

PAN AMERICAN PETROLEUM CORPORATION

SECURITY LIFE BUILDING
DENVER, COLORADO 80202

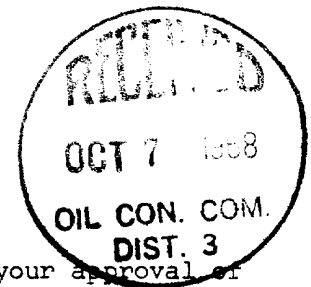
October 3, 1968

File: AMR-2294-986.511

Re: Application to Dispose of Salt Water
Into Penn "D" Formation, Pan American's
Navajo Tribal "U" No. 1
Tocito Dome - Penn "D" Field
San Juan County, New Mexico

Mr. A. L. Porter, Jr. (3)
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Porter:



Pan American Petroleum Corporation respectfully requests your approval of this Application, under the provisions of Rule 701, to dispose of salt water produced from the Tocito Dome - Penn "D" Field into the Pennsylvanian "D" formation at its Navajo Tribal "U" No. 1, located in Unit "L" of Section 21, Township 26 North, Range 18 West, San Juan County, New Mexico. In connection with this Application, attached are the following exhibits:

1. Three copies of New Mexico Oil Conservation Commission's Form C-108 entitled "Application to Dispose of Salt Water by Injection into a Porous Formation." A copy of this form is also being sent to the United States Geological Survey as representative of the Navajo Tribe of Indians, the surface and royalty owner, and to all operators within a two (2) mile radius of the proposed disposal well.
2. A map of the field and surrounding area showing in detail the location of all wells and dry holes, the operators of the various leases, and the specific location of the present disposal well and the proposed disposal well.
3. A copy of the Induction Electrolog on the proposed disposal well.
4. A schematic diagram showing particulars of the casing and tubing program on the proposed well. The proposed disposal well, the Navajo Tribal "U" No. 1, was originally completed as an oil well on August 26, 1964, for an initial potential of 423 BOPD with no water, but commenced producing water in September, 1965. Water production has since increased until in July, 1968, the well was producing 99% water and was shut-in due to being uneconomic. Work-over attempts to re-establish commercial production have not been successful.

Mr. A. L. Porter, Jr.

October 3, 1968

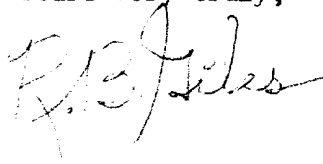
Page 2

5. A copy of various water analyses obtained from wells in the field, which are "typical" analyses of Pennsylvanian "D" zone waters, which are unfit for domestic, stock, irrigation or other general use.

New Mexico Oil Conservation Commission Order No. R-2984, issued October 13, 1965, granted Pan American permission to dispose of Tocito Dome - Penn "D" Field produced water into Pan American's Navajo Tribal "U" No. 6, now named "Tocito Dome Salt Water Disposal Well," located in Unit "D" of Section 22, Township 26 North, Range 18 West. Disposals into this well commenced November 22, 1965, and over one million barrels of produced water from Pan American's and Texaco, Inc.'s leases have been disposed of to date. However, it has been necessary to periodically stimulate the well with acid treatments to continue these disposals so an alternate disposal well is needed.

It is planned to utilize both the new proposed disposal well and the present disposal well if it continues to take water at reasonable pressure. The interval to be utilized for disposal on the proposed Navajo Tribal "U" No. 1 is the same Penn "D" zone used on the present disposal well, and the method of handling this water will be similar. Therefore, it is requested that you approve this Application by administrative order if you are satisfied with the completeness of this Application and receive no objections within 15 days from the attached listed notified parties. In the event you believe this Application should only be considered for approval after a public hearing, please set the matter for hearing on the next scheduled docket. If this matter is set for hearing, it is also requested that provisions be made for administrative approval by the Director, without hearing, of any future Applications for disposal wells in the Tocito Dome - Penn "D" Field, if such wells are completed in a similar manner and no objections are received from any interested parties.

