

CASE 3601: Application of WALKER
BROS. OIL CO. & TESORO PETRO.
for an exception to RULE 104C I.

CASE NO.
3601

Application,
TRANSCRIPTS,
SMALL Exhibits
ETC.

State of New Mexico
Oil Conservation Commission

July 10, 1967

Re: Case No. 3601
 ws Order No. R-3270
 Applicant:
WALKER BROS. OIL CO. &
TESORO PETROLEUM CORPORATION

A. L. PORTER, Jr.
Secretary-Director

Hobbs OCC x
 Artesia OCC
 Aztec OCC x
 Other

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. 3601
Order No. R-3270

APPLICATION OF WALKER BROTHERS OIL
COMPANY AND TESORO PETROLEUM CORPO-
RATION FOR AN EXCEPTION TO RULE 104
C I, MCKINLEY COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on June 28, 1967,
at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 10th day of July, 1967, 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 applicants, Walker Brothers Oil Company and
Tesoro Petroleum Corporation, seek an exception to Rule 104 C I
of the Commission Rules and Regulations to permit the drilling of
more than one well per 40-acre tract, said wells being located
closer than 660 feet to each other and each 40-acre tract subject
to a single 40-acre allowable.

(3) That the applicants request the above-described excep-
tion apply to both the South Hospah Upper Sand Oil Pool and the
South Hospah Lower Sand Oil Pool and be applicable to Walker's
Hansen Lease comprising the S/2 of Section 5, Walker's Santa Fe
Lease comprising the N/2 and SW/4 of Section 7, both in Township
17 North, Range 8 West, and to Tesoro's Santa Fe Lease comprising

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the SE/4 of Section 1, Township 17 North, Range 9 West, NMPM, McKinley County, New Mexico.

(4) That production of one well per 40-acre tract in the South Hospah Lower Sand Oil Pool at a rate sufficient to produce its assigned allowable has caused water coning.

(5) That increasing the density of wells per 40-acre tract in the South Hospah Lower Sand Oil Pool will allow the applicants the opportunity to produce the 40-acre top unit allowable for said tracts and lessen the danger of water coning provided a 40-acre proration unit does not receive more than a single 40-acre allowable.

(6) That, due to the location of some wells presently producing from the South Hospah Lower Sand Oil Pool, increasing the density of wells per 40-acre tract on the aforesaid leases will require that some wells be located closer than 660 feet to another well drilling to or capable of producing from the same pool.

(7) That as wells producing from the South Hospah Lower Sand Oil Pool will also be utilized for the production of oil from the South Hospah Upper Sand Oil Pool as dual completions, an exception granted for the location of wells in the South Hospah Lower Sand Oil Pool should also apply to the South Hospah Upper Sand Oil Pool in order to prevent the drilling of unnecessary wells.

(8) That in order to allow the applicants the opportunity to produce their just and equitable share of the oil in the aforesaid pools without damage to the reservoirs and to prevent economic loss caused by the drilling of unnecessary wells, applicants should be authorized to develop the aforesaid leases by drilling more than one well per 40-acre tract with no well being nearer than 330 feet to the outer boundary of the unit and no nearer than 200 feet to another well drilling to or capable of producing from the same pool.

IT IS THEREFORE ORDERED:

(1) That the applicants, Walker Brothers Oil Company and Tesoro Petroleum Corporation, are hereby authorized to develop the Walker Hansen Lease comprising the S/2 of Section 6, the Walker Santa Fe Lease comprising the N/2 and SW/4 of Section 7, both in Township 17 North, Range 8 West, and the Tesoro Santa Fe

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Lease comprising the SE/4 of Section 1, Township 17 North, Range 9 West, NMPM, South Hospah Lower Sand Oil Pool and South Hospah Upper Sand Oil Pool, McKinley County, New Mexico, to a density of more than one well per 40-acre tract;

PROVIDED HOWEVER, that no well shall be drilled nearer than 330 feet to the outer boundary of said tract and no nearer than 200 feet to another well drilling to or capable of producing from the same pool;

PROVIDED FURTHER, that a 40-acre proration unit in the South Hospah Lower Sand Oil Pool or the South Hospah Upper Sand Oil Pool shall not produce in excess of the 40-acre top unit allowable for wells in the South Hospah Lower Sand Oil Pool or South Hospah Upper Sand Oil Pool, whichever is applicable, regardless of the number of wells on the unit.

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

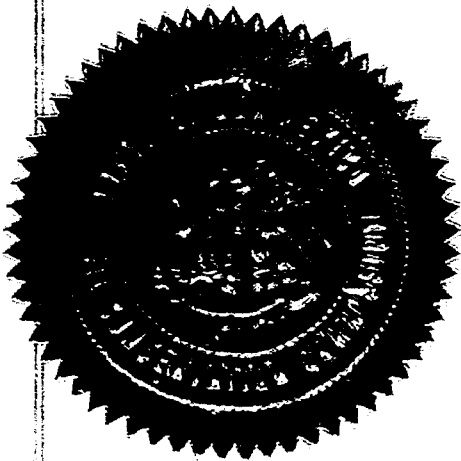
DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION


DAVID F. CARGO, Chairman


GUYTON B. HAYS, Member


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



esr/

Docket No. 19-67

DOCKET: EXAMINER HEARING - WEDNESDAY - JUNE 28, 1967

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 3598: Application of Dugan Production Corporation for the creation of a new gas pool, special pool rules and three unorthodox gas well locations, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks the creation of the North Shiprock-Gallup Gas Pool in Section 14, Township 30 North, Range 18 West, San Juan County, New Mexico and the promulgation of special rules therefor including a provision to authorize exception to the pump-plug method of cementing prescribed by Rule 107 (a). Applicant also seeks authority to meter production from all wells on its Shiprock lease in said pool through one meter and to allocate production from the individual wells on the basis of well tests. Applicant further seeks approval of the unorthodox gas well locations for its Shiprock Well No. 5 located 1650 feet from the North line and 1870 feet from the East line, its Shiprock Well No. 7 located 990 feet from the North line and 2310 feet from the West line, and its Shiprock Well No. 8 located 2310 feet from the South line and 660 feet from the East line, all in Section 14, Township 30 North, Range 18 West.

