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BEFORE THE  
NEW MEXICO OIL CONSERVATION COMMISSION  
Santa Fe, New Mexico  
July 19, 1966

EXAMINER                      HEARING

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IN THE MATTER OF: Application of Continental )  
Oil Company for a unit agreement, Lea County, )  
New Mexico. )

-and-

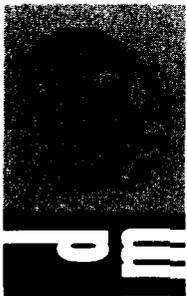
Application of Continental )  
Oil Company for two waterflood projects, )  
Lea County, New Mexico. )

3428 &

Case No. 3429

-----  
BEFORE: ELVIS A. UTZ, Examiner

TRANSCRIPT OF HEARING



NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

REGISTER

HEARING DATE JULY 19, 1966 TIME: 9 A.M.

| NAME:                              | REPRESENTING:                   | LOCATION:                   |
|------------------------------------|---------------------------------|-----------------------------|
| Garry W. Selinger<br>J. W. Stuckey | Skelly Oil Co<br>Skelly Oil Co, | Jules, Okla.<br>Hobbs, N.M. |
| Leonard Patch                      | Self                            | Lubbock, Texas              |
| Richard S. Morin                   | Jeth, Montgomery, Texaco        | S. F. - Santa Fe            |
| J. M. Breining                     | Tidewater Oil Co.               | Hobbs, N.M.                 |
| R. M. Anderson                     | Sinclair                        | Midland                     |
| F. P. Boylan                       | Continental Oil Co              | Hobbs, N.M.                 |
| J. T. Lyon                         | " "                             | "                           |
| Raymond W. Ball                    | Tenneco                         | Midland, Texas              |
| K. D. Griffin                      | Self                            | Midland, Texas              |
| Bother Kelly                       | archib. bbbet. kudo. kelly      | S. F.                       |
| Frank E. Saly                      | state Engr. Office              | Santa Fe                    |
| Jason W. Kellahy                   | continental oil                 | Santa Fe                    |
| J. L. Patten Jr.                   | OCC                             | Santa Fe, N.M.              |

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| NAME:  | REPRESENTING:  | LOCATION:  |
|--|--|--|
| <p>Bill Baker<br/>J H Hoover<br/>W V Kastle</p>                      | <p>Midwest Oil Corp<br/>Gulf Oil Corp<br/>✓</p>                              | <p>Midland, Texas<br/>Roswell N.M.<br/>✓</p>                     |
| <p>N Dalbarnie<br/>D Lopez<br/>Ralph T Gray<br/>NORBERT McINTYRE</p> | <p>R W Byram<br/>Lopez + Stewart<br/>Gates Pet. Co.<br/>MIDWEST OIL CORP</p> | <p>Santa Fe<br/>Artesia N.M.<br/>Artesia,<br/>MIDLAND, TEXAS</p> |

MR. UTZ: The next Case will be 3428.

MR. HATCH: Application of Continental Oil Company for a unit agreement, Lea County, New Mexico.

MR. KELLAHIN: If the Examiner please, I believe in the interest of time, we could consolidate this Case for the purposes of the record with Case 3429, since they deal with the same subject matter and there is an unusual situation in Case 3429, in that we are asking for an approval of a waterflood together with an offsetting cooperative waterflood by the same operator. The explanation is tied in with Case 3428.

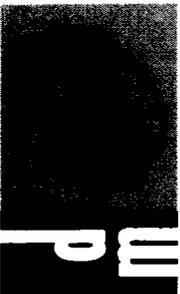
MR. UTZ: The unit requested in 3428 will be the unit that will be used to accomodate the waterflood in 3429?

MR. KELLAHIN: That is correct, and also there is an offsetting waterflood in Case 3429.

MR. UTZ: For purposes of testimony, 3428 and 3429 will be consolidated. Separate orders will be written on each case.

MR. HATCH: Application of Continental Oil Company for a unit agreement, Lea County, New Mexico, and application of Continental Oil Company for two waterflood projects, Lea County, New Mexico.

MR. KELLAHIN: If the Examiner please, we will have two witnesses I would like to have sworn.



(Witnesses sworn.)

MR. UTZ: Are there other appearances? You may proceed.

\* \* \*

V I C T O R T. L Y O N, called as a witness herein, having been first duly sworn, was examined and testified as follows:

## DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A Victor T. Lyon, L-y-o-n.

Q By whom are you employed and in what position, Mr. Lyon?

A Continental Oil Company as supervising engineer in the Hobbs District Office, Hobbs, New Mexico.

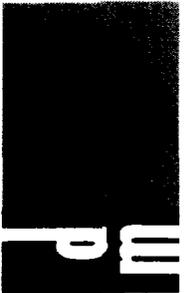
Q In connection with your position, do you have anything to do with the area involved in the Eumont-Hardy Unit and the Unit Agreement and waterflood?