Yours very truly,



Attachments

cc: See Attached List

MAILING LIST

Mr. E. C. Arnold
New Mexico Oil Conservation Commission
1000 Rio Brazos Road
Aztec, New Mexico

U. S. Geological Survey
P. O. Box 965
Farmington, New Mexico

U. S. Geological Survey
Drawer 1857
Roswell, New Mexico

Texaco, Inc.
P. O. Box 2100
Denver, Colorado 80201

Texaco, Inc.
P. O. Box 810
Farmington, New Mexico 87401

Mobil Oil Corporation
P. O. Box 1652
Casper, Wyoming 82602

Sinclair Oil & Gas Company
501 Lincoln Tower Building
Denver, Colorado 80203

Southern Gulf Production Company
C & I Building
Houston, Texas

NEW MEXICO OIL CONSERVATION COMMISSION

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION

OPERATOR Pan American Petroleum Corporation		ADDRESS Security Life Building, Denver, Colorado	
LEASE NAME Navajo Tribal "U"	WELL NO. 1	FIELD Tocito Dome - Penn. "D"	COUNTY San Juan
LOCATION UNIT LETTER <u>L</u> ; WELL IS LOCATED <u>1980</u> FEET FROM THE <u>South</u> LINE AND <u>660</u> FEET FROM THE <u>West</u> LINE, SECTION <u>21</u> TOWNSHIP <u>26 N</u> RANGE <u>18 W</u> NMPM.			
CASING AND TUBING DATA			
NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEMENT
SURFACE CASING	13-3/8"	87'	100
INTERMEDIATE	8-5/8"	1,510'	350
LONG STRING	4-1/2"	6,440'	1,100
Stage cementing tool set at 3646'			1st Stage 3646'
			2nd Stage 800'
TUBING	2-3/8"	to be set @ approx. 6200'	NAME, MODEL AND DEPTH OF TUBING PACKER Baker Model "D" - to be set about 6200'
NAME OF PROPOSED INJECTION FORMATION Pennsylvanian "D"		TOP OF FORMATION 6266'	BOTTOM OF FORMATION 6292'
IS INJECTION THROUGH TUBING, CASING, OR ANNULUS? Tubing		PERFORATIONS OR OPEN HOLES? Perforations	PROPOSED INTERVAL(S) OF INJECTION 6267-6286'
IS THIS A NEW WELL DRILLED FOR DISPOSAL? No	IF ANSWER IS NO, FOR WHAT PURPOSE WAS WELL ORIGINALLY DRILLED? Oil Well		HAS WELL EVER BEEN PERFORATED IN ANY ZONE OTHER THAN THE PROPOSED INJECTION ZONE? No
LIST ALL SUCH PERFORATED INTERVALS AND SACKS OF CEMENT USED TO SEAL OFF OR SQUEEZE EACH Original perfs 6267-6285 were squeezed off with 100 sacks of diesel oil cement. Present perfs 6283-6286' will be re-perf 6267-6286'.			
DEPTH OF BOTTOM OF DEEPEST FRESH WATER ZONE IN THIS AREA Est. 1300'		DEPTH OF BOTTOM OF NEXT HIGHER OIL OR GAS ZONE IN THIS AREA None	DEPTH OF TOP OF NEXT LOWER OIL OR GAS ZONE IN THIS AREA Not Known
ANTICIPATED DAILY INJECTION VOLUME (BBL'S.) 500	MINIMUM 2500	MAXIMUM Closed	IS INJECTION TO BE BY GRAVITY OR PRESSURE? As Necessary
ANSWER YES OR NO WHETHER THE FOLLOWING WATERS ARE MINERALIZED TO SUCH A DEGREE AS TO BE UNFIT FOR DOMESTIC, STOCK, IRRIGATION, OR OTHER GENERAL USE -		WATER TO BE DISPOSED OF Unfit	NATURAL WATER IN DISPOSAL ZONE Unfit
NAME AND ADDRESS OF SURFACE OWNER (OR LESSEE, IF STATE OR FEDERAL LAND) Navajo Tribe c/o U.S. Geological Survey, P. O. Box 985, Farmington, New Mexico		APPROX. PRESSURE (PSI) 150 psi	
LIST NAMES AND ADDRESSES OF ALL OPERATORS WITHIN ONE-HALF MILE OF THIS INJECTION WELL Texaco, Inc., P. O. Box 2100, Denver, Colorado 80201 Texaco, Inc., P. O. Box 810, Farmington, New Mexico 87401 Mobil Oil Corporation, P. O. Box 1652, Casper, Wyoming 82602 Sinclair Oil & Gas Company, 501 Lincoln Tower Building, Denver, Colorado 80203 Southern Gulf Production Company, C & I Building, Houston, Texas			
two			
HAVE COPIES OF THIS APPLICATION BEEN SENT TO EACH OF THE FOLLOWING?	SURFACE OWNER yes	EACH OPERATOR WITHIN ONE-HALF MILE OF THIS WELL yes	THE NEW MEXICO STATE ENGINEER NA
ARE THE FOLLOWING ITEMS ATTACHED TO THIS APPLICATION (SEE RULE 701-B)	PLAT OF AREA yes	ELECTRICAL LOG yes	DIAGRAMMATIC SKETCH OF WELL yes