CASE 3599: Application of Franklin, Aston and Fair, Inc. for a waterflood project, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project by the injection of water into the Grayburg-San Andres formations through two wells located in Unit E of Section 17 and Unit A of Section 18, Township 17 South, Range 31 East, Grayburg-Jackson Pool, Eddy County, New Mexico.

CASE 3600: Application of Texaco Inc., for a dual completion, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval of the dual completion (conventional) of its Cotton Draw Unit Well No. 65, located in Unit G of Section 2, Township 25 South, Range 31 East, Eddy County, New Mexico, to produce gas from an undesignated Wolfcamp gas pool and gas from an undesignated Morrow gas pool through parallel strings of tubing.

CASE 3601: Application of Walker Brothers Oil Company and Tesoro Petroleum Corporation for an exception to Rule 104 C I, McKinley County, New Mexico. Applicant, in the above-styled cause, seeks an exception to the well location requirements of Rule 104 C I to permit the drilling of more than one well on a 40-acre tract, said wells being located closer than 660 feet to each other and with each 40-acre tract being subject to a single 40-acre allowable. The above exceptions for the South Hospah Upper Sand Oil Pool and the South Hospah Lower Sand Oil Pool, McKinley County, New Mexico, would be applicable to Walker's Hansen Lease comprising the S/2 of Section 6, and Walker's Santa Fe Lease comprising the N/2 and

and SW/4 of Section 7, both in Township 17 North, Range 8 West and to Tesoro's Santa Fe Lease comprising the SE/4 of Section 1, Township 17 North, Range 9 West.

- CASE 3602: Application of Amerada Petroleum Corporation for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion (conventional) of its State WE "K" Well No. 1 located in Unit F of Section 15, Township 21 South, Range 35 East, Lea County, New Mexico, in such a manner as to permit the production of gas from an undesignated Wolfcamp gas pool and gas from an undesignated Morrow gas pool through parallel strings of tubing.
- CASE 3603: Application of Continental Oil Company for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Langlie Jack Unit Area comprising 680 acres, more or less, of Federal and Fee lands in Township 24 South, Range 37 East, Lea County, New Mexico.
- CASE 3604: Application of Continental Oil Company for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project in its Langlie Jack Unit Area by the injection of water into the Seven Rivers-Queen formations through 8 injection wells in Sections 17, 20, 21, and 29, Township 24 South, Range 37 East, Langlie-Mattix Pool, Lea County, New Mexico.
- CASE 3605: Application of Walter Duncan for a casing-cementing exception, and for an unorthodox location, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks authority to complete his North Hogback 1 Well No. 5 at an unorthodox Dakota oil well location 2466 feet from the North line and 2310 feet from the East line of Section 1, Township 29 North, Range 17 West, San Juan County, New Mexico. Applicant further seeks an exception to the provisions of Rule 107(a) concerning cementing of casing.
- CASE 3606: Application of Bell Petroleum Company for salt water disposal and a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to complete its State "K" Well No. 1 located in Unit K of Section 21, Township 11 South, Range 33 East, Lea County, New Mexico, in such a manner as to permit the production of oil from the North Bagley-Lower Pennsylvanian formation and the disposal of produced salt water through the intermediate casing-production casing annulus into the San Andres and other formations included in the open-hole interval from 3845 feet to 7800 feet.

June 28, 1967 Examiner Hearing

Docket No. 19-67

CASE 3607: Application of Stoltz & Company for an amendment to Order No. R-3238, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the amendment to Order No. R-3238, which order authorized the disposal of produced salt water into a playa lake in Sections 12 and 13, Township 10 South, Range 32 East, and Sections 6 and 7, Township 10 South, Range 33 East, Lea County, New Mexico. Applicant seeks to alter the location of the three observation wells required by said order. Alternate locations proposed by applicant are as follows: one well 300 feet from the South line and 1100 feet from the West line; one well 600 feet from the South line and 1400 feet from the East line; one well 2400 feet from the South line and 1100 feet from the East line, all in Section 7, Township 10 South, Range 33 East. Applicant further seeks the amendment to Order No. R-3238 to alter the location of two of the three permanent water level markers required by said order. Applicant proposes one marker on the North shore of the lake in lieu of the marker required in the SW/4 SE/4 of Section 6 and one marker on the East shore of the lake in lieu of the marker required in the SE/4 NW/4 of Section 7.

Case 3601

Heard. 6-28-67

Rec. 6-28-67 Grant Walker Bros. & Desoro Pet.
exception to Rule 104.5.1. To allow
them to drill wells closer than
660 ft. to another well. ~~on a~~ 40 ft.
tract.

Do not give exception to the 330'
fr. 8 1/4" section lines.

