Amoco Production Company
Security Life Building
Denver, Colorado 80202

October 11, 1972

File: KWB-156-986.511

SWD-130

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

Re: Application to Extend Approved Disposal Zone Interval
USG, Section 19, Well No. 17, Hogback Dakota Pool,
San Juan County, New Mexico

Dear Mr. Porter:

Amoco Production Company hereby makes application under the Administrative Provisions of Rule 701 for permission to dispose of produced Dakota salt water into an additional section of the Entrada formation of its USG, Section 19, Well No. 17, located in Unit I of Section 19, Township 29N, Range 16W, San Juan County, New Mexico. In connection with this application, attached are the following exhibits:

1. Three copies of NMOCC 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 New Mexico State Engineer and to the USGS as representative of the Navajo tribe of Indians, the surface owner. There are no offset operators within one half mile of the disposal well.

2. A map of the area showing the location of USG, Section 19, Well No. 17, and the location of all other wells within a two mile radius. Also shown are the lessees within this same area.

3. A copy of the Electric Log on USG Section 19, Well No. 17 showing the present injection zone from 2157' to 3100' and the upper Entrada zone from 2045' to 2105' which is proposed for disposal purposes.

4. A schematic diagram showing the casing program which was employed on this well, together with the approximate location of the various formation tops in this well. The diagram also shows the present disposal zone and the proposed additional disposal zone.

5. A copy of a letter from the State Engineer's Office dated January 28, 1963 advising that that office had no objection to the disposal of salt water in the Entrada-Chinle Zone in USG, Section 19, Well No. 17.

6. A copy of a water analysis obtained on a drill stem test from the Entrada Zone on Pan American's Navajo Tribal No. 1, a dry hole located 790' from the north line and 1090' from the west line of Section 12, Township 29N, Range 17W, which shows the Entrada water to contain in excess of 9000 parts per million total solids. Also, a copy of typical Dakota water collected from Well No. 15, Section 19, Township 29N, Range 16W, showing total solids of 2850 parts per million total solids.

With regard to the use of the Entrada Zone from 2045' to 2105' for additional disposal capacity, the following points are submitted:

1. The proposed disposal interval is not known to be productive of oil, gas or fresh water anywhere in the vicinity of the Hogback Pool.

2. The casing program used on this well adequately protects all surrounding formations from any possible contamination by the injected water.

3. NMOCC Order R-2438 dated February 27, 1963 granted permission to dispose of produced Pennsylvanian salt water into the interval from 2157' to 3100' in the existing disposal well. By letter dated May 22, 1970, a copy of which is attached hereto, Mr. George M. Hatch, General Counsel for the Commission, approved disposal of water produced from the Dakota formation into the authorized disposal zone of Well No. 17.

4. Increasing water production from the Dakota Wells in the Hogback Pool and increasing injection pressures in the disposal well have brought about the need for additional disposal well capacity. The Entrada interval lying between the depths of 2045' and 2105' should provide this additional needed disposal capacity.

It is therefore the purpose of this application to secure your approval for the use of the additional Entrada Zone lying between 2045' and the top of the presently approved zone at 2157' for salt water disposal purposes. To prepare this zone for disposal we will follow the following general procedure:

1. Cut 7" casing just above the 9-5/8" casing shoe at a depth of approximately 2150'.

2. Spot cement plug in 7" casing from approximately 3250' to 3100'.

3. Set bridge plug at 2130' in the 9-5/8" casing.

4. Perforate the upper Entrada from 2050' to 2100' and stimulate if necessary.

5. If additional disposal capacity is necessary, remove the bridge plug at 2130' and inject also into the existing disposal zone from 2157'-3100'.

Yours very truly,

CJB:db

Attachments

cc: w/attachments

Mr. E. C. Arnold (2)
New Mexico Oil Conservation Commission
1000 Rio Brazos Road
Aztec, New Mexico 87410

United States Geological Survey (2)
P. O. Box 965
Farmington, New Mexico

United States Geological Survey (2)
Drawer 1857
Roswell, New Mexico

New Mexico State Engineer
State Capitol
Santa Fe, New Mexico

Form C-108
Revised 1-1-65

NEW MEXICO OIL CONSERVATION COMMISSION

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

OPERATOR	ADDRESS
Amoco Production Company	Security Life Bldg, Denver, Colorado 80202

LEASE NAME	WELL NO.	FIELD	COUNTY
U S G Section 19	17	Hogback Dakota	San Juan

LOCATION

UNIT LETTER I ; WELL IS LOCATED 1850 FEET FROM THE South LINE AND 790 FEET FROM THE East LINE, SECTION 19 TOWNSHIP 29N RANGE 16W NMPM.