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

(Signature)

(Title)

(Date)

NOTE: Should waivers from the State Engineer, the surface owner, and all operators within one-half mile of the proposed injection well, not accompany this application, the New Mexico Oil Conservation Commission will hold the application for a period of 15 days from the date of receipt by the Commission's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing, if the applicant so requests. SEE RULE 701.

NEW MEXICO OIL CONSERVATION COMMISSION

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION

OPERATOR Pan American Petroleum Corporation		ADDRESS Security Life Building, Denver, Colorado	
LEASE NAME Navajo Tribal "U"	WELL NO. 1	FIELD Tocito Dome - Penn. "D"	COUNTY San Juan
LOCATION UNIT LETTER <u>L</u> ; WELL IS LOCATED <u>1980</u> FEET FROM THE <u>South</u> LINE AND <u>660</u> FEET FROM THE <u>West</u> LINE, SECTION <u>21</u> TOWNSHIP <u>26 N</u> RANGE <u>18 W</u> NMPM.			

CASING AND TUBING DATA					
NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEMENT	TOP OF CEMENT	TOP DETERMINED BY
SURFACE CASING	13-3/8"	87'	100	Surface	Circulated
INTERMEDIATE	8-5/8"	1,510'	350	Surface	Circulated
LONG STRING Stage cementing tool set at 3646'	4-1/2"	6,440'	1,100	1st Stage 3646' 2nd Stage 800'	Calculated Calculated
TUBING	2-3/8"	to be set @ approx. 6200'	NAME, MODEL AND DEPTH OF TUBING PACKER Baker Model "D" - to be set about 6200'		
NAME OF PROPOSED INJECTION FORMATION Pennsylvanian "D"			TOP OF FORMATION 6266'		BOTTOM OF FORMATION 6292'
IS INJECTION THROUGH TUBING, CASING, OR ANNULUS? Tubing		PERFORATIONS OR OPEN HOLE? Perforations	PROPOSED INTERVAL(S) OF INJECTION 6267-6286'		
IS THIS A NEW WELL DRILLED FOR DISPOSAL? No		IF ANSWER IS NO, FOR WHAT PURPOSE WAS WELL ORIGINALLY DRILLED? Oil Well		HAS WELL EVER BEEN PERFORATED IN ANY ZONE OTHER THAN THE PROPOSED INJECTION ZONE? No	
LIST ALL SUCH PERFORATED INTERVALS AND SACKS OF CEMENT USED TO SEAL OFF OR SQUEEZE EACH Original perfs 6267-6285 were squeezed off with 100 sacks of diesel oil cement. Present perfs 6283-6286' will be re-perf 6267-6286'.					
DEPTH OF BOTTOM OF DEEPEST FRESH WATER ZONE IN THIS AREA Est. 1300'		DEPTH OF BOTTOM OF NEXT HIGHER OIL OR GAS ZONE IN THIS AREA None		DEPTH OF TOP OF NEXT LOWER OIL OR GAS ZONE IN THIS AREA Not Known	
ANTICIPATED DAILY INJECTION VOLUME (BBL/S.) 500	MINIMUM 2500	MAXIMUM Closed	OPEN OR CLOSED TYPE SYSTEM Closed	IS INJECTION TO BE BY GRAVITY OR PRESSURE? As Necessary	APPROX. PRESSURE (PSI) 150 psi
ANSWER YES OR NO WHETHER THE FOLLOWING WATERS ARE MINERALIZED TO SUCH A DEGREE AS TO BE UNFIT FOR DOMESTIC, STOCK, IRRIGATION, OR OTHER GENERAL USE -		WATER TO BE DISPOSED OF Unfit		NATURAL WATER IN DISPOSAL ZONE Unfit	ARE WATER ANALYSES ATTACHED? Yes
NAME AND ADDRESS OF SURFACE OWNER (OR LESSEE, IF STATE OR FEDERAL LAND) Navajo Tribe c/o U.S. Geological Survey, P. O. Box 965, Farmington, New Mexico two (2) Drawer 1857, Roswell, New Mexico					
LIST NAMES AND ADDRESSES OF ALL OPERATORS WITHIN ONE-HALF MILE OF THIS INJECTION WELL Texaco, Inc., P. O. Box 2100, Denver, Colorado 80201 Texaco, Inc., P. O. Box 810, Farmington, New Mexico 87401 Mobil Oil Corporation, P. O. Box 1652, Casper, Wyoming 82602 Sinclair Oil & Gas Company, 501 Lincoln Tower Building, Denver, Colorado 80203 Southern Gulf Production Company, C & I Building, Houston, Texas					
two					
HAVE COPIES OF THIS APPLICATION BEEN SENT TO EACH OF THE FOLLOWING?	SURFACE OWNER yes		EACH OPERATOR WITHIN ONE-HALF MILE OF THIS WELL yes		THE NEW MEXICO STATE ENGINEER NA
ARE THE FOLLOWING ITEMS ATTACHED TO THIS APPLICATION (SEE RULE 701-B)	PLAT OF AREA yes		ELECTRICAL LOG yes		DIAGRAMMATIC SKETCH OF WELL yes