Require that well be drilled not
closer than ^{200'}~~330'~~ to another
well prod. from same Pool.

Grant this exception for
both Pools.

(a) S Hoopah - Upper Sand
(2) c - Lower -

ER

TESORO PETROLEUM CORPORATION

533 BUSBY DRIVE
512-TAYLOR 4-0261
SAN ANTONIO, TEXAS 78209

MAIN OFFICE

'67 JUN 19 AM 8 23

June 15, 1967

Case 3601

Mr. D. S. Nutter, Chief Engineer
State of New Mexico
Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Nutter:

This is a formal application of Tesoro Petroleum Corporation, San Antonio, Texas and Walker Bros. Oil Company, Oklahoma City, Oklahoma, to the New Mexico Oil Conservation Commission for a hearing covering an exception to Rule 104-C-1 to allow drilling on a spacing of less than 660 feet between wells on governmental quarter-quarter sections in the South Hospah Field, McKinley County, New Mexico.

It is the desire of the above operators to develop their leases in this Field on 10-acre or 20-acre spacing at their option. The lands involved are as follows:

Tesoro Petroleum Corporation - SE/4 of Section 1, Township 17 North,
Range 9 West

Walker Bros. Oil Company - S/2 of Section 6, Township 17 North,
Range 8 West
N/2 of Section 7, Township 17 North,
Range 8 West
SW/4 of Section 7, Township 17 North,
Range 8 West

No request is entered here for an exception to that part of Rule 104-C-1 requiring 330-foot spacing from the boundaries of the governmental quarter-quarter sections involved.

The South Hospah Field is situated in a horst formed by two generally northeast-southwest trending faults immediately southeast of the original Hospah Field. There are two oil productive formations in this horst, the

Mr. D. S. Nutter

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June 15, 1967

Hospah Gallup formation at approximately 1,550 feet and the Massive Gallup formation at approximately 1,600 feet. This request for an exception to the between-well spacing rule applies to both of these formations but at present Tesoro and Walker Bros. are producing from the Massive Gallup formation only.

The Massive Gallup formation is a clean, uniform sand characterized by excellent porosity and permeability. For all practical purposes, the vertical and horizontal permeabilities are equal. The viscosity of the produced crude is approximately 45 centipoises. The high viscosity of the crude, coupled with the fact that the entire areal extent of the oil accumulation is underlain by water, has led to water coning problems.

The northwest New Mexico allowable for a well drilled on 40 acres is currently 70 barrels of oil per day. Wells produced at this rate in the South Hospah Field cone water rapidly even when completed well above the water-oil contact. Following the appearance of water in the producing wells, the water-oil ratio increases rapidly. A reduction in fluid withdrawal rates from these wells does not reduce the water-oil ratio but retards the rate of water-oil ratio increase with cumulative oil production. Therefore, Tesoro and Walker Bros. feel that withdrawal rates of 70 barrels of oil per day per well may be excessive for this reservoir and a greater well density would be desirable.

Tesoro Petroleum Corporation, Walker Bros. Oil Company and Tenneco Oil Company have voluntarily reduced the producing rates on their wells to reduce the severity of water coning. Tesoro and Walker Bros. feel that by doing this the ultimate recovery of oil from the reservoir will be improved. There is a tremendous volume of oil in place in this reservoir and an increase of ultimate recovery of oil of a few per cent would justify the drilling of wells on closer spacing.

Walker Bros. have drilled a number of wells in the centers of 40-acre governmental quarter-quarter sections. Any additional wells, if drilled 330 feet from the boundaries of these governmental quarter-quarter sections, will result in between-well spacing of less than 660 feet.

Following is a list of operators who will be directly affected by the results of this hearing:

Tesoro Petroleum Corporation
533 Busby Drive
San Antonio, Texas 78209
Telephone: Area Code 512, TA 4-0261

Mr. D. S. Nutter

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June 15, 1967


Walker Bros. Oil Company
P. O. Box 18715
Oklahoma City, Oklahoma 73118
Telephone: Area Code 405, GR 8-0420

Tenneco Oil Company
4th Floor - 201 Wall Building
Midland, Texas 79701
Telephone: Area Code 915, MU 3-4621

Additional supporting data for our request will be presented at the hearing.

If you need additional information, please advise.

Yours very truly,


Harold Vagtberg, Jr.

HV:lt

cc: Walker Bros. Oil Company, Oklahoma City, Oklahoma
Tenneco Oil Company, Durango, Colorado
Tenneco Oil Company, Midland, Texas
Mr. Emery Arnold, Aztec, New Mexico

dearnley-meier reporting service, inc.

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

1120 SIMAS BLDG. • P. O. BOX 1092 • PHONE 243-4491 • ALBUQUERQUE, NEW MEXICO



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

June 28, 1967

IN THE MATTER OF:)

Application of Walker Brothers)
Oil Company and Tesoro Petroleum)
Corporation for an exception to)
Rule 104 C I, McKinley County,)
New Mexico.)

Case No. 3601

BEFORE: Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: Case 3601.

MR. HATCH: Application of Walker Brothers Oil Company and Tesoro Petroleum Corporation for an exception to Rule 104 C I, McKinley County, New Mexico.

MR. MORRIS: If the Examiner please, I'm Dick Morris of Montgomery, Federici and Andrews, Santa Fe, New Mexico, appearing on behalf of the Applicants, Walker Brothers Oil Company and Tesoro Petroleum Corporation. We'll have one witness, Mr. Harold Vagtborg, and I ask that he stand and be sworn, please.

