

CASE 3763: Application of PAN
AMERICAN FOR SALT WATER DISPOSAL,
SAN JUAN COUNTY, NEW MEXICO.

Case Number

3763

Application
Transcripts.

Small Exhibits

ETC.



IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Drawer 1857
Roswell, New Mexico 88201

May 14, 1968

Pan American Petroleum Corporation
Security Life Building
Denver, Colorado 80202

Attention: Mr. R. B. Giles

Gentlemen:

Your application of April 19, to the New Mexico Oil Conservation Commission requests approval to inject salt water into the Dakota formation on Navajo tribal lease I-89-Ind-58.

Either or both well No. 28 in the SW $\frac{1}{4}$ sec. 18 and well No. 24 in the NW $\frac{1}{4}$ sec. 19, T. 29 N., R. 16 W., N.M.P.M., will be converted to water injection. The method of injection as described by your application is acceptable to this office.

Please notify our Farmington District office when the system is complete, so that a field inspection can be made.

Sincerely yours,

Carl A. Anderson

for JOHN A. ANDERSON
Regional Oil and Gas Supervisor

cc:
Farmington
NMOCC, Santa Fe ✓

60 MAY 15 1968

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE No. 3763
Order No. R-3419

APPLICATION OF PAN AMERICAN PETROLEUM
CORPORATION FOR SALT WATER DISPOSAL,
SAN JUAN COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on May 16, 1968,
at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 29th day of May, 1968, the Commission, a
quorum being present, having considered the testimony, the record,
and the recommendations of the Examiner, and being fully advised
in the premises,

FINDS:

(1) That due public notice having been given as required by
law, the Commission has jurisdiction of this cause and the subject
matter thereof.

(2) That the applicant, Pan American Petroleum Corporation,
is the owner and operator of the USG Section 18 Well No. 28,
located in Unit O of Section 18, and the USG Section 19 Well
No. 24, located in Unit J of Section 19, both in Township 29
North, Range 15 West, NMPM, Hogback-Dakota Pool, San Juan County,
New Mexico.

(3) That the applicant proposes to utilize said wells to
dispose of water produced only from the Dakota formation in the
subject pool and to dispose of said water back into the Dakota
formation, with injection into the intervals as follows:

The open-hole interval from approximately
712 feet to 715 feet in the USG Section 18
Well No. 28;

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CASE No. 3763
Order No. R-3419

The open-hole interval from approximately
757 feet to 762 feet in the USG Section 19
Well No. 24.

(4) That the injection should be accomplished through:

2 3/8-inch internally plastic-coated tubing
installed in packers set just above the 4 1/2-
inch casing shoe in each of the subject wells;

that the casing-tubing annulus of each of the subject wells should
be filled with an inert fluid; and that a pressure gauge should be
attached to the annulus of each of the subject wells or the annulus
left open at the surface in order to determine leakage in the tub-
ing or packer.

(5) That approval of the subject application will prevent
the drilling of unnecessary wells and otherwise prevent waste
and protect correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Pan American Petroleum Corporation,
is hereby authorized to utilize the following-described wells in
Township 29 North, Range 16 West, NMPM, Hogback-Dakota Pool, San
Juan County, New Mexico, to dispose of produced water (from Dakota
formation only) into the Dakota formation:

USG Section 18 Well No. 28, located in Unit O
of Section 18 - injection to be accomplished
through 2 3/8-inch tubing installed in a packer
set just above the 4 1/2-inch casing shoe,
with injection into the open-hole interval from
approximately 712 feet to 715 feet;

USG Section 19 Well No. 24, located in Unit J
of Section 19 - injection to be accomplished
through 2 3/8-inch tubing installed in a packer
set just above the 4 1/2-inch casing shoe,
with injection into the open-hole interval from
approximately 757 feet to 762 feet;

PROVIDED HOWEVER, that the tubing of each of the subject wells
shall be internally-plastic coated; that the casing-tubing annulus
of each of the subject wells shall be filled with an inert fluid;

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CASE No. 3763

Order No. R-3419

and that a pressure gauge shall be attached to the annulus of each of the subject wells or the annulus left open at the surface in order to determine leakage in the tubing or packer.

(2) That the applicant shall submit monthly reports of its disposal operations in accordance with Rules 704 and 1120 of the Commission Rules and Regulations.

(3) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION


DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

GOVERNOR
DAVID F. CARGO
CHAIRMAN

State of New Mexico
Oil Conservation Commission



LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

P. O. BOX 2008
SANTA FE

May 29, 1968

Mr. Lewis C. Ross
Pan American Petroleum Corporation
Security Life Building
Denver, Colorado 80202

Re: Case No. 3763
Order No. R-3419
Applicant:
Pan American Petroleum Corp.

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Carbon copy of order also sent to:

Hobbs OCC X

Artesia OCC

Aztec OCC X

Other State Engineer Office

Case 3763

Heard 5-16-68

Rec. 5-17-68.

Grant Perm. Am. permission to
connect Shier. ~~W.B.S.A. #28~~
E.S.S. 'B' #28 Unit 0 sec. 18 and
their E.S.S. 'A' #24 Unit 5 section
19 both in 28N-16W. Hogback-
Dakota Oil Pool to SWD wells

The Disposal water will be
only produced Dakota water +
the disposal zone will be into
the Dakota zone in open hole
from 712' to 715' in the #28 and
from 757' to 762' in the #24. ~~the~~

Disposal will be thru ³ tubing and
under packers set just above the
4 1/2 packer shoe.

Thur. W.

DOCKET: EXAMINER HEARING - THURSDAY - MAY 16, 1968

9 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Elvis A. Utz, Examiner, or Daniel S. Nutter, Alternate Examiner:

- CASE 3760: Application of Union Oil Company of California for salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of water produced in the South Vacuum-Devonian Pool into the Devonian formation in the interval from 12,000 feet to 12,180 feet in its John Trigg Lea Federal J Well No. 2 located in Unit P of Section 14, Township 18 South, Range 35 East, Reeves-Devonian Pool, Lea County, New Mexico.
- CASE 3761: Application of Harlan Production Company for an unorthodox oil well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks authority to drill its Etz-State Well No. 15 at an unorthodox location 1650 feet from the North line and 1325 feet from the West line of Section 16, Township 17 South, Range 30 East, Grayburg-Jackson Pool, Eddy County, New Mexico.
- CASE 3762: Application of Shannick Oil Company for authority to operate an oil treating plant, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to install a combination chemical and hot-water wash oil treating plant, said plant to be located approximately four miles West of Crossroads, New Mexico, and to purchase, transport, treat, and sell oil, condensate, and sediment oil in connection with the operation of said plant.
- CASE 3763: Application of Pan American Petroleum Corporation for salt water disposal, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the Dakota formation in the interval from 712 feet to 715 feet in its USG Section 18 Well No. 28, located in Unit C of Section 18, and/or in the interval from 757 feet to 762 feet in its USG Section 19 Well No. 24 located in Unit C of Section 19, both in Township 29 North, Range 16 West, Hogback-Dakota Pool, San Juan County, New Mexico.

