Re: Produced Water Samples Required by
Commission Order 4-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,

W. P. Tomlinson

JLT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

160 SEP 6 1968

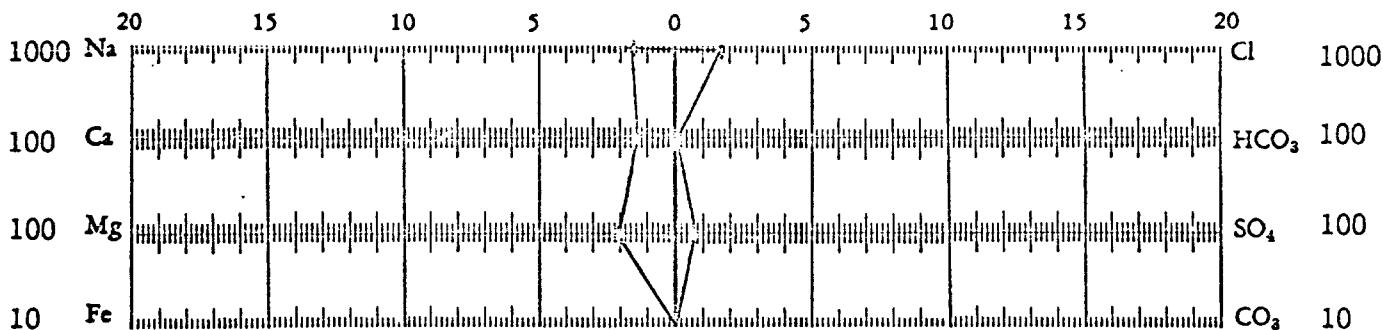
PRODUCTION PROFITS, INC.
Consultants in Petroleum Production
7101 CARPENTER FREEWAY

DALLAS, TEXAS

REPORT OF WATER ANALYSIS

CLIENT: Atlantic Richfield Company OPERATOR: DO SAMPLE NO. A-2321
FIELD: Shugart COUNTY: Eddy STATE: New Mexico TOTAL SOLIDS 107,470
LEASE AND WELL NO. Swearingen PROD. FORM. _____
SOURCE OF SAMPLE Produced Water DEPTH: TOTAL _____ PERF. _____
SAMPLE OF: ☒ PRODUCED WATER ☐ INJECTION SYSTEM WATER ☐ OTHER ☐
DATE COLLECTED 7-15-68 by Ed Ingram ANALYST _____

MINERAL ANALYSIS PATTERN
(NUMBER BELOW ION NAME INDICATES MEQ./SCALE UNIT)



PRECIPITATED AND SUSPENDED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL UNDISSOLVED SOLIDS	_____
IRON OXIDE	_____
CALCIUM CARBONATE	_____
CALCIUM SULFATE	_____
MAGNESIUM CARBONATE	_____
BARIUM SULFATE	_____
SILICA	_____
ORGANIC	_____

PHYSICAL PROPERTIES

SP. GRAVITY 1.074
PH 7.3
RESISTIVITY 0.090 OHMMETERS @ 68°
STABILITY INDEX @ 41°F _____
@ 86°F _____
CaSO₄ SOLUBILITY @ 41°F _____ MEQ/L
@ 86°F _____ MEQ/L
MAX. CaSO₄ POSSIBLE _____ MEQ/L

DISSOLVED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL SOLIDS (CALC.)	<u>107,470</u>
SODIUM (CALC.)	<u>34,700</u>
IRON (TOTAL)	<u>-</u>
MANGANESE	<u>-</u>
BARIUM	<u>-</u>
CALCIUM	<u>2,850</u>
MAGNESIUM	<u>2,650</u>
CHLORIDE	<u>63,300</u>
BICARBONATE	<u>230</u>
CARBONATE	<u>0</u>
SULFATE	<u>3,740</u>

DISSOLVED GASES

CONSTITUENT	MG/L (PPM)
HYDROGEN SULFIDE	<u>Absent</u>
CARBON DIOXIDE	_____
OXYGEN	_____

REMARKS: The sample consisted of one 1 quart plastic bottle of water with a small amount of sediment solids.

AtlanticRichfieldCompany North American Producing Division
New Mexico-Arizona District
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

W. P. Tomlinson
District Engineer



June 25, 1968

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

File

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required by
Commission Order P-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,

W. P. Tomlinson

W. P. Tomlinson

JLT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

68 JUN 26 PM 1 03

PRODUCTION PROFITS, INC.

Petroleum Service Laboratory

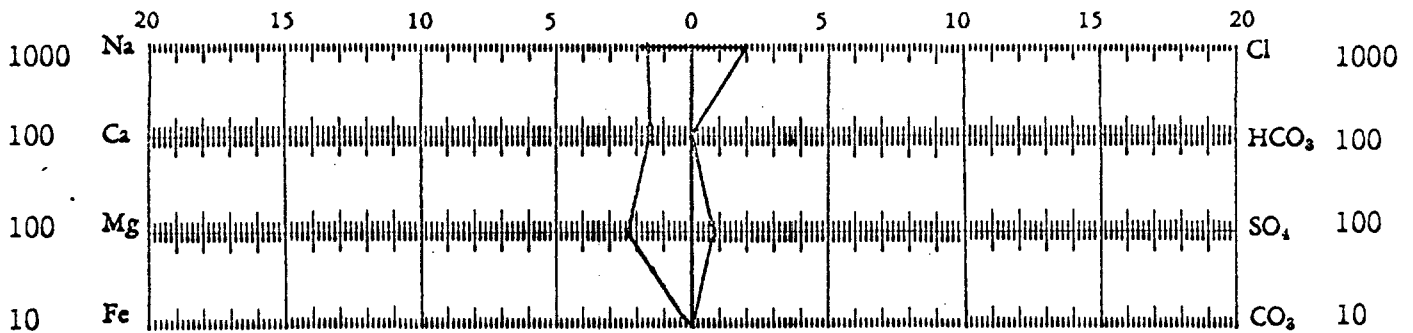
7101 CARPENTER FREEWAY

DALLAS, TEXAS

REPORT OF WATER ANALYSIS

SAMPLE NO. A-2255
TOTAL SOLIDS 116,576
CLIENT Atlantic Richfield Company OPERATOR Atlantic Richfield Company
FIELD Shugart COUNTY Eddy STATE New Mexico
LEASE AND WELL NO. Swearinger PROD. FORM. _____
SOURCE OF SAMPLE Produced Water DEPTH: TOTAL _____ PERF. _____
SAMPLE OF: ☒ PRODUCED WATER ☐ INJECTION SYSTEM WATER ☐ OTHER ☐
DATE COLLECTED 5-14-68 ANALYST _____

MINERAL ANALYSIS PATTERN (NUMBER BELOW ION NAME INDICATES MEQ./SCALE UNIT)



PRECIPITATED AND SUSPENDED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL UNDISSOLVED SOLIDS	_____
IRON OXIDE	_____
CALCIUM CARBONATE	_____
CALCIUM SULFATE	_____
MAGNESIUM CARBONATE	_____
BARIUM SULFATE	_____
SILICA	_____
ORGANIC	_____

PHYSICAL PROPERTIES

SP. GRAVITY 1.082
PH 7.0
RESISTIVITY 0.086 OHMMETERS @ 68°
STABILITY INDEX @ 41°F _____
@ 86°F _____
CASO₄ SOLUBILITY @ 41°F _____ MEQ/L
@ 86°F _____ MEQ/L
MAX. CASO₄ POSSIBLE _____ MEQ/L

DISSOLVED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL SOLIDS (CALC.)	<u>116,576</u>
SODIUM (CALC.)	<u>37,700</u>
IRON (TOTAL)	<u>-</u>
MANGANESE	<u>-</u>
BARIUM	<u>-</u>
CALCIUM	<u>3,060</u>
MAGNESIUM	<u>2,840</u>
CHLORIDE	<u>68,800</u>
BICARBONATE	<u>217</u>
CARBONATE	<u>0</u>
SULFATE	<u>3,959</u>

DISSOLVED GASES

CONSTITUENT	MG/L (PPM)
HYDROGEN SULFIDE	<u>Absent</u>
CARBON DIOXIDE	_____
OXYGEN	_____

REMARKS: The sample consisted of one 1 quart plastic bottle of water.

AtlanticRichfieldCompany

North American Producing Division
New Mexico-Arizona District
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

W. P. Tomlinson
District Engineer



October 14, 1968

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

File

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson
W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico

LOCATION: Water Injection Wells B-3

SYSTEM: Water Injection

TYPE STATION: Bar Type at Wellhead

REMARKS: On West Leg of system (Sup

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-589 F-595	11/14/67--1/15/68	62	111,588	0.2797 0.2724	2.0 2.0	Scattered pitting attack to at least .004" (24 MPY)
F-614 F-615	1/15/68--3/13/68	57		0.0491 0.0509	0.38 0.40	Even etch
F-810 F-811	3/13/68--5/15/68	63		0.0073 0.0061	0.05 0.04	Even etch
F-826 F-827	5/15/68--7/15/68	61		0.0105 0.0095	0.08 0.07	Even etch w/some pitting at corners and end
F-924 F-925	7/15/68--9/16/68	63	12,521	0.1281 0.2505	0.92 1.8	Even etched body w/a few scattered pitted areas and severe pitting under holder blocks to at least 0.016" (about 95 MPY)

CORROSION COUPON EXPOSURE RESULTS

UNIT: OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: West Header

TYPE STATION: Bar Type at Water F

WATER: Water Injection

REMARKS: Produced Water injected otherwise, inject supply

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-590	11/14/67--1/15/68	62	925,298	0.1577	1.1	Overall Shallow pitting
F-592				0.1835	1.3	
F-610	1/15/68-3/13/68	57		0.0399	0.32	Even etch w/ areas of minor pitting and pitting under holder blocks
F-611				0.0312	0.24	
F-814	3/13/68--5/15/68	63		0.2859	2.0	Scattered pitting to at least 0.004" (about 23 MPY)
F-815				0.3650	2.6	
F-818	5/15/68--7/15/68	61	1,244,577	0.1283	0.95	Scattered pitting w/one to at least 0.016" (about 96 MPY) under holder blocks
F-819				0.1691	1.2	
F-926	7/15/68--9/16/68	63	1,244,577	0.6036	4.3	Scattered broad severe pits w/one to at least 0.018" (about 100 MPY)
F-928				0.9277	6.5	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico

LOCATION: Water Injection Wells A

TYPE STATION: Bar Type at Wellhead

REMARKS: On East Leg at System

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-594 F-596	11/14/67--1/15/68	62	226,523	0.1962 0.2005	1.4 1.4	Scattered pitting attack to at least .008" (47MPY)
F-608 F-609	1/15/68--3/13/68	57		0.0651 0.0586	0.51 0.46	Scattered pitting attack to at least .006" (38MPY)
F-812 F-813	3/13/68--5/15/68	63		0.1123 0.1179	0.78 0.85	Spotty etch w/some edge pitting
F-961 F-962	5/15/68--7/15/68	61		0.1582 0.1269	1.2 .95	Spotty etch w/some edge pitting
F-923 F-969	7/15/68--9/16/68	63	13,656	0.0311 0.0265	0.22 0.19	Smooth spotty etch w/some very minor pitting under holder block

CORROSION COUPON EXPOSURE RESULTS

Pe

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: East Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water

REMARKS: Supply Water

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-591 F-593	11/14/67--1/15/68	62	925,298	0.1135 0.1152	0.82 0.83	Scattered minor pitting
F-612 F-613	1/15/68--3/13/68	57		lost lost		
F-816 F-817	3/13/68--5/15/68	63		0.2567 0.4888	1.8 3.4	Scattered shallow pitting and gouges
F-825 F-970	5/15/68--7/15/68	61	1,244,577	0.4102 0.3737	3.0 2.7	Overall shallow pitting
F-927 F-929	7/15/68--9/16/68	63	1,244,577	0.0827 0.1165	0.59 0.85	Spotty etch w/some minor edge and end pitting

Atlantic Richfield Company

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



September 3, 1968

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

file

Attention: Mr. A. L. Porter, Jr.

Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
In Case No. 3302 Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

69 SEP 5 11:10

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico
 SYSTEM: Water Injection

LOCATION: Water Injection Wells /
 TYPE STATION: Bar Type at Wellhead
 REMARKS: On East Leg at System

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-594 F-596	11/14/67--1/15/68	62	226,523	0.1962 0.2005	1.4 1.4	Scattered pitting attack to at least .008" (47MPY)
F-608 F-609	1/15/68--3/13/68	57		0.0651 0.0586	0.51 0.46	Scattered pitting attack to at least .006" (38MPY)
F-812 F-813	3/13/68--5/15/68	63		0.1123 0.1179	0.78 0.85	Spotty etch w/some edge pitting
F-961 F-962	5/15/68--7/15/68	61		0.1582 0.1269	1.2 .95	Spotty etch w/some edge pitting

CORROSION COUPON EXPOSURE RESULTS

Page

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: East Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water f

REMARKS: Supply Water

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-591 F-593	11/14/67--1/15/68	62	925,298	0.1135 0.1152	0.82 0.83	Scattered minor pitting
F-612 F-613	1/15/68--3/13/68	57		Lost Lost		
F-816 F-817	3/13/68--5/15/68	63		0.2567 0.4888	1.8 3.4	Scattered shallow pitting and gouges
F-825 F-970	5/15/68--7/15/68	61	1,244,577	0.4102 0.3737	3.0 2.7	Overall shallow pitting

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico

LOCATION: Water Injection Wells B-

SYSTEM: Water Injection

TYPE STATION: Bar Type at Wellhead

REMARKS: On West Leg of system (S

COUPON NUMBER	DATES	EXPOSURE		DAYS	VOLUME (BW)	WEIGHT		CORROSION		TYPE ATTACK
		LOSS	(GMS)			RATE	(MPY)			
F-589 F-595	11/14/67--1/15/68	62	111,588			0.2797	0.2724	2.0	2.0	Scattered pitting attack to at least .004" (24 MPY)
F-614 F-615	1/15/68--3/13/68	57				0.0491	0.0509	0.38	0.40	Even etch
F-810 F-811	3/13/68--5/15/68	63				0.0073	0.0061	0.05	0.04	Even etch
F-826 F-827	5/15/68--7/15/68	61				0.0105	0.0095	0.08	0.07	Even etch w/some pitting at corners and end

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: West Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water

REMARKS: Produced Water injected
otherwise, inject suppl

COUPON NUMBER	DATES	EXPOSURE DAYS	VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
F-590 F-592	11/14/67--1/15/68	62	925,298	0.1577 0.1835	1.1 1.3	Overall) Shallow pitting
F-610 F-611	1/15/68-3/13/68	57		0.0399 0.0312	0.32 0.24	Even etch w/ areas of minor pitting and pitting under holder blocks
F-814 F-815	3/13/68--5/15/68	63		0.2859 0.3650	2.0 2.6	Scattered pitting to at least 0.004" (about 23 MPY)
F-818 F-819	5/15/68--7/15/68	61	1,244,577	0.1283 0.1691	0.95 1.2	Scattered pitting w/one to at least 0.016" (about 96 MPY) under holder blocks

ATLANTIC

THE ATLANTIC REFINING COMPANY

INCORPORATED - 1870

PETROLEUM PRODUCTS

MAIN OFFICE 000

February 18, 1966

FEB 21 AM 8:04

NORTH AMERICAN PRODUCING DEPARTMENT
NEW MEXICO - ARIZONA DISTRICT

S. L. SMITH, DISTRICT MANAGER
JACK BIARD, DISTRICT LANDMAN
E. R. DOUGLAS, DISTRICT GEOLOGIST
A. D. KLOXIN, DISTRICT DRG. & PROD. SUP'T.
M. D. ROBERTS, DISTRICT GEOPHYSICIST
W. P. TOMLINSON, DISTRICT ENGINEER
B. R. WARE, DISTRICT ADMINISTRATIVE SUP'V.

SECURITY NATIONAL BANK BLDG.

MAILING ADDRESS
P. O. BOX 1978
ROSWELL, NEW MEXICO

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter,
Secretary Director

Re: Corrosion coupon results
as per Commission Order #R-2969
entered in Case #3302, concerning
The Atlantic Refining Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above order, we are required to submit the results of the rate of corrosion of the coupons in the Swearingen-Shugart Waterflood Project. Attached are the results from our laboratory concerning the corrosion rate for the first three month period.

Yours very truly,


W. P. Tomlinson

LCH:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico

Mr. Frank Irby

INTERNAL CORRESPONDENCE

DATE February 17, 1966

TO Mr. W. P. Tomlinson

FROM Mr. R. L. McAdams

OFFICE Roswell, New Mexico

MAIN OFFICE OCC

OFFICE

Chemical Engineering
Section -- Dallas

YOUR LETTER

FILE

FEB 21 AM 8:04
Letter No. 8:0478SUBJECT Swearingen Lease Waterflood
Shugart Field, New Mexico
Corrosion Monitoring

MY FILE

Attached are the corrosion coupon results that were reported by telephone to you and L. C. Hudry by H. G. Byars. Also attached is an analysis (No. A-974) of deposits from the plant manifold coupons. These results are a part of the corrosion monitoring in the Ogallala water injection system. Coupon stations have been installed at two locations in the plant manifold and at two injection wells.

This is the initial coupon exposure at each location. The plant and well exposure periods were not the same but were overlapping. The indicated corrosion rates were all in the same range (4.3 to 6.5 Mils Per Year). Deposits removed from the coupons were mostly acid soluble and were predominantly iron oxides.

Although the corrosion rate of these exposures were somewhat high, the pitting was not severe. This corrosive indication does not justify immediate corrosion control. Further monitoring is being done to determine this system's corrosion control requirements.

Currently installed coupons at all four locations are scheduled to be changed out in early March. It has been agreed, at Hudry's suggestion, that only one of the two coupons at each location be changed at that time. The longer exposure might verify the low long-term corrosion rate reported to him by a New Mexico water supplier. Reportedly they have had no serious corrosion when handling Ogallala water in bare pipe.

Another method of verifying long-term corrosion rates would be the installation of Test Nipples in the injection well piping. If you will furnish us with the proper nipples for your well piping, we will prepare them. Nipples in sizes from 1" through 2" diameter and 4" to 1' in length have been used for this purpose. Such nipples would be exposed from six months to a year. If you have any questions concerning this program, please contact us. A copy of the invoice approved for payment has been forwarded to Accounts Payable.

R. L. McAdams
R. L. McAdams

RLM:sjw

cc: Mr. B. J. Lancaster

Mr. L. C. Hudry

Accounts Payable (invoice only)

Attachments

PRODUCTION PROFITS, INC.

SCALE ANALYSIS

Client: The Atlantic Refining Co. Lab. No. : A-974
Field: Shugart County: Eddy State: New Mexico
Date of Sample: 12-2-65 Date of Analysis: 12-10-65
Source of Sample: Coupons E-861-862- West Leg Manifold (Injection System)
Coupons E-863-854- East Leg Manifold (Injection System)
Description of Sample: The sample consisted of a four ounce ampule containing a
small amount of red scale.
Preparation of Sample in Lab.: A portion of the scale was transferred to an extraction
crucible and dried. Sample weight 0.4935 grams.

CHEMICAL ANALYSIS

	<u>%</u>	<u>%</u>
TOTAL ORGANIC CONTENT:		<u>3.1</u>
Extraction by Solvent	<u>0.0</u>	
Ignition Loss After Acid Extraction	<u>3.1</u>	
WATER SOLUBLE CONTENT AFTER SOLVENT EXTRACTION:		<u>3.1</u>
Calcium as _____	<u>0.0</u>	
Chloride as _____	<u>-</u>	
Sulfate as _____	<u>0.0</u>	
ACID SOLUBLE CONTENT AFTER SOLVENT EXTRACTION:		<u>81.8</u>
Iron as <u>Iron Oxide</u>	<u>66.0</u>	
Calcium as <u>Calcium Carbonate</u>	<u>4.5</u>	
Magnesium as _____	<u>0.0</u>	
Sulfate as _____	<u>0.0</u>	
Unidentified _____	<u>11.3</u>	
ACID INSOLUBLE CONTENT: (Non-ignitable)		<u>10.9</u>
Silica _____	<u>-</u>	
Barium Sulfate _____	<u>-</u>	
Other _____	<u>-</u>	

Atlantic Richfield Company

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

MAIL ROOM

DEC 12 PM 1 11



December 11, 1968

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.

Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

CORROSION COUPON EXPOSURE RESULTS

P

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: East Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water

REMARKS: Supply Water

COUPON NUMBER	EXPOSURE DAYS	VOLUME (BW)	WEIGHT		CORROSION		TYPE ATTACK
			LOSS (GMS)	RATE (MPY)			
F-501 F-593	11/14/67--1/15/68 11/14/67--1/15/68	62	925,298	0.1135 0.1152	0.82 0.83	Scattered minor pitting	
F-612 F-613	1/15/68--3/13/68	57		Lost Lost			
F-816 F-817	3/13/68--5/15/68	63		0.2567 0.4888	1.8 3.4	Scattered shallow pitting and gouges	
F-825 F-970	5/15/68--7/15/68	61	1,244,577	0.4102 0.3737	3.0 2.7	Overall shallow pitting	
F-927 F-929	7/15/68--9/16/68	63	1,244,577	0.0827 0.1165	0.59 0.85	Spotty etch w/some minor edge and end pitting	
G-231 G-232	9/16/68--11/15/68	60		0.0711 0.0725	0.53 0.54	Spotty etch w/some shallow pits to at least 0.002" (about 12 MPY)	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico
 SYSTEM: Water Injection

LOCATION: Water Injection Wells
 TYPE STATION: Bar Type at Wellh
 REMARKS: On East Leg at System

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE	
		DAYS	VOLUME (BW)			ATTACK	
F-594	11/14/67--11/15/68	62	226,523	0.1962	1.4	Scattered pitting attack to at least .008" (47MPY)	
F-596				0.2005	1.4		
F-608	1/15/68--3/13/68	57		0.0651	0.51	Scattered pitting attack to at least .006" (38MPY)	
F-609				0.0586	0.46		
F-812	3/13/68--5/15/68	63		0.1123	0.78	Spotty etch w/some edge pitting	
F-813				0.1179	0.85		
F-961	5/15/68--7/15/68	61		0.1582	1.2	Spotty etch w/some edge pitting	
F-962				0.1269	.95		
F-923	7/15/68--9/16/68	63	13,656	0.0311	0.22	Smooth spotty etch w/some very minor pitting under holder block	
F-969				0.0265	0.19		
G-233	9/16/68--11/15/68	60	15,422	0.0450	0.33	Spotty etch w/some tiny pits at blocks	
G-236				0.0455	0.33		

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: West Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water

REMARKS: Produced Water, injecte
otherwise, inject supt

COUPON NUMBER	DATES	EXPOSURE DAYS	VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
F-590	11/14/67--1/15/68	62	925,298	0.1577	1.1	Overall Shallow pitting
F-592				0.1835	1.3	
F-610	1/15/68-3/13/68	57		0.0399	0.32	Even etch w/ areas of minor pitting and pitting under holder blocks
F-611				0.0312	0.24	
F-814	3/13/68--5/15/68	63		0.2859	2.0	Scattered pitting to at least 0.004" (about 23 MPY)
F-815				0.3650	2.6	
F-818	5/15/68--7/15/68	61	1,244,577	0.1283	0.95	Scattered pitting w/one to at least 0.016" (about 96 MPY) under holder blocks
F-819				0.1691	1.2	
F-926	7/15/68--9/16/68	63	1,244,577	0.6036	4.3	Scattered broad severe pit w/one to at least 0.018" (about 100 MPY)
F-928				0.9277	6.5	
G-229	9/16/68--11/15/68	60		0.1129	0.83	Many shallow pits w/some isolated pits to at least 0.009" (about 55 MPY) and some severe pitting under holder blocks
G-230				0.1398	1.0	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico
 SYSTEM: Water Injection

LOCATION: Water Injection Wells B-
 TYPE STATION: Bar Type at Wellhead
 REMARKS: On West Leg of system (S

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS	CORROSION RATE	TYPE ATTACK
		DAYS	VOLUME (BW)	(GMS)	(MPY)	
F-589	11/14/67--1/15/68	62	111,588	0.2797	2.0	Scattered pitting attack to at least .004" (24 MPY)
F-595				0.2724	2.0	
F-614	1/15/68--3/13/68	57		0.0491	0.38	Even etch
F-615				0.0509	0.40	
F-810	3/13/68--5/15/68	63		0.0073	0.05	Even etch
F-811				0.0061	0.04	
F-826	5/15/68--7/15/68	61		0.0105	0.08	Even etch w/some pitting
F-827				0.0095	0.07	at corners and end
F-924	7/15/68--9/16/68	63	12,521	0.1281	0.92	Even etched body w/a few
F-925				0.2505	1.8	scattered pitted areas and severe pitting under hold blocks to at least 0.016" (about 95 MPY)
G-234	9/16/68--11/15/68	60	12,482	0.0710	0.53	Even etch w/severe pitting
G-235				0.0891	0.66	under holder blocks to at least 0.013" (about 80 MPY)

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

RECEIVED

61 JAN 18 AM 10 1969



January 15, 1969

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required by
Commission Order R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,

W. P. Tomlinson

by: E. M. Pringle

JLT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS, INC.

Consultants in Petroleum Production

7101 CARPENTER FREEWAY

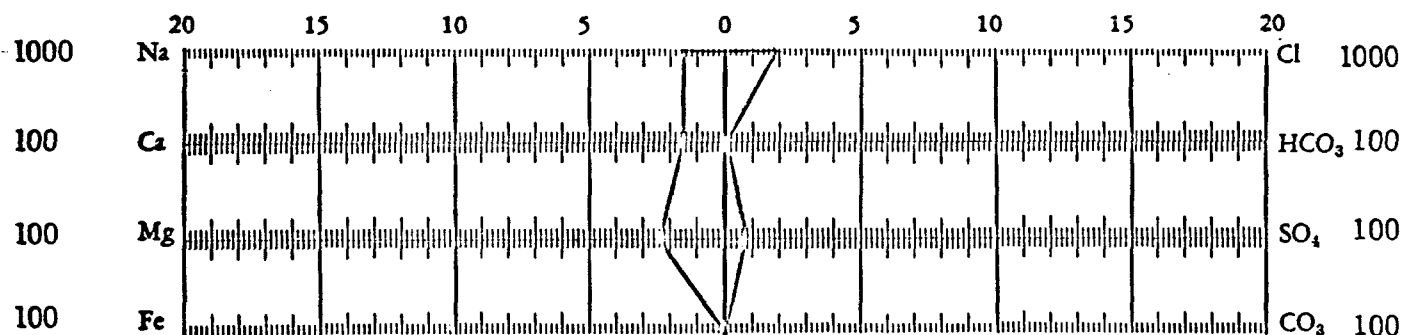
DALLAS, TEXAS

REPORT OF WATER ANALYSIS

MAILED 16 AM 8 28
JAN 16 1969

CLIENT Atlantic Richfield Company OPERATOR do
FIELD Shugart COUNTY Eddy STATE New Mexico
LEASE AND WELL NO. Swearingen PROD. FORM. _____
SOURCE OF SAMPLE Produced Water DEPTH: TOTAL _____ PERF. _____
SAMPLE OF: PRODUCED WATER ☐ INJECTION SYSTEM WATER ☐ OTHER ☐
DATE COLLECTED 12-16-68 ANALYST _____
SAMPLER NO. A-2804
TOTAL SOLIDS 108,720

MINERAL ANALYSIS PATTERN (NUMBER BELOW ION NAME INDICATES MEQ./SCALE UNIT)



PRECIPITATED AND SUSPENDED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL UNDISSOLVED SOLIDS	_____
IRON OXIDE	_____
CALCIUM CARBONATE	_____
CALCIUM SULFATE	_____
MAGNESIUM CARBONATE	_____
BARIUM SULFATE	_____
SILICA	_____
ORGANIC	_____

PHYSICAL PROPERTIES

SP. GRAVITY 1.078
PH 7.3
RESISTIVITY 0.084 OHMMETERS @ 68°
STABILITY INDEX @ 41°F _____
@ 86°F _____
CASO₄ SOLUBILITY @ 41°F _____ MEQ/L
@ 86°F _____ MEQ/L
MAX. CASO₄ POSSIBLE _____ MEQ/L

DISSOLVED SOLIDS

CONSTITUENT	MG/L (PPM)
TOTAL SOLIDS (CALC.)	<u>108,720</u>
SODIUM (CALC.)	<u>34,800</u>
IRON (TOTAL)	<u>-</u>
MANGANESE	<u>-</u>
BARIUM	<u>0</u>
CALCIUM	<u>2,980</u>
MAGNESIUM	<u>2,800</u>
CHLORIDE	<u>64,200</u>
BICARBONATE	<u>260</u>
CARBONATE	<u>0</u>
SULFATE	<u>3,680</u>

DISSOLVED GASES

CONSTITUENT	MG/L (PPM)
HYDROGEN SULFIDE	<u>Absent</u>
CARBON DIOXIDE	_____
OXYGEN	_____

REMARKS: This sample consisted of one 1 quart plastic bottle of water.

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

February 18, 1969

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

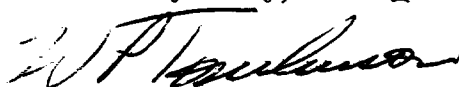
Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,



W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



69 FEB 19 AM 8 18

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: West Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water I

REMARKS: Produced Water injected otherwise, inject supply

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS	CORROSION RATE	TYPE	
		DAYS	VOLUME (BW)	(GMS)	(MPY)	ATTACK	
F-590	11/14/67--1/15/68	62	925,298	0.1577	1.1	Overall	Shallow pitting
F-592				0.1835	1.3		
81 8 HW 61 83 J 69 F-610	1/15/68-3/13/68	57		0.0399	0.32	Even etch	w/ areas of
F-611				0.0312	0.24	minor pitting and pitting	under holder blocks
F-814	3/13/68--5/15/68	63		0.2859	2.0	Scattered pitting to at	least 0.004" (about 23 MPY)
F-815				0.3650	2.6		
F-818	5/15/68--7/15/68	61	1,244,577	0.1283	0.95	Scattered pitting w/one to	at least 0.016" (about 96
F-819				0.1691	1.2	MPY) under holder blocks	
F-926	7/15/68--9/16/68	63	1,244,577	0.6036	4.3	Scattered broad severe pits	w/one to at least 0.018"
F-928				0.9277	6.5	(about 100 MPY)	
G-229	9/16/68--11/15/68	60		0.1129	0.83	Many shallow pits w/some	isolated pits to at least
G-230				0.1398	1.0	0.009" (about 55 MPY) and	some severe pitting under
						holder blocks	
G-239	11/15/68--1/15/69	61		0.0110	0.08	Even etch w/scattered areas	of minor pitting.
G-240				0.0137	0.10		

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico
 SYSTEM: Water Injection

LOCATION: Water Injection Wells
 TYPE STATION: Bar Type at Well
 REMARKS: On West Leg of system

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS	CORROSION RATE	TYPE ATTACK
		DAYS	VOLUME (BW)	(GMS)	(MPY)	
F-589 61 834 61 834 69	11/14/67--1/15/68	62	111,588	0.2797	2.0	Scattered pitting attack to at least .004" (24 MP
F-614	1/15/68--3/13/68	57		0.0491	0.38	Even etch
F-615				0.0509	0.40	
F-810	3/13/68--5/15/68	63		0.0073	0.05	Even etch
F-811				0.0061	0.04	
F-826	5/15/68--7/15/68	61		0.0105	0.08	Even etch w/some pitting at corners and end
F-827				0.0095	0.07	
F-924	7/15/68--9/16/68	63	12,521	0.1281	0.92	Even etched body w/a few scattered pitted areas a severe pitting under hol blocks to at least 0.016 (about 95 MPY)
F-925				0.2505	1.8	
G-234	9/16/68--11/15/68	60	12,482	0.0710	0.53	Even etch w/severe pitti under holder blocks to a least 0.013" (about 80 M
G-235				0.0891	0.66	
G-243	11/15/68--1/15/69	61	12,824	0.0311	0.22	Even etch w/shallow scat body pitting and pitting under holder blocks to a least 0.010" (about 60 M
G-244				0.0302	0.22	

CORROSION COUPON EXPOSURE RESULTS

Pa

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico
 SYSTEM: Water Injection

LOCATION: East Header
 TYPE STATION: Bar Type at Water
 REMARKS: Supply Water

COUPON NUMBER	DATES	EXPOSURE DAYS	VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
81 F-591 F-593 F-595 F-597 F-599	11/14/67--1/15/68 83 69	62	925,298	0.1135 0.1152	0.82 0.83	Scattered minor pitting
F-612 F-613	1/15/68--3/13/68	57		Lost Lost		
F-816 F-817	3/13/68--5/15/68	63		0.2567 0.4888	1.8 3.4	Scattered shallow pitting and gouges
F-825 F-970	5/15/68--7/15/68	61	1,244,577	0.4102 0.3737	3.0 2.7	Overall shallow pitting
F-927 F-929	7/15/68--9/16/68	63	1,244,577	0.0827 0.1165	0.59 0.85	Spotty etch w/some minor edge and end pitting
G-231 G-232	9/16/68--11/15/68	60		0.0711 0.0725	0.53 0.54	Spotty etch w/some shallow pits to at least 0.002" (about 12 MPY)
G-237 G-238	11/15/68--1/15/69	61		0.3058 0.2543	2.3 1.8	Overall shallow pitting

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico
 SYSTEM: Water Injection

LOCATION: Water Injection Wells
 TYPE STATION: Bar Type at Wellhead
 REMARKS: On East Leg at System

Coupon Number	DATES	EXPOSURE DAYS	VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
F-594	11/14/67--11/15/68	62	226,523	0.1962	1.4	Scattered pitting attack to at least .008" (47MPY)
F-596				0.2005	1.4	
F-608	1/15/68--3/13/68	57		0.0651	0.51	Scattered pitting attack to at least .006" (38MPY)
F-609				0.0586	0.46	
F-812	3/13/68--5/15/68	63		0.1123	0.78	Spotty etch w/some edge pitting
F-813				0.1179	0.85	
F-961	5/15/68--7/15/68	61		0.1582	1.2	Spotty etch w/some edge pitting
F-962				0.1269	.95	
F-923	7/15/68--9/16/68	63	13,656	0.0311	0.22	Smooth spotty etch w/some very minor pitting under holder block
F-969				0.0265	0.19	
G-233	9/16/68--11/15/68	60	15,422	0.0450	0.33	Spotty etch w/some tiny pits at blocks
G-236				0.0455	0.33	
G-241	11/15/68--1/15/69	61	14,004	0.4653	3.4	Overall tiny shallow pits
G-242				0.3862	2.9	

Atlantic Richfield Company

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

104-10-10-10

54 PM 10 JUL '69



July 9, 1969

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

File

Re: Corrosion Coupon Results as per
~~Commission Order R-2969~~ Entered
in Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

CORROSION COUPON EXPOSURE RESULTS:

FIELD OR UNIT: Swearingen Lease W. F., Shugart Field,
SYSTEM: Eddy Co., New Mexico
Water Injection

LOCATION: Water Injection Wells B-1
TYPE STATION: Bar Type at Wellhead
REMARKS: On West Leg System (S)

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
G-486	3/19/69-	62	217BWP	0.0491	0.36	Scattered shallow
G-487	5/20/69		.	0.0250	0.18	pitting

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field,
SYSTEM: Eddy Co., New Mexico
Water Injection

LOCATION: West Header
TYPE STATION: Bar Type at Water P
REMARKS: Produced Water Injected wh
otherwise, inject supply w

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
G-482	3/19/69-	62		0.0447	0.33	Scattered broad pits to at least 0.005" (about 31 MPY)
G-483	5/20/69			0.0565	0.40	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W. F., Shugart Field,
Eddy Co., New Mexico
SYSTEM: Water Injection

LOCATION: Water Injection Wells A-6
TYPE STATION: Bar Type at Wellhead
REMARKS: On East Leg at System

COUPON NUMBER	EXPOSURE			WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK	R
	DATES	DAYS	VOLUME (BW)				
G-488	3/19/69-	62	288 BWP	0.0609	0.44	Scattered shallow pitting	C
G-489	5/20/69			0.0620	0.45		C

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field,
Eddy Co., New Mexico.
SYSTEM: Water Injection

LOCATION: East Header
TYPE STATION: Bar Type at Water Plan
REMARKS: Supply Water

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK	
	DATES	DAYS					
G-484	3/19/69-	62		0.8839	6.4	Overall shallow pitting	(
G-485	5/20/69			0.6643	4.8	to at least 0.002". (About 12 MPY)	(

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

MAILED 10 1969

69 APR 15 AM 8 18



April 14, 1969

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.

Secretary-Director

Re: Produced Water Samples Required by
Commission Order R-2969 Entered
In Case No. 3302 Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

file

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,

W. P. Tomlinson

JLT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

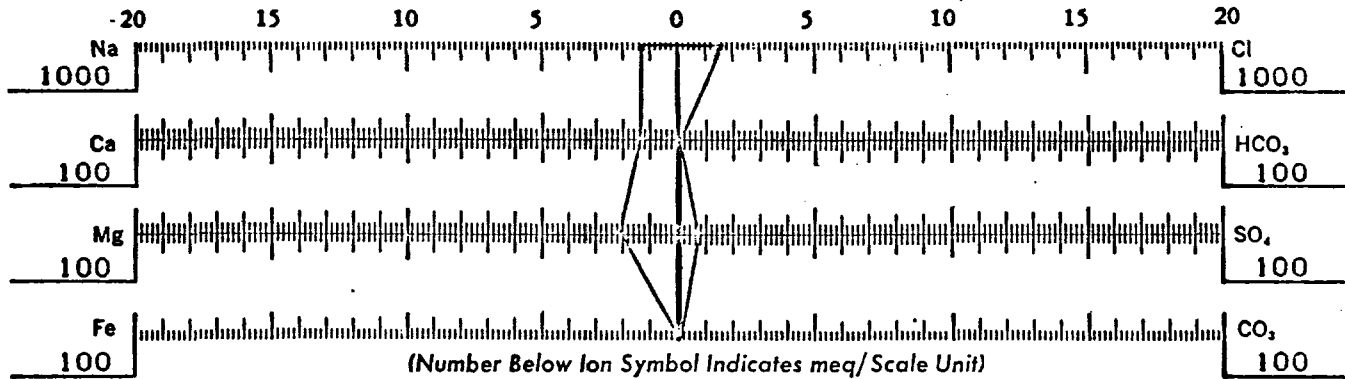
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearinger Produced Water Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample _____
Date Collected 3-19-69 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-2948 Specific Gravity 1.075 pH 7.3
Total Dissolved Solids 106905 Resistivity (Ohmmeters at 68° F.) 0.088 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	106905	
Sodium (Calc.)	34300	1492.1
Iron (Dissolved)	-	-
Barium	-	-
Calcium	2930	146.2
Magnesium	2670	219.5
Chloride	62900	1773.8
Bicarbonate	315	5.2
Carbonate	0	0.0
Sulfate	3790	78.8

TOTAL IRON _____

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F _____
Calcium Sulfate Stability at 95° F _____
Concentration _____ meq/l.
Barium Sulfate Stability at 95° F _____
Concentration _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron as _____	_____
Calcium as _____	_____
Magnesium as _____	_____
Sulfate as _____	_____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate (Quan.)	_____
(Qual.)	_____

REMARKS

The sample consisted of one 1 quart plastic bottle of water.

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

100-100000-1000

63 APR 22 PM 1 20



April 21, 1969

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.