(Witness sworn.)

MR. MORRIS: Mr. Examiner, in this case the Applicants seek exception to Rule 104 C I, the portion of that rule that requires wells to be located a minimum of 660 feet apart. No exception is being sought in this hearing to the requirement of that rule that requires wells to be located 330 feet from the lease line or from a quarter quarter section line.

MR. UTZ: Actually you propose a target area of 660 feet in the center of a 40-acre tract?

MR. MORRIS: No, sir, I think we can show by plat what we do propose.

HAROLD VAGTBORG

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

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Vagtborg, will you state your name and where you reside?

A Harold Vagtborg, Junior, 119 Oak Glen, San Antonio, Texas.

Q Mr. Vagtborg, by whom are you employed and in what capacity?

A Tesoro Petroleum Corporation in San Antonio, Vice President.

Q Have you previously testified before the New Mexico Oil Conservation Commission or any one of its Examiners?

A I have not.

Q Would you briefly state your education and your experience in the petroleum industry?

A I received a Bachelor's Degree in Mechanical Engineering from the University of Kansas and then I received a Master's Degree in Petroleum Engineering from the University of Kansas and then went to work for the Pure Oil Company in their research laboratories at Crystal Lake, Illinois doing PBT work. I then went down to San Antonio and went to work for the Bank of Commerce. Following three years with the Bank I went with Slick Secondary Recovery Corporation which later became Texas Star Petroleum Company and which is now Tesoro

Petroleum Corporation. I have been with that company for eleven years, the combined company.

Q What are your present duties with that company?

A Manager of Production essentially, Vice President of Production.

Q Are you familiar with the application of Walker Brothers Oil Company and Tesoro Petroleum Corporation in Case 3601?

A Yes, sir.

MR. MORRIS: Are the witness's qualifications acceptable?

MR. UTZ: Yes, sir.

Q (By Mr. Morris) Mr. Vagtborg, are you here today representing both of the Applicants in this case?

A I am.

Q Have you prepared some information in support of this application?

A I have.

(Whereupon, Applicants' Exhibit A was marked for identification.)

Q Is that the statement with exhibits attached that has been marked as Exhibit A in this case?

A Yes.

Q Will you refer to the exhibits that are attached,

the four exhibits that are attached to that statement and first refer to Exhibit 1 and point out the acreage under consideration and its relationship to the other Hospah field development?

A The Hospah field, the original field, old Hospah field is located in Section 1 in the northwest part of this map, and also in Section 36 just north of this Section 1. In the South Hospah field, as you can see, is separated from the original Hospah field by a fault about 130 or 40 feet of throw. Now there are three operators involved in the South Hospah field. The Tenneco lease is outlined in green. The Tesoro, our lease is outlined in red, and Walker Brothers' lease is to the east of the yellow line.

This map is a structure map drawn using the top of the sand as the datum. A second map is drawn which is not included here, using a marker about 90 feet above the sand. It has the identical configuration of this. There is no erosion on top of the sand. This sand is a sand body approximately ten feet thick. It has a permeability of three million, averages about eleven. There is 28% porosity. Connate water varies depending where you are relative to the water-oil contact. The entire oil accumulation is underlain by water. The oil has a gravity of 25 degrees API and the viscosity at reservoir temperature of 74 centipoise.

Tesoro drilled their No. 72 well, which is in the Southeast of the Southeast of 1 in December, 1966. We obtained an allowable of 91 barrels a day for this well because it's located on a 52-acre lot. We produced it starting in January at 90 barrels a day, until approximately 33 to 3400 barrels of oil had been produced, at which time the well started making water. We cut the rate back from 90 to 70 barrels a day after the well had produced about 4300 barrels, and we have recently cut it back to 44 barrels a day, when we reached 9,000 barrels of cumulative production from that well.

Now, during the period that the well was making water we have made monthly well tests on it and several times a week take a wellhead water cut and that information is shown in Exhibit 4. We feel that there has been a definite break in the rate of water-oil ratio increase with cumulative production and we feel this break as a result of reducing the rate from 90 to 70 barrels a day.

Now that we are at 44 barrels a day we expect within the next thousand to two thousand barrels of production that we will get another break in this curve. On this basis we feel that perhaps 40-acre spacing for this field is too wide and we would like to develop our leases on either twenty or ten-acre spacing at our option, start out on twenty and drop to ten if necessary, and retain the same allowable for the

40, 70 barrels.

Q Mr. Vagtborg, why is this hearing necessary in order to accomplish the development of this acreage on the greater density that you have just outlined?

A Well, first of all, we wanted to verify that we have the right to move in on the Southeast Quarter of Section 1 there, our lease, Santa Fe lease, and drill three additional wells on the Southeast of the Southeast.

Now, these wells will all be 330 from the quarter quarter section line and they will be at least 660 feet apart. I want to verify that we can do this. I think probably we can do it without hearing but we weren't sure.

Now, since we are representing Walker Brothers, when they developed their lease they drilled a number of the wells in the center of the 40's or very near the centers so that if they were to go in and develop this on ten-acre spacing and drill wells 330 out of the corner in each 40, the spacing between the center well and the corner well would be less than 660 feet.

Q Now, you are referring here to the well, for instance, in the Southwest Southwest Quarter, Southwest Quarter of the Southwest Quarter of Section 6 just as an example, where the well is drilled near the center of the 40's?

A It's drilled near the center, a little west of center.