CASE 3764: Application of Pan American Petroleum Corporation for lease commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks authority to commingle Dakota oil production from its Navajo Tribal USG Section 19 (A) and its Navajo Tribal USG Section 18 (B) leases in Sections 18 and 19 of Township 29 North, Range 16 West, Hogback-Dakota Oil Pool, San Juan County, New Mexico, allocating the production to each lease on the basis of periodic well tests even though there is a difference in over-riding royalty interests between Sections 18 and 19.

CASE 3765: Application of D. J. Simmons for an unorthodox gas well location, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of his General Petroleum-Rock Island Well No. 2 at a point 1850 feet from the North line and 810 feet from the West line of Section 24, Township 29 North, Range 9 West, Blanco-Mesaverde Pool, San Juan County, New Mexico, in exception to the pool rules which require locations to be in either the Northeast or Southwest of the Section.

CASE 3766: Application of Tamarack Petroleum Company, Inc., for an amendment to Order No. R-3396, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-3396, which authorized a waterflood project in its South Pearl Queen Unit Area, Pearl Queen Pool, Lea County, New Mexico, to delete the water injection wells previously authorized in Unit B of Section 3, Units G and L of Section 4, Unit I of Section 5, and Unit C of Section 10, and to authorize for water injection its Saunders Federal Well No. 7 in Unit P of Section 5 and its Saunders Federal Well No. 3 in Unit D of Section 10, all in Township 20 South, Range 35 East.

CASE 3767: Application of Mobil Oil Corporation for lease commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to commingle Grayburg-San Andres production from its Bridges State Wells Nos. 8 and 53 located in Units J and H, respectively, of Section 23, with Grayburg-Jackson production from its Bridges State Lease comprising the W/2 of Section 24, all in Township 17 South, Range 34 East, Vacuum Grayburg-San Andres Pool, Lea County, New Mexico, allocating the production on the basis of periodic well tests, even though there is a

-3- Examiner Hearing - May 16, 1968

Docket No. 15-68

difference in over-riding royalty interest between Sections 23 and 24.

CASE 3768: Application of Mobil Oil Corporation for a triple completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the triple completion (conventional) of its Bridges State Well No. 126 located in Unit J of Section 11, Township 17 South, Range 34 East, Lea County, New Mexico, in such a manner as to produce oil from the Abo, Upper Pennsylvanian, and Morrow formations, Vacuum Field, through parallel strings of tubing.

PAN AMERICAN PETROLEUM CORPORATION

SECURITY LIFE BUILDING
DENVER, COLORADO 80202

April 19, 1968

File: AMR-1256-986,511

Set for Hearing

Re: Application to Dispose of Salt Water Into
The Dakota Formation Through Pan American's
USG Section 18 Well No. 28 and/or
USG Section 19 Well No. 24, Hogback Dakota
Field, San Juan County, New Mexico

Case 3763

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

3:12 PM

Dear Sir:

Pan American Petroleum Corporation hereby makes Application under the provisions of Rule 701 for approval to dispose of salt water produced from the Hogback Dakota pool into the Dakota formation at its USG Section 18 Well No. 28 and/or USG Section 19 Well No. 24, each located in Township 29 North, Range 16 West, San Juan County, New Mexico. Disposal into either or both wells will be through 2-3/8" tubing below a packer set inside the casing to minimize pressure on the existing 4-1/2" production string in these proposed disposal wells. 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 U. S. Geological Survey as representative of the Navajo Tribe of Indians, the surface owner. There are no offset operators to the USG Sections 18 and 19 lease, leasehold owned and operated by Pan American; however, there are other lessees within a two (2) mile radius of the proposed disposal wells, as shown on the attached map, who are being notified of our proposed disposal plans by copy of this Application.
2. A localized map of the area showing in detail the wells in the immediate area and the location of USG Section 18 Well No. 28 in the SE/4 of Section 18 and the location of USG Section 19 Well No. 24 in the SE/4 of Section 19.
3. A copy of the Radioactivity Log on each proposed disposal well.
4. A schematic diagram showing particulars of the casing program in each well and the proposed tubing and packer details. Testing during completion operations in each well revealed:

DOCKET MAILED

Date *5/2/68*

Mr. A. L. Porter, Jr.
April 19, 1968
Page 2

USG Section 18 Well No. 28

After cementing 4-1/2" casing, the well was drilled into the Dakota pay sand to 715 feet and allowed to flow for test. Well subsequently flowed 107 barrels of water in 50 hours with no show of oil. Well was temporarily abandoned November 14, 1967, for possible future use as water disposal well.

USG Section 19 Well No. 24

After cementing 4-1/2" casing, the well was drilled into the Dakota pay sand to 762 feet and allowed to flow for test. Well subsequently flowed 197 barrels of water with a trace of oil. Well was acidized October 7, 1967, with 250 gallons 7-1/2% HCl. Subsequent testing recovered 236 barrels of water with no oil. Well was temporarily abandoned October 11, 1967, for possible future use as a water disposal well.

5. A copy of a water analysis obtained from USG Section 19 Well No. 11, which is a "typical" analysis of Dakota produced water, which water is unfit for domestic, stock, irrigation or other general use.

Prior to an intensive development drilling program to raise Dakota oil productivity last year, it was felt the Dakota operated under an extremely active water drive. While we still feel the Dakota is operating under an active natural water drive, recent increased withdrawals lend credence that disposal of produced Dakota water into a Dakota well(s) that exhibited no commercial oil shows will assist in maintaining oil producing rates from the Dakota pool.