Secretary Director

File

Re: Corrosion Coupon Results as per
Commission Order R-2969 Entered
In Case No. 3302 Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

JLT:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: East Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water

REMARKS: Supply Water

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-591 F-593	11/14/67--1/15/68	62	925,298	0.1135 0.1152	0.82 0.83	Scattered minor pitting
F-612 F-613	1/15/68--3/13/68	57		Lost Lost		
F-816 F-817	3/13/68--5/15/68	63		0.2567 0.4888	1.8 3.4	Scattered shallow pitting and gouges
F-825 F-910	5/15/68--7/15/68	61	1,244,577	0.4102 0.3737	3.0 2.7	Overall shallow pitting
F-927 F-929	7/15/68--9/16/68	63	1,244,577	0.0827 0.1165	0.59 0.85	Spotty etch w/some minor edge and end pitting
G-231 G-232	9/16/68--11/15/68	60		0.0711 0.0725	0.53 0.54	Spotty etch w/some shallow pits to at least 0.002" (about 12 MPY)
G-237 G-238	11/15/68--1/15/69	61		0.3058 0.2543	2.3 1.8	Overall shallow pitting
G-478 G-479	1/15/69--3/19/69	63		0.7638 0.6926	5.5 4.9	Overall shallow pitting to at least 0.002" (about 12 MPY)

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico

LOCATION: Water Injection Wells

SYSTEM: Water Injection

TYPE STATION: Bar Type at Wellh

REMARKS: On East Leg at System

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-594	11/14/67--1/15/68	62	226,523	0.1962	1.4	Scattered pitting attack to at least .008" (47MPY)
F-596				0.2005	1.4	
F-608	1/15/68--3/13/68	57		0.0651	0.51	Scattered pitting attack to at least .006" (38MPY)
F-609				0.0586	0.46	
F-812	3/13/68--5/15/68	63		0.1123	0.78	Spotty etch w/some edge pitting
F-813				0.1179	0.85	
F-961	5/15/68--7/15/68	61		0.1582	1.2	Spotty etch w/some edge pitting
F-962				0.1269	.95	
F-923	7/15/68--9/16/68	63	13,656	0.0311	0.22	Smooth spotty etch w/some very minor pitting under holder block
F-969				0.0265	0.19	
G-233	9/16/68--11/15/68	60	15,422	0.0450	0.33	Spotty etch w/some tiny pits at blocks
G-236				0.0455	0.33	
G-241	11/15/68--1/15/69	61	14,004	0.4653	3.4	Overall tiny shallow pits
G-242				0.3862	2.9	
G-473	1/15/69--3/19/69	63	13,802	0.4997	3.5	Surface roughening
G-475				0.4411	3.1	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field, Eddy Co., New Mexico

LOCATION: West Header

SYSTEM: Water Injection

TYPE STATION: Bar Type at Water

REMARKS: Produced Water injected otherwise, inject supp

COUPON NUMBER	DATES	EXPOSURE DAYS	VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
F-590	11/14/67--1/15/68	62	925,298	0.1577	1.1	Overall Shallow pitting
F-592				0.1835	1.3	
F-610	1/15/68-3/13/68	57		0.0399	0.32	Even etch w/ areas of minor pitting and pitting under holder blocks
F-611				0.0312	0.24	
F-814	3/13/68--5/15/68	63		0.2859	2.0	Scattered pitting to at least 0.004" (about 23 MPY)
F-815				0.3650	2.6	
F-818	5/15/68--7/15/68	61	1,244,577	0.1283	0.95	Scattered pitting w/one to at least 0.016" (about 96 MPY) under holder blocks
F-819				0.1691	1.2	
F-926	7/15/68--9/16/68	63	1,244,577	0.6036	4.3	Scattered broad severe pits w/one to at least 0.018" (about 100 MPY)
F-928				0.9277	6.5	
G-229	9/16/68--11/15/68	60		0.1129	0.83	Many shallow pits w/some isolated pits to at least 0.009" (about 55 MPY) and some severe pitting under holder blocks
G-230				0.1398	1.0	
G-239	11/15/68--1/15/69	61		0.0110	0.08	Even etch w/scattered area of minor pitting.
G-240				0.0137	0.10	
G-476	1/15/69--3/19/69	63		0.2475	1.7	Scattered broad pits to at least 0.009" (about 52 MPY) Severe pitting under holder block coupon G-476.
G-477				0.2658	1.9	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W.F., Shugart Field, Eddy Co., New Mexico

LOCATION: Water Injection Wells E

SYSTEM: Water Injection

TYPE STATION: Bar Type at Wellhead

REMARKS: On West Leg of system (

COUPON NUMBER	DATES	EXPOSURE		WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
		DAYS	VOLUME (BW)			
F-589	11/14/67--1/15/68	62	111,588	0.2797	2.0	Scattered pitting attack to at least .004" (24 MP)
F-595				0.2724	2.0	
F-614	1/15/68--3/13/68	57		0.0491	0.38	Even etch
F-615				0.0509	0.40	
F-810	3/13/68--5/15/68	63		0.0073	0.05	Even etch
F-811				0.0061	0.04	
F-826	5/15/68--7/15/68	61		0.0105	0.08	Even etch w/some pitting at corners and end
F-827				0.0095	0.07	
F-924	7/15/68--9/16/68	63	12,521	0.1281	0.92	Even etched body w/a few scattered pitted areas and severe pitting under hold blocks to at least 0.016" (about 95 MPY)
F-925				0.2505	1.8	
G-234	9/16/68--11/15/68	60	12,482	0.0710	0.53	Even etch w/severe pitting under holder blocks to at least 0.013" (about 80 MP)
G-235				0.0891	0.66	
G-243	11/15/68--1/15/69	61	12,824	0.0311	0.22	Even etch w/shallow scattered pitting and pitting under holder blocks to at least 0.010" (about 60 MP)
G-244				0.0302	0.22	
G-472	1/15/69--3/19/69	63	14,113	0.0653	0.46	Even etch w/minor pitting
G-474				0.0432	0.31	Severe pitting under hold blocks 0.007" (about 40 MP)

Atlantic Richfield Company

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

MAILED 100

69 JUL 24 PM 1 52



July 23, 1969

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

file

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required by
Commission Order R-2969 Entered
In Case No. 3302, Concerning
~~Atlantic Richfield Company~~
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,

W. P. Tomlinson

W. P. Tomlinson

by S. H. Christianson

MAO:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS, INC.

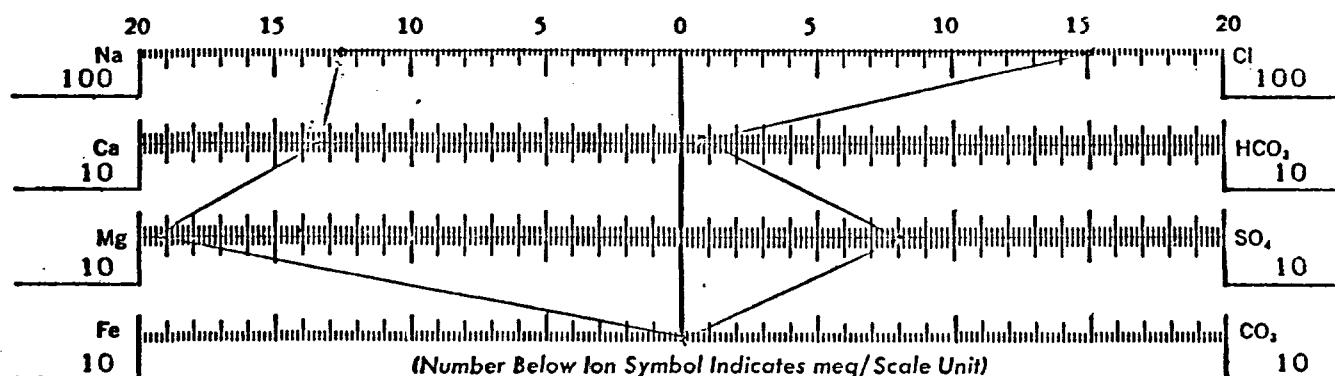
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Snugart Lease Swearinger Waterflood Well No. _____
Formation Queen Depth _____ Perf. _____
Source of Sample Produced Water
Date Collected 6-19-69 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-3051 Specific Gravity 1.067 pH 7.2
Total Dissolved Solids 92313 Resistivity (Ohmmeters at 68° F.) 0.093 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>92313</u>	
Sodium (Calc.)	<u>29300</u>	<u>1272.0</u>
Iron (Dissolved)	<u>-</u>	<u>-</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2690</u>	<u>134.2</u>
Magnesium	<u>2370</u>	<u>194.8</u>
Chloride	<u>53700</u>	<u>1514.3</u>
Bicarbonate	<u>393</u>	<u>6.4</u>
Carbonate	<u>0</u>	<u>0.0</u>
Sulfate	<u>3860</u>	<u>80.3</u>

TOTAL IRON

-

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F _____

Calcium Sulfate Stability at 95° F _____

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

Barium Sulfate Stability at 95° F _____

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	<u>as</u>
Calcium	<u>as</u>
Magnesium	<u>as</u>
Sulfate	<u>as</u>
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

REMARKS

The sample consisted of one 1 quart plastic bottle of water.

AtlanticRichfieldCompany

North American Producing Division
New Mexico-Arizona District
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

W. P. Tomlinson
District Engineer

September 5, 1969

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required by
Commission Order R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,



W. P. Tomlinson

MAO:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



MAILED
SEP 6 1969
PH 8 25

File

91-810

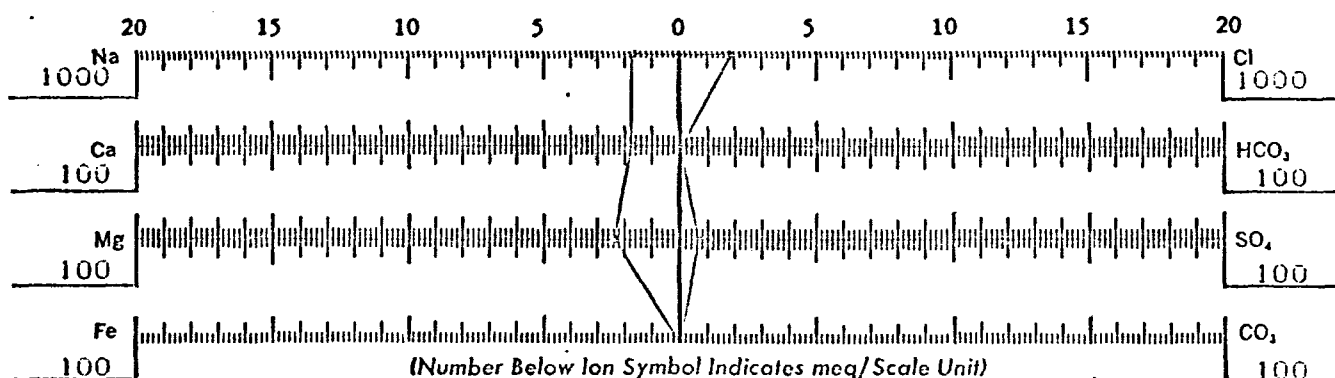
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearinger Water Plant - Produced
Formation _____ Depth _____ Perf. _____
Source of Sample West Pump Discharge
Date Collected 8-1-69 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-3167 Specific Gravity 1.052 pH 7.2
Total Dissolved Solids 117262 Resistivity (Ohmmeters at 68° F.) 0.073 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>117262</u>	
Sodium (Calc.)	<u>37700</u>	<u>1639.9</u>
Iron (Dissolved)	<u>-</u>	<u>-</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>3270</u>	<u>163.2</u>
Magnesium	<u>2880</u>	<u>236.7</u>
Chloride	<u>69500</u>	<u>1959.9</u>
Bicarbonate	<u>332</u>	<u>5.4</u>
Carbonate	<u>0</u>	<u>0.0</u>
Sulfate	<u>3580</u>	<u>74.5</u>

TOTAL IRON _____

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F _____

Calcium Sulfate Stability at 95° F _____

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

Barium Sulfate Stability at 95° F _____

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	_____ as _____
Calcium	_____ as _____
Magnesium	_____ as _____
Sulfate	_____ as _____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____ (Qual.) _____

REMARKS

The sample consisted of one 1 quart glass jar of water.

John

KilanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

September 5, 1969

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
Commission Order R-1969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

MAO:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



SEP 6 PM 8 25

file

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field,
Eddy Co., New Mexico.
SYSTEM: Water Injection

LOCATION: East Header
TYPE STATION: Bar Type at Water Pl:
REMARKS: Supply Water

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
-484	3/19/69-	62		0.8839	6.4	Overall shallow pitting ✓ to at least 0.002". (About 12 MPY)
-485	5/20/69			0.6643	4.8	
-795	5/20/69-	62		0.9524	6.8	Overall surface roughening ✓
-796	7/21/69			0.8609	6.2	

John

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W. F., Shugart Field,
Eddy Co., New Mexico
SYSTEM: Water Injection

LOCATION: Water Injection Wells A-6
TYPE STATION: Bar Type at Wellhead
REMARKS: On East Leg at System

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
S-488	3/19/69-	62	288 BWPD	0.0609	0.44	Scattered shallow pitting ✓
S-489	5/20/69			0.0620	0.45	
S-789	5/20/69-	62	204 BWPD	0.4520	3.3	Overall roughening w/pitting to at least 0.004" (about 24 MPY) ✓
S-792	7/21/69			0.4614	3.3	

John

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W. F., Shugart Field,
SYSTEM: Eddy Co., New Mexico
Water Injection

LOCATION: Water Injection Wells B-
TYPE STATION: Bar Type at Wellhead
REMARKS: On West Leg of System (S

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
-486	3/19/69-	62	217BWP	0.0491	0.36	Scattered shallow pitting
-487	5/20/69			0.0250	0.18	
-790	5/20/69-	62	278BWP	0.0785	0.58	Scattered tiny body pits w/severe pitting under holder blocks to at least 0.009" (about 53 MPY)
-791	7/21/69			0.0668	0.48	

ASU

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease WF, Shugart Field,
STEM: Eddy Co., New Mexico
Water Injection

LOCATION: West Header

TYPE STATION: Bar Type at Water P

REMARKS: Produced Water injected wh
otherwise, inject supply w

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
-482	3/19/69-	62		0.0447	0.33	Scattered broad pits to at least 0.005" (about 31 MPY)
-483	5/20/69			0.0565	0.40	
-793	5/20/69-	62		0.0658	0.48	Scattered pitting attack to at least 0.003" (about 18 MPY)
-794	7/21/69			0.0776	0.57	

JS

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

OCT 15 1969



W. P. Tomlinson

District Engineer

October 14, 1969

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

File

Re: Corrosion Coupon Results as per
~~Commission Order R-1969 Entered~~
In Case No. 3302, Concerning
~~Atlantic Richfield Company~~
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W P Tomlinson
W. P. Tomlinson

MAO:jcb

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88120

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

CORROSION COUPON EXPOSURE RESULTS

D OR UNIT: Swearingen Lease W. F., Shugart Field,
Eddy Co., New Mexico
EM: Water Injection

LOCATION: Water Injection Wells A-6

TYPE STATION: Bar Type at Wellhead

REMARKS: On East Leg at System

COU- PON NO.	EXPOSURE			WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK	RE- MARKS
	DATES	DAYS	VOLUME (BW)				
38	3/19/69-	62	288 BWP	0.0609	0.44	Scattered shallow pitting	G
39	5/20/69			0.0620	0.45		G
9	5/20/69-	62	204 BWP	0.4520	3.3	Overall roughening w/pitting	
2	7/21/69			0.4614	3.3	to at least 0.004" (about 24 MPY)	
5	7/21/69	63	150 BWP	0.1437	2.3	etched	
6	9/22/69			0.1697	1.2		

CORROSION COUPON EXPOSURE RESULTS

WELL OR UNIT: Swearingen Lease W. F., Shugart Field,
 OPERATOR: Eddy Co., New Mexico
 REMARKS: Water Injection

LOCATION: Water Injection Wells E
 TYPE STATION: Bar Type at Wellhead
 REMARKS: On West Leg of System I

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
36	3/19/69-	62	217BWP	0.0491	0.36	Scattered shallow pitting
37	5/20/69			0.0250	0.18	
10	5/20/69-	62	278BWP	0.0785	0.58	Scattered tiny body pits w/severe pitting under holder blocks to at least 0.009" (about 53 MPY)
11	7/21/69			0.0668	0.48	
19	7/21/69	63	300 BWP	0.1822	1.3	Scattered body pitting w/one broad pit under holder blocks to at least 0.015" (about 87 MPY)
10	9/22/69			0.1011	0.71	

CORROSION COUPON EXPOSURE RESULTS

GR UNIT: Swearingen Lease WF, Shugart Field,
EM: Eddy Co., New Mexico
 Water Injection

LOCATION: West Header

TYPE STATION: Bar Type at Water

REMARKS: Produced Water injected
 otherwise, inject supply

COUPON NO.	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
2	3/19/69-	62		0.0447	0.33	Scattered broad pits to at least 0.005" (about 31 MPY)
3	5/20/69			0.0565	0.40	
3	5/20/69-	62		0.0658	0.48	Scattered pitting attack to at least 0.003" (about 18 MPY)
4	7/21/69			0.0776	0.57	
1	7/21/69	63		0.0688	0.50	Scattered pitting attack w/ broad pits underholder blocks to at least 0.008" (about 45 MPY)
3	9/22/69			0.0948	0.68	

CORROSION COUPON EXPOSURE RESULTS

WELL OR UNIT: Swearingen Lease WF, Shugart Field,
Eddy Co., New Mexico.
EM: Water Injection

LOCATION: East Header

TYPE STATION: Bar Type at Water P

REMARKS: Supply Water

COUPON NUMBER	EXPOSURE			WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS	VOLUME (BW)			
1	3/19/69-	62		0.8839	6.4	Overall shallow pitting to at least 0.002". (About 12 MPY)
2	5/20/69			0.6643	4.8	
3	5/20/69-	62		0.9524	6.8	Overall surface roughening
4	7/21/69			0.8609	6.2	
	7/21/69	63		1.1494	8.1	Surface roughening
	9/22/69			2.1945	15.6	

CORROSION COUPON EXPOSURE RESULTS

D OR UNIT: Swearingen Lease WF, Shugart Field,
Eddy Co., New Mexico.
EM: Water Injection

LOCATION: East Header

TYPE STATION: Bar Type at Water P

REMARKS: Supply Water

COU PON NO.	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
4	3/19/69-	62		0.8839	6.4	Overall shallow pitting to at least 0.002". (About 12 MPY)
5	5/20/69			0.6643	4.8	
5	5/20/69-	62		0.9524	6.8	Overall surface roughening
6	7/21/69			0.8609	6.2	
	7/21/69	63		1.1494	8.1	Surface roughening
	9/22/69			2.1945	15.6	

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

MAIN OFFICE 000

'70 JAN 26 AM 8 42



*File
Case*

January 22, 1970

New Mexico Oil Conservation Commission

P.O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Corrosion Coupon Results as per
~~Commission Order~~ R-2969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
~~Swearingen-Shugart~~ Waterflood Project

Gentlemen:

As per the above Order, we are required to submit the corrosion rates as obtained from coupon tests in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of the latest exposed coupons.

Yours very truly,

W. P. Tomlinson

MAO:lfs

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W. F., Shugart Field,
Eddy Co., New Mexico

SYSTEM: Water Injection

LOCATION: Water Injection Well A-6

TYPE STATION: Bar type at wellhead

REMARKS: On east leg of system

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
G-488	3/19/69-	62	288 BWP	0.0609	0.44	Scattered shallow pitting
G-489	5/20/69			0.0620	0.45	
G-789	5/20/69-	62	204 BWP	0.4520	3.3	Overall roughening w/pitting to at least 0.004" (about 24 MPY)
G-792	7/21/69			0.4614	3.3	
G-895	7/21/69-	63	150 BWP	0.1437	2.3	Etched
G-896	9/22/69			0.1697	1.2	
G-995	9/22/69-	71	200 BWP	0.3572	2.2	Overall roughening
G-996	12/1/69			0.3934	2.5	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W. F., Shugart Field,
Eddy Co., New Mexico

SYSTEM: Water Injection

LOCATION: Water Injection Well B-3

TYPE STATION: Bar type at wellhead

REMARKS: On west leg of system (st

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
G-486 G-487	3/19/69- 5/20/69	62	217 BWP	0.0491 0.0250	0.36 0.18	Scattered shallow pitting
G-790 G-791	5/20/69- 7/21/69	62	278 BWP	0.0785 0.0668	0.58 0.48	Scattered tiny body pits w/severe pitting under holder blocks to at least 0.009" (about 53 MPY)
G-899 G-900	7/21/69- 9/22/69	63	300 BWP	0.1822 0.1011	1.3 0.71	Scattered body pitting w/one broad pit under holder blocks to at least 0.015" (about 87 MPY)
G-997 H-7	9/22/69- 12/1/69	71	150 BWP	0.3127 0.3234	1.9 2.0	Surface roughening w/areas of pitting to at least 0.024" (about 120 MPY)

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W. F., Shugart Field,
Eddy Co., New Mexico

LOCATION: East Header

SYSTEM: Water Injection

TYPE STATION: Bar type at water pla

REMARKS: Supply water

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
G-484	3/19/69-	62		0.8839	6.4	Overall, shallow pitting to at least 0.002" (about 12 MPY)
G-485	5/20/69			0.6643	4.8	
G-795	5/20/69-	62		0.9524	6.8	Overall surface roughening
G-796	7/21/69			0.8609	6.2	
G-894	7/21/69-	63		1.1494	8.1	Surface roughening
G-901	9/22/69			2.1945	15.6	
G-991	9/22/69-	71		1.1333	7.1	Overall surface roughening
G-994	12/1/69			1.5798	10.0	

CORROSION COUPON EXPOSURE RESULTS

FIELD OR UNIT: Swearingen Lease W. F., Shugart Field
Eddy Co., New Mexico

LOCATION: West Header

SYSTEM: Water Injection

TYPE STATION: Bar type at water pl

REMARKS: Produced water injected wh
inject supply water

COUPON NUMBER	EXPOSURE		VOLUME (BW)	WEIGHT LOSS (GMS)	CORROSION RATE (MPY)	TYPE ATTACK
	DATES	DAYS				
G-482 G-483	3/19/69- 5/20/69	62		0.0447 0.0565	0.33 0.40	Scattered broad pits to at least 0.005" (about 31 MPY)
G-793 G-794	5/20/69- 7/21/69	62		0.0658 0.0776	0.48 0.57	Scattered pitting attack to at least 0.003" (about 18 MPY)
G-897 G-898	7/21/69- 9/22/69	63		0.0688 0.0948	0.50 0.68	Scattered pitting attack w/broad pits under holder blocks to at least 0.008" (about 45 MPY)
G-992 G-993	9/22/69- 12/1/69	71		0.0928 0.1193	0.58 0.75	Spotted etch w/pitting under holder block to at least 0.009" (about 46 MPY)

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer

MAILED 10 1970

'70 APR 8 AM 8 16



April 7, 1970

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

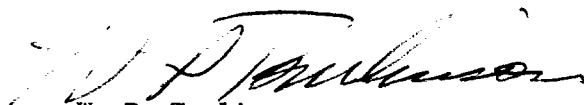
Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required by
Commission Order P-2969 Entered
In Case No. 3302 Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart Waterflood
Project.