Q Would you propose that additional wells be drilled in that 40-acre tract?

A We are proposing both for our leases and Walker Brothers' leases to drill three additional wells on that tract.

Q As many as three additional wells?

A As many as three, and utilizing the center well since it is there as one of the producing wells.

Q If any well were drilled within that 40-acre tract and was 330 feet away from the quarter quarter section line, it would be closer than 660 feet to the center well?

A That is right.

Q And that is why the exception is needed in this case?

A That's right.

Q And that is true for many of the other 40-acre tracts in the Walker Brothers and Tesoro acreage, is that correct?

A Yes. Tesoro's acreage is all right as is but Walker Brothers does have this problem. The fact that we have a water coning problem in this reservoir is of primary interest to us. We feel that if we reduce rates we will ultimately drill more oil on closer spacing. In Texas we are used to drilling closer than 40. This is a rather shallow reservoir.

Now, Exhibit 2, which I did not discuss, shows this reservoir has a tilted water-oil contact. There is no question in my mind that it does, the water-oil contact on the west

side of the field is 28 feet higher structurally than the sand top on the east side of the field. By taking various points in the field on the structure map Exhibit 1, taking the difference between those points on that map and Exhibit 2, we get a net oil sand above water map, which is Exhibit 3.

As you can see, a good portion of the reservoir has 20 feet or more of the oil-saturated sand above water.

Q Mr. Vagtborg, if the Commission grants the exception that you seek by this application, how many additional wells can be drilled in this area and do you have a reasonable prospect for drilling?

A We propose three wells ultimately on our lease in the Southeast Quarter of Section 1, and Walker Brothers are talking about 13 total wells, 7 to be drilled at first, making each, putting it on 20-acre spacing, and then the additional wells to put it on 10-acre spacing.

MR. PORTER: So this could result in 16 additional wells on the two leases?

A Right. We are not proposing to drill the 16 all at once. We probably will start in the Northwest, the Southwest Quarter of 6 for the moment and we would probably drill our well 330 out of the corner in the Southeast of the Southeast of 1, the Southeast corner.

Q (By Mr. Morris) Mr. Vagtborg, your proposal here is

for an exception to Rule 104 that requires wells to be spaced no closer than 660 feet apart. If the Commission desired to establish an order to be entered in this case, a minimum distance of some sort, that still should be observed for separation of the wells, what distance would you recommend?

A I didn't really check this. It would appear, if the well is in the center and we could drill 330 out of the corner and the distance from the center well and that drilled well would be 467 feet. I would say that No. 2 well there in the Southwest of the Southwest of 6 would probably be not over a hundred feet out of the center, so I would say 330 feet.

Q So if the Commission saw fit to establish a 330-foot separation requirement, that would be satisfactory to the Applicants in this case?

A Yes.

Q And would enable development of this acreage on a 10-acre spacing if that is the ultimate decision?

A That is right. We would drill them as far apart as possible on our lease and I'm sure that Walker Brothers would also.

Q Will the granting of this application, or this exception, enable the recovery of additional oil from this reservoir in your opinion?

A Yes.

Q Will the correlative rights of all operators in this field be protected if the application is granted?

A I believe so.

Q Was Exhibit A with its attached exhibits prepared by you or at your direction?

A It was prepared by me.

MR. MORRIS: We offer Exhibit A into evidence.

MR. UTZ: Without objection Exhibit A, including its attachments, will be entered into the record of this case.

(Whereupon, Applicants' Exhibit A was offered and admitted in evidence.)

CROSS EXAMINATION

BY MR. UTZ:

Q Then as I understand your situation, Mr. Vagtborg, an order written allowing you to drill no closer to a quarter quarter section line than 330 feet or 330 feet from another producing well would be satisfactory?

A Yes, sir.

MR. MORRIS: I might say, Mr. Examiner, by way of further clarification here, although I think it has been covered, we are not proposing that the Commission amend the spacing in this pool to something less than 40 acres but by waiving the 660-foot requirement, or establishing a 330-foot between well requirement, it would enable the Applicants here

to come in and drill more than one well on a 40-acre proration unit. You would still have a 40-acre allowable but it would be produced between the wells on the proration units.

MR. PORTER: You want to keep the same size cup but just dip some more straws into it?

MR. MORRIS: Yes, sir.

MR. PORTER: I would like to ask a question in connection with the location of the well.

CROSS EXAMINATION

BY MR. PORTER:

Q You have indicated in response to Mr. Utz' question that an order which would allow spacing within 330 feet of another well would be satisfactory. Would more flexibility be desirable?

A It would be, sir, in that I have not sat down and measured this distance 330 out of the corner, but it looks like 330. I would prefer that it not be limited.

Q You are not asking that it be located any closer than 330 to your unit line?

A No, sir.

Q Let me ask you this, would there be any damage or any harm as far as waste or correlative rights are concerned, in drilling the well closer than 330 feet to an existing well, say within a hundred feet?

A The only problem there might be if Walker Brothers drilled against Tenneco within a hundred feet, then Tenneco, if that's what you are --

Q I want us to stick to this 330 feet from a property line.

A I see.

Q But within a 40-acre unit. Would there be any harm in drilling the wells closer than 330 feet to each other?

A I would say there would certainly be a distance that would be too close, I would estimate maybe a hundred feet.

MR. PORTER: That's all I have.

CROSS EXAMINATION

BY MR. UTZ:

Q Do you or Walker intend to drill wells any closer or any more than one well to each ten-acre tract?

A No, sir.