NMOCC Order No. R-2438, issued February 27, 1963, granted Pan American permission to dispose of produced Hogback Pennsylvanian salt water into a non-productive zone of the Chinle formation in its USG Section 19 Well No. 17, located in the SE/4 of Section 19, T29N-R16W. Recent indications are that while the Chinle formation will accept 350 BWPD of Pennsylvanian water with periodic acid treatments, an additional disposal source will be needed to handle the 1100 BWPD of Dakota produced water. It is the purpose of this Application, therefore, to secure your administrative approval for the use of the Dakota in USG Section 18 Well No. 28 and/or USG Section 19 Well No. 24 as an additional disposal zone for the produced water from the Hogback Dakota pool, if you are satisfied with the completeness of this Application and receive no objections within 15 days from the below 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.

Yours very truly,

R.B. Giler

Attachments

Mr. A. L. Porter, Jr.
April 19, 1968
Page 3

Carbon Copies to:

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

Walter Duncan
Security Life Building
Denver, Colorado 80202

Aztec Oil and Gas Company
First National Bank Building
Dallas, Texas

C. C. Kennedy
1249 Chaco Avenue
Farmington, New Mexico

W. C. Imbt
210 West 38th Street
Farmington, New Mexico

ATWOOD & MALONE
LAWYERS

P. O. DRAWER 700
TELEPHONE 505 622-6221
SECURITY NATIONAL BANK BUILDING
ROSWELL, NEW MEXICO
88201

JEFF D. ATWOOD (883-1960)

CHARLES F. MALONE
RUSSELL D. MANN
PAUL A. COOTER
BOB F. TURNER
ROBERT A. JOHNSON
JOHN W. BASSETT
ROBERT E. SABIN

May 8, 1968

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

Re: May 16, 1968 Docket - Cases Nos. 3763 and 3764

Dear Mr. Porter:

We enclose herewith for filing in the captioned cases our
Entry of Appearance for Pan American Petroleum Corporation. The
actual presentation will be made by Louis C. Ross, one of Pan Ameri-
can Petroleum Corporation's Denver attorneys.

Very truly yours,

ATWOOD & MALONE

By: 

PC:bc
Encls.

50 MAY 9 AM 8 31

BEFORE THE OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION
OF PAN AMERICAN PETROLEUM CORPORA-
TION FOR SALT WATER DISPOSAL, SAN
JUAN COUNTY, NEW MEXICO.

Case No. 3763

ENTRY OF APPEARANCE

The undersigned attorneys, duly licensed to practice law in the
State of New Mexico, hereby enters their appearance in this cause as
New Mexico counsel for Pan American Petroleum Corporation.

DATED at Roswell, New Mexico, this 8th day of May, 1968.

ATWOOD & MALONE

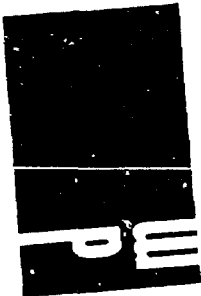
By 

P. O. Drawer 700
Roswell, New Mexico

dearnley-meier reporting service, inc.

SPECIALIZING IN: DEPOSITIONS, HEARINGS, STATEMENTS, EXPERT TESTIMONY, DAILY COPY, CONVENTIONS

1120 SIMMS BLDG. • P. O. BOX 1092 • PHONE 243-6491 • ALBUQUERQUE, NEW MEXICO



BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
May 16, 1968
EXAMINER HEARING

IN THE MATTER OF:

Application of Pan American
Petroleum Corporation for salt
water disposal, San Juan County,
New Mexico.

Case 3763

BEFORE: Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Hearing will come to order, please.

Case 3763.

MR. HATCH: Case 3763, Application of Pan American Petroleum Corporation for salt water disposal, San Juan County, New Mexico.

MR. ROSS: Louis C. Ross appearing for Pan American Petroleum Corporation Denver Division. I believe that Atwood & Malone have entered their appearance in this case, is that correct?

MR. UTZ: That's correct.

MR. ROSS: This application is under Rule 701 for approval to inject water into the Dakota Formation which is the formation from which the water is produced in our present wells No. 28 and 24 in the Hogback Dakota Pool. We've already submitted our application with certain data required by Rule 701 and it's almost a prima facie case, but we want to supplement it with additional exhibits here today. Among those exhibits is a map showing a two-mile radius and I would like to state for the record at this time that all the people that would be interested within this radius have been notified. We have one witness and I would like to have him sworn.

(Witness sworn)

MR. UTZ: Let me call for other appearances at this time. There are none.

FRANK H. HOLLINGSWORTH

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. ROSS:

Q State your name.

A My name is Frank Hollingsworth.

Q What is your occupation?

A I am a Petroleum Engineer Senior Grade with Pan American Petroleum Corporation, Denver Colorado. I work as a Reservoir Engineer.

Q How familiar are you with this Hogback Pool?

A I have worked in the Farmington area for nine years and have been -- done work in the Hogback Dakota Field for approximately eleven years.

Q Have you ever appeared before this Commission before?

A Yes, sir.

Q When was the last time?

A It was in August of 1967.

MR. ROSS: I would like to ask if the witness's qualifications are satisfactory?

MR. UTZ: Yes, sir, they are.

(Whereupon, Applicant's Exhibits
1 through 4 marked for
identification)

MR. ROSS: Now we have four exhibits and I
would like to introduce them all at one time and we will take
them up one at a time from the top.

Q Now, the first exhibit is a vicinity map and I
would like to ask the witness what is the significance of
this particular exhibit?

A This is a map of the northwest area of New
Mexico, San Juan County primarily, it shows the location of
the Hogback Dakota Field in relation to the town of
Farmington and to the Four Corners Monument. It also shows
other Dakota oil producing fields in the area. I would like
to point out that the shallow Dakota at this area west of
the San Juan Basin is a significant oil producer.

MR. ROSS: We introduce Exhibit 1.

MR. UTZ: I don't think we could hardly argue
with you about that, could we?

Q Our Exhibit 2 is a field structure map and I
would like to introduce Exhibit 2 and ask the witness to
discuss the history and the current status of the field from
this map.