Yours very truly,


W. P. Tomlinson

WPT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

(51-0124)

PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company

County Eddy State New Mexico

Field Shugart Lease Swearingen Waterflood Well No. _____

Formation _____ Depth _____ Perf. _____

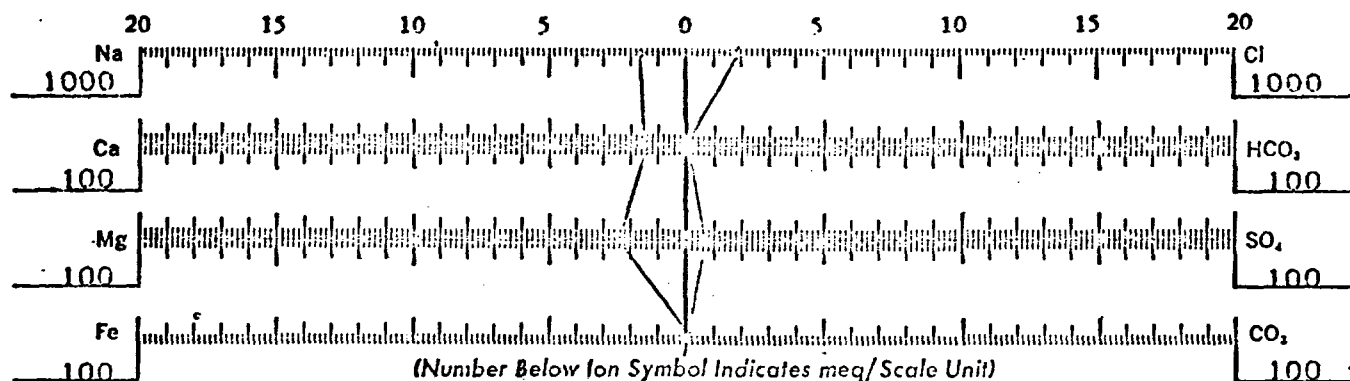
Source of Sample Produced Water

Date Collected 1-27-70 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-3493 Specific Gravity 1.081 pH 7.2
Total Dissolved Solids 1151.66 Resistivity (Ohmmeters at 68° F.) 0.087 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	1151.66	
Sodium (Calc.)	36900	1603.3
Iron (Dissolved)	-	-
Barium	-	-
Calcium	3110	155.2
Magnesium	2980	245.0
Chloride	68100	1920.4
Bicarbonate	386	6.3
Carbonate	0	0.0
Sulfate	3690	76.8

TOTAL IRON _____

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F _____

Calcium Sulfate Stability at 95° F _____

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

Barium Sulfate Stability at 95° F _____

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron as _____	_____
Calcium as _____	_____
Magnesium as _____	_____
Sulfate as _____	_____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	_____
(Quan.)	_____
(Qual.)	_____

REMARKS

The sample consisted of one 1 quart plastic bottle of water

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1978

Roswell, New Mexico 88201

Telephone 505 622 4041

W. P. Tomlinson

District Engineer



May 20, 1970

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.

Secretary-Director

File

Re: Produced Water Samples Required by
Commission Order R-969 Entered
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of laboratory
analysis of the latest produced water sample from the Swearingen-
Shugart Waterflood Project.

Yours very truly,

WPT by J J Lued

W. P. Tomlinson

WPT:lfs

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88201

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

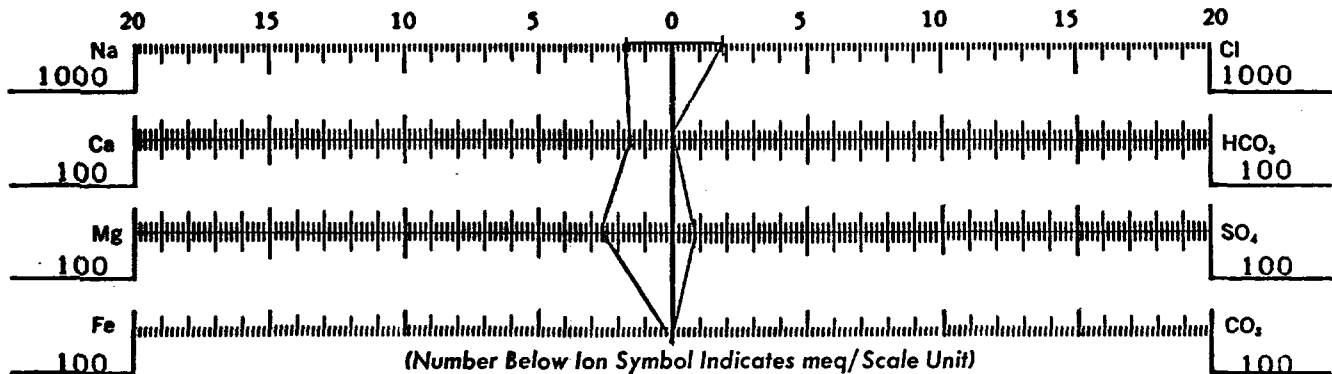
(01-0376)

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Shugart Lease Swearinger Waterflood Well No. _____
 Formation _____ Depth _____ Unit _____ Perf. _____
 Source of Sample Produced Water
 Date Collected 4-22-70 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-3639 Specific Gravity 1.082 pH 7.3
 Total Dissolved Solids 117015 Resistivity (Ohmmeters at 68° F.) 0.079 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>117015</u>	
Sodium (Calc.)	<u>37700</u>	<u>1638.2</u>
Iron (Dissolved)	<u>0</u>	<u>0.0</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2990</u>	<u>149.2</u>
Magnesium	<u>3010</u>	<u>247.4</u>
Chloride	<u>69100</u>	<u>1948.6</u>
Bicarbonate	<u>325</u>	<u>5.3</u>
Carbonate	<u>0</u>	<u>0.0</u>
Sulfate	<u>3890</u>	<u>80.9</u>

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F
 Calcium Sulfate Stability at 95° F
 Concentration 80.9 meq/l.
 Barium Sulfate Stability at 95° F
 Concentration _____ meq/l.

0.60
 Calc. Solubility 79.41 meq/l.
 Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	
Calcium _____ as _____	
Magnesium _____ as _____	
Sulfate _____ as _____	
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

Scaling Tendency POS.
 Percent Saturation 100.00
 Percent Saturation _____

REMARKS

The sample consisted of one 1 quart plastic bottle of water.

AtlanticRichfieldCompany North American Producing Division
Permian District
Post Office Box 1610
Midland, Texas 79701
Telephone 915 682 8631

70 SEP 15 PM 1 05



September 14, 1970

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary Director

Re: Analysis of Produced Water as per
Commission Order P-2969 Entered In
Case No. 3302, Concerning Atlantic
Richfield Company
Swearingen-Shugart Waterflood Project

File

Gentlemen:

As per the above Order, we are required to submit tri-monthly produced water analysis from the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses.

Yours very truly,

W. P. Tomlinson

WTP/agp

Attachments

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capital
Santa Fe, New Mexico 87501

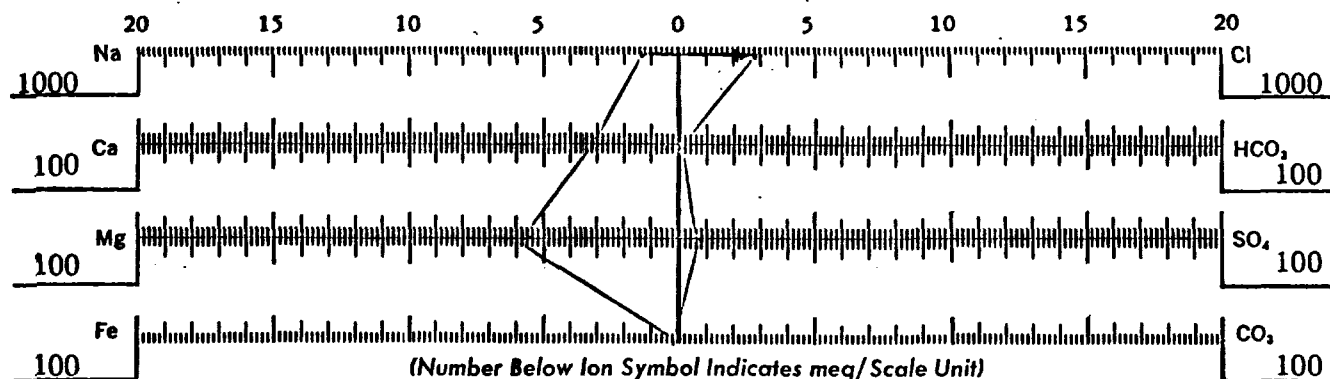
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Shugart Lease Swearingen Well No. _____
 Formation _____ Depth _____ Perf. _____
 Source of Sample Produced Water
 Date Collected 7-20-70 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-3826 Specific Gravity 1.095 pH 6.9
 Total Dissolved Solids 131802 Resistivity (Ohmmeters at 68° F.) 0.073 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>131802</u>	
Sodium (Calc.)	<u>33300</u>	<u>1449.4</u>
Iron (Dissolved)	<u>0</u>	<u>0.0</u>
Barium	<u>0</u>	<u>0.0</u>
Calcium	<u>6570</u>	<u>327.8</u>
Magnesium	<u>7108</u>	<u>584.3</u>
Chloride	<u>80800</u>	<u>2278.6</u>
Bicarbonate	<u>174</u>	<u>2.9</u>
Carbonate	<u>0</u>	<u>0.0</u>
Sulfate	<u>3850</u>	<u>80.0</u>

TOTAL IRON

-

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F

Calcium Sulfate Stability at 95° F

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	_____
Calcium _____ as _____	_____
Magnesium _____ as _____	_____
Sulfate _____ as _____	_____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	_____
(Quan.)	_____
(Qual.)	_____

REMARKS

The sample consisted of one 1 quart plastic bottle of water

Atlantic Richfield Company

North American Producing Division
Permian District - West Area
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

ST NOV 16 AM 13 1970



November 13, 1970

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required by
~~Commission Order R-2969 Entered~~
In Case No. 3302, Concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood Project

File

Gentlemen:

As per the above Order, we submit the results of laboratory analysis of the latest produced water sample from the Swearingen-Shugart waterflood project.

Yours very truly,

E. M. Pringle

EMP:rhs

Attach.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

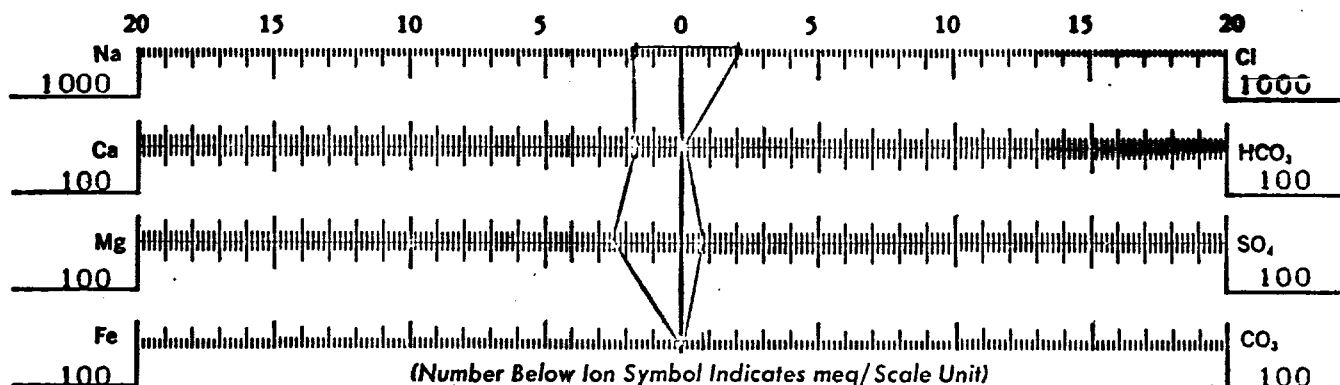
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Swearinger Well No. 70
Formation Permian Depth 100
Source of Sample Wellhead
Date Collected 10-20-70 by

REPORT OF WATER ANALYSIS

Lab. Number A-3899 Specific Gravity 1.0855 pH 6.8
Total Dissolved Solids 123345 Resistivity (Ohmmeters at 68° F.) 0.077 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	123345	
Sodium (Calc.)	40000	1739.4
Iron (Dissolved)	0	0.0
Barium	-	-
Calcium	3190	159.2
Magnesium	2990	245.8
Chloride	73000	2058.6
Bicarbonate	195	3.2
Carbonate	0	0.0
Sulfate	3970	82.6

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F -0.4
Calcium Sulfate Stability at 95° F
Concentration 82.6 meq/l.
Barium Sulfate Stability at 95° F
Concentration meq/l.

Calc. Solubility 77.33 meq/l.
Calc. Solubility meq/l.

Scaling Tendency NEG.
Percent Saturation 100.00
Percent Saturation

REMARKS

The sample consisted of one 1 quart plastic bottle of water.

Atlantic Richfield Company

North American Producing Division
Permian District - West Area
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041



February 8, 1971

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.,
Secretary-Director

Re: ~~Produced Water~~ Samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company -
Swearingen - Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results of
laboratory analysis of the latest produced water
sample from the Swearingen-Shugart waterflood
project.

Yours very truly,

E. M. Pringle
E. M. Pringle

EMP:rhs
Attach.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

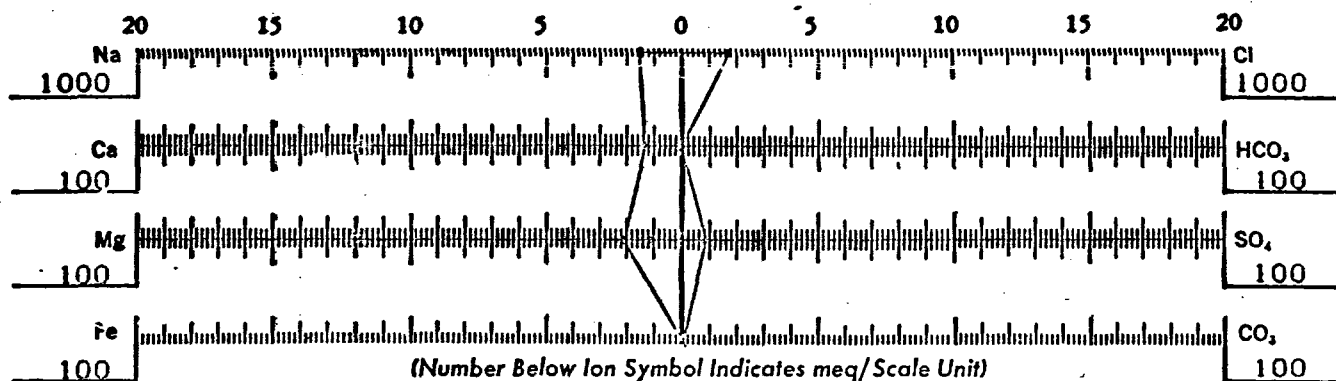
9 AM 8 04
71 FEB 11

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen Well No. 1
Formation _____ Depth _____ Perf. _____
Source of Sample _____
Date Collected Rec: 1-18-71 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-3997 Specific Gravity 1.0779 pH 7.1
Total Dissolved Solids 109289 Resistivity (Ohmmeters at 68° F.) .087 Hydrogen Sulfide ABSEN

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	109289	
Sodium (Calc.)	35400	1539.2
Iron (Dissolved)	0	0.
Barium	-	-
Calcium	2890	144.2
Magnesium	2580	212.1
Chloride	64000	1804.8
Bicarbonate	259	4.2
Carbonate	0	0.
Sulfate	4160	86.5

TOTAL IRON _____

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F
Calcium Sulfate Stability at 95° F
Concentration 86.5 meq/l.
Barium Sulfate Stability at 95° F
Concentration _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	as _____
Calcium	as _____
Magnesium	as _____
Sulfate	as _____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____ (Qual.) _____

Scaling Tendency POS.
Percent Saturation 100.00
Calc. Solubility 81.86 meq/l.
Calc. Solubility _____ meq/l.
Percent Saturation _____

REMARKS

AtlanticRichfieldCompany

North American Producing Division
Permian District - West Area
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

13 JUN 1971



May 17, 1971

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.,
Secretary-Director

Re: Produced Water Samples required by
Commission Order R-2969 entered in
Case No. 3302 concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above Order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen-Shugart water-
flood project.

Yours very truly,

E. M. Pringle
E. M. Pringle

EMP:rhs
Attach.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

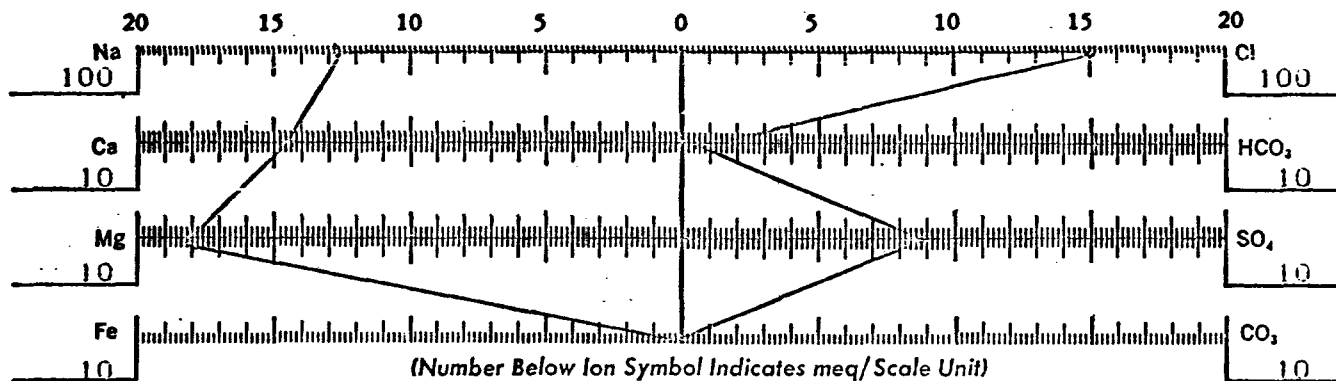
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Sweainger Lease _____ Well No. _____
 Formation _____ Depth _____ Perf. _____
 Source of Sample Produced Water
 Date Collected Rec: 4-26-71 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-4100 Specific Gravity 1.0661 pH 7.6
 Total Dissolved Solids 92599 Resistivity (Ohmmeters at 68° F.) .096 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>92599</u>	
Sodium (Calc.)	<u>29400</u>	<u>1276.9</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2890</u>	<u>124.2</u>
Magnesium	<u>2210</u>	<u>181.7</u>
Chloride	<u>53500</u>	<u>1506.7</u>
Bicarbonate	<u>349</u>	<u>5.7</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4250</u>	<u>88.4</u>

TOTAL IRON

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F

Calcium Sulfate Stability at 95° F

Concentration 38.4 meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	<u>as</u>
Calcium	<u>as</u>
Magnesium	<u>as</u>
Sulfate	<u>as</u>
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	_____
(Quan.)	_____
(Qual.)	_____

.76

Scaling Tendency

PDS.

Calc. Solubility 78.93 meq/l.

Percent Saturation

100.00

Calc. Solubility _____ meq/l.

Percent Saturation

REMARKS



March 9, 1972

New Mexico Oil Conservation
Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

RECEIVED
MAR 10 1972
OIL CONSERVATION COMM.
SANTA FE

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced Water Samples Required By
~~Commission Order R-2969~~ entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

File

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry
L. C. Hudry

Attach.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS

DIVISION OF SONICS INTERNATIONAL, INC.

