STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
AZTEC DISTRICT OFFICE

1000 RIO BRAZOS ROAD
AZTEC, NEW MEXICO 87410
(505) 334-6178

OIL CONSERVATION DIVISION
BOX 2088
SANTA FE, NEW MEXICO 87501

DATE September 2-1983

RE: Proposed MC_____
Proposed DHC_____
Proposed NSL_____
Proposed SWD_____
Proposed WFX X
Proposed PMX_____

Gentlemen:

I have examined the application dated August 31, 1983

for the Aztec O.+G. Co. Hoover Gallup Unit #3 F-32-31N-16W
Operator Lease and Well No. Unit, S-T-R

and my recommendations are as follows:

Approve

APPLICATION FOR AUTHORIZATION TO INJECT

RECEIVED
AUG 31 1983
OIL CON. DIV.
DIST. 3

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

II. Operator: ARCO Oil and Gas Company

Address: P. O. Box 5540, Denver, Colorado 80217

Contact party: W. A. Walther, Jr. Phone: 303-293-7031

III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project? [X] yes [ ] no
If yes, give the Division order number authorizing the project R-1699, Original Pressure Maintenance Authorization R-2210, Unit Authorization

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

* VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

*VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any. NONE.

* X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)

* XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: W.A. Walther, Jr. Title Operations Manager

Signature: [signature] Date: 8-25-83

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal.

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

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

(1) Lease name; Well No.; location by Section, Township, and Range; and footage location within the section.

(2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.

(3) A description of the tubing to be used including its size, lining material, and setting depth.

(4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

(1) The name of the injection formation and, if applicable, the field or pool name.

(2) The injection interval and whether it is perforated or open-hole.

(3) State if the well was drilled for injection or, if not, the original purpose of the well.

(4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.

(5) Give the depth to and name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

(1) The name, address, phone number, and contact party for the applicant;

(2) the intended purpose of the injection well; with the exact location of single wells or the section, township, and range location of multiple wells:

(3) the formation name and depth with expected maximum injection rates and pressures; and

(4) a notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, P. O. Box 2088, Santa Fe, New Mexico 87501 within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

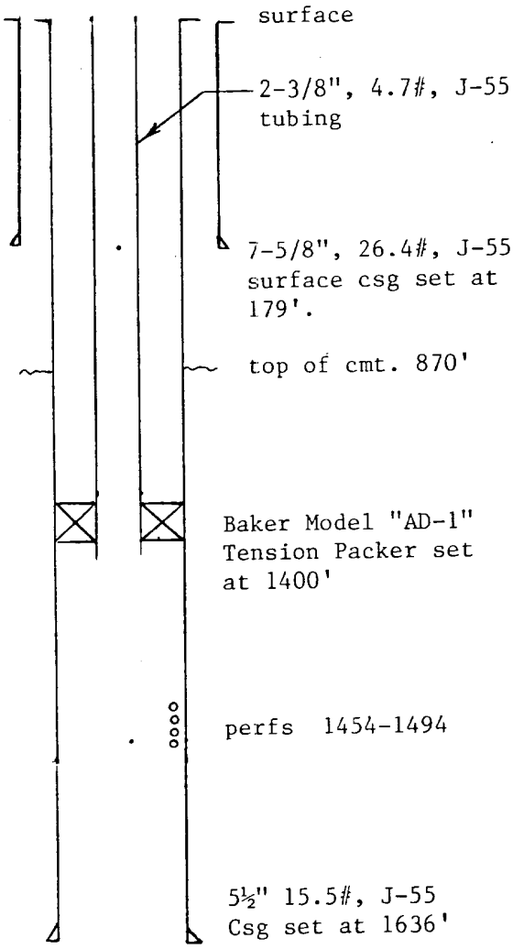
INJECTION WELL DATA SHEET

ARCO Oil and Gas Company (OPERATOR) — Horseshoe Gallup Unit D (LEASE)

#188 (WELL NO.) — 2035' FNL, 3280' FEL (FOOTAGE LOCATION) — Section 23 - T31N - R16W (SECTION, TOWNSHIP, RANGE)

San Juan County, New Mexico

Schematic



Tabular Data

Surface Casing

Size 7-5/8" Cemented with 100 sx.