A Yes, sir.

Q Have you testified before the Oil Conservation Commission of New Mexico and had your qualifications made a matter of record?

A Yes, sir.

MR. KELLAHIN: Are the witness' qualifications acceptable?



MR. UTZ: Yes, he has previously qualified.

Q (By Mr. Kellahin) Mr. Lyon, are you familiar with the application of Continental Oil Company in Case 3428?

A Yes, sir. Case 3428 is the application of Continental Oil Company for an approval of the Eumont-Hardy Unit.

Q Does the unit also seek authority to install a waterflood in the unit area and approval of the centralized tank battery, or is that in the other case?

A That is in the other case.

(Whereupon, Applicant's Exhibit 1 marked for identification.)

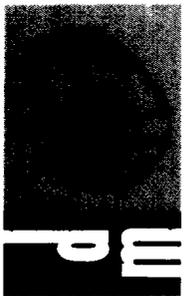
Q (By Mr. Kellahin) Referring to what has been marked as Exhibit Number 1, will you identify the Exhibit and discuss it?

A Exhibit Number 1 is the proposed Unit Agreement for the Eumont-Hardy Unit. It is a modified Federal form and contains the usual provisions in it. There is attached to it Exhibit A, which is a plat of the unit area showing the tract numbers and other pertinent information, and Exhibit B, which is a list of the leases with the tract number and the owner and the tract participation shown thereon.

Q What is the total unit area?

A The total unit area is approximately 1930 acres, and a fraction, 1930.23, I believe.

Q Attached to the unit is the usual exhibit B showing



a tabulation of the leases and the ownership, is that correct?

A Yes, sir.

Q What percentage of the unit is Federal and what per cent is State and what percentage is Fee?

A There are three Federal tracts which comprise 197.61 acres, or 10.24 per cent of the unit area. There are eight State tracts containing 916.90 acres, or 47.5 per cent of the unit area. The remaining seven tracts contain 815.72 acres. They are patented lands which amounts to 42.26 per cent of the unit area.

Q Does the unit cover all formations or are you unitizing only a single formation?

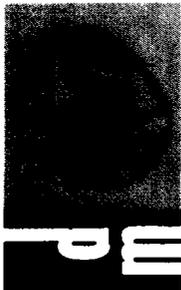
A We are seeking to unitize the Yates, Seven Rivers and Queen formations, which comprise the Eumont Pool.

Q How is that defined in the Unit Agreement?

A It is defined by referring to radioactivity log of Continental Oil Company's State A-36 Well Number 10, which is Exhibit 3 in the bounded Exhibits. It is shown by a red line at the top of the Yates, 2700 feet, and another red line at the top of the Grayburg on the base of the Queen at 3776 feet.

Q What is the basis of tract participation under the terms of the Agreement?

A Section 13, beginning on page 13 of the Unit Agreement



provides that tracts will participate on the basis of 60 per cent of each tract's cumulative production to September 1st, 1963, and 40 per cent on the basis of the tract's floodable acre-feet.

Q Do you have an exhibit which shows the parameters for each of these tracts?

(Whereupon, Exhibit 1-1 marked for identification.)

A Yes, sir. Exhibit 1-1, which is the first Exhibit in the bound booklet, is a schedule of participation parameters showing the value of each of the parameters and the weight given to it, and at the extreme right is each tract's total unit participation.

Exhibit 1-2, which is the second sheet in the bound booklet, is an isopach map from which the figures in the column headed Floodable Acre-Feet on Exhibit 1-1 was taken. The number indicated in there is the estimated floodable acre-feet as shown on Exhibit 1-2, and then the column to the right of that shows the percentage of the floodable acre-feet weighted at 40 per cent for each tract.

(Whereupon, Exhibit 1-2 marked for identification.)

Q (By Mr. Kellahin) So Exhibit 1-2 covers the participation factor for each tract, is that the fact of it?

A Yes, sir.

Q Now, your cumulative production, was it taken from the reports prepared by the New Mexico Oil and Gas Engineering Committee?

A Yes, it was.

Q Would you describe the salient points covered by the Unit Agreement?

A Yes, sir; as I stated, it is a modified Federal form, if such a term is applicable; Section 2 describes the unit area, and perhaps I should make that a matter of record.

In Township 20 South, Range 37 East, the south half south half of Section 25, and all of Section 36; In Township 20 South, Range 38 East, Lots 1, 2, 3, and 4, and the southeast quarter of the southwest quarter of Section 31; in Township 21 South, Range 36 East, Lots 1, 8, and 9 of Section 1; and in Township 21 South, Range 37 East, Lots 3, 4, 5, and 6 of Section 5, and Lots 1 through 12, 14, 15 and 16, the northwest quarter of the southeast quarter, and northeast quarter of southwest quarter of Section 6, a total of 1930.23 acres.