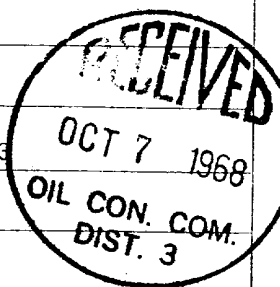
I hereby certify that the information above is true and complete to the best of my knowledge and belief.

(Signature)

(Title)

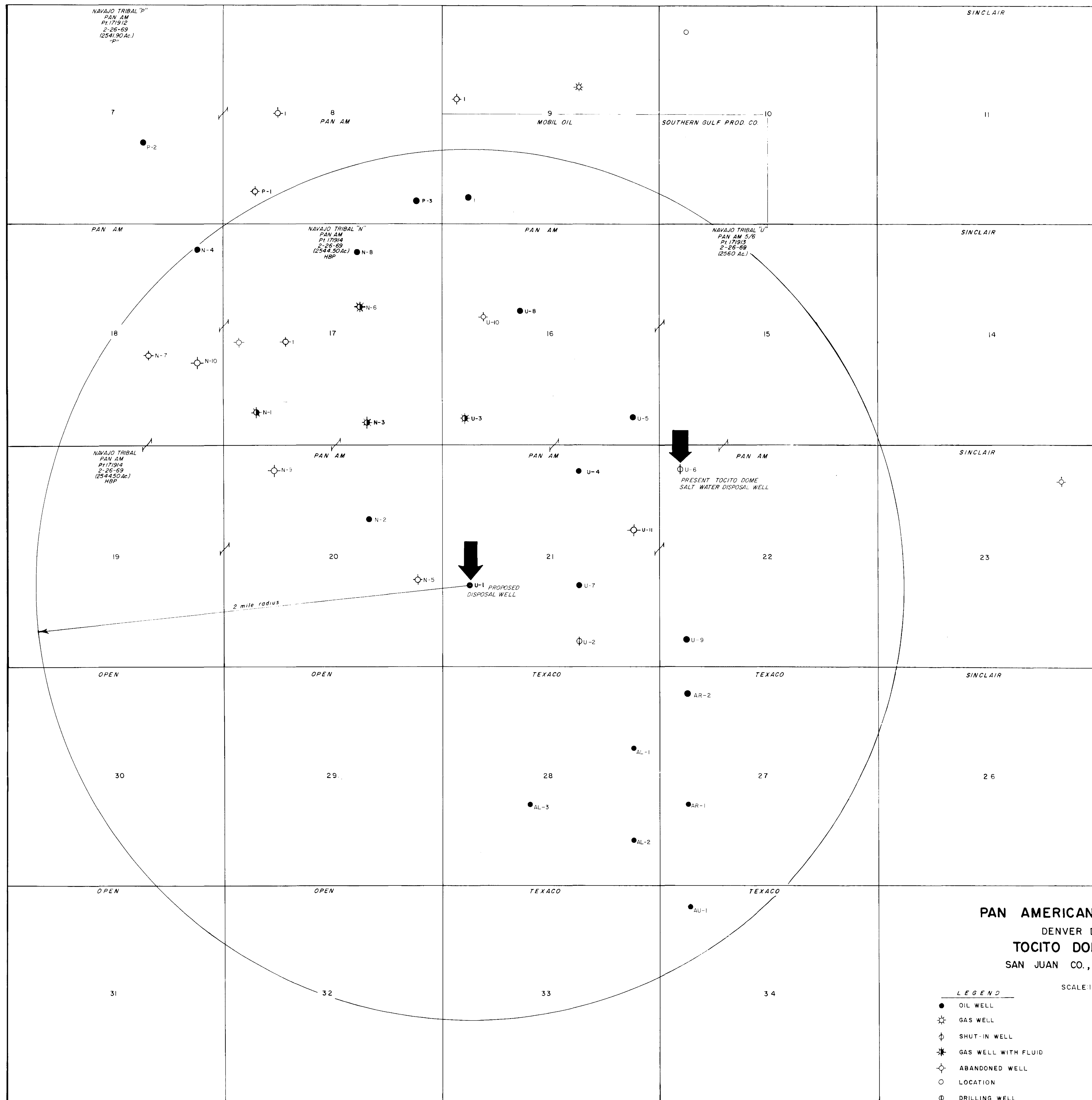
(Date)

NOTE: Should waivers from the State Engineer, the surface owner, and all operators within one-half mile of the proposed injection well, not accompany this application, the New Mexico Oil Conservation Commission will hold the application for a period of 15 days from the date of receipt by the Commission's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing, if the applicant so requests. SEE RULE 701.



R 18 W

T 26 N



NOTE: ALL ACREAGE ON PLAT IS NAVAJO TRIBAL LAND

PAN AMERICAN PETR. CORP.
DENVER DIVISION
TOCITO DOME AREA
SAN JUAN CO., NEW MEXICO

SCALE: 1"=1000'

LEGEND

- OIL WELL
- ☼ GAS WELL
- ⊕ SHUT-IN WELL
- ✱ GAS WELL WITH FLUID
- ⊙ ABANDONED WELL
- LOCATION
- ⊙ DRILLING WELL

PAN AMERICAN PETROLEUM CORPORATION
 NAVAJO TRIBAL "U" NO.1
 TOCITO DOME - PENN "D" FIELD
 SAN JUAN COUNTY, NEW MEXICO

ELEV. GL 5727
 RDB 5740

Calculated top of cement
 (Second Stage)-800'

Casing - tubing annulus
 to be filled with inert
 fluid

2 3/8" Tubing (Plastic
 coated internally)

13 3/8" Csg. set at 87' w/100sacks cement
 (in 17 1/4" hole). Cement circulated
 to surface.

8 5/8" Csg. set at 1510' w/350 sacks cement
 (in 11" hole). Cement circulated to
 surface.