CASING AND TUBING DATA

NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEMENT	TOP OF CEMENT	TOP DETERMINED BY
SURFACE CASING	13-3/8"	251'	250	Surface	Returns
INTERMEDIATE	9-5/8"	2157'	625	772'	Temperature
LONG STRING	7"	5613'	475	3100'	Temperature
TUBING: None			NAME, MODEL AND DEPTH OF TUBING PACKER: None		

NAME OF PROPOSED INJECTION FORMATION	TOP OF FORMATION	BOTTOM OF FORMATION
Entrada and Chinli	2045' - Entrada	3100' - Chinli

IS INJECTION THROUGH TUBING, CASING, OR ANNULUS?	PERFORATIONS OR OPEN HOLE?	PROPOSED INTERVAL(S) OF INJECTION
Casing and annulus	Perfs: 2045-2105 OH: 2157-3100	2045'-2105' and 2157'-3100'

IS THIS A NEW WELL DRILLED FOR DISPOSAL?	IF ANSWER IS NO, FOR WHAT PURPOSE WAS WELL ORIGINALLY DRILLED?	HAS WELL EVER BEEN PERFORATED IN ANY ZONE OTHER THAN THE PROPOSED INJECTION ZONE?
No	Oil and gas in Pennsylvanian	Yes - Pennsylvanian

LIST ALL SUCH PERFORATED INTERVALS AND SACKS OF CEMENT USED TO SEAL OFF OR SQUEEZE EACH
6530-70', 350 sx; 6396-6426', 200 sx; 6350-6370', 150 sx; 6045-6080', 400 sx; 6643-6659', 175 sx; plug 5000'-6597'.

DEPTH OF BOTTOM OF DEEPEST FRESH WATER ZONE IN THIS AREA	DEPTH OF BOTTOM OF NEXT HIGHER OIL OR GAS ZONE IN THIS AREA	DEPTH OF TOP OF NEXT LOWER OIL OR GAS ZONE IN THIS AREA
None known	Dakota - 960'	Pennsylvanian 5340'

ANTICIPATED DAILY INJECTION VOLUME (BBLS.) MINIMUM	MAXIMUM	OPEN OR CLOSED TYPE SYSTEM	IS INJECTION TO BE BY GRAVITY OR PRESSURE?	APPROX. PRESSURE (PSI)
3000	6000	Closed	Pressure	600

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	NATURAL WATER IN DISPOSAL ZONE	ARE WATER ANALYSES ATTACHED?
Yes	Yes	Yes

NAME AND ADDRESS OF SURFACE OWNER (OR LESSEE, IF STATE OR FEDERAL LAND)
Navajo tribe of Indians, c/o U.S.G.S. Box 965, Farmington, New Mexico

LIST NAMES AND ADDRESSES OF ALL OPERATORS WITHIN ONE-HALF (½) MILE OF THIS INJECTION WELL
None

HAVE COPIES OF THIS APPLICATION BEEN SENT TO EACH OF THE FOLLOWING? SURFACE OWNER	EACH OPERATOR WITHIN ONE-HALF MILE OF THIS WELL	THE NEW MEXICO STATE ENGINEER
To U.S.G.S.	Yes (None)	Yes

ARE THE FOLLOWING ITEMS ATTACHED TO THIS APPLICATION (SEE RULE 701-B) PLAT OF AREA	ELECTRICAL LOG	DIAGRAMMATIC SKETCH OF WELL
Yes	Yes	Yes

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

R B Giles — Sr. Staff Engr. Amoco Prod. Co. — 10/12/72

(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.