A The Hogback Dakota Field was discovered in 1923

by the Midwest Corporation and development was done in 1923 through 1925 with the drilling of seven producers and four dry holes. It remained in that status until approximately the mid 50's when Pan American Petroleum Corporation drilled some additional wells in the field, drilling three producers and two dry holes at that time. In 1966 field production had declined to a low of 66 barrels a day so in early 1967 we worked over three wells by stimulating them with sand oil fracture treatments, two of which were highly successful in increasing production and one a partial success. Then in August of 1967 I appeared before Mr. Utz for field rules which would permit the drilling of infield wells, in other words, more than one well per 40-acre tract, which was approved. After that we drilled six wells, three which were oil producers, three that were dry holes or noncommercial and we presently have an active well that we are recovering load oil on. As a result of these workovers and this infield drilling program we have got production from the field from sixty-six barrels a day to 372 barrels a day, but as a result of this increased production we have also increased water production considerable, from about 150 barrels of water a day to a little over 1,100 barrels of water per day, and we have been utilizing an approved injection well which is called

the USG Section 19 Well No. 17 which is located in the northeast quarter of the southeast quarter of Section 19 Township 29 North, Range 16 West. This is an injection into a casing, casing annulus to Chimlee Formation. This was approved by order R-2438 in 1963. In the early part of this year we were injecting both a mixture of Pennsylvanian produced water and the Dakota produced water into the Chimlee Formation here. The Pennsylvanian well which is No. 13 which is located in the southwest of the northeast of Section 19 was the only Pennsylvanian producer we had. This has declined to about half a barrel a day so we have now shut it in so no more Pennsylvanian water is now being produced and we are only injecting Dakota Formation water; due to this -- formerly we were injecting about 350 barrels of water a day into this disposal well, presently injecting a little over 900 barrels of water per day and we're having trouble with the well pressuring up, in other words, where we formerly disposed at pressures of about 350 to 390 PSI this has climbed to five and 600 PSI and we occasionally have to give the well acid treatment to get it back down and it's currently running about 500 PSI. We are a little bit concerned that this well will continue to take the volume of water we are now injecting here into it so we are requesting a

supplemental disposal system which will be the Dakota Formation into two of our originally drilled dry holes. These are USG Section 18 No. 28 which is in the southwest quarter of the southeast quarter of Section 18 and into USG Section 19 No. 24 which is in the northwest quarter of the southeast quarter of Section 19. These, as I mentioned, were dry holes in our recent drilling program. Both of the wells were structurally low as you can see, in their particular fault blocks; as you can see from the contour map. I want to point out the water to be injected or disposed of here will be only Dakota Formation water, in other words, it will be returning the same water that comes from the formation. There will be no other waters in this system. Now, we are primarily requesting this as a supplemental method of disposal. We do not want to cancel our existing order on Well No. 17 because we may find we need both.

MR. UTZ: Where is 17 located?

A The northeast quarter of the southeast quarter of Section 19. It's got a little arrow there.

MR. ROSS: It's outside the structure.

MR. UTZ: Oh, yes.

A Now, returning this Dakota water to the Dakota Formation may assist in maintaining field production at

present rates but we don't really know. We have had no evidence that our active water drive is not maintaining this at the current time, but we have only been at these higher rates for about four months now, so this is not really being considered as a repressuring operation.

Q You do have water problems though, now, is that correct?

A Well, no, we're disposing of all the water from Section 19.

Q Substantially what you are worried about.

A We won't be able to get rid of all of it.

MR. UTZ: What was your water production again?

A It's about 1,100 barrels of water a day and we are injecting about 900 of this. The two wells up there in Section 18 actually aren't in the system yet. They are going to temporary tanks.

Q I would like to move on to our Exhibit 3 and introduce it and this exhibit is a schematic plat showing -- well, I'll just ask the witness to explain the plat to us, please.

A This is a schematic of the well and how they are completed. These wells were drilled to the top of the Dakota where a long casing string was set on top and they

were completed in an open hole manner as shown. Well No. 24 has five feet of open hole below the four and a half inch casing. We tested the well, it initially flowed 197 barrels of water with a trace of oil. We gave it an acid treatment of 250 gallons of seven and a half per cent acid and then it flowed 236 barrels of water with no shows, we lost our trace completely. It was temporarily abandoned October 11, 1967. Well No. 28, was drilled in a similar manner with the open hole section being approximately 3 feet below the four and a half inch casing. The well flowed 107 barrels of water 50 hours with no shows whatsoever. It was temporarily abandoned on November 14, 1967. The wells had good flow capacity even with the relatively minor amount of open hole that we had here so we think they will take plenty of water but we won't know until we actually get into operation.

I particularly want to point out that both the seven inch surface casing string and the four and a half inch long string casing were cemented to the surface and this is not based on any logs or temperature survey, this was actual visual evidence of the cement circulating during the cementing operation so all shallow horizons are well protected. We will also run a Baker Model P Packer and set it close to the casing seat and sting into this with two and three eighths

tubing which will be our disposal string. The casing annulus will be loaded with fresh water, with some inhibitor and we will periodically observe the casing pressure to insure that that tubing and packer are not leaking.

Q You would say that the present condition of these wells are good for the purpose that you intend to use them for?

A Yes, though I may find that I might have to fracture them to get them to take more fluid since they haven't had really any strong stimulation to date.

Q I would like to move on to the condition of the water, our Exhibit 4 which I now introduce is a water analysis, typical water analysis of the waters in this field and I would like to ask the witness if the water produced with the oil from this field, is it usable for any known purpose?

A No, this water is not too bad in comparison with most oil field waters. It is unfit for human consumption or livestock or continued irrigation. In reference to Exhibit 4 these are water analyses from three different wells and as you can see they are all very comparable with the total solids running 2770 up to about 3289 parts per million. In other words, we don't believe there is any

difference anywhere across the field in the type of water to be produced.

MR. ROSS: I believe that concludes our Direct. I would like to introduce these four exhibits if they are acceptable to the Commission.

MR. HATCH: I have marked four. There are some other exhibits on this pack that I have here.

A Exhibit 4 is actually three water analyses. If you want to mark them 4,5, and 6 that will be fine.

MR. ROSS: We just grouped them together because they all pertained to the same subject.

MR. UTZ; That would probably be better to mark them 4,5, and 6 for our purpose.

MR. ROSS: We will introduce them as 4,5,6 and 7.

CROSS EXAMINATION

BY MR. UTZ:

Q Injection into your present No. 17 well is in what formation?

A Chimlee.

MR. ROSS: That's under Order R-2438 if you want to make a notation of it, R-2438.

A February 21, 1963.

MR. ROSS: No, it's February 27, 1963.

Q That is the only injection well you have at this time?

A Right.

MR. UTZ: Are there other questions of the witness?