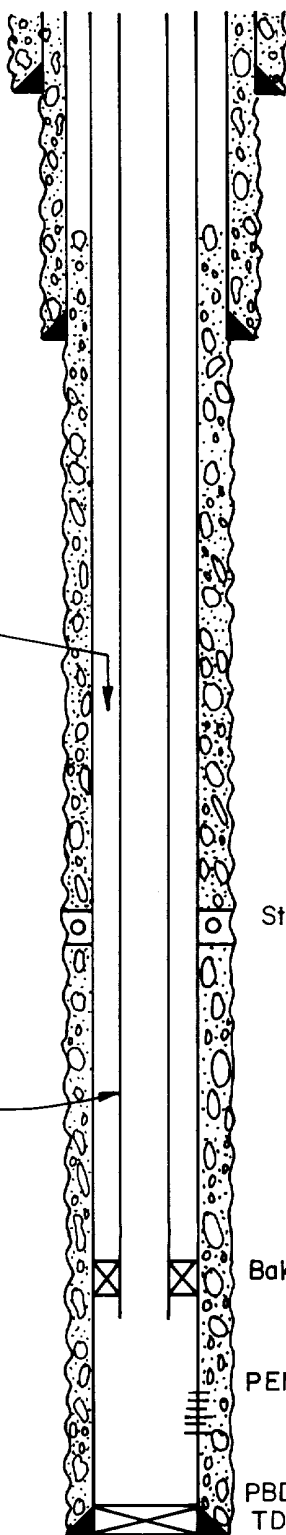
Stage cementing tool set at 3646'.
 Second stage was 500sacks cement with
 6% gel and 2# Tuf Plug/sack.

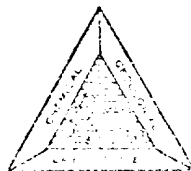
Baker Model "D" Packer set at approx. 6200'.

PENN "D" ZONE 6266'-6292' (Present perms. 6283'-6286').
 Will be re-perf. 6267'-6286'.

PBD 6400
 TD 6440

4 1/2" Csg. set at 6440' w/1100 sacks cement
 (in 7 7/8" hole). First stage was 500 sacks
 cement with 6% gel and 2# Tuf Plug/sack
 followed by 100 sacks neat cement.





CHEM LAB

WATER ANALYSIS EXCHANGE REPORT

FEB 18 1968

MEMBER Pan American Petroleum Corp.
OPERATOR Pan American Petroleum Corp.
WELL NO. Navajo Tribal "U" No. 9
FIELD Tocito Dome
COUNTY San Juan
STATE New Mexico

LAB NO. 24020