Q Then if you maintain your 330 feet, you couldn't possibly have a well any closer than 330 feet to another well, could you?

A Only if one of these wells that Walker drilled is off center.

Q Then you would have to drill on another ten-acre tract, wouldn't you?

A Well, we would have to put, say, three wells on

that, three additional wells on that 40.

Q Yes. Okay.

A There's no problem.

Q You are still going to have all your wells in a 660 square area?

A Right.

MR. MORRIS: Yes.

MR. KENDRICK: Essentially so, except on the east side of Sections 11 and 12 where the wells could not be located within a 60-foot square in the center.

MR. PORTER: It appears from the witness's testimony that there's a possibility of recovering considerable amount of oil because of, additional oil because of this closer spacing and because we recognize that this is rate sensitive, I was just wondering whether the 330 would be too restrictive.

MR. MORRIS: We would prefer to just be granted an exception to the 660-foot requirement, but if the Commission wants to set a minimum requirement, well, that's, we could probably live with the 330-foot requirement, but if it could be made more liberal to 100 foot less than 330, we would appreciate it.

Q (By Mr. Utz) Actually if you have four wells a hundred feet apart, you would have pretty much the same situation as by drawing 70 barrels a day from a well bore

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you draw 70 barrels a day from a hundred foot square, which would be pretty close to the same situation you have right now?

A I think it would make a considerable difference but we would not intend to drill wells one hundred feet apart.

Q Well, if we give you the authority it could be done, somebody might do it?

A Well, that's a possibility, I guess. We would not.

Q Yes.

A Unless it was a replacement well.

Q The thing you are trying to do here is to distribute the production over the 40-acre tract?

A Right, to put the wells as far apart as possible.

Q So you don't get the coning situation which is aggravating you?

A Right.

MR. UTZ: Any other questions? The witness may be excused.

MR. PORTER: I have one more question. How many operators in the pool?

THE WITNESS: Three.

MR. PORTER: Just three. Who else is in there besides you?

THE WITNESS: Tenneco, Tesoro and Walker.

MR. UTZ: What are the horizontal limits of the

pool now?

THE WITNESS: The horizontal limits would be on Exhibit 3. The zero sand thickness.

MR. UTZ: I meant the horizontal limits as defined by the Commission.

MR. KENDRICK: The present definition of the lower sand pool is the Southwest Quarter of Section 6, Northwest of Section 7, the North Half of Section 12, the North Half of the South Half of Section 12, the Northeast Quarter of the Southeast Quarter of Section 11, the Southeast Quarter of the Southeast Quarter of Section 1.

The proposed extension for the nomenclature case next month would include the Northeast Quarter of the Southeast Quarter of Section 1, the Southwest Quarter of the Southeast Quarter of Section 1.

MR. PORTER: Mr. Kendrick, will this area that you have outlined, does it include all of the present production?

MR. KENDRICK: Yes, sir, with the exception possibly of the Well No. 4 in Unit B of Section 7. I am not sure that that well is currently producing.

THE WITNESS: That's Well No. 10.

MR. MORRIS: That's a four-foot line.

MR. KENDRICK: Well No. 10 in Unit B of Section 7. I'm not sure that that well is currently producing.

MR. UTZ: You are asking this exception for each pool, right?

THE WITNESS: Yes, sir.

MR. KENDRICK: Each pool?

THE WITNESS: For the upper sand, the Hospah.

MR. MORRIS: Which pool is actually involved in this, Mr. Vagtborg?

THE WITNESS: We are asking for this exception on the Massive Gallup reservoir and would like at the same time to get the exception to cover the zone just above it, the Hospah-Gallup zone.

MR. KENDRICK: The upper zone, all the production in the upper zone is currently encompassed in the existing horizontal limits of the pool.

MR. MORRIS: I would like to point out that in the advertisement of the case, this was advertised for the South Hospah Upper Sand Oil Pool and the South Hospah Lower Sand Oil Pool.

MR. UTZ: That was the question I asked.

MR. MORRIS: Yes, sir.

MR. PORTER: The same conditions prevail in both pools?

THE WITNESS: No, sir, the upper sand does not have a water drive, if it does it's down dip from these locations.

There's no bottom water in the upper sand.

MR. PORTER: But from the standpoint of economics, you still think it is advisable to drill it on the closer spacing?

THE WITNESS: For the Massive Gallup only since the well will be there when the Massive Gallup is depleted we would like to use those wells in depleting the upper zone.

MR. UTZ: Actually what you are requesting is for an exception to the spacing rules for both pools, the horizontal limits of both pools?

THE WITNESS: That's right.

MR. UTZ: Any other questions? The witness may be excused.

(Witness excused.)

MR. MORRIS: We have nothing further, Mr. Examiner.

MR. UTZ: Any statements in this case? The case will be taken under advisement.

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STATE OF NEW MEXICO)
) SS
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, 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 30th day of June, 1967.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1971.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3661, heard by me on June 28, 1967.

Michael R. [Signature], Examiner
New Mexico Oil Conservation Commission

Testimony for an Exception to Rule 104-C-1 Hearing
South Hospah Field, McKinley County, New Mexico
Before the New Mexico Oil Conservation Commission

June 28, 1967

BEFORE EXAMINER UTZ	
OIL CONSERVATION COMMISSION	
Exhibit NO.	<u>11</u>
CASE NO.	<u>3601</u>

Tesoro Petroleum Corporation

By Harold Vagtberg Jr.
Harold Vagtberg, Jr.
Vice President

Testimony for an Exception to Rule 104-C-1 Hearing
South Hospah Field, McKinley County, New Mexico
Before the New Mexico Oil Conservation Commission

June 28, 1967

The South Hospah Field is situated in a horst formed by two generally northeast-southwest trending faults immediately southeast of the original Hospah Field. There are two oil productive formations in this horst, the Hospah Gallup at approximately 1,550 feet and the Massive Gallup at approximately 1,600 feet.