CROSS EXAMINATION

BY MR. ARNOLD:

Q Mr. Hollingsworth, this Dakota water is considerably better water than the Pennsylvanian?

A Yes, Pennsylvanian water runs about a hundred thousand parts per million whereas I say this runs twenty-seven hundred to thirty-two hundred.

Q Also it's higher chloride, isn't it?

A Right, but since we shut in Well No. 13 and have no plans to produce it in the near future we won't have any problem with the Pennsylvanian water anymore.

Q I think you stated that at no time in the future will you be disposing of Pennsylvanian water in this formation?

A Well, not in the Dakota Formation, I'll assure you of this, in other words, if we work over 13 and get it back to commercial production we would probably segregate

it and have it go into Well 17 where it was approved for disposal before, in other words, this is one thing I want to point out is that we are only going to be returning Dakota water to the Dakota Formation and --

MR. ROSS: It is substantially the same type of water?

A It is the same type of water. One other request that we want to make here is that since I have some question as to whether the two wells 24 and 28 will take all the water we would like to have -- be able to request future additional wells in the Dakota Formation by administrative order; in other words, Well No. 29 over here which is in the northeast quarter of the northeast quarter of Section 19 is a potential disposal well too though we are not completely through testing the well, we are considering the running of a down-hole submersible pump on the well when we get electricity into the field.

MR. UTZ: No. 19?

A No. 29. Wells No. 19 there in the southeast of the northwest quarter is also a potential disposal well though we may do additional stimulation and testing of it yet.

MR. ROSS: In other words, what you are saying

is you don't want to be tied down to these two particular wells in case things don't work exactly the way you think they should develop.

A Right, we want to be able to apply to get administrative approval on additional wells in the future.

MR. ROSS: Or change wells or make a sensible judgment about how to handle your project, right?

A Yes.

MR. UTZ: Administrative approval that you are requesting here would pertain only to this pool, correct?

A Right.

Q (By Mr. Utz) In this particular case.

A It would be similar situation, in other words, it would be only strictly restricted to Dakota Formation water, no other waters.

MR. ROSS: What I think the Applicant wants, my company, is a certain degree of flexibility to make decisions and to operate this pool as the events develop.

MR. UTZ: You mean for additional wells, disposal wells or substitutes?

A Well, both additional or substitutes.

MR. ROSS: There are two potential wells that they are still working on, isn't that right?

A Right.

MR. ROSS: That could be better injection wells.

A We may need them, but we aren't completely satisfied they can't be made into commercial oil producers yet.

MR. UTZ: Are there other questions? Witness may be excused. Statements?

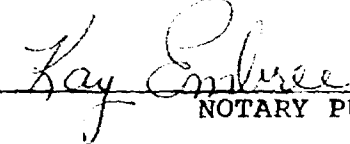
MR. ROSS: I believe that's all. We have kicked around the desire for an administrative order. I would like to emphasize that this is only formation water going back into the formation from which it came, that it's substantially the same type of water from the analyses that we have made. We are in bad shape on No. 17 the present well pressure is up and we need an -- and indirectly we think this might benefit the reservoir but we can't say, for sure.

MR. UTZ: Any other statements? Case will be taken under advisement.

STATE OF NEW MEXICO)
) ss
 COUNTY OF BERNALILLO)

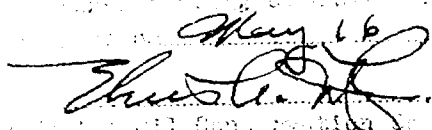
I, KAY EMBREE, Notary Public in and for the County of Bernalillo, State of New Mexico do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand and Seal this 24th day of May, 1968.


 NOTARY PUBLIC

My Commission Expires:

November 19, 1971

I hereby certify that the foregoing is a true and correct copy of the original as the same appears in the records of the Commission.
 May 16 1968

 Notary Public

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 80202	
LEASE NAME USG Section 18	WELL NO. 28	FIELD Hogback Dakota	COUNTY San Juan
LOCATION UNIT LETTER <u>0</u> ; WELL IS LOCATED <u>265</u> FEET FROM THE <u>South</u> LINE AND <u>1995</u> FEET FROM THE <u>East</u> LINE, SECTION <u>18</u> TOWNSHIP <u>29 North</u> RANGE <u>16 West</u> NMPM.			

CASING AND TUBING DATA					
NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEMENT	TOP OF CEMENT	TOP DETERMINED BY
SURFACE CASING	7"	60'	50	Surface	Circulated
INTERMEDIATE None	--	--	--	--	--
LONG STRING	4-1/2"	712'	135	Surface	Circulated
TUBING	2-3/8"	Approx. 650	NAME, MODEL AND DEPTH OF TUBING PACKER Baker Model "P"		
NAME OF PROPOSED INJECTION FORMATION Dakota			TOP OF FORMATION 712'		BOTTOM OF FORMATION 715' Total Depth
IS INJECTION THROUGH TUBING, CASING, OR ANNULUS? Tubing		PERFORATIONS OR OPEN HOLE? Open Hole		PROPOSED INTERVAL(S) OF INJECTION 712' - 715'	
IS THIS A NEW WELL DRILLED FOR DISPOSAL? No		IF ANSWER IS NO, FOR WHAT PURPOSE WAS WELL ORIGINALLY DRILLED? Oil Producer		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 None					
DEPTH OF BOTTOM OF DEEPEST FRESH WATER ZONE IN THIS AREA None known to be in area		DEPTH OF BOTTOM OF NEXT HIGHER OIL OR GAS ZONE IN THIS AREA None known		DEPTH OF TOP OF NEXT LOWER OIL OR GAS ZONE IN THIS AREA 4900' Penn. 6500'; possible Cutler	
ANTICIPATED DAILY INJECTION VOLUME (BBLs.)	MINIMUM 100	MAXIMUM 1200	OPEN OR CLOSED TYPE SYSTEM Closed	IS INJECTION TO BE BY GRAVITY OR PRESSURE? Pressure	APPROX. PRESSURE (PSI) 300
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 yes	NATURAL WATER IN DISPOSAL ZONE same	ARE WATER ANALYSES ATTACHED? yes
NAME AND ADDRESS OF SURFACE OWNER (OR LESSEE, IF STATE OR FEDERAL LAND) Navajo Tribe					
LIST NAMES AND ADDRESSES OF ALL OPERATORS WITHIN ONE-HALF (1/2) MILE OF THIS INJECTION WELL No one, other than Pan American					
HAVE COPIES OF THIS APPLICATION BEEN SENT TO EACH OF THE FOLLOWING?		SURFACE OWNER To U.S. Geological Survey		EACH OPERATOR WITHIN ONE-HALF MILE OF THIS WELL yes	
ARE THE FOLLOWING ITEMS ATTACHED TO THIS APPLICATION (SEE RULE 701-B)		PLAT OF AREA Yes		ELECTRICAL LOG Radioactivity Log	
				THE NEW MEXICO STATE ENGINEER 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.