LOCATION SW SW 22-26N-18W
FORMATION Pennsylvanian "D"
INTERVAL 6182 - 6188
SAMPLE FROM Flow test (1-24-68)
DATE February 6, 1968

REMARKS & CONCLUSIONS: Rusty colored water, clear filtrate.

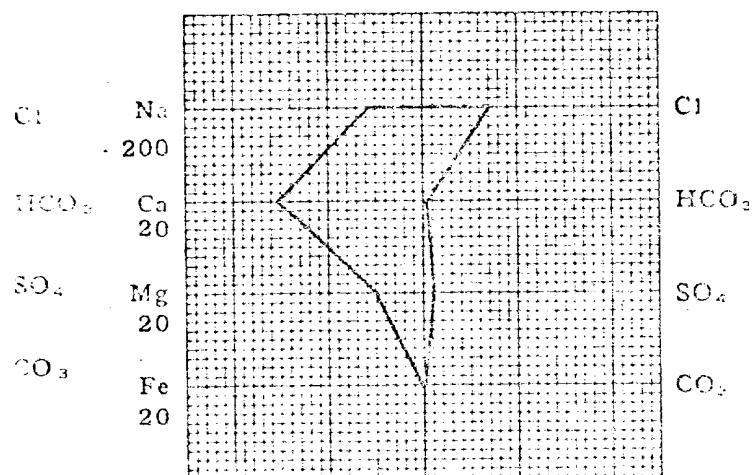
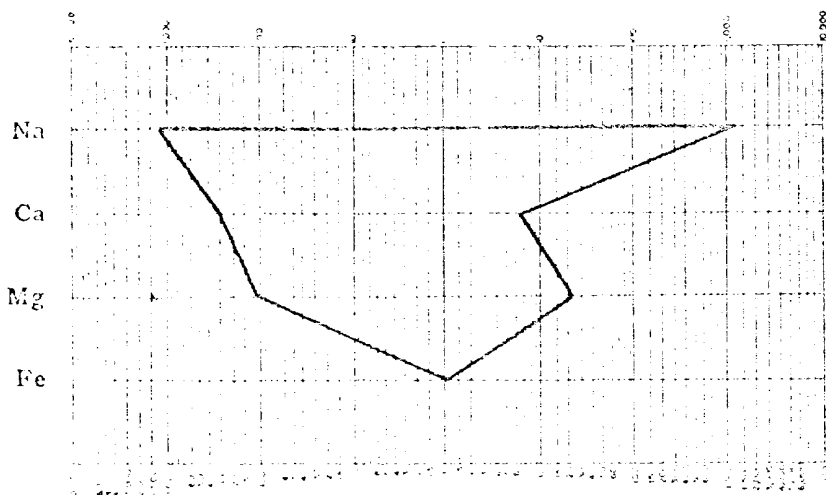
Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	27,490	1195.74	Sulfate	1,147	23.86
Potassium	95	2.43	Chloride	56,000	1579.20
Lithium	-	-	Carbonate	-	-
Calcium	6,075	303.14	Bicarbonate	427	7.00
Magnesium	1,323	108.75	Hydroxide	-	-
Iron	present	-	Hydrogen sulfide	absent	-
Total Cations		1610.06	Total Anions		1610.06
Total dissolved solids, mg/l	92,340		Specific resistance @ 68° F.:		
NaCl equivalent, mg/l	92,671		Observed	0.095	ohm-meters
Observed pH	7.3		Calculated	0.092	ohm-meters