Petroleum Service Laboratory

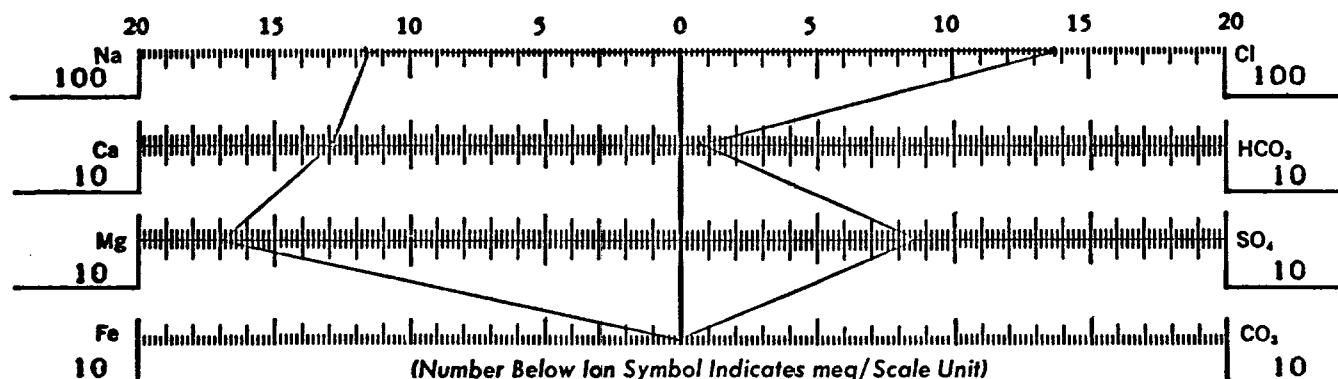
DALLAS, TEXAS

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Swearingen Lease Swearingen Well No.
 Formation Depth Perf.
 Source of Sample Heater Treater - Produced Water
 Date Collected 2-8-72 by

REPORT OF WATER ANALYSIS

Lab. Number A-4483 Specific Gravity 1.0610 pH 6.7
 Total Dissolved Solids 84581 Resistivity (Ohmmeters at 68° F.) .341 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>84581</u>	
Sodium (Calc.)	<u>26800</u>	<u>1163.8</u>
Iron * (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>0</u>	<u>0.</u>
Calcium	<u>2600</u>	<u>129.7</u>
Magnesium	<u>2060</u>	<u>169.3</u>
Chloride	<u>48600</u>	<u>1370.5</u>
Bicarbonate	<u>381</u>	<u>6.2</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4140</u>	<u>86.1</u>

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F

Calcium Sulfate Stability at 95°F

Concentration 86.1 meq/l.

Barium Sulfate Stability at 95° F

Concentration meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	<u> </u>
Oil (Solvent Soluble)	<u> </u>
Acid Solubles	<u> </u>
Iron	<u>as</u>
Calcium	<u>as</u>
Magnesium	<u>as</u>
Sulfate	<u>as</u>
Organic (Ignition Loss)	<u> </u>
Acid Insolubles	<u> </u>
Sand & Clay	<u> </u>
Barium Sulfate	<u> </u>
	(Quan.) <u> </u>
	(Qual.) <u> </u>

- .17

Scaling Tendency NEG.

Calc. Solubility 81.22 meq/l.

Percent Saturation 100.00

Calc. Solubility meq/l.

Percent Saturation

REMARKS

AtlanticRichfieldCompany

North American Producing Division
Permian District - West Area
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041



December 20, 1971

RECEIVED
- 022 1971
OIL CONSERVATION COMM.
SANTA FE

New Mexico Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.,
Secretary-Director

Re: Produced Water Samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

File
Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry

LCH:rhs
Attach.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 88501

PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

11 22 1971

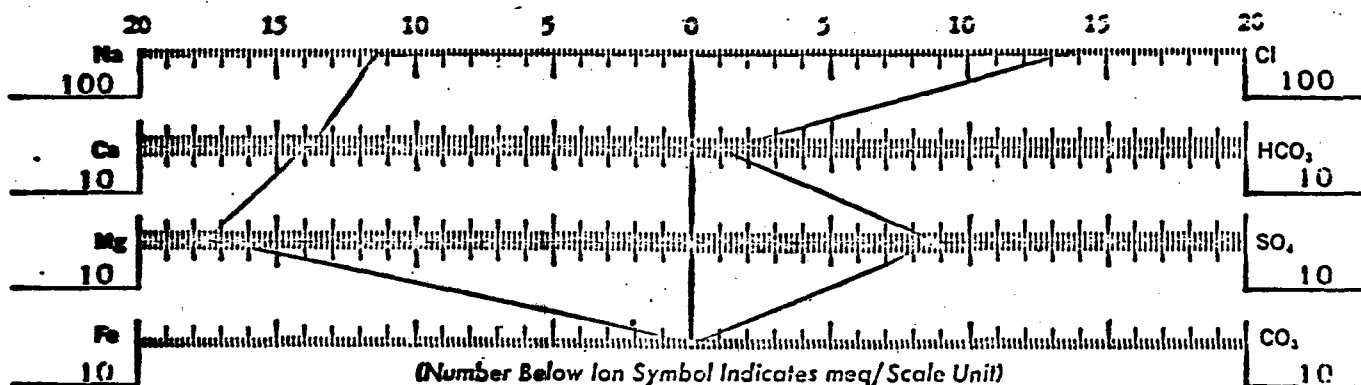
OIL CONSERVATION COMM.
 SANTA FE

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Shugart Lease Swearingen Well No. R-6
 Formation _____ Depth _____ Perf. _____
 Source of Sample _____
 Date Collected 11-12-71 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-4338 Specific Gravity 1.0609 pH 6.8
 Total Dissolved Solids 34529 Resistivity (Ohmmeters at 68° F.) .103 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>34529</u>	
Sodium (Calc.)	<u>26400</u>	<u>1146.9</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2770</u>	<u>138.2</u>
Magnesium	<u>2150</u>	<u>176.7</u>
Chloride	<u>48300</u>	<u>1362.1</u>
Bicarbonate	<u>559</u>	<u>9.2</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4350</u>	<u>90.5</u>

TOTAL IRON

-

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F

.12

Calcium Sulfate Stability at 95° F

Concentration 90.5 meq/l.

Calc. Solubility 79.77 meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

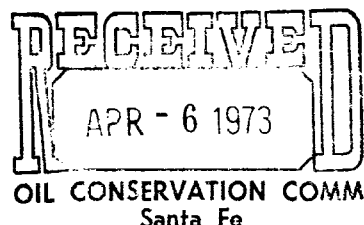
	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	<u>as</u>
Calcium	<u>as</u>
Magnesium	<u>as</u>
Sulfate	<u>as</u>
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

REMARKS

The sample consisted of one 1 pint bottle of water

AtlanticRichfieldCompany

North American Producing Division
Permian District — West Area
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041



April 4, 1973

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.,
Secretary-Director

File Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

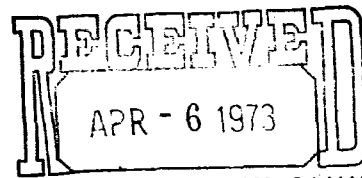
L. C. Hudry

Attach.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS
DIVISION OF SONICS INTERNATIONAL, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

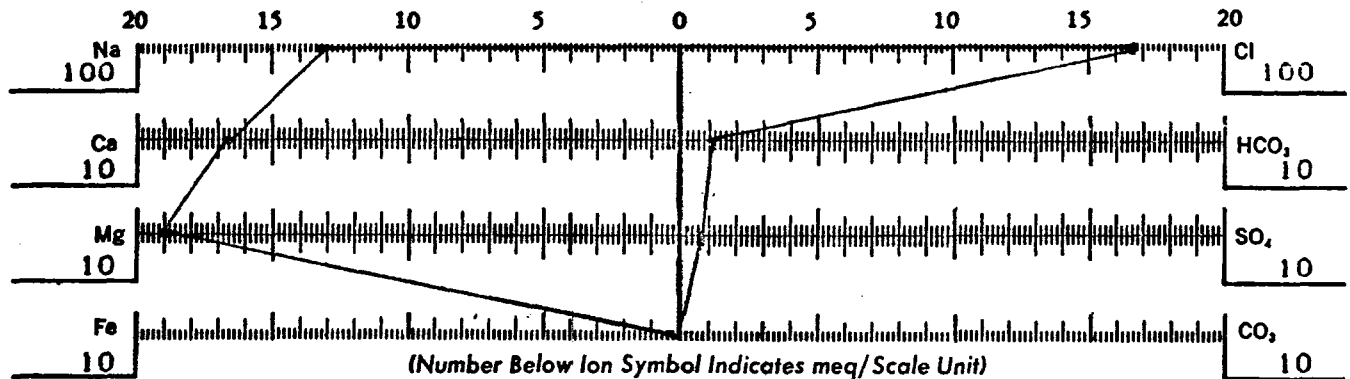


Client Atlantic Richfield Company County Eddy State New Mexico
Field Shugart Lease Swearingen Lease Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water
Date Collected 2-21-73 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-5015 Specific Gravity 1.0718 pH 7.3
Total Dissolved Solids 96049 Resistivity (Ohmmeters at 68° F.) .092 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	96049	
Sodium (Calc.)	30400	1323.2
Iron (Dissolved)	0	0.
Barium	0	0.
Calcium	3340	166.7
Magnesium	2330	191.5
Chloride	59000	1663.8
Bicarbonate	644	10.6
Carbonate	0	0.
Sulfate	335	7.0

TOTAL IRON

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F
Calcium Sulfate Stability at 95° F
Concentration 6.97 meq/l.
Barium Sulfate Stability at 95° F
Concentration 0. meq/l.

.81
Calc. Solubility 51.17 meq/l.
Calc. Solubility .01 meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

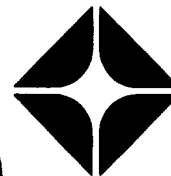
	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	as _____
Calcium	as _____
Magnesium	as _____
Sulfate	as _____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

Scaling Tendency POS.
Percent Saturation 13.62
Percent Saturation 0.

REMARKS

Atlantic Richfield Company

North American Producing Division
Permian District - West Area
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041



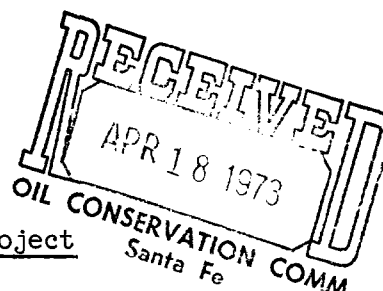
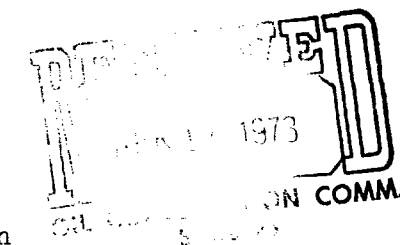
April 17, 1973

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.,
Secretary-Director

Re: Corrosion Coupon Results as per
Commission Order R-2969 entered
in Case No. 3302, concerning
Atlantic Richfield Company
Swearingen Shugart Waterflood Project

File



Gentlemen:

As per the above order, we submit the results
of laboratory analyses of the latest exposed
corrosion coupons.

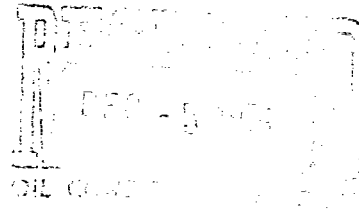
Yours very truly,

L.C. Hudry
L. C. Hudry

Attachs.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



December 4, 1974

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attn: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,


L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501



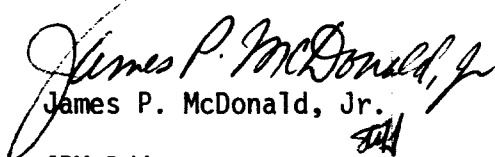
Date: November 26, 1974
To: Mr. Cecil Johnson, Hobbs, New Mexico
From: J.P. McDonald, Jr., PRC-E144, Dallas, Texas
Subject: Produced Water Analysis
Swearingen Waterflood
Shugart Field, Eddy County, New Mexico

Letter: 40-739

Attached is a water analysis (A 5852) of produced water from this lease as requested.

This analysis is performed on a quarterly basis in compliance with the request from the New Mexico Oil Conservation Commission.

A copy of the attached invoice, approved for payment, has been sent to Accounts Payable.


James P. McDonald, Jr.

JPMcD/jap

Attachment

PRODUCTION PROFITS

DIVISION OF SONICS INTERNATIONAL, INC.

Petroleum Service Laboratory

DALLAS, TEXAS

Client Atlantic Richfield Company

County Eddy

State New Mexico

Field Shugart

Lease Swearingen

Well No. _____

Formation _____

Depth _____

Perf. _____

Source of Sample Produced Water

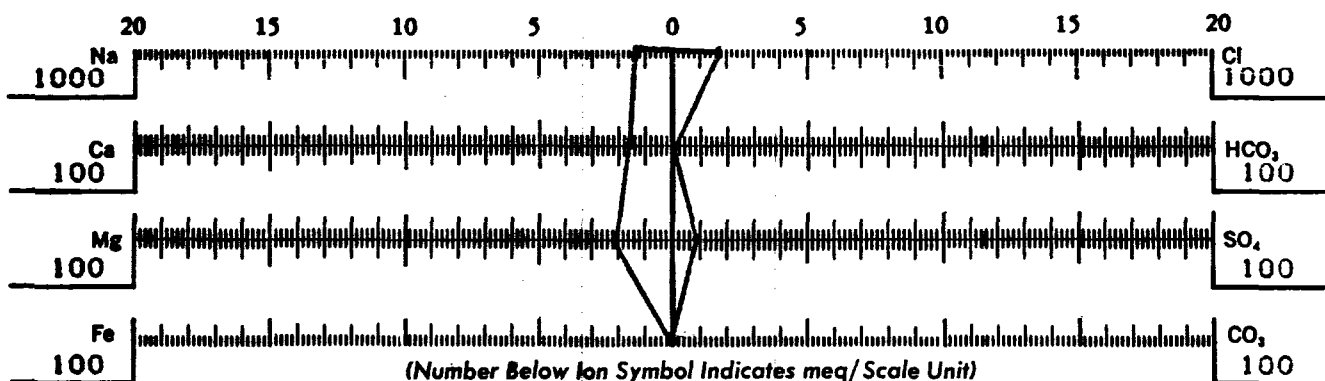
Date Collected Rec: 11-14-74

by _____

REPORT OF WATER ANALYSIS

Lab. Number A-5352 Specific Gravity 1.0726 pH 7.2
Total Dissolved Solids 103896 Resistivity (Ohmmeters at 68° F.) .085 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	103896	
Sodium (Calc.)	32700	1422.9
Iron (Dissolved)	0	0.
Barium	-	-
Calcium	3260	162.7
Magnesium	2620	215.4
Chloride	60300	1700.5
Bicarbonate	876	14.4
Carbonate	0	0.
Sulfate	4140	86.1

TOTAL IRON 11

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F

.88

Calcium Sulfate Stability at 95° F

Concentration 86.11 meq/l.

Calc. Solubility 74.41 meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	as _____
Calcium	as _____
Magnesium	as _____
Sulfate	as _____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

Scaling Tendency

P.S.

Percent Saturation

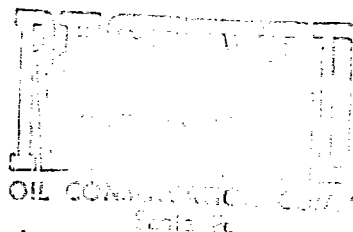
100.00

Percent Saturation

REMARKS



Case 3302
2-1-1974



September 25, 1973

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.

Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry
L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission

P. O. Drawer DD

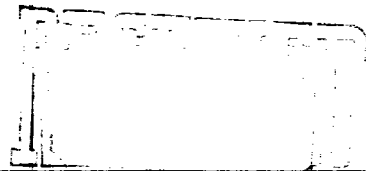
Artesia, New Mexico 88210

New Mexico State Engineer's Office

State Capitol

Santa Fe, New Mexico 87501

PRODUCTION PROFITS
DIVISION OF SONICS INTERNATIONAL, INC.
Petroleum Service Laboratory
DALLAS, TEXAS

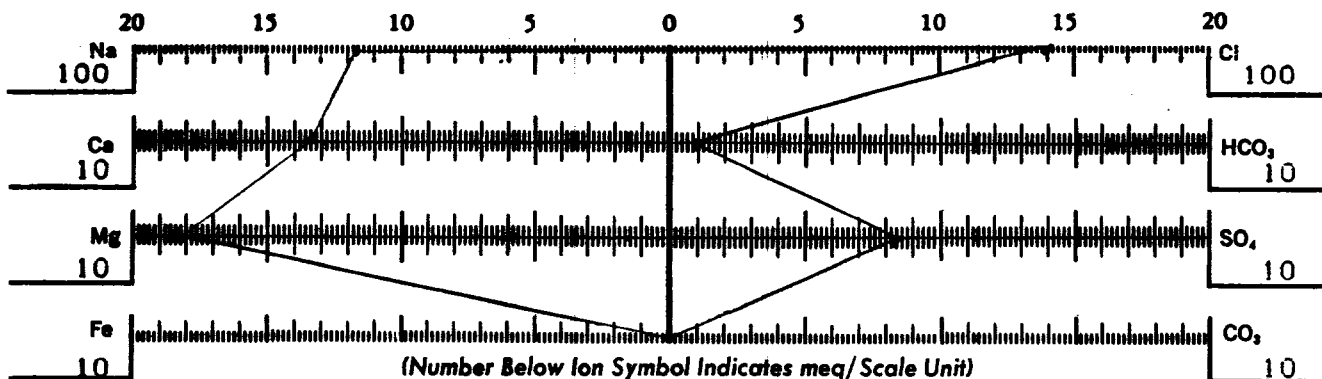


Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen WF Well No. Santa Fe
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water
Date Collected Rec: 8-2-73 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-5182 Specific Gravity 1.0610 pH 7.4
Total Dissolved Solids 86575 Resistivity (Ohmmeters at 68° F.) .089 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>86575</u>	
Sodium (Calc.)	<u>27200</u>	<u>1181.4</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>0</u>	<u>0.</u>
Calcium	<u>2700</u>	<u>134.7</u>
Magnesium	<u>2220</u>	<u>182.5</u>
Chloride	<u>49800</u>	<u>1404.4</u>
Bicarbonate	<u>595</u>	<u>9.8</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4060</u>	<u>84.4</u>

TOTAL IRON _____

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F _____
Calcium Sulfate Stability at 95° F _____
Concentration 84.45 meq/l.
Barium Sulfate Stability at 95° F _____
Concentration _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	
Calcium _____ as _____	
Magnesium _____ as _____	
Sulfate _____ as _____	
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

REMARKS

Scaling Tendency POS.
Percent Saturation 100.00
Percent Saturation _____

AtlanticRichfieldCompany

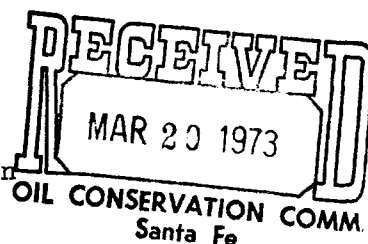
North American Producing Division
Permian District - West Area
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041



THEN

March 19, 1973

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501



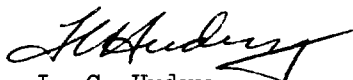
Attention: Mr. A. L. Porter, Jr.,
Secretary-Director

File Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen-Shugart
Waterflood Project

Gentlemen:

As per the above Order, we submit the results
of laboratory analyses of the latest produced
water samples from the Swearingen-Shugart water-
flood project.