TOC Surface feet determined by _____

Hole size 12-1/4"

Intermediate Casing

Size 5-1/2" Cemented with 50 sx.

TOC 870 feet determined by Temp. Survey

Hole size 6-3/4

Long string

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Total depth 1637'

Injection interval

1454 feet to 1494 feet
(perforated or open-hole, indicate which)

Additional information requested in Section VII:

1. Proposed average daily injection rate: 300 BWPD
   Proposed maximum daily injection rate: 300 BWPD
2. Closed system (i.e. source of injection water: well)
3. Proposed average injection pressure: 700 psi
   Proposed maximum injection pressure: 750 psi
4. Source of injection water: water well/Morrison formation and produced water/Gallup formation
   Analysis of injection water: see attachment

Tubing size 2-3/8",4.7# J-55 lined with (tubing not treated) (material) set in a Baker Model "AD-1" Tension (brand and model) packer at 1400' feet

(or describe any other casing-tubing seal).

Other Data

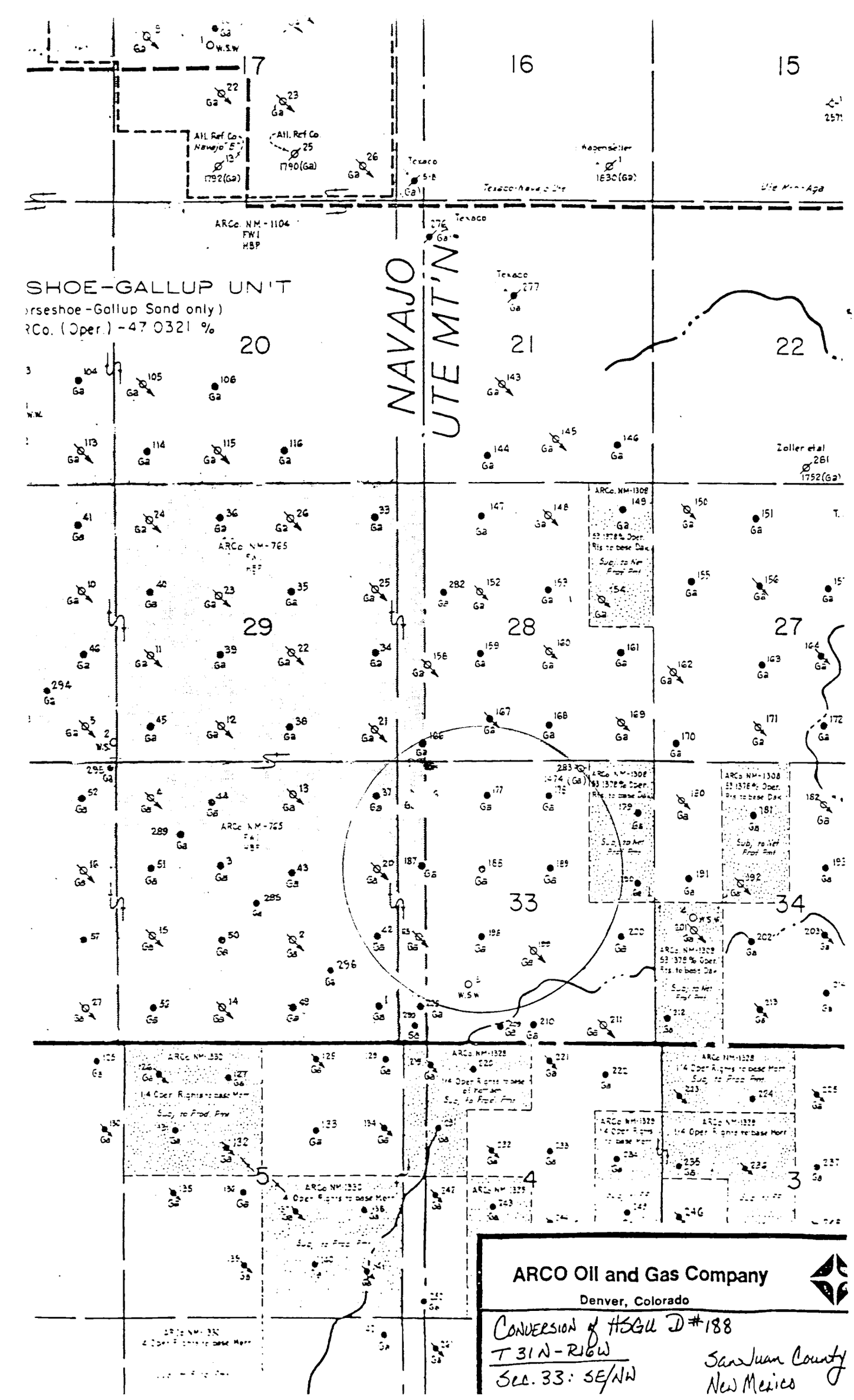
1. Name of the injection formation Gallup
2. Name of Field or Pool (if applicable) Horseshoe Gallup
3. Is this a new well drilled for injection? /_/ Yes /X/ No