The Massive Gallup formation is a clean sand approximately 110 feet thick, characterized by excellent porosity and permeability. A structure map contoured on top of the Massive Gallup sand is attached hereto as Exhibit I. The entire areal extent of the oil accumulation is underlain by water.

The average physical properties of the Massive Gallup reservoir and the produced crude are as follows:

Permeability	1,147 md
Porosity	28%
Interstitial water saturation	varies from 23 to 50% depending on heights above water-oil contact
Reservoir temperature	86°F
Crude oil gravity	25°API
Crude oil viscosity at 86°F	45 cp
Crude oil pour point	-16°F

Determination of the oil saturated sand interval in this reservoir is complicated by the fact that the reservoir apparently has a tilted water-oil contact. The contact is well defined on several of the induction electric logs from wells in the Field. On others it is very difficult to pick an actual contact. In these wells there appears to be a thick transition zone. The occurrence of a transition zone in this reservoir is hard to explain in view of the high vertical permeability.

Ten wells were drilled through the water-oil contact. The entire section was cored and analyzed in most of these wells. Using core analyses, core descriptions and induction electric logs, a water-oil contact was picked in each well at the highest reasonable point to obtain the most conservative estimate of oil reservoir volume. It was found that the 50 ohms/meter²/meter resistivity point on the induction electric logs most closely correlated with the core analysis where a change in water or oil saturation occurred and staining changed from good to fair. A water-oil contact map was then prepared from the datum points so obtained. This map is attached as Exhibit II. It should be noted that the water-oil contact on the west side of the Massive Gallup reservoir is 28 feet higher structurally than the top of the sand on the east side of the reservoir.

The vertical distance between the top of the Massive Gallup sand as shown in Exhibit I and the water-oil contact in the sand as shown by Exhibit II, was determined at various locations in the reservoir and from this information a map was prepared showing the net oil saturated sand thickness above water. This map, Exhibit III, shows the thickness of the oil saturated sand in the reservoir varies from 0 to 48 feet with a large portion of the reservoir having

at least 30 feet of net oil saturated sand above water.

When Tesoro Petroleum Corporation completed their Santa Fe Railroad Well No. 72, it was felt that limited penetration of the Massive Gallup sand would be advisable because of the large aquifer located below the oil-bearing section. For this reason, the well was drilled 17 feet into the sand. At the time, we felt the well would have approximately 60 feet of oil saturated sand above water and were attempting to obtain a 25 per cent penetration. Little thought had been given to the possibility of water coning. When Well No. 72 had produced between 3,300 and 3,400 barrels of water-free oil, the sudden appearance of water was noted. At first it was believed this water was migrating from the lowest sand member of the Upper Hospah through a channel in the primary cement sheath. An analysis of the reservoir sand characteristics and reservoir fluid properties led Tesoro to the conclusion that water coning was a distinct possibility, in fact a probability. When our Santa Fe No. 74 Well started producing water, the coning theory was verified.

The vertical permeability in this reservoir averages approximately 95 per cent of the horizontal permeability so for all practical purposes the horizontal and vertical permeability are equal. The high viscosity of the produced crude, coupled with the high vertical permeability presents a textbook example of the conditions necessary for water coning. The early breakthrough of water also indicates a lack of shale laminae barriers to vertical flow.

Tesoro Petroleum Corporation initiated a program of wellhead water-cut measurements several times a week and a monthly well test program on the three wells located on their Santa Fe Railroad Lease. Exhibit IV shows the results

of these tests on the Santa Fe Railroad No. 72 Well, the well with the longest production history. The No. 74 Well has exhibited an identical performance history. The Santa Fe Railroad No. 72 Well was produced at allowable rate of 90 barrels per day following completion in December, 1966. As mentioned earlier, the well produced between 3,300 and 3,400 barrels of water-free oil before the appearance of water. Following production of approximately 4,300 barrels of cumulative oil, the producing rate on this well was reduced to 70 barrels of total fluid per day. No change in the rate of water-oil ratio increase was noted until an additional 1,000 to 1,500 barrels of cumulative oil had been produced at which time a definite reduction in rate of water-oil ratio increase was noted. We surmised the lack of immediate response to reduced fluid withdrawal rate was the time lag required for the system to reach new equilibrium conditions. The fluid withdrawal rates from the well were further reduced to 44 barrels per day when a cumulative production of 9,000 barrels had been attained. Equilibrium conditions at this new rate have not yet been reached.