WATER ANALYSIS PATTERNS

MEQ per unit

LOGARITHMIC

STANDARD



(Na value in above graphs includes Na, K, and Li)

NOTE: Mg/l = Milligrams per liter; Meq/l = Milligram equivalents per liter
Sodium chloride equivalent by Dunlop & Hawthorne calculation from components

AN AMERICAN PETROLEUM CORPORATION

RESEARCH DEPARTMENT

WATER ANALYSIS

Lease Navajo Tribal "U" Well No. 2 Lab. No. T-16,697
 Field Tocito Dome Pennsylvanian "D" County San Juan State New Mexico
 Quarter or Survey SE/4 Blk. 21 Section 21 T. 26N R. 18W
 Exact Location _____ Sample Series No. HG-34-1
 Producing Stratum _____ PBTB 6388 Total Depth 6425
 Stratum Yielding Sample Penn "D" From 6280 To 6284
 Condition of Well _____
 Sample Collected From Flow line Method Used _____
 Collected by J. C. Holt Date Collected 10-11-64 Date Received 10-15-64
 Transmittal Letter by L. O. Speer, Jr. Date 10-13-64 File N-1182-535.11

Radicle	Per Cent by Analysis	(a) P. P. M.	(b)	(a) X (b)	Per Cent Reacting Value	Calculated Compound	P. P. M.
Na	31.31	26,766	.0435	1,164.26	39.28	Na ₂ SO ₄	
Ca	4.76	4,060	.0499	202.59	6.84	NaCl	67,580
Mg	1.64	1,400	.0822	115.08	3.88	Na ₂ CO ₃	
Fe						NaHCO ₃	680
						CaSO ₄	1,274
SO ₄	1.06	900	.0208	18.72	.63	CaCl ₂	10,205
Cl	60.55	51,600	.0282	1,455.12	49.10	CaCO ₃	
CO ₂	0	0	.0333	0	0	Ca(HCO ₃) ₂	
HCO ₃	.58	493	.0164	8.09	.27	MgSO ₄	
H ₂ S						MgCl ₂	5,480
						MgCO ₃	
						Mg(HCO ₃) ₂	
Total solids as a summation of radicles							85,219 P.P.M.
Total solids by evaporation and ignition of residue at low red heat							88,360 P.P.M.
Sample as received: Resistivity: ohms/FTM .084 at 77°F. pH Value 6.4 Specific Gravity 60°/60°F. 1.063							

PROPERTIES OF REACTION IN PER CENT

PRIMARY SALINITY: SO₄ + Cl = with equal value Na (K) = 78.56 %
 SECONDARY SALINITY: If SO₄ + Cl is greater than Na (K) = %
 Then SO₄ + Cl = with equal value of Ca + Mg = 20.90 %
 PRIMARY ALKALINITY: Excess Na (K) over SO₄ + Cl = with equal value of CO₂ + S = %
 SECONDARY ALKALINITY: Excess Ca + Mg over SO₄ + Cl = with equal value of CO₂ + = .54 %
 CHLORIDE SALINITY: Cl ÷ (SO₄ + Cl) = X 100% = 98.73 %
 SULPHATE SALINITY: SO₄ ÷ (SO₄ + Cl) = X 100% = 1.27 %

NOTE: Multiply Parts per Million by .0583 to obtain Grains per Gallon.