ATTACHMENT NO. 1

AMOCO PRODUCTION COMPANY
HOGBACK DAKOTA FIELD
WELL NO. 17 - USG SECTION 19

ELEVATION KBB 5110'

13 3/8" CSA 251' W/250 SX. CMT. CIRCULATED

TOP DAKOTA 753'

TOP MORRISON 960'

ILLEGIBLE

TOP
ENTRADA 2045'

9 5/8" CSA
2157' W/625 SX.
CMT.

PROPOSED ZONE

DISPOSAL ZONE
2157' TO 3100'

TOP CHINLE 2770'

TOP CEMENT
BEHIND 7" CSG 3100'

TOP DECHELLY 3723'

TOP CUTLER 3976'

PBD 5000' W/175 SX. CLASS "C" CMT.

TOP PENNSYLVANIAN 5340'

7" CSA 5613' W/475 SX. CMT.

SHOT OFF 2-3/8" TUBING AT 6597'

GAS ZONE 6396'-6426' SQUEEZED OFF

GAS ZONE 6530'-6570' SQUEEZED OFF

2-3/8" TBG LANDED AT 6645'
W/LANE WELLS PKR. SET AT 6612'

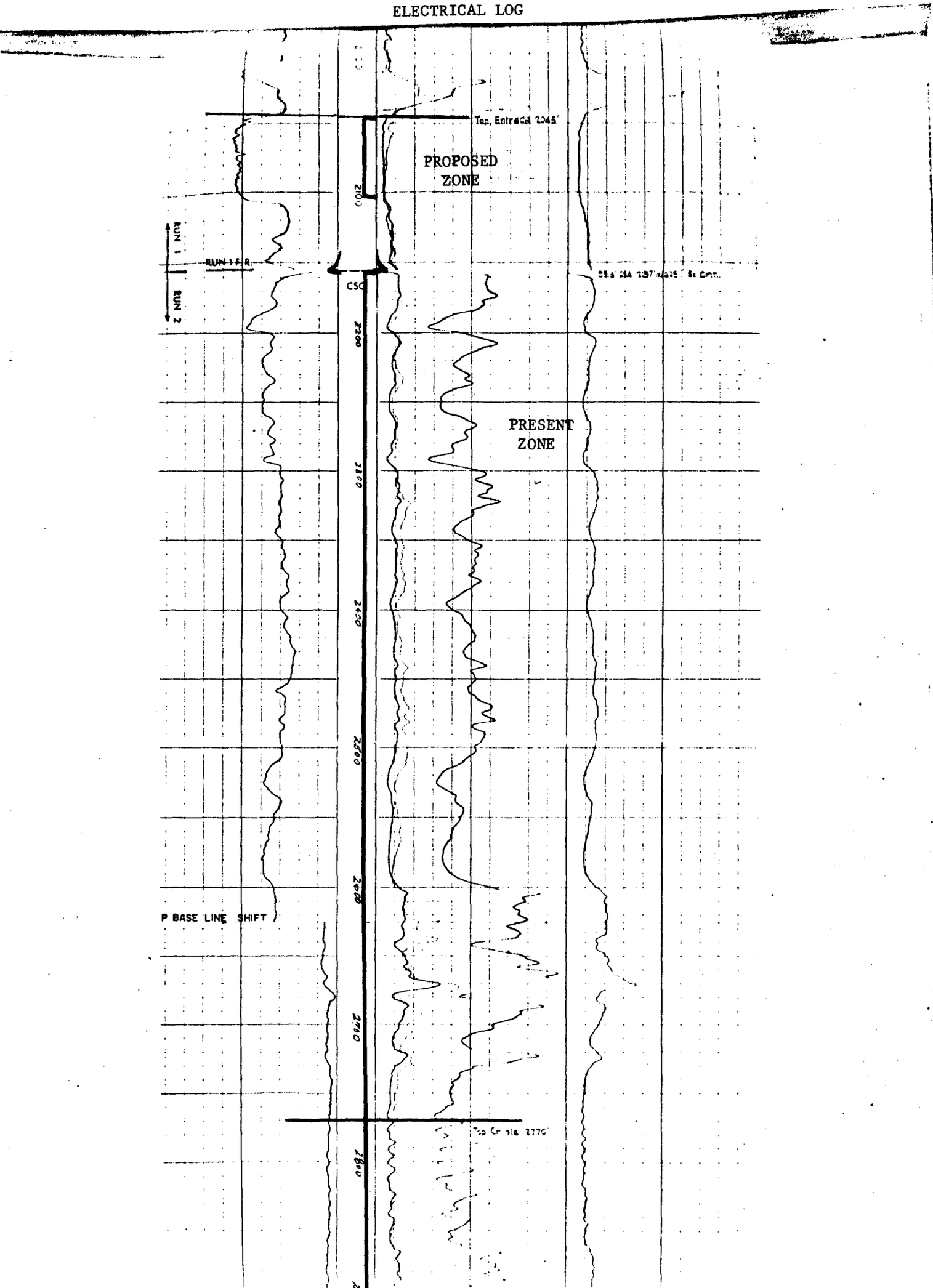
OIL ZONE 6643'-6659' PRODUCED THRU TBG.