Yours very truly,

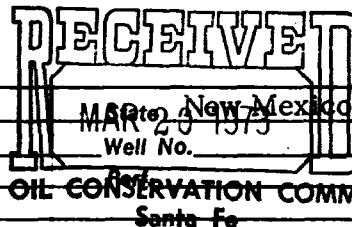

L. C. Hudry

Attachs.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

DIVISION OF SONICS INTERNATIONAL, INC.
Petroleum Service Laboratory
 DALLAS, TEXAS



Client Atlantic Richfield Company

County Eddy

Field Shugart

Lease Swearingen

Formation _____

Depth _____

Source of Sample Produced water

Date Collected 11-15-72

by _____

State New Mexico

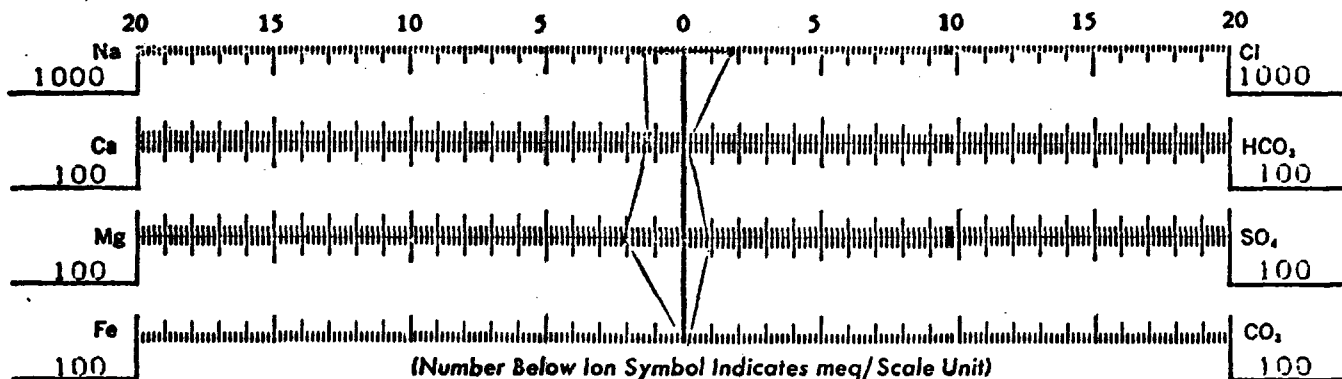
Well No. _____

OIL CONSERVATION COMM.
 Santa Fe

REPORT OF WATER ANALYSIS

Lab. Number A-4961 Specific Gravity 1.0743 pH 7.1
 Total Dissolved Solids 105540 Resistivity (Ohmmeters at 68° F.) .093 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>105540</u>	
Sodium (Calc.)	<u>33800</u>	<u>1468.4</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2900</u>	<u>144.7</u>
Magnesium	<u>2670</u>	<u>219.5</u>
Chloride	<u>61900</u>	<u>1745.6</u>
Bicarbonate	<u>410</u>	<u>6.7</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>3860</u>	<u>80.3</u>

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F .41

Calcium Sulfate Stability at 95° F

Concentration 80.29 meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	<u>as</u>
Calcium	<u>as</u>
Magnesium	<u>as</u>
Sulfate	<u>as</u>
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

REMARKS

Scaling Tendency P.S.

Percent Saturation 100.00

Percent Saturation _____

Calc. Solubility 78.79 meq/l.

Calc. Solubility _____ meq/l.

Petroleum Service Laboratory
DALLAS, TEXAS

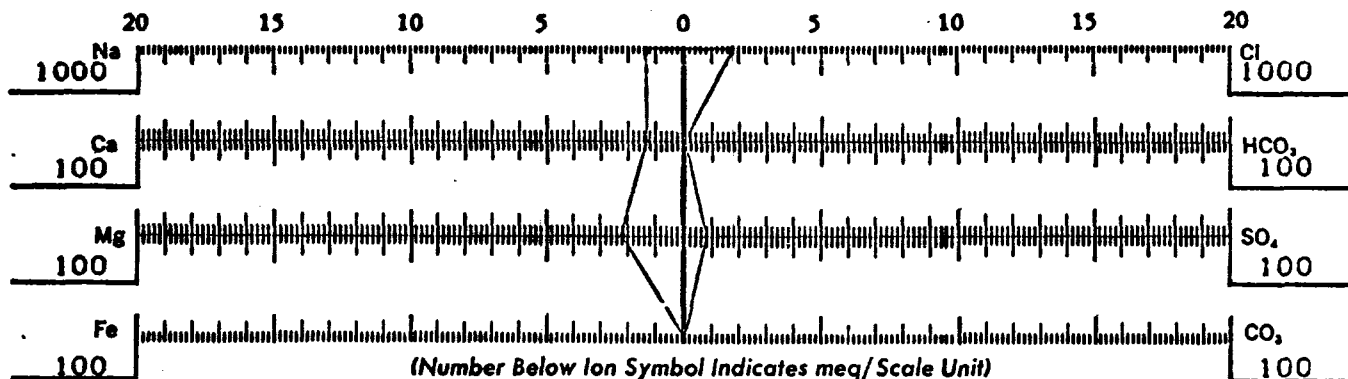
Client Atlantic Richfield Company

County Eddy State New Mexico
Field Shugart Lease Swearinger Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample Produced Water - Heater Treater
Date Collected 8-11-72 by _____

REPORT OF WATER ANALYSIS

Lab. Number P-4879 Specific Gravity 1.0746 pH 6.9
Total Dissolved Solids 104898 Resistivity (Ohmmeters at 68° F.) .089 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>104898</u>	
Sodium (Calc.)	<u>33300</u>	<u>1449.8</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2990</u>	<u>149.2</u>
Magnesium	<u>2740</u>	<u>225.2</u>
Chloride	<u>61600</u>	<u>1737.1</u>
Bicarbonate	<u>388</u>	<u>6.4</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>3880</u>	<u>80.7</u>

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F

.20

Calcium Sulfate Stability at 95° F

Concentration 80.70 meq/l.

Calc. Solubility 77.33 meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	<u>as</u>
Calcium	<u>as</u>
Magnesium	<u>as</u>
Sulfate	<u>as</u>
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

Scaling Tendency P0S.

Percent Saturation 100.00

Percent Saturation _____

REMARKS

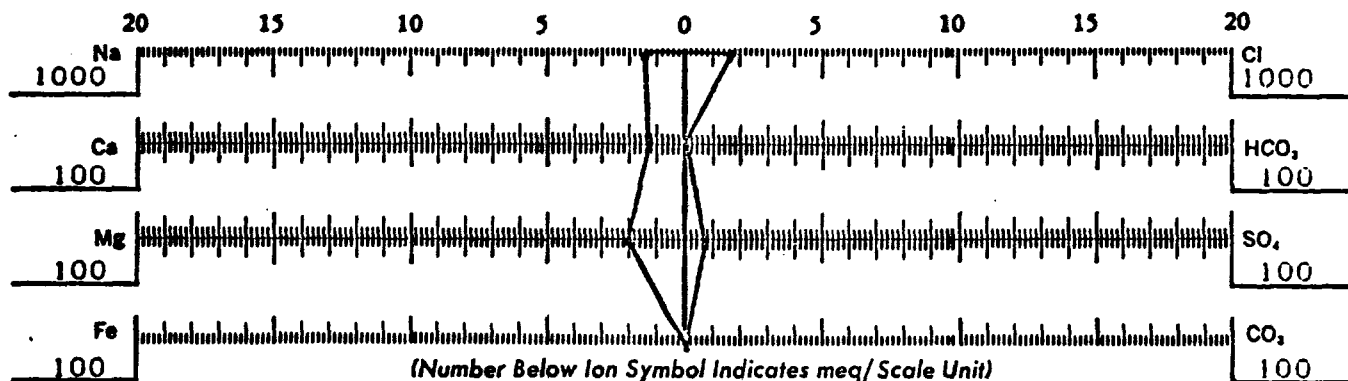
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen Waterflood Well No. _____
Formation _____ Depth _____ Perf. _____
Source of Sample produced water
Date Collected 5-9-72 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-4750 Specific Gravity 1.0707 pH 6.9
Total Dissolved Solids 101257 Resistivity (Ohmmeters at 68° F.) .096 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>101257</u>	
Sodium (Calc.)	<u>32400</u>	<u>1409.9</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2780</u>	<u>138.7</u>
Magnesium	<u>2550</u>	<u>209.6</u>
Chloride	<u>59300</u>	<u>1672.3</u>
Bicarbonate	<u>447</u>	<u>7.3</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>3780</u>	<u>78.6</u>

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F	<u>.20</u>	Scaling Tendency	<u>POS.</u>
Calcium Sulfate Stability at 95° F			
Concentration <u>78.6</u> meq/l.	Calc. Solubility <u>79.42</u> meq/l.	Percent Saturation	<u>98.96</u>
Barium Sulfate Stability at 95° F			
Concentration _____ meq/l.	Calc. Solubility _____ meq/l.	Percent Saturation	_____

REMARKS

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	
Calcium _____ as _____	
Magnesium _____ as _____	
Sulfate _____ as _____	
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

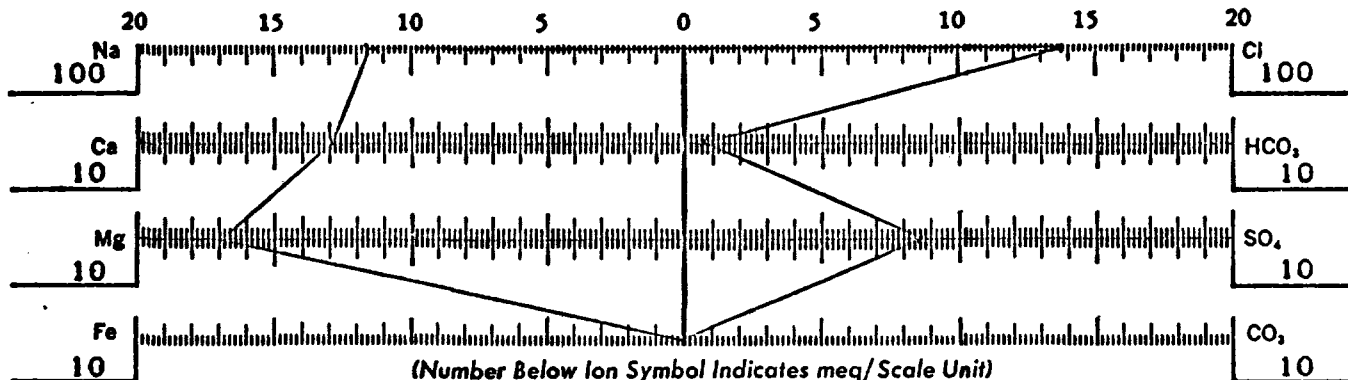
DIVISION OF SERVICES INTERNATIONAL, INC.
Petroleum Service Laboratory
 DALLAS, TEXAS

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field _____ Lease Swearingen Well No. _____
 Formation _____ Depth _____ Perf. _____
 Source of Sample Heater Treater - Produced Water
 Date Collected 2-8-72 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-4483 Specific Gravity 1.0610 pH 6.7
 Total Dissolved Solids 84581 Resistivity (Ohmmeters at 68° F.) .341 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>84581</u>	
Sodium (Calc.)	<u>26800</u>	<u>1163.8</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>0</u>	<u>0.</u>
Calcium	<u>2600</u>	<u>129.7</u>
Magnesium	<u>2060</u>	<u>169.3</u>
Chloride	<u>48600</u>	<u>1370.5</u>
Bicarbonate	<u>381</u>	<u>6.2</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4140</u>	<u>86.1</u>

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F
 Calcium Sulfate Stability at 95° F
 Concentration 86.1 meq/l.
 Barium Sulfate Stability at 95° F
 Concentration _____ meq/l.

-0.17
 Calc. Solubility 81.22 meq/l.
 Calc. Solubility _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	_____
Calcium _____ as _____	_____
Magnesium _____ as _____	_____
Sulfate _____ as _____	_____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	_____
(Quan.) _____	_____
(Qual.) _____	_____

Scaling Tendency NEG.
 Percent Saturation 100.00
 Percent Saturation _____

REMARKS

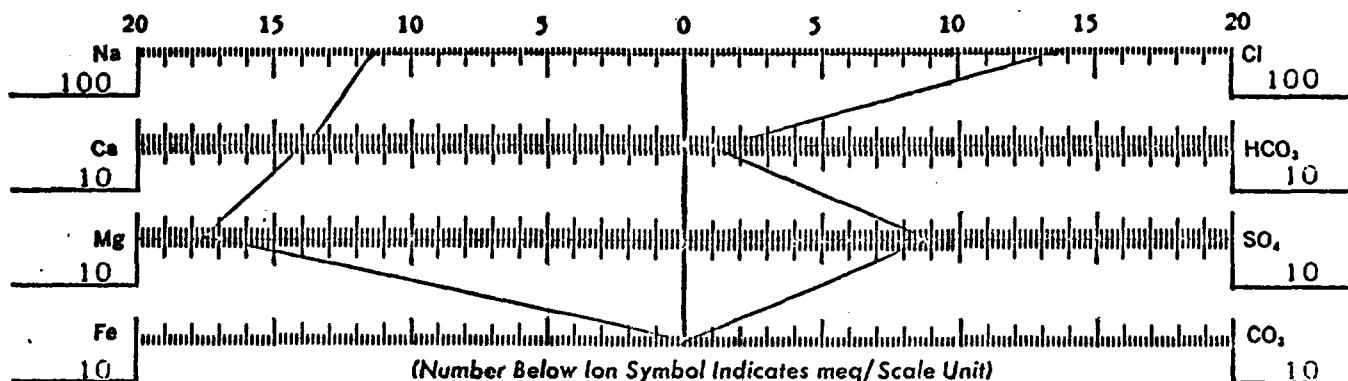
Petroleum Service Laboratory
DALLAS, TEXAS

Client Atlantic Richfield Company
County Eddy State New Mexico
Field Shugart Lease Swearingen Well No. R-6
Formation _____ Depth _____ Perf. _____
Source of Sample _____
Date Collected 11-12-71 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-4388 Specific Gravity 1.0609 pH 6.8
Total Dissolved Solids 84529 Resistivity (Ohmmeters at 68° F.) .108 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>84529</u>	
Sodium (Calc.)	<u>26400</u>	<u>1146.9</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>2770</u>	<u>138.2</u>
Magnesium	<u>2150</u>	<u>176.7</u>
Chloride	<u>48300</u>	<u>1362.1</u>
Bicarbonate	<u>559</u>	<u>9.2</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>4350</u>	<u>90.5</u>

TOTAL IRON -

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F	<u>.12</u>	Scaling Tendency	<u>P.O.S.</u>
Calcium Sulfate Stability at 95° F		Percent Saturation	<u>100.00</u>
Concentration <u>90.5</u> meq/l.	Calc. Solubility <u>79.77</u> meq/l.	Percent Saturation	
Barium Sulfate Stability at 95° F		Percent Saturation	
Concentration _____ meq/l.	Calc. Solubility _____ meq/l.	Percent Saturation	

REMARKS

The sample consisted of one 1 pint bottle of water

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron	<u>as</u>
Calcium	<u>as</u>
Magnesium	<u>as</u>
Sulfate	<u>as</u>
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

AtlanticRichfieldCompany

North American Producing Division

New Mexico-Arizona District

Post Office Box 1710

Hobbs, New Mexico 88240

Telephone 505 393 7163



Case 3302

April 16, 1975

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry

LCH:rm

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

PRODUCTION PROFITS

DIVISION OF SONICS INTERNATIONAL, INC.

Petroleum Service Laboratory

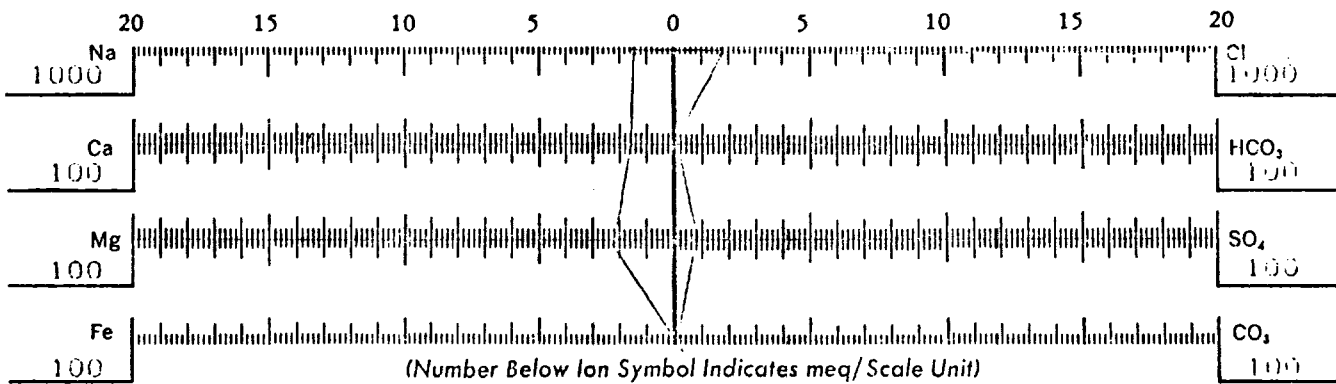
DALLAS, TEXAS

Client Atlantic Richfield Company County Eddy State New Mexico
 Field Shugart Lease Swearingen Well No. _____
 Formation _____ Depth _____ Perf. _____
 Source of Sample Produced Water
 Date Collected Rec: 3-4-75 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-6067 Specific Gravity 1.01732 pH 7.1
 Total Dissolved Solids 1061.06 Resistivity (Ohmmeters at 68° F.) .023 Hydrogen Sulfide NEGATIVE

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	<u>1061.06</u>	
Sodium (Calc.)	<u>335.00</u>	<u>1457.5</u>
Iron (Dissolved)	<u>0</u>	<u>0.</u>
Barium	<u>-</u>	<u>-</u>
Calcium	<u>32.90</u>	<u>164.2</u>
Magnesium	<u>26.30</u>	<u>216.2</u>
Chloride	<u>615.00</u>	<u>1734.3</u>
Bicarbonate	<u>94.6</u>	<u>16.2</u>
Carbonate	<u>0</u>	<u>0.</u>
Sulfate	<u>42.00</u>	<u>87.4</u>

TOTAL IRON 3

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F .85

Calcium Sulfate Stability at 95° F

Concentration 87.36 meq/l.

Barium Sulfate Stability at 95° F

Concentration _____ meq/l.

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron as _____	_____
Calcium as _____	_____
Magnesium as _____	_____
Sulfate as _____	_____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate (Quan.)	_____
(Qual.)	_____

Scaling Tendency P.S.

Calc. Solubility 74.72 meq/l.

Percent Saturation 100.00

Calc. Solubility _____ meq/l.

Percent Saturation _____

REMARKS

The sample consisted of one quart bottle of cloudy water with black sediment.



June 15, 1976

New Mexico Oil Conservation Commission

P. O. Box 2088

Santa Fe, NM 87501

Attention: Mr. J. Ramey, Jr.
Secretary-Director

Re: Produced water samples required by
Commission Order R-2969 entered in
Case No. 3302, concerning Atlantic
Richfield Company - Swearingen -
Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analysis of the latest produced
water sample from the Swearingen Shugart water-
flood project.