R.B. Giles
(Signature)

Engineering Group Supervisor
(Title)

9-11-65
(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.

Case 3763

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 80202	
LEASE NAME USG Section 19	WELL NO. 24	FIELD Hogback Dakota	COUNTY San Juan
LOCATION UNIT LETTER <u>J</u> WELL IS LOCATED <u>2310</u> FEET FROM THE <u>South</u> LINE AND <u>1650</u> FEET FROM THE <u>East</u> 1/4 SECTION <u>19</u> TOWNSHIP <u>29 North</u> RANGE <u>16 West</u> NMPM.			
CASING AND TUBING DATA			
NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEMENT
SURFACE CASING	7"	57'	35
INTERMEDIATE	None	--	--
LONG STRING	4-1/2"	757'	125
TUBING	2-3/8"	Approx. 700'	NAME, MODEL AND DEPTH OF TUBING PACKER Baker Model "P"
NAME OF PROPOSED INJECTION FORMATION Dakota		TOP OF FORMATION 757'	BOTTOM OF FORMATION Total Depth 762'
IS INJECTION THROUGH TUBING, CASING, OR ANNULUS? Tubing		PERFORATIONS OR OPEN HOLE? Open Hole	PROPOSED INTERVAL OF INJECTION 757-762'
IS THIS A NEW WELL DRILLED FOR DISPOSAL? No	IF ANSWER IS NO, FOR WHAT PURPOSE WAS WELL ORIGINALLY DRILLED? Oil Producer		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 None			
DEPTH OF BOTTOM OF DEEPEST FRESH WATER ZONE IN THIS AREA None known to be in area		DEPTH OF TOP OF NEXT LOWER OIL OR GAS ZONE IN THIS AREA None known	
ANTICIPATED DAILY INJECTION VOLUME (BBL/DAY)	MINIMUM 100	MAXIMUM 1200	OPEN OR CLOSED TYPE SYSTEM Closed
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 -- yes		WATER TO BE DISPOSED OF yes	NATURAL WATER IN DISPOSAL ZONE same
NAME AND ADDRESS OF SURFACE OWNER (OR LESSEE, IF STATE OR FEDERAL LAND) Navajo Tribe		ARE WATER ANALYSES ATTACHED? yes	
LIST NAMES AND ADDRESSES OF ALL OPERATORS WITHIN ONE-HALF (1/2) MILE OF THIS INJECTION WELL No one, other than Pan American			
HAVE COPIES OF THIS APPLICATION BEEN SENT TO EACH OF THE FOLLOWING? To U. S. Geological Survey		EACH OPERATOR WITHIN ONE-HALF MILE OF THIS WELL yes	
ARE THE FOLLOWING ITEMS ATTACHED TO THIS APPLICATION (SEE RULE 701-B)? yes		ELECTRICAL LOG Radioactivity Log	
		THE NEW MEXICO STATE ENGINEER 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.

Case 3763

R 17 W

R 16 W

13

18

17

24

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29
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BEFORE EXAMINER UTZ

OIL CONSERVATION COMMISSION

Applic EXHIBIT NO. 2

CASE NO. 3763

25

30

29

- DRILLING IN PROGRESS
- PRODUCTION WELL
- SHUT-IN WELL
- ABANDONED WELL
- SUSPENDED WELL
- PENN. WELL
- WATER SHUT-IN WELL
- DRY HOLE
- PROPOSED WATER SHUT-IN WELL

CONTOURED ON TOP OF DANOSA HAY

PAN AMERICAN PETROLEUM CORPORATION
ROCKY MOUNTAIN DIVISION
HOGBACK FIELD
SAN JUAN CO., N. MEX.
SCALE 1" = 500'

100' 50' 100'

MANCOS

U.S.G. Sec. 19, Well N° 24

El. 5114
KB 5119

7" Csg set at 57'
Cemented to surface w/35 Sacks.

2 3/8" Tubing

GREENHORN

BAKER MODEL "P" PACKER
to be set below 700'

4 1/2" Csg set in 6 1/8" hole at 757'
Cemented to surface w/125 Sacks.

DAKOTA

3 7/8" OPEN HOLE
762' TOTAL DEPTH

MANCOS

U.S.G. Sec. 18, Well N° 28

El. 5051
KB 5056

7" Csg set at 60'
Cemented to surface w/50 Sacks.

2 3/8" Tubing

GREENHORN

BAKER MODEL "P" PACKER
to be set below 650'

4 1/2" Csg set in 6 1/8" hole at 712'
Cemented to surface w/135 Sacks.

DAKOTA

3 7/8" OPEN HOLE
715' TOTAL DEPTH

BEFORE EXAMINER UTZ

CONSERVATION COMMISSION
EXHIBIT NO. 3
CASE NO. 3763

PAN AMERICAN
PETROLEUM CORPORATION

Proposed Disposal Well Program
HOGBACK DAKOTA FIELD
San Juan County, New Mexico

Drk. JRJ Ck. Ap. Ap. No. 1-A

ST. MOLIND OIL AND GAS COMPANY

RESEARCH DEPARTMENT

WATER ANALYSIS

Lease: USG "A"
 Field: Hogback-Dakota
 Quarter or Survey: _____
 Exact Location: _____
 Producing Stratum: Dakota
 Stratum Yielding Sample: _____
 Condition of Well: _____
 Sample Collected From: Well head
 Collected by: W. T. Holland
 Transmittal Letter by: L. O. Speer, Jr.
 Well No.: 11
 County: San Juan
 Blk: _____
 Section: G/H 19
 T: 29
 R: 16
 Sample Series No.: HG-15
 Total Depth: 700
 Method Used: Water dump
 Date Collected: 3-26-57
 Date Received: 4-1-57
 Date: 3-28-57
 File: B-2070-535.11