TOP MISSISSIPPIAN 6933'

5" LINER SET 5486'-7035' W/210 SX. CMT.

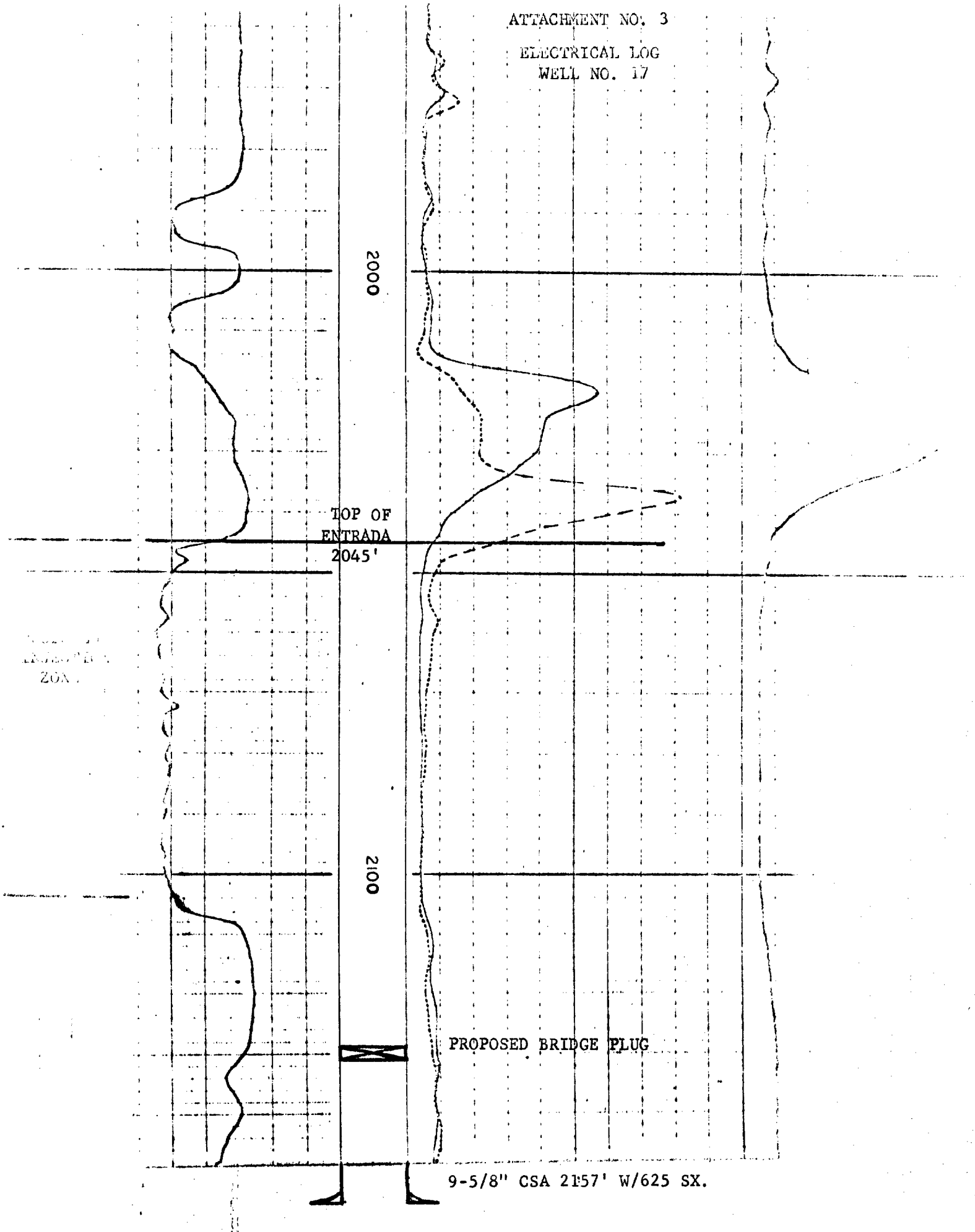
ATTACHMENT NO. 2

ELECTRICAL LOG



ATTACHMENT NO. 3

ELECTRICAL LOG
WELL NO. 17



STATE OF NEW MEXICO

STATE ENGINEER OFFICE

SANTA FE

RECEIVED JAN 29 1963

S. E. REYNOLDS
STATE ENGINEER

ADDRESS CORRESPONDENCE TO:
STATE CAPITOL
SANTA FE, N. M.

January 28, 1963

Pan-American Petroleum Corporation
P. O. Box 480
Farmington, New Mexico

Attn. Mr. T. M. Curtis
District Superintendent

Dear Mr. Curtis:

Reference is made to my letter of January 11, 1963, and your reply dated January 16, 1963, concerning the disposal of salt water in the Entrada-Chinlee zone by using the USG Section 19 No. 17 Well.

This office has reviewed the analysis of Entrada water from the Navajo Tribal No. 1 well in Section 12, Township 29 North, Range 17 West and is inclined to agree with your statement that the Entrada water may have a total solids content in excess of 10,000 ppm in the subject field. Therefore, this office offers no objection to your proposal to inject salt water into the Entrada-Chinlee zone between the 2157 foot and 3100 foot interval by using Well No. 17.

Very truly yours,

S. E. Reynolds
State Engineer

By: D. E. Gray
D. E. Gray
Engineer
Water Rights Division

DEG/ma
cc-Mr. A. L. Porter, Jr.

X-6

FORM 66 2-66
PRINTED IN U.S.A.

PAN AMERICAN PETROLEUM CORPORATION