   If no, for what purpose was the well originally drilled? Primary oil production.

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used)

   Original perfs: 1454-1494'; original perfs will be used for injection

5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. None.


SHOE-GALLUP UNIT
rseshoe-Gallup Sond only)
RCo. (Oper.) - 47.0321 %
NAVAJO
UTE MT'N
17
16
15
20
21
22
29
28
27
33
34
5
4
3
ARCo. NM-1104
FWI
HBP
ARCo NM-765
ARCo NM-1308
ARCo NM-1328
Texaco
Zoller et al
ARCo Oil and Gas Company
Denver, Colorado
Conversion of HSGU D#188
T 31 N - R 16 W
Sec. 33: SE/NW
San Juan County
New Mexico

Project No. 8-64-18P

SAMPLE NO. 18,129

TOTAL SOLIDS 6,129

CLIENT The Atlantic Refining Co. OPERATOR

FIELD Horseshoe Gallup Unit COUNTY San Juan STATE New Mexico

LEASE AND WELL NO. Water Supply Well No. 1 PROD. FORM. Dakota-Morrison

SOURCE OF SAMPLE Injection Lines DEPTH: TOTAL PERF.

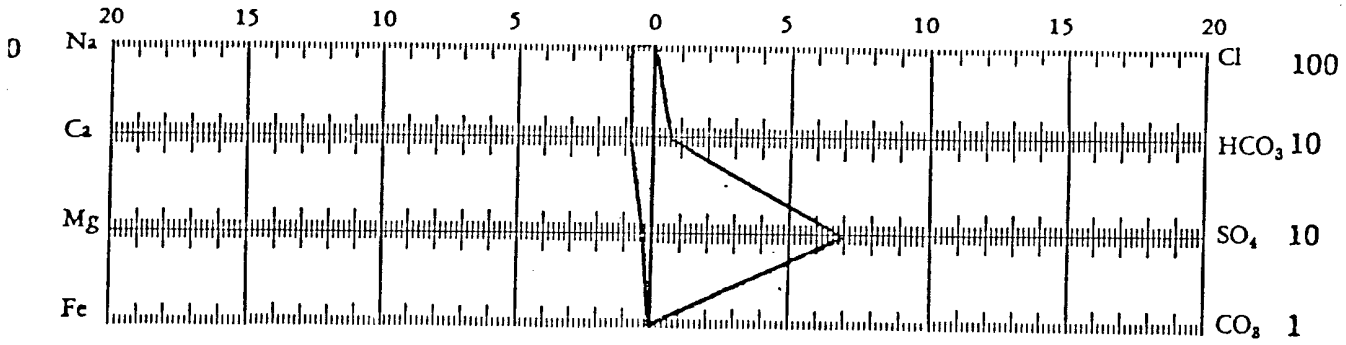
SAMPLE OF: PRODUCED WATER ☐ INJECTION SYSTEM WATER ☒ OTHER ☐

DATE COLLECTED 8-5-64 ANALYST

make up water

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	1.006	
pH	7.9	
RESISTIVITY	1.43	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.)	6,129
SODIUM	(CALC.)	1,780
IRON	(TOTAL)	-
MANGANESE		-
BARIUM		0
CALCIUM		152
MAGNESIUM		26
CHLORIDE		326
BICARBONATE		469
CARBONATE		0
SULFATE		3,376