Radicle	Per Cent by Analysis	(a) P. P. M.	(b)	(a) X (b)	Per Cent Reacting Value	Calculated Compound	P. P. M.
Na	30.25	935	.6435	43.27	47.91	Na ₂ SO ₄	1161
Ca	.85	28	.0492	1.40	1.55	NaCl	420
Mg	.18	6	.0872	.49	.54	Na ₂ CO ₃	69
Fe						NaHCO ₃	1545
						CaSO ₄	
						CaCl ₂	
SO ₄	23.93	787	.0208	16.37	18.12	CaCO ₃	70
Cl	7.75	255	.0282	7.19	7.96	Ca(HCO ₃) ₂	
CO ₂	2.92	96	.0333	3.20	3.54	MgSO ₄	
HCO ₃	34.12	1122	.0164	18.40	20.38	MgCl ₂	
H ₂ S						MgCO ₃	21
						Mg(HCO ₃) ₂	
Total solids as a summation of radicles						3289	P.P.M.
Total solids by evaporation and ignition of residue at low red heat						2692	P.P.M.
Sample as received: Resistivity: ohms/M" 1.504						77°F	pH Value 8.6
						Specific Gravity 69°/60°F	1.003

PROPERTIES OF REACTION IN PER CENT

PRIMARY SALINITY: SO₄ + Cl = _____ with equal value Na (K) = 52.16 %
 SECONDARY SALINITY: If SO₄ + Cl is greater than Na (K) = _____ %
 Then SO₄ + Cl = _____ with equal value of Ca + Mg = _____ %
 PRIMARY ALKALINITY: Excess Na (K) over SO₄ + Cl = _____ with equal value of CO₂ + S = 43.66 %
 SECONDARY ALKALINITY: Excess Ca + Mg over SO₄ + Cl = _____ with equal value of CO₂ + S = 4.18 %
 CHLORIDE SALINITY: Cl + (SO₄ + Cl) = _____ X 100% = 30.52
 SULPHATE SALINITY: SO₄ + (SO₄ + Cl) = _____ X 100% = 69.48

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

REMARKS:

E. V. Hewitt
 C. L. Kelley
 L. O. Speer, Jr.
 A. F. Frederickson (2)

BEFORE EXAMINER UTZ
 OIL CONSERVATION COMMISSION
 EXHIBIT NO. 4
 CASE NO.

Anal. James D. Elliott Date 4-10-57

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 analysis _____
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/l

	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 BOTTOM MIDDLE TOP
ion mg/l: _____
Comments on quality _____

CONVENTIONAL MAJOR ION ANALYSIS

	Major Ions mg/l ¹	% of Total Major Ions	Reaction Value meq/l 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/l
NaCl resistivity equivalent (Dunlap) 2,134 mg/l
Resistivity 2.30 ohm-meters at 77 °F
pH 8.7 Specific gravity 1.073 at _____ °F
Ryznar stability index (2pHs-pH) _____ at _____ °F

OTHER IONS AND DISSOLVED SOLIDS

CATIONS	mg/l	ANIONS	mg/l	OTHERS	mg/l
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/l /sp. gr.
² meq/l means milligram equivalents per liter.

REMARKS AND CONCLUSIONS:

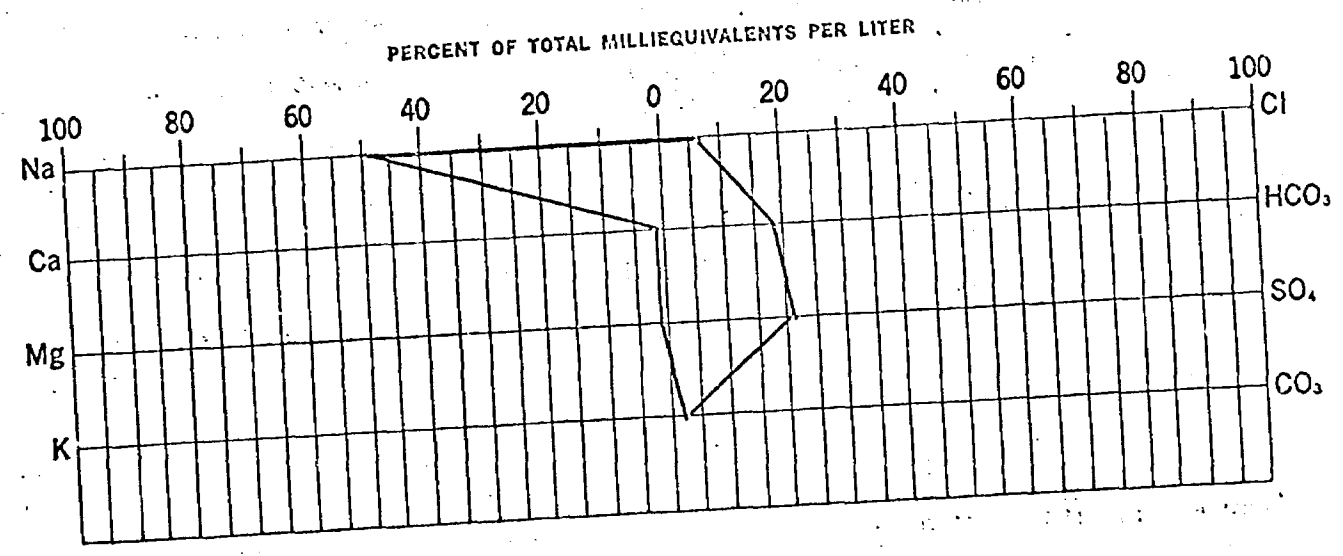
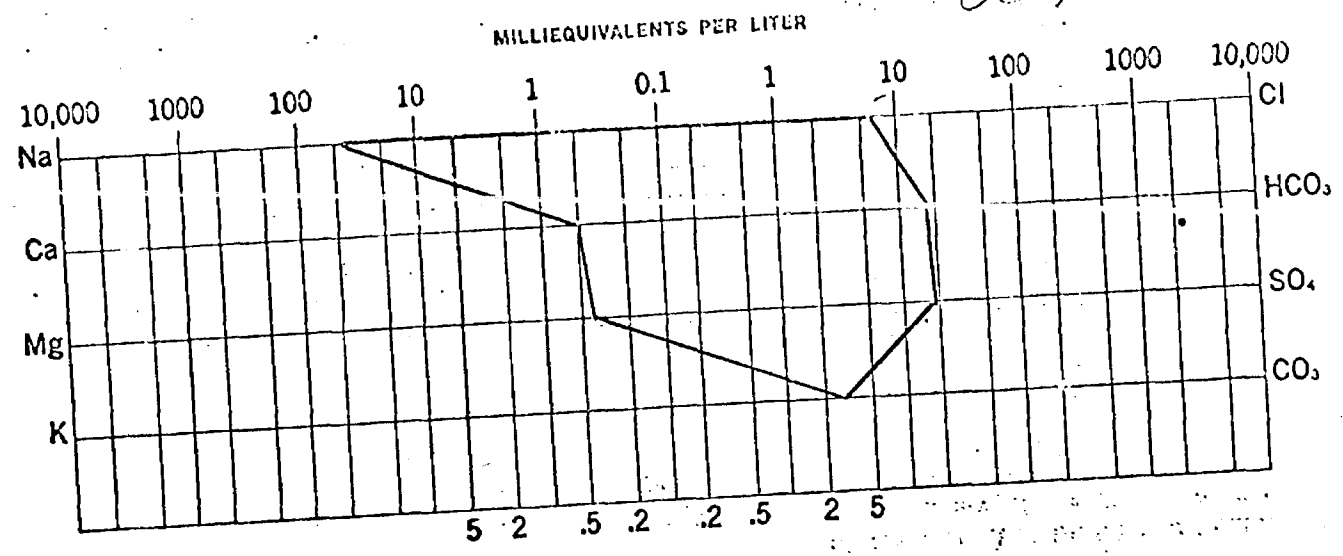
cc: M. S. Kraemer, W. R. Franey Date received 8-18-67 Field sample no. HG-186
H. T. Hunter Lab. no. T-18652
P. H. Garrison Analyst James J. Elliott Date 8-25-67
L. O. Speer, Jr.
J. P. Barrett