RESEARCH CENTER
WATER ANALYSIS

LOCATION SAMPLED: Division Denver District South Area Farmington
Operator (Plant) Pan American Well No. 15 Lease USG Section 19
State (Province) New Mexico County (Parish) San Juan
Twp. 29N Rng. 16W Sec. 19 Quarter (Lsd.) Other (Meridian)
Wildcat ( ) Field Well (x)
Field name Hogback Sample used for detailed analyses
Sample collected from Well head Sample collected by J. C. Holt Date 8-7-67
Interval sampled to Interval name Dakota
Recovery
Form 97 transmitted by L. O. Speer, Jr. Date transmitted 8-7-67, File: E-178-535.11
Technical Service request authorized by Office
Technical Service Number: 3098

ORGANIC CONSTITUENTS in mg/1

	BOTTOM	MIDDLE	TOP	MUD	
Benzene					
Toluene					
Phenols					
HC Gases					

DESCRIPTION OF SAMPLE

Condition as received
Color
Odor
Suspended solids
Bottom sediment
Oil content

QUALITY OF SAMPLE

Chloride ion mg/1:	BOTTOM	MIDDLE	TOP

Comments on quality

CONVENTIONAL MAJOR ION ANALYSIS

		Major Ions mg/1[1]	% of Total Major Ions	Reaction Value meq/1[2]	% of Total Reaction Value
CATIONS	Sodium Na^+	1,035	30.82	45.03	49.01
	Calcium Ca^{++}	10	.30	.50	.54
	Magnesium Mg^{++}	5	.15	.41	.45
	Potassium K^+				
ANIONS	Chloride Cl^-	212	6.31	5.98	6.52
	Bicarbonate HCO_3^-	1,100	32.76	18.04	19.63
	Sulfate SO_4^{--}	900	26.80	18.72	20.37
	Carbonate CO_3^{--}	96	2.86	3.20	3.48
	TOTAL	3,358			