Yours very truly,

L. C. Hudry

LCH/rd

Attachment

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, NM 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, NM 87501

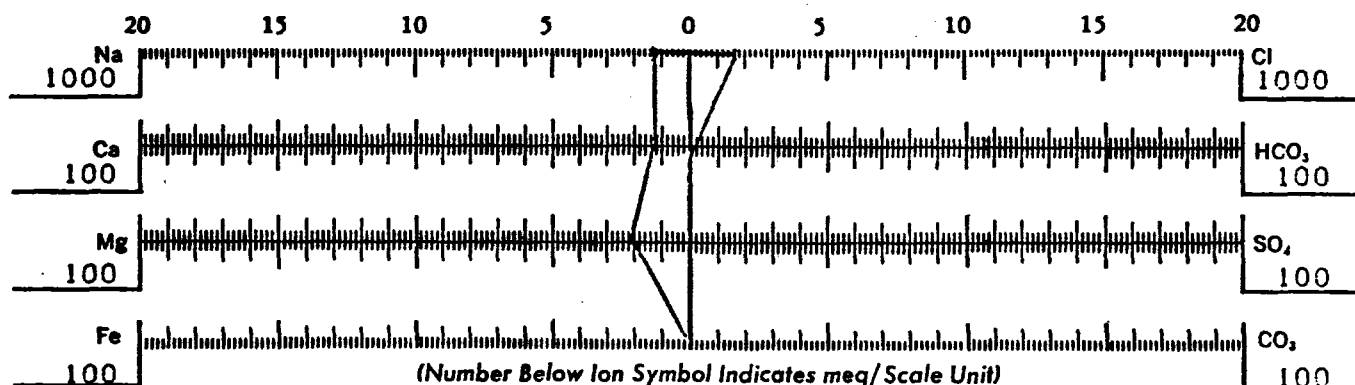
PRODUCTION PROFITS, INC.
Petroleum Service Laboratory
 DALLAS, TEXAS

Client Atlantic Richfield Company
 County Eddy State New Mexico
 Field Shugart Lease Swearingen Well No. 17234
 Formation _____ Depth _____ Perf. _____
 Source of Sample Produced Water Sample 10-1976
 Date Collected 5/76 by _____

REPORT OF WATER ANALYSIS

Lab. Number A-6490 Specific Gravity 1.0709 pH 6.9
 Total Dissolved Solids 100356 Resistivity (Ohmmeters at 68° F.) .087 Hydrogen Sulfide ABSENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	100356	
Sodium (Calc.)	31800	1382.2
Iron (Dissolved)	0	0.
Barium	-	-
Calcium	2770	138.2
Magnesium	2700	221.9
Chloride	58600	1652.5
Bicarbonate	786	12.9
Carbonate	0	0.
Sulfate	3700	77.0

TOTAL IRON 17

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F	<u>.44</u>	Scaling Tendency	<u>POS.</u>
Calcium Sulfate Stability at 95° F			
Concentration <u>76.96</u> meq/l.	Calc. Solubility <u>78.88</u> meq/l.	Percent Saturation	<u>97.56</u>
Barium Sulfate Stability at 95° F			
Concentration _____ meq/l.	Calc. Solubility _____ meq/l.	Percent Saturation	_____

REMARKS

PRECIPITATED AND SUSPENDED SOLIDS ANALYSIS

	mg/l
Total Undissolved Solids	_____
Oil (Solvent Soluble)	_____
Acid Solubles	_____
Iron _____ as _____	_____
Calcium _____ as _____	_____
Magnesium _____ as _____	_____
Sulfate _____ as _____	_____
Organic (Ignition Loss)	_____
Acid Insolubles	_____
Sand & Clay	_____
Barium Sulfate	(Quan.) _____
	(Qual.) _____

CORROSION COUPON EXPOSURE RESULTS

LEAD OR UNIT: 6493301 SAGARINEN WATERFLUDD

WELL OR PLANT: 6-3 COUPON LOCATION: INJECTION WELLHEAD

89012345078

TYPE SYSTEM: WATER INJECTION				POSITION: VERTICAL, VERTICAL FLUX				TYPE: BAR	
COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS/GNS	CORROSION RATE:MPY	BODY PITS IN MPY	END PITS DPTH RATE	REMARKS		
								AREAS OF PITS	
A-293	9-30-70 96	0.000	0.0200	0.2	0.020	75	0	CPN BODY ATTACK: SPOTTY ETCH	286
A-295	1-4-71	254.00W	0.0476	0.3				HLDR BLK ATTACK: NONE	
		0.00CF						UN WEST LEG OF SYSIM	
B-172	1-7-71 92	0.000	0.1471	0.7	0.005	19	0	CPN BODY ATTACK: SPOTTY ETCH	201
B-175	4-6-71	0.00W	0.0754	0.4				HLDR BLK ATTACK: NONE	
		0.00CF							
B-206	4-6-71 127	0.000	0.1046	0.0	0.009	25	0	CPN BODY ATTACK: SPOTTY ETCH	208
B-200	8-13-71	236.00W	0.1705	0.6				HLDR BLK ATTACK: NONE	
		0.00CF							
B-276	3-13-71 207	0.000	0.3009	0.9	0.014	24	0	CPN BODY ATTACK: HEAVY ETCH	207
B-277	3-7-72	400.00W	0.3025	0.9				HLDR BLK ATTACK: NONE	
		0.00CF							
C-764	5-7-72 125	0.000	0.8104	2.2	0.012	34	0	CPN BODY ATTACK: HEAVY ETCH	207
C-765	7-10-72	425.00W	0.6312	2.3				HLDR BLK ATTACK: NONE	
		0.00CF							
C-530	7-10-72 134	0.000	0.0441	0.2	0.000	21	0	CPN BODY ATTACK: SPOTTY ETCH	201
C-537	11-22-72	410.00W	0.0637	0.3				HLDR BLK ATTACK: NONE	
		0.00CF							
D-260	11-22-72 126	0.000	0.1144	0.5	0.005	14	0	CPN BODY ATTACK: SPOTTY ETCH	202
D-261	3-20-73	400.00W	0.1080	0.4				HLDR BLK ATTACK: ATTACK	
		0.00CF							

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 0493501 SHEARINGEN WATERFLOOD

WELL OR PLANT: E-HEADER COUPON LOCATION: INJECTION HEADER SUPPLY WATER

39012345079

TYPE SYSTEM: WATER INJECTION POSITION: HORIZONTAL, HORIZONTAL FLOW TYPE: BAR

Coupon #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS/GMS	CORROSION RATE:4PY	OVERALL BODY PITS	END PITS	DPH RATE	REMARKS
				IN	MPY	MILS	MPY	

A-849	9-30-70	90	0.088	1.0392	5.0	0.0	0	0 CPN BODY ATTACK: SPOTTY EICH
A-890	1-4-71		0.084	0.7226	3.4			HLDR BLK ATTACK: ATTACK

END PITS.

593

B-106	1-5-71	92	0.029	1.8978	4.2	0.04	11	0 CPN BODY ATTACK: HEAVY EICH
B-107	4-8-71		0.084	0.9919	4.0			HLDR BLK ATTACK: NONE

ISOLATED PITS

594

B-260	4-6-71	127	0.080	2.0403	7.2	0.0	0	0 CPN BODY ATTACK: OVERALL ATTACK
B-267	6-13-71		0.054	1.7611	6.3			HLDR BLK ATTACK: NONE

PITTING

595

B-672	6-13-71	201	0.086	7.9121	17.0	0.0	0	0 CPN BODY ATTACK: SEVERE OVERALL ATTACK
B-673	6-7-72		0.034	6.1331	17.4			HLDR BLK ATTACK: NONE

END PITS.

SEVERE THINNING

596

C-382	3-7-72	122	0.060	0.9208	2.3	0.001	2	0 CPN BODY ATTACK: SPOTTY EICH
C-386	7-10-72		0.084	1.4900	5.3			HLDR BLK ATTACK: ATTACK

ISOLATED PITS

597

C-538	7-10-72	134	0.080	0.2017	0.7	0.004	2	0 CPN BODY ATTACK: SPOTTY EICH
C-539	11-22-72		0.084	0.1483	0.5			HLDR BLK ATTACK: ATTACK

AREAS OF PITS

598

CORROSION COUPON EXPOSURE RESULTS

LEADER OR DATE: 04933-1 CARRIAGE WATERFLOOD

WELL OR PLANT: L-HEADS COUPON LOCATION: INJECTION HEADER ALT. PRODUCE-SUPPLY

09012345678

TYPE SYSTEM: WATER INJECTION POSITION: HORIZONTAL, HORIZONTAL FLOW TYPE: BAR

Coupon #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS: GMS	CORROSION RATE: MPY	DEPTH IN IN	DEPTH RATE MPY	END PITS	REMARKS
U-019	11-22-72 120	0.000	0.0001	0.3	0.0	0.0	3 CPN BDY ATTACK: SPOTTY EICH	
U-020	3-25-73	0.000	0.0494	0.2			HLDR BLK ATTACK: NONE	440 PITS.
		0.000						599

CORROSION COUPON EXPOSURE RESULTS

CLASS OR UNIT: 045301 SEARIGEN WATERFLOOD

WELL OR PLANT: F-HEADR COUPON LOCATION: INJECTION HEADER SUPPLY WATER

09112345575

TYPE SYSTEM: WATER INJECTION

POSITION: HORIZONTAL, VERTICAL FLOW

TYPE: BAR

Coupon #	EXPOSURE DATES	DAYS	PRODUCTION	DAILY WEIGHT LOSS: LBS	OVERALL CORROSION RATE: MPY	BOUY PITS IN	BOUY PITS DPTH RATE MPY	END PITS DPTH RATE MPY	REMARKS
----------	----------------	------	------------	------------------------	-----------------------------	--------------	-------------------------	------------------------	---------

0-017	11-22-72	126	0.000	2.6726	9.4	0.004	11	0.0	0 CPH BDY ATTACK: OVERALL ATTACK
0-018	3-25-73		600.000	1.6662	5.9				HLDR BLK ATTACK: ATTACK
			0.000						AREAS OF PITS

5/10

CORROSION COUPON EXPOSURE RESULTS

LEADS ON UNIT: 049331 SHEARING WATERFLOOD

WELL OR PLANT: NAME: COUPON LOCATION: INJECTION HEADER ALT. PRODUCE-SUPPLY

19012343070

TYPE SYSTEM: WATER INJECTION POSITION: HORIZONTAL, HORIZONTAL FLOW TYPE: BAR

COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS: GMS	OVERALL CORROSION RATE: MPY		BODY PITS		END PITS	REMARKS
				IN	MPY	IN	MPY		
0-098	9-30-70	0.000	0.0407	0.2	0.002	34	0	0	CPU BODY ATTACK: EVEN ETCH
0-099	1-4-71	0.000	0.0164	0.1					HLDR BLK ATTACK: NONE
0.00CF									
0-100	1-4-71	0.000	0.0417	0.1	0.002	12	0	0	CPU BODY ATTACK: AREAS OF ATTACK
0-101	4-8-71	0.000	0.0030	0.3					HLDR BLK ATTACK: NONE
0.00CF									
0-097	4-8-71	0.000	0.1590	0.6	0.007	20	0	0	CPU BODY ATTACK: HEAVY ETCH
0-098	8-13-71	0.000	0.1625	0.6					HLDR BLK ATTACK: NONE
0.00CF									
0-070	8-13-71	0.000	0.1597	0.4	0.004	7	0	0	CPU BODY ATTACK: SPOTTY ETCH
0-071	3-7-72	0.000	0.2134	0.5					HLDR BLK ATTACK: NONE
0.00CF									
THE POSITION OF THE COUPON STATION HAS BEEN CHANGED TO NOT DEFINED YET									
0-702	1-7-72	0.000	0.2186	0.8	0.005	14	0.008	23	CPU BODY ATTACK: SPOTTY ETCH
0-554	7-10-72	542.000	0.2307	0.9					HLDR BLK ATTACK: ATTACK
0.00CF									
THE POSITION OF THE COUPON STATION HAS BEEN CHANGED TO HORIZONTAL, HORIZONTAL FLOW									
0-240	7-10-72	0.000	0.1000	0.4	0.002	13	0	0	CPU BODY ATTACK: SPOTTY ETCH
0-561	11-22-72	410.000	0.1220	0.5					HLDR BLK ATTACK: NONE
0.00CF									

ISOLATED PITS

604

ISOLATED PITS

604

AREAS OF PITS

603

AREAS OF PITS

604

PITTING

603

PITTING

600

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 0495301 SHERIDAN WATERFLOOD

WELL TO PLANT: WIN A-6 COUPON LOCATION: INJECTION WELLHEAD

09012345075

TYPE SYSTEM: WATER INJECTION

POSITION: NOT DEFINED YET

TYPE: BAR

Coupon Exposure Dates Days Production Daily Weight Losses Rate MPY Overall Body Pits End Pits Corrosion Optm Rate DPTH Rate MPY Remarks

0-391	9-30-70	90	0.000	0.0029	0.1	0.0	0.0	0	CPM BODY ATTACK: EVEN ETCH	
0-392	1-4-71		117.00W	0.0049	0.1				HLDR BLK ATTACK: NONE	NO PITS.
			0.00CF						A-6 UN EST LEG DE SYS	0.7
0-170	1-4-71	92	0.000	0.1729	0.9	0.05	22	0	CPM BODY ATTACK: SPOTTY ETCH	
0-171	4-8-71		0.03W	0.0446	0.3				HLDR BLK ATTACK: NONE	AREAS OF PITS
			0.00CF							0.0
0-074	8-13-71	201	0.000	0.0116	0.1	0.005	8	0	CPM BODY ATTACK: EVEN ETCH	
0-075	3-7-72		0.00W	0.0036	0.1				HLDR BLK ATTACK: NONE	PITTING
			0.00CF						WELL SHUT IN 6-24-71	0.0

CURRENTS ON LATEST DATA FROM SWARINGEN WATERFLOOD

OVERALL CORROSION RATES:
WATER INJECTION HEADER SUPPLY WATER OVERALL CORROSION RATE GREATER THAN 5 MPY.

COMPOUND PITTING RATES:
WATER INJECTION HEADER SUPPLY WATER PITTING NOTED.
WATER INJECTION HEADER SUPPLY WATER PITTING NOTED.

NO CORROSION PITTING AT ANY LOCATION.

CURRENTS ON LATEST DATA FROM SWEARINGEN WATERFLOOD

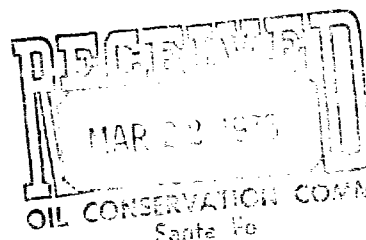
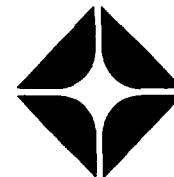
OVERALL CORROSION RATES:
W-HEAD INJECTION HEADER SUPPLY WATER OVERALL CORROSION RATE GREATER THAN 5 MPY.

Coupon-Only Pitting Rates:
D-3 INJECTION WELLHEAD PITTING NOTED.
W-HEAD INJECTION HEADER SUPPLY WATER PITTING NOTED.

NO COUPON-END PITTING AT ANY LOCATION.

AtlanticRichfieldCompany

North American Producing Division
Permian District — West Area
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041



March 20, 1973

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr.,
Secretary-Director

J. C. Hudry
Re: Corrosion Coupon Results as per
Commission Order R-2969 entered
in Case No. 3302 concerning
~~Atlantic Richfield Company~~
Swearingen-Shugart Waterflood Project

Gentlemen:

As per the above order, we submit the results
of laboratory analyses of the latest exposed
corrosion coupons.

Yours very truly,

L. C. Hudry

L. C. Hudry

Attachs.

cc: New Mexico Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico 88210

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico 87501

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 6493301 SWEARINGEN WATERFLOOD

WELL OR PLANT: B-3 COUPON LOCATION: INJECTION WELLHEAD

TYPE SYSTEM: WATER INJECTION POSITION: VERTICAL, VERTICAL FLOW TYPE: BAR

COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS: GMS	CORROSION RATE: MPY	BODY PITS IN	END PITS RATE MPY	OVERALL CORROSION RATE: MPY	REMARKS
A-693	9-30-70 96	0.080	0.0260	0.2	.020	75	.0	0 CPN BODY ATTACK: SPOTTY ETCH
A-895	1-4-71	254.08M 0.0MCF	0.0476	0.3				HLDR BLK ATTACK: NONE ON WEST LEG OF SYSTEM AREAS OF PITS 409
B-172	1-4-71 93	0.080	0.1471	0.7	.005	19	.0	0 CPN BODY ATTACK: SPOTTY ETCH
B-173	4-8-71	0.08M 0.0MCF	0.0754	0.4				HLDR BLK ATTACK: NONE AREAS OF PITS 401
B-568	4-8-71 127	0.080	0.1646	0.6	.009	25	.0	0 CPN BODY ATTACK: SPOTTY ETCH
B-600	8-13-71	238.08M 0.0MCF	0.1705	0.6				HLDR BLK ATTACK: NONE AREAS OF PITS 401
B-676	8-13-71 207	0.080	0.3809	0.9	.014	24	.0	0 CPN BODY ATTACK: HEAVY ETCH
B-677	3-7-72	400.08M 0.0MCF	0.3825	0.9				HLDR BLK ATTACK: NONE ISOLATED PITS 402
C-761	3-7-72 125	0.080	0.6141	2.2	.012	34	.0	0 CPN BODY ATTACK: HEAVY ETCH
C-763	7-10-72	425.08M 0.0MCF	0.6312	2.3				HLDR BLK ATTACK: NONE PITTING 403
C-536	7-10-72 134	0.080	0.0441	0.2	.008	21	.0	0 CPN BODY ATTACK: SPOTTY ETCH
C-537	11-22-72	410.08M 0.0MCF	0.0637	0.3				HLDR BLK ATTACK: NONE ISOLATED PITS 404

LEASE OR UNIT: 6493301 SWEARINGEN WATERFLOOD

WELL OR PLANT: E.HEADR COUPON LOCATION: INJECTION HEADER SUPPLY WATER

TYPE SYSTEM: WATER INJECTION	POSITION: HORIZONTAL, HORIZONTAL FLOW	TYPE: BAR
------------------------------	---------------------------------------	-----------

COUPON		EXPOSURE		DAILY PRODUCTION		WEIGHT LOSS:GMS		CORROSION RATE:MPY		BODY PITS IN MPY		END PITS DPTH RATE MPY		REMARKS
#	DATES	DAYS	PRODUCTION	LOSS:GMS	RATE:MPY	IN	MPY	MILS	MPY	REMARKS				

A-889	9-30-70	96	0.080	1.0802	5.0	.0	0	.0	0 CPN BOY ATTACK: SPOTTY ETCH	
A-890	1-4-71		684.0BM	0.7226	3.4				HLOR BLK ATTACK: ATTACK	,NO PITS.
			0.0MCF							

B-166	1-4-71	95	0.080	0.8978	4.2	.004	15	.0	0 CPN BOY ATTACK: HEAVY EICH	
B-167	4-8-71		0.08W	0.9919	4.6				HLDR BLK ATTACK: NONE	ISOLATED PITS
			0.0MCF							458

B-560	4-8-71	127	0.080	2.0405	7.2	.0	0	.004	11	CPN BCY ATTACK: OVERALL ATTACK
B-567	8-13-71		0.08M	1.7811	6.3					HLDR BLK ATTACK: NONE
			0.0MCF							PITTING

407

B-672	8-13-71	207	0.080	7.9121	17.0	.0	0	.0	0	CPN BDY ATTACK: SEVERE OVERALL ATTACK
B-673	3-7-72		0.08M	8.1381	17.4					HLDR BLK ATTACK: NONE ,ND PITS.
			0.0MCF							SEVERE THINNING

C-385	3-7-72	125	0.080	0.6268	2.3	.003	8	.001	2 CPN BGY ATTACK; SPOTTY ETC
C-386	7-10-72		542.08W	1.4900	5.3				HLD R BLK ATTACK; ATTACK , ISOLATED PITS
			0.0MCF						453

[illegible]

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 6493301 SWEARINGEN WATERFLOOD

WELL OR PLANT: M-HEADR COUPON LOCATION: INJECTION HEADER ALT. PRODUCE-SUPPLY

TYPE SYSTEM: WATER INJECTION POSITION: HORIZONTAL, HORIZONTAL FLOW TYPE: BAR

Coupon	Exposure	Daily	Weight	Overall	Body	Pits	End	Pits	
#	Dates	Days	Production	Loss:GMS	Rate:MPY	In	MPY	Mils	MPY

REMARKS

A-888	9-30-70	96	0.080	0.0207	0.2	.009	34	.0	0 CPN BDY ATTACK: EVEN ETCH
A-896	1-4-71		684.0BW	0.0164	0.1				HLDR BLK ATTACK: NONE

*ISOLATED PITS

471

B-168	1-4-71	95	0.080	0.0617	0.3	.005	19	.0	0 CPN BDY ATTACK: AREAS OF ATTACK
B-169	4-8-71		0.08W	0.0530	0.3				HLDR BLK ATTACK: NONE

*ISOLATED PITS

472

B-557	4-8-71	127	0.080	0.1580	0.6	.007	20	.0	0 CPN BDY ATTACK: HEAVY ETCH
B-558	8-13-71		0.08W	0.1625	0.6				HLDR BLK ATTACK: NONE

*AREAS OF PITS

473

B-670	8-13-71	207	0.080	0.1597	0.4	.004	7	.0	0 CPN BDY ATTACK: SPOTTY ETCH
B-671	3-7-72		0.08W	0.2134	0.5				HLDR BLK ATTACK: NONE

*AREAS OF PITS

474

THE POSITION OF THE COUPON STATION HAS BEEN CHANGED TO NOT DEFINED YET

C-762	3-7-72	125	0.080	0.2186	0.8	.005	14	.008	23 CPN BDY ATTACK: SPOTTY ETCH
C-384	7-10-72		542.0BW	0.2307	0.9				HLDR BLK ATTACK: ATTACK

*PITTING

475

THE POSITION OF THE COUPON STATION HAS BEEN CHANGED TO HORIZONTAL, HORIZONTAL FLOW

C-540	7-10-72	134	0.080	0.1006	0.4	.005	13	.0	0 CPN BDY ATTACK: SPOTTY ETCH
C-541	11-22-72		410.0BW	0.1220	0.5				HLDR BLK ATTACK: NONE

*PITTING

476

SWEARINGEN LEASE WF, SHUGART FLD, NEW MEXICO
WATER INJECTION SYSTEM

CORROSION COUPON EXPOSURE RESULTS

<u>LOCATION</u> <u>Supply Water</u> <u>(Bar-type</u> <u>Stations at</u> <u>Water Plant)</u>	<u>COUPON</u> <u>NUMBER</u>	<u>EXPOSURE</u>		<u>WEIGHT</u> <u>LOSS</u> <u>(gms)</u>	<u>CORROSION</u> <u>RATE</u> <u>(MPY)</u>	<u>TYPE</u> <u>ATTACK</u>	<u>REMARKS</u>
		<u>Dates</u>	<u>Days</u> <u>Volume</u>				
West Leg of Manifold	E-861	11-6-65--12-2-65	26 800BWPD	0.2978	5.2	Surface roughened	General appearance fair. When received coupons coated w/red deposit (see Analysis A-974).
	E-862			0.3018	5.2	Scattered shallow pits	
East Leg of Manifold	E-863	11-6-65--12-2-65	26 1200BWPD	0.2642	4.5	Even etch w/some	General appearance good. Coupons coated w/red deposit (see Analysis A-974).
	E-864			0.2538	4.3	edge attack & minor pitting	

LOCATION <u>Water Injection</u> <u>Wells</u> (Bar-type Stations at Wellhead)	COUPON NUMBER	EXPOSURE			WEIGHT LOSS (gms)	CORROSION RATE (MPY)	TYPE ATTACK	REMARKS
		Dates	Days	Volume				
A-6 WIW	E-865	11-13-65--1-18-66	66	450BWPD	0.9738	6.5	General corrosion	General appearance poor.
	E-866				0.9628	6.5	w/broad shallow pits	Total of 29,682BWI Coupons coated w/red deposit.
B-3 WIW	E-867	11-13-65--1-18-66	66	288BWPD	0.7034	4.7	Even etch w/areas	General appearance fair.
	E-868				0.8032	5.4	of surface rough- ening	Total of 19,003BWI Coupons coated w/red deposit.