REMARKS:

J. L. Hoyt, Jr.
 W. T. Smith
 R. M. Curtis
 L. O. Speer, Jr.
 G. W. Schmidt

Resistivity ohms/FTM = .093 at 70°F
 " " " = .054 at 130°F

Analyst James J. Elliott Date 10-23-64

BFA 535.11
File

Lease Navajo Tribal "U" Well No. 6 Lab. No. T-17,220
 Field Tocito Dona Penn. D County San Juan State New Mexico
 Quarter or Survey Blk. Section 22 T. 28N R. 18W
 Exact Location 660' ENL X 510' ENL Sample Series No. HG-65
 Producing Stratum PBTB 6343 Total Depth 6386
 Stratum Yielding Sample Lower Hermosa From 6238 To 44
 Condition of Well Method Used Direct
 Sample Collected From Flow Line Date Collected 6-2-65 Date Received 6-8-65
 Collected by D. R. Hogan Transmittal Letter by L. O. Speer, Jr. Date 6-2-65 File No. 1063-535,11

Radicle	Per Cent by Analysis	(a) P. P. M.	(b)	(a) X (b)	Per Cent Reacting Value	Calculated Compound	P. P. M.
Na	29.12	26,207	.0433	1,139.97	36.26	Na ₂ SO ₄	
Ca	6.93	6,240	.0499	311.38	9.90	NaCl	66,271
Mg	1.63	1,470	.0822	120.83	3.84	Na ₂ CO ₃	
Fe						NaHCO ₃	521
						CaSO ₄	1,020
						CaCl ₂	16,450
SO ₄	.80	720	.0208	14.98	.48	CaCO ₃	
Cl	61.10	55,000	.0282	1,551.00	49.32	Ca(HCO ₃) ₂	
CO ₂	0	0	.0333	0	0	MgSO ₄	
HCO ₃	.42	378	.0164	6.20	.20	MgCl ₂	5,753
H ₂ S						MgCO ₃	
						Mg(HCO ₃) ₂	
Total solids as a summation of radicles					90,015		P.P.M.
Total solids by evaporation and ignition of residue at low red heat					93,480		P.P.M.
Sample as received: Resistivity: ohms/MM .083 at 77°F. pH Value 6.2 Specific Gravity 60°/60°F. 1.008							

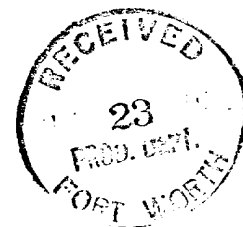
PROPERTIES OF REACTION IN PER CENT

PRIMARY SALINITY: SO₄ + Cl = with equal value Na (K) = 72.52 %
 SECONDARY SALINITY: If SO₄ + Cl is greater than Na (K) = %
 Then SO₄ + Cl = with equal value of Ca + Mg = 27.08 %
 PRIMARY ALKALINITY: Excess Na (K) over SO₄ + Cl = with equal value of CO₂ + S = 0 %
 SECONDARY ALKALINITY: Excess Ca + Mg over SO₄ + Cl = with equal value of CO₂ + = .40 %
 CHLORIDE SALINITY: Cl ÷ (SO₄ + Cl) = X 100% = 99.04
 SULPHATE SALINITY: SO₄ ÷ (SO₄ + Cl) = X 100% = .96

NOTE: Multiply Parts per Million by .0583 to obtain Grains per Gallon.

REMARKS:

J. L. Hoyt, Jr.
 W. T. Smith
 L. O. Speer, Jr.
 G. W. Schmidt

Analyst James D. Elliott Date 6-17-65