Total solids by evaporation 2,850 mg/1
NaCl resistivity equivalent (Dunlap) 2,134 mg/1
Resistivity 2.30 ohm-meters at 77 °F
pH 8.7 Specific gravity 1.003 at °F
Ryznar stability index (2pHs–pH) at °F

OTHER IONS AND DISSOLVED SOLIDS

CATIONS	mg/1	ANIONS	mg/1	OTHERS	mg/1
Lithium Li^+		Bromide Br^-		Iron Fe	
		Iodide I^-		Boron B	
				Silica SiO_2	

[1] Data previously reported on Form 66 7-62 under the heading P.P.M. was actually in milligrams per liter. By definition, ppm = mg/1 /sp. gr.
[2] meq/1 means milligram equivalents per liter.

REMARKS AND CONCLUSIONS:

cc: M. S. Kraemer, W. R. Franey
H. T. Hunter
P. H. Garrison
L. O. Speer, Jr.
J. P. Barrett

Date received 8-18-67 Field sample no. HG-186
Lab. no. T-18652
Analyst James L Elliott Date 8-25-67

RESEARCH DEPARTMENT
WATER ANALYSIS

Lease Navajo Tribal Well No. 1 Lab. No. Lab. 537
Field Wildcat County San Juan State New Mexico
Quarter-quarter-quarter Blk. Section 12 T. 29N R. 17W
Exact Location 720' From n & 1090' From w lines Sample Series No. Mis-70
Producing Stratum Entrada PBTD Total Depth 2190
Stratum Yielding Sample Entrada From To
Condition of Well
Sample Collected From Drill Pipe Method Used From Drill Pipe Breakout
Collected by A. W. Rothe Date Collected 4-30-54 Date Received 5-12-54
Transmittal Letter by L. G. Speer, Jr. Date 4-30-54 File GCF-2033-251.3

Radicle	Per Cent by Analysis	(a) P. P. M.	(b)	(a) X (b)	Per Cent Reacting Value	Calculated Compound	P. P. M.
Na	33.37	3,010	.0435	130.7	47.45	Na_2SO_4	6,503
Ca	.81	73	.0499	3.64	1.34	NaCl	2,221
Mg	.14	13	.0822	1.07	.40	Na_2CO_3	69
Fe						$NaHCO_3$	
						$CaSO_4$	
						$CaCl_2$	
SO_4	49.75	4,397	.0208	91.48	33.76	$CaCO_3$	142
Cl	14.93	1,347	.0282	37.97	14.03	$Ca(HCO_3)_2$	
CO_3	2.00	180	.0333	5.99	2.21	$MgSO_4$	
HCO_3		0	.0164			$MgCl_2$	
H_2S						$MgCO_3$	45
						$Mg(HCO_3)_2$	

Total solids as a summation of radicle 9,027 P.P.M.
Total solids by evaporation and ignition of residue at low red heat 10,054 P.P.M.
Sample as received. Resistivity ohms/MM .310 at 77°F pH Value 11.52 Specific Gravity 60° 60°F. 1.0095

PROPERTIES OF REACTION IN PER CENT

PRIMARY SALINITY SO_4 + Cl with equal value Na (K) 94.52 %
SECONDARY SALINITY If SO_4 + Cl is greater than Na (K)
Then SO_4 + Cl = with equal value of Ca + Mg 1.06 %
PRIMARY ALKALINITY Excess Na (K) over SO_4 + Cl = with equal value of CO_3 + HCO_3
SECONDARY ALKALINITY Excess Ca + Mg over SO_4 + Cl = with equal value of CO_3 + HCO_3 = 4.42 %
CHLORIDE SALINITY Cl ÷ (SO_4 + Cl) X 100% 2.35
SULPHATE SALINITY SO_4 ÷ (SO_4 + Cl) = X 100% 97%

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

REMARKS:

This analysis indicates contamination, probably from drilling fluid and is not considered representative of formation water.

cc: C. F. Bedford
C. L. Kelley
L. G. Speer, Jr.

RECEIVED
Roswell Dist. Office
JUN 18 1954

DS
1 DE
DC
2
3 6/18
4
5 FILE

ILLEGIBLE

Analyst Date 6-11-54

LARGE FORMAT EXHIBIT HAS BEEN REMOVED AND IS LOCATED IN THE NEXT FILE