Simple extrapolation of various segments of the curve in Exhibit IV at different producing rates would indicate increased cumulative oil recovery at reduced rates. We recognize that for some producing conditions the water-oil ratio versus cumulative oil production curve takes the form of an "S" but normally not at water-oil ratios as low as those plotted in Exhibit IV. Only at the time of depletion will all the facts be known. However, based on the limited information available at this time, it appears that an increased well density will result in some additional oil recovery. There is a tremendous volume of

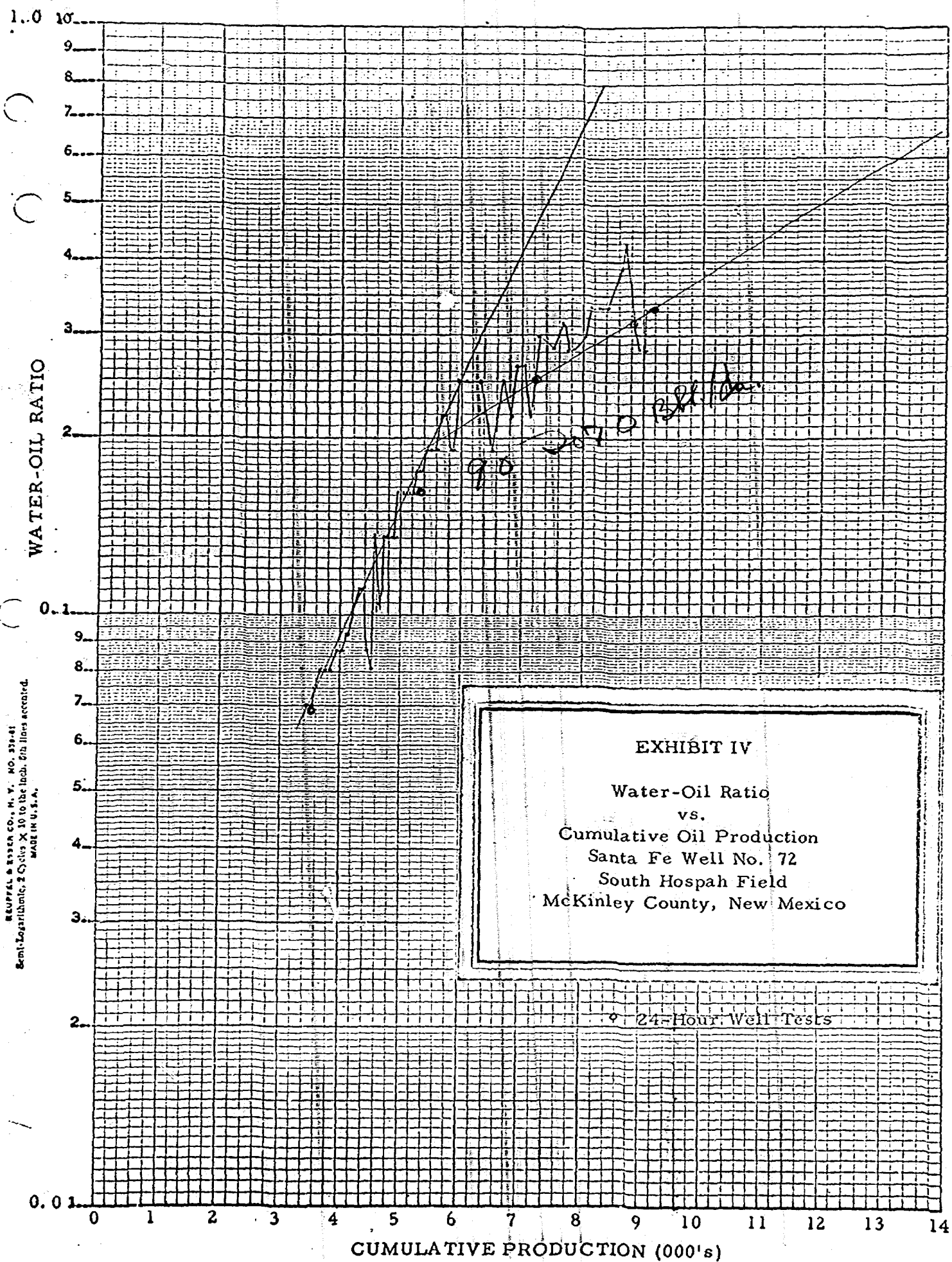
oil in place in this reservoir and an increase in ultimate recovery of a few per cent will justify the drilling of additional wells.

Tesoro Petroleum Corporation and Walker Bros. Oil Company would like to develop their leases on either 10-acre or 20-acre spacing at their option. We are under the impression that if we wish to do so, we may, providing the wells are not less than 660 feet apart and 330 feet from governmental quarter-quarter section boundaries. We wish to verify this at this hearing.

Walker Bros. have drilled a number of wells in the centers of 40-acre governmental quarter-quarter sections. Any additional wells, if drilled 330 feet from the boundaries of these governmental quarter-quarter sections, will result in between-well spacing of less than 660 feet. This would be a violation of Rule 104-C-1. Therefore, we have requested this hearing for an exception to a part of this Rule. We do not wish to enter a request for an exception to that part of the Rule requiring 330 feet from the boundary of a governmental quarter-quarter section.

Tenneco Oil Company, the only other operator in the Field, apparently recognizes the water coning problem as they have voluntarily reduced the fluid withdrawal rates from their wells to a level well below the statewide allowable.

Tesoro Petroleum Corporation and Walker Bros. Oil Company respectfully request that the Examiner give our plea favorable consideration.



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South Nappah Upper & Lower

Walker Bros. Oil Co 7205 E. Wilshire
~~Penn~~ Otta City, Ok

Tesoro Petr Corp. 533 Busby Dr
San Antonio Texas

exception to 104 C I

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Walker / S/2 Sec 6 T 17 N R 8 W
Hanson N/2 & SW/4 Sec 7 T 17 N R 8 W
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Look up
name

Harold Vagtborg
Vagtborg

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Date

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