ATLANTIC RICHFIELD COMPANY
FORMERLY

ATLANTIC

THE ATLANTIC REFINING COMPANY
INCORPORATED - 1870
PETROLEUM PRODUCTS

August 10, 1966

NORTH AMERICAN PRODUCING GROUP
NEW MEXICO - ARIZONA DISTRICT

S. L. SMITH, DISTRICT MANAGER
JACK BIARD, DISTRICT LANDMAN
E. R. DOUGLAS, DISTRICT GEOLOGIST
A. D. KLOXIN, DISTRICT DRUG. & PROD. SUP'T.
M. D. ROBERTS, DISTRICT GEOPHYSICIST
W. P. TOMLINSON, DISTRICT ENGINEER
B. R. WARE, DISTRICT ADMINISTRATIVE SUP'V.

SECURITY NATIONAL BANK BLDG.

MAILING ADDRESS

P. O. BOX 1978
ROSWELL, NEW MEXICO 88201

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter
Secretary Director

Re: Corrosion coupon results as per Commission Order R-2969
entered in Case #3302, concerning
Atlantic Richfield Company
Swearingen-Shugart Waterflood
Project

Free

RECEIVED
AUG 11 PM 1 30

Gentlemen:

As per the above order, we are required to submit the results of the rate of corrosion of the coupons in the Swearingen-Shugart Waterflood Project. Attached are the results of laboratory analyses of recently exposed coupons.

Yours very truly,

W. P. Tomlinson
W. P. Tomlinson

WPT:jcb

cc: New Mexico Oil Conservation Commission
P. O. Drawer "DD"
Artesia, New Mexico

New Mexico State Engineer's Office
State Capitol
Santa Fe, New Mexico
Attention: Mr. Frank Irby

LEASE OR UNIT: 6493301 SNAKINGEN WATERFLOOD

WELL OR PLANT: B-3 COUPON LOCATION: INJECTION WELLHEAD

TYPE SYSTEMS WATER INJECTION

POSITION: VERTICAL, VERTICAL FLOW	TYPE: BAR
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

TYPE 2 BAR

COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS/gms	OVERALL				REMARKS
				CORROSION RATE/MPY	BOOY PITS IN	PITS MPY	END PITS DPTH RATE	
1	10/1/68 - 10/31/68	1000	1.5	0.05	0	0	0.001	
2	11/1/68 - 11/30/68	1000	1.5	0.05	0	0	0.001	
3	12/1/68 - 12/31/68	1000	1.5	0.05	0	0	0.001	
4	1/1/69 - 1/31/69	1000	1.5	0.05	0	0	0.001	
5	2/1/69 - 2/28/69	1000	1.5	0.05	0	0	0.001	
6	3/1/69 - 3/31/69	1000	1.5	0.05	0	0	0.001	
7	4/1/69 - 4/30/69	1000	1.5	0.05	0	0	0.001	
8	5/1/69 - 5/31/69	1000	1.5	0.05	0	0	0.001	
9	6/1/69 - 6/30/69	1000	1.5	0.05	0	0	0.001	
10	7/1/69 - 7/31/69	1000	1.5	0.05	0	0	0.001	
11	8/1/69 - 8/31/69	1000	1.5	0.05	0	0	0.001	
12	9/1/69 - 9/30/69	1000	1.5	0.05	0	0	0.001	
13	10/1/69 - 10/31/69	1000	1.5	0.05	0	0	0.001	
14	11/1/69 - 11/30/69	1000	1.5	0.05	0	0	0.001	
15	12/1/69 - 12/31/69	1000	1.5	0.05	0	0	0.001	
16	1/1/70 - 1/31/70	1000	1.5	0.05	0	0	0.001	
17	2/1/70 - 2/28/70	1000	1.5	0.05	0	0	0.001	
18	3/1/70 - 3/31/70	1000	1.5	0.05	0	0	0.001	
19	4/1/70 - 4/30/70	1000	1.5	0.05	0	0	0.001	
20	5/1/70 - 5/31/70	1000	1.5	0.05	0	0	0.001	
21	6/1/70 - 6/30/70	1000	1.5	0.05	0	0	0.001	
22	7/1/70 - 7/31/70	1000	1.5	0.05	0	0	0.001	
23	8/1/70 - 8/31/70	1000	1.5	0.05	0	0	0.001	
24	9/1/70 - 9/30/70	1000	1.5	0.05	0	0	0.001	
25	10/1/70 - 10/31/70	1000	1.5	0.05	0	0	0.001	
26	11/1/70 - 11/30/70	1000	1.5	0.05	0	0	0.001	
27	12/1/70 - 12/31/70	1000	1.5	0.05	0	0	0.001	
28	1/1/71 - 1/31/71	1000	1.5	0.05	0	0	0.001	
29	2/1/71 - 2/28/71	1000	1.5	0.05	0	0	0.001	
30	3/1/71 - 3/31/71	1000	1.5	0.05	0	0	0.001	
31	4/1/71 - 4/30/71	1000	1.5	0.05	0	0	0.001	
32	5/1/71 - 5/31/71	1000	1.5	0.05	0	0	0.001	
33	6/1/71 - 6/30/71	1000	1.5	0.05	0	0	0.001	
34	7/1/71 - 7/31/71	1000	1.5	0.05	0	0	0.001	
35	8/1/71 - 8/31/71	1000	1.5	0.05	0	0	0.001	
36	9/1/71 - 9/30/71	1000	1.5	0.05	0	0	0.001	
37	10/1/71 - 10/31/71	1000	1.5	0.05	0	0	0.001	
38	11/1/71 - 11/30/71	1000	1.5	0.05	0	0	0.001	
39	12/1/71 - 12/31/71	1000	1.5	0.05	0	0	0.001	
40	1/1/72 - 1/31/72	1000	1.5	0.05	0	0	0.001	
41	2/1/72 - 2/28/72	1000	1.5	0.05	0	0	0.001	
42	3/1/72 - 3/31/72							

A-093	9-30-70	96	0.080	0.0260	0.2	.020	75	.0	0 CPN BOY ATTACKS SPOTTY HIGH
A-895	1- 4-71		254.0CM	0.0476	0.3				HLDOR BLK ATTACKS NONE
			0.0MCF						ON WEST LEG OF SYSTN

	1-4-71	95	0.080	0.1471	0.7	0.005	19	0	Q CPN BDY ATTACK: SPOTTY HIGH
B-172	1-4-71	95	0.080	0.1471	0.7	0.005	19	0	Q CPN BDY ATTACK: SPOTTY HIGH
B-173	4-8-71		0.06W	0.0754	0.4				HLD R BLK ATTACK: NONE
			0.0NCF						

	DATE	TIME	SEC	FREQ	POWER	MODE	STATUS	REMARKS
E-508	4-8-71	127	0.080	0.1546	0.6	.009	25	0 CPN BDY ATTACK: SPOTTY FLCH
B-500	8-13-71	235.0EW	0.1705	0.6				HLD R BLK ATTACK: NONE
			Q.VMCE					

BUFILE	DATE	TIME	TO	FROM	REMARKS
B-676	8-13-71	207	0.020	0.3009	0.014 24 .0
B-677	3- 7-72	400.0EW	0.9	0.3825	0.9

HLOR BLK ATTACK: NUFF
O CPL BDY ATTACK: HEAVY EICH

[illegible][illegible]

REF ID	DATE	TIME	FROM	TO	INFO	STATUS
0-560	11-22-72	126	0.080	0.114	0.5	0.005
0-581	3-26-73		400.08W	0.1080	0.4	

REF ID	DATE	TIME	FROM	TO	REMARKS
D-567	3-26-73	181	0.050	0.007	16 CPN BODY ATTACK: SPECIALLY HIGH
D-563	9-24-73	400.00W	0.0245	0.1	HLDR BLK ATTACK: NUCL
					0.000E

CORROSION COUPON EXPOSURE RESULTS

WELL OR UNIT: 6493301 SWEARINGEN WATERFLOOD

WELL OR PLANT: 5-2 COUPON LOCATION: INJECTION WELLHEAD

89012345678

TYPE SYSTEM: WATER INJECTION

POSITION: VERTICAL, VERTICAL FLOW

TYPE: DAR

Coupon #	Exposure Dates	Daily Production	Weight Loss: GMS	Corrosion Rate: MPY	Overall Body Pits	Optm Rate	Optm Rate	Remarks
----------	----------------	------------------	------------------	---------------------	-------------------	-----------	-----------	---------

C-536	7-17-72 134	0.080	0.0441	0.2	0.008	21	0.0	0 CPN BODY ATTACK: SPOTTY ETCH HLDR BLK ATTACK: NONE
C-537	11-22-72	410.08W 0.0MCF	0.0637	0.3				ISOLATED PITS 924

D-567	11-22-72 126	0.080	0.1144	0.5	0.05	14	0.0	0 CPN BODY ATTACK: SPOTTY ETCH HLDR BLK ATTACK: ATTACK
D-581	3-26-73	400.08W 0.0MCF	0.1080	0.4				AREAS OF PITS 925

D-567	3-26-73 181	0.080	0.0262	0.1	0.07	14	0.008	0 CPN BODY ATTACK: SPOTTY ETCH HLDR BLK ATTACK: NONE
D-568	9-24-73	400.08W 0.0MCF	0.0245	0.1				AREAS OF PITS 926

E-984	9-24-73 184	0.080	0.0003	0.1	0.0	0	0.0	0 CPN BODY ATTACK: NONE HLDR BLK ATTACK: NONE
E-985	3-25-74	412.08W 0.0MCF	0.0145	0.1				NO PITS. 957

ILLEGIBLE

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 6493301 SWEARINGEN WATERFLOOD

WELL OR PLANT: E-HEAD COUPON LOCATION: INJECTION HEADER SUPPLY WATER

89012345678

TYPE SYSTEM: WATER INJECTION

POSITION: HORIZONTAL. HORIZONTAL FLOW

TYPE: BAR

COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS: GMS	CORROSION RATE: MPY	OVERALL CORROSION RATE: MPY	DEPTH IN IN	PITS RATE MPY	END PITS DEPTH RATE MPY	REMARKS
----------	----------------	------------------	------------------	---------------------	-----------------------------	-------------	---------------	-------------------------	---------

A-889	9-30-70	96	0.080	5.0	0.0	0	0	0	CPN BODY ATTACK: SPOTTY ETCH
A-890	1-4-71		684.08W	3.4	0.0	0	0	0	HLDR BLK ATTACK: ATTACK
			0.0MCF						NO PITS.

950

B-166	1-4-71	95	0.080	4.2	0.4	15	0	0	CPN BODY ATTACK: HEAVY ETCH
B-167	4-8-71		0.08W	4.5	0.0	0	0	0	HLDR BLK ATTACK: NONE
			0.0MCF						ISOLATED PITS

959

B-560	4-8-71	127	0.080	7.2	0	0	0	0	CPN BODY ATTACK: OVERALL ATTACK
B-567	8-13-71		0.08W	6.3	0	0	0	0	HLDR BLK ATTACK: NONE
			0.0MCF						PITTING

960

B-672	8-13-71	207	0.080	17.0	0	0	0	0	CPN BODY ATTACK: SEVERE OVERALL ATTACK
B-673	3-7-72		0.08W	17.4	0	0	0	0	HLDR BLK ATTACK: NONE
			0.0MCF						NO PITS.

961

C-385	3-7-72	125	0.080	2.3	0.03	8	0	0	CPN BODY ATTACK: SPOTTY ETCH
C-386	7-10-72		542.08W	5.3	0.03	0	0	0	HLDR BLK ATTACK: ATTACK
			0.0MCF						ISOLATED PITS

962

C-538	7-10-72	134	0.080	0.7	0.01	2	0	0	CPN BODY ATTACK: SPOTTY ETCH
C-539	11-22-72		752.08W	0.5	0.04	10	0	0	HLDR BLK ATTACK: ATTACK
			0.0MCF						AREAS OF PITS

963

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 6493351 SWEARINGEN WATERFLOOD

WELL OR PLANT: E-HEAD COUPON LOCATION: INJECTION HEADER ALT. PRODUCE-SUPPLY

69112345678

TYPE SYSTEM: WATER INJECTION

POSITION: HORIZONTAL, HORIZONTAL FLOW

TYPE: BAR

COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS: GMS	CORROSION RATE: MPY	IN MPY	BDY PITS	LN3 PITS	DEPTH RATE	REMARKS
----------	----------------	------------------	------------------	---------------------	--------	----------	----------	------------	---------

D-019	11-22-72 126	0.080	0.0581	1.3	0	0	0	0	CPN BDY ATTACK: SPOTTY ETCH
D-020	3-26-73	600.08M 0.0MCF	0.0494	0.2	0	0	0	0	HLDR BLK ATTACK: NONE

NO PITS.

964

D-560	3-26-73 181	0.080	5.9227	14.6	0.22	44	0.10	20	CPN BDY ATTACK: SEVERE OVERALL ATTACK
D-561	9-24-73	600.08M 0.0MCF	6.2520	15.4	0	0	0	0	HLDR BLK ATTACK: SEVERE ATTACK EAST PUMP

BROAD PITS

965

E-988	9-24-73 184	0.080	2.8691	7.0	0	0	0	0	CPN BDY ATTACK: OVERALL ATTACK
E-989	3-25-74	702.08M 0.0MCF	2.5868	6.3	0	0	0	0	HLDR BLK ATTACK: ATTACK

NO PITS.

966

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 6493301 SWEARINGEN WATERFLOOD

WELL OR PLANT: W.HEADR COUPON LOCATION: INJECTION HEADER SUPPLY WATER

89012345678

TYPE SYSTEM: WATER INJECTION

POSITION: HORIZONTAL, VERTICAL FLOW

TYPE: BAR

COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS: GMS	CORROSION RATE: MPY	OVERALL BODY PITS		END PITS		REMARKS
					DEPTH IN	RATE MPY	DEPTH IN	RATE MPY	

D-017 11-22-72 126
D-018 3-26-730.250
600.00W
0.00MCF2.6726
1.66629.4
5.9

11 0.0

0.504

0 CPN BODY ATTACK: OVERALL ATTACK
HLDR BLK ATTACK: ATTACK

, AREAS OF PITS 96

THE POSITION OF THE COUPON STATION HAS BEEN CHANGED TO HORIZONTAL, HORIZONTAL FLOW
D-558 3-26-73 181 0.080
D-559 9-24-73 400.08W 0.00MCF
0.0132 0.1 0.10 20 0.10 20 CPN BODY ATTACK: SPOTTY ETCH
0.0127 0.1 0.1 HLDR BLK ATTACK: NONE
WEST PUMP

, PITTING 96

E-986 9-24-73 184
E-987 3-25-740.150
412.00W
0.00MCF0.0176
0.0061

0 0.0

0 CPN BODY ATTACK: OVERALL ATTACK
HLDR BLK ATTACK: ATTACK

, NO PITS 96

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 6493301 SWEARINGEN WATERFLOOD

WELL OR PLANT: W-HEADR COUPON LOCATION: INJECTION HEADER ALT. PRODUCE-SUPPLY

89012345678

TYPE SYSTEM: WATER INJECTION

POSITION: HORIZONTAL, HORIZONTAL FLOW

TYPE: BAR

COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS: GMS	OVERALL CORROSION RATE: MPY		BODY PITS OPTH RATE IN MPY		END PITS OPTH RATE MPY	REMARKS
				RATE: MPY	IN MPY	MPY	MILS		

A-888	9-30-70	96	0.060	0.0207	0.2	0.009	34	0.0	0 CPN BODY ATTACK: EVEN ETCH
A-896	1-4-71	684.00W	0.0MCF	0.0164	0.1				HLDR BLK ATTACK: NONE

ISOLATED PITS 970

B-168	1-4-71	95	0.080	0.0617	0.3	0.005	19	0.0	0 CPN BODY ATTACK: AREAS OF ATTACK
B-169	4-8-71	0.08W	0.0MCF	0.0530	0.3				HLDR BLK ATTACK: NONE

ISOLATED PITS 971

B-557	4-8-71	127	0.080	0.1580	0.6	0.007	20	0.0	0 CPN BODY ATTACK: HEAVY ETCH
B-558	8-13-71	0.08W	0.0MCF	0.1625	0.6				HLDR BLK ATTACK: NONE

AREAS OF PITS 972

B-670	8-13-71	207	0.080	0.1597	0.4	0.004	7	0.0	0 CPN BODY ATTACK: SPOTTY ETCH
B-671	3-7-72	0.08W	0.0MCF	0.2134	0.5				HLDR BLK ATTACK: NONE

AREAS OF PITS 973

THE POSITION OF THE COUPON STATION HAS BEEN CHANGED TO NOT DEFINED YET

C-762	3-7-72	125	0.080	0.2186	0.8	0.005	14	0.0	23 CPN BODY ATTACK: SPOTTY ETCH
C-384	7-10-72	542.08W	0.0MCF	0.2337	0.9				HLDR BLK ATTACK: ATTACK

PITTING 974

THE POSITION OF THE COUPON STATION HAS BEEN CHANGED TO HORIZONTAL, HORIZONTAL FLOW

C-540	7-10-72	134	0.080	0.1096	0.4	0.005	13	0.0	0 CPN BODY ATTACK: SPOTTY ETCH
C-541	11-22-72	410.08W	0.0MCF	0.1220	0.5				HLDR BLK ATTACK: NONE

PITTING 975

CORROSION COUPON EXPOSURE RESULTS

LEASE OR UNIT: 6493301 SWEARINGEN WATERFLOOD

WELL OR PLANT: MW A-6 COUPON LOCATION: INJECTION WELLHEAD

89-12345678

TYPE SYSTEM: WATER INJECTION

POSITION: NOT DEFINED YET

TYPE: BAR

COUPON #	EXPOSURE DATES	DAILY PRODUCTION	WEIGHT LOSS: GMS	OVERALL CORROSION RATE: MPY	BODY PITS IN MPY	END PITS DPTH RATE MPY	REMARKS
----------	----------------	------------------	------------------	-----------------------------	------------------	------------------------	---------

A-891	9-30-70	96	0.080	0.1	0	0	CPN BODY ATTACK: EVEN ETCH
A-892	1-4-71	117.0BW 0.0MCF	0.0049	0.1	0	0	HLDR BLK ATTACK: NONE A-6 ON EST LEG UFSYS

,NO PITS.

B-170	1-4-71	95	0.080	7.9	22	0	CPN BODY ATTACK: SPOTTY ETCH
B-171	4-8-71	0.0BW 0.0MCF	0.0446	0.3	0	0	HLDR BLK ATTACK: NONE

,AREAS OF PITS.

B-674	8-13-71	2.7	0.080	0.1	8	0	CPN BODY ATTACK: EVEN ETCH
B-675	3-7-72	0.0BW 0.0MCF	0.0336	0.1	0	0	HLDR BLK ATTACK: NONE WELL SHUT IN 6-25-71

,PITTING