(Water charts on back)

BEFORE EXAMINER UTZ
OIL POLLUTION COMMISSION
EXHIBIT NO. 5
CASE NO. _____

7-18652
WATER ANALYSIS PATTERNS

USG Sec. 19 #112



BEFORE EXAMINER UTZ
OBSERVATION COMMISSION
EXHIBIT NO. 6
CASE NO. 7-18652



CHEM LAB OCT 9 1967

WATER ANALYSIS EXCHANGE REPORT

1	IS	10
2	AS	10
3	AC	10
4	AA	10
5	AB	10
6	AD	10
7	AE	10
8	AF	10
9	AG	10
10	AH	10

MEMBER Pan American Petroleum Corp.
 OPERATOR Pan American Petroleum Corp.
 WELL NO. 23 USG Sec. 19
 FIELD Hogback
 COUNTY San Juan
 STATE New Mexico

LAB NO. 23668 REPORT NO. 35.11
 LOCATION NW NE 19-29N-16W
 FORMATION Dakota
 INTERVAL 658 - 664 (Spl. No. 1)
 SAMPLE FROM Wellhead
 DATE October 3, 1967

REMARKS & CONCLUSIONS: Black water, green filtrate.

Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	882	38.35	Sulfate	395	8.22
Potassium	8	0.20	Chloride	650	18.33
Lithium	-	-	Carbonate	60	2.00
Calcium	136	6.79	Bicarbonate	1,208	19.81
Magnesium	44	3.62	Hydroxide	-	-
Iron	absent	-	Hydrogen sulfide	present	-
Total Cations		48.36	Total Anions		48.36

Total dissolved solids, mg/l 2,770
 NaCl equivalent, mg/l 2,356
 Observed pH 8.4

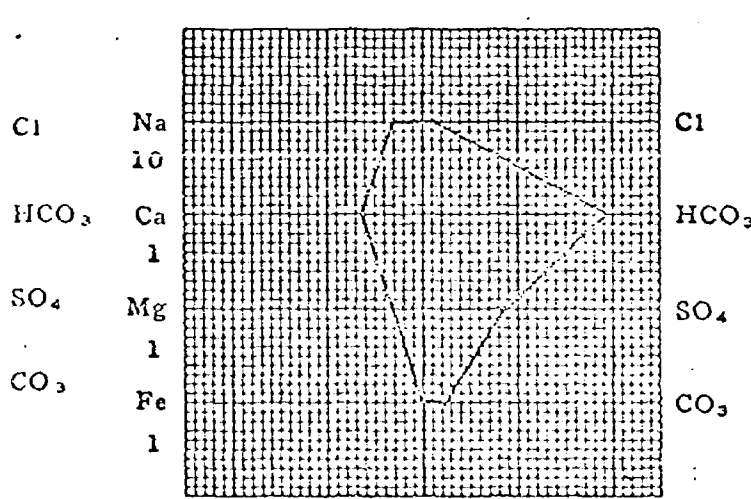
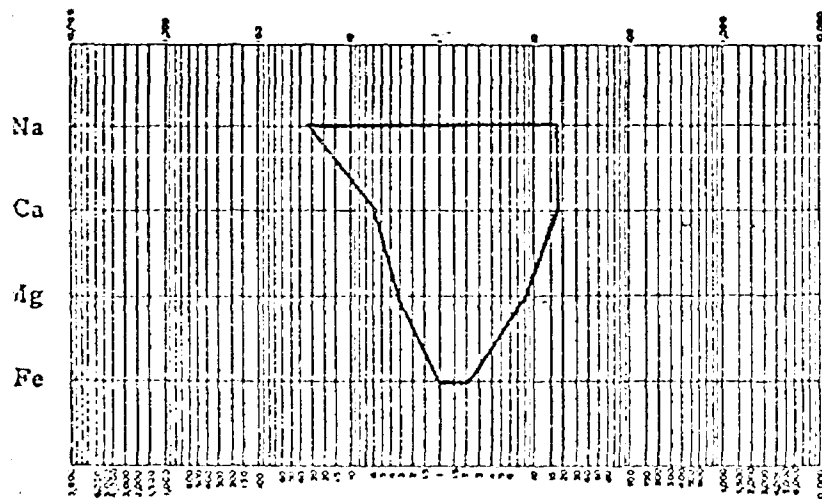
Specific resistance @ 68° F.:
 Observed 2.43 ohm-meters
 Calculated 2.55 ohm-meters

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

BEFORE EXAMINER UTZ
 OIL CONSERVATION DIVISION
 EXHIBIT NO. 1
 CASE NO. 1