DISSOLVED GASES

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

REMARKS: The sample consisted of one - one quart plastic bottle of water containing a dark precipitate of iron sulfide.

The sample contains a low concentration of a surf-active material that interferred with the end point in the chloride determination, therefore, chlorides were determined by electrometric methods.

Source of Sample Separator at Test Station

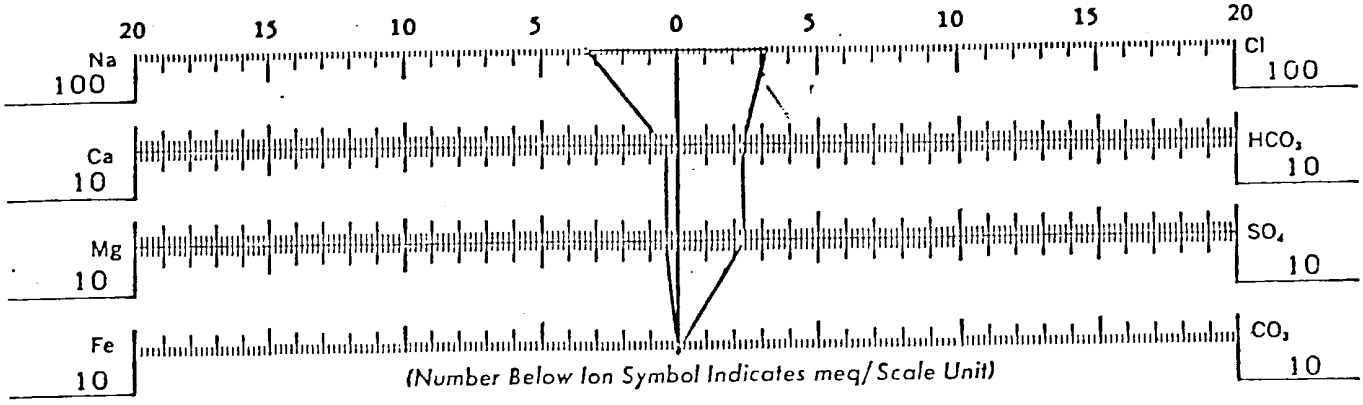
Date Collected produced by water 11/75

REPORT OF WATER ANALYSIS

Lab. Number A-2915 Specific Gravity 1.016 pH 30.0

Total Dissolved Solids 22032 Resistivity (Ohmmeters at 68° F.) .333 Hydrogen Sulfide PRESENT

DISSOLVED MINERAL ANALYSIS PATTERN



DISSOLVED SOLIDS ANALYSIS

	mg/l	meq/l
Total Solids (Calc.)	22032	
Sodium (Calc.)	8150	354.5
Iron (Dissolved)	-	-
Barium	0	.0
Calcium	94	4.7
Magnesium	54	4.4
Chloride	11300	318.7
Bicarbonate	1350	22.1
Carbonate	24	.8
Sulfate	1060	22.0

TOTAL IRON -

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.)		

SOLUBILITY CALCULATIONS

Calcium Carbonate Stability Index at 77° F _____ Scaling Tendency _____

Calcium Sulfate Stability at 95°F

Concentration _____ meq/l. Calc. Solubility _____ meq/l. Percent Saturation _____

Barium Sulfate Stability at 95° F

Concentration _____ meq/l. Calc. Solubility _____ meq/l. Percent Saturation _____

REMARKS

The sample consisted of one 8 ounce plastic bottle of water.