Section 4 describes the manner the unit can be expanded, although we do not anticipate that expansion will be necessary. Section 6 designates Continental Oil Company as unit operator, and Section 7 provides for resignation or removal of the unit operator. Section 8 for a successor unit operator in the event of removal or resignation. Section 13,

as I previously testified, describes the manner in which each tract participates.

Section 14 defines the tracts which are qualified for unit participation. Section 16 provides for royalty settlement. Section 23 designates the effective date and term and the effective date will be the first day of the month following the commitment to the unit of 85 per cent of the surface area, the filing of a counterpart in the County Office, and the approval of the Land Commissioner and the USGS.

Q Offsetting this unit, there is another proposed waterflood project, is there not?

A Yes, sir.

Q What's the reason for that, Mr. Lyon?

A Well, this 160 acres immediately adjoining the unit to the north, which is outlined, I believe, on Exhibit 2 in the booklet in red, is a part of the Eumont participating area for the Southeast Monument Unit. The USGS has refused to delete this area from that unit so that it can participate in the Eumont-Hardy Unit, consequently, it will be necessary to flood this reservoir by a cooperative waterflood project.

Q Has preliminary approval of the proposed Unit Agreement been obtained from the USGS and the State Land Commissioner?

A Yes, sir. We received preliminary approval from the

USGS by a letter dated March 16, 1966, and I have discussed the agreement in detail with Mrs. Rhea of the State Land Commissioner's Office.

Q What per cent of interest have executed or ratified the agreement at this time?

A At this time, the agreement has been ratified by 71.5 per cent of the working interest owners, 18.8 per cent of the Fee royalty owners, and 19.1 per cent of the overriding royalty owners.

Q Do you anticipate you'll have any difficulty in obtaining 85 per cent of the working interest owners?

A I do not think so.

Q Were Exhibits 1 through Exhibit 1-2 prepared by you or under your supervision?

A Yes, sir.

MR. KELLAHIN: That's all the questions I have at this time of this witness. I'll offer in evidence Exhibits 1 through 1-2.

(Whereupon, Exhibits 1 through 1-2 offered in evidence.)

MR. UTZ: Exhibit 1 was the Unit Agreement?

MR. KELLAHIN: Yes, sir.

MR. UTZ: And 1-2 is the structure map?

A The isopach map.

MR. KELLAHIN: We also have Exhibit 1-1, which is

the tabulation of the data on each tract.

MR. UTZ: Without objection, Exhibits, 1, 1-1 and 1-2 will be entered into the record.

(Whereupon, Exhibits 1 through 1-2 admitted in evidence.)

CROSS EXAMINATION

BY MR. UTZ:

Q Will you explain again why the USGS is not going to let you put the 160 acres in this waterflood project?

A I am afraid I can't explain it. All I know, they would not permit it.

Q They just said no and didn't give you any reason?

A Yes, they did give me a reason. They said that this does not comprise all of the participating area for the Eumont Pool in the Southeast Monument Unit, and they do not feel that it is proper to take a part of a participating area from one unit and put it in another. If this had involved the entire Eumont participating area, I believe that they would have permitted it to go into this unit.

Q You are not ready to pledge the entire participating area of the Eumont unit at this time?

A Most of it is gas.

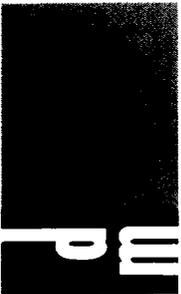
Q Is the balance of the flood a part of SEMU unit or any part of it part of the SEMU unit?

A There is no acreage inside the Eumont-Hardy Unit

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which is a part of the Southeast Monument Unit.

MR. UTZ: Are there other questions?

CROSS EXAMINATION

BY MR. PORTER:

Q Is this the old Hardy Pool?

A Yes, sir.

Q And some of these wells must be more than 20 years old?

A Nearly 30.

Q I note quite a difference in cumulative production from well to well.

A Yes, there's a large difference.

MR. PORTER: I don't have any further questions.

MR. UTZ: Are there any further questions of Mr. Lyon? He may be excused.

(Witness excused.)

MR. KELLAHIN: I would like to call the next witness, Mr. Boylan.

J. P. B O Y L A N, called as a witness herein, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A James P. Boylan, B-o-y-l-a-n.



Q By whom are you employed and in what position, Mr. Boylan?

A I am employed by Continental Oil Company as a senior engineer in the Hobbs District Production Office.

Q In connection with your duties as a senior engineer do you have anything to do with the area involved in the Eumont-Hardy waterflood project?

A Yes, sir, I do.

Q And the SEMU offsetting waterflood project?

A I do.

Q Have you ever testified before the Oil Conservation Commission and made your qualifications a matter of record?

A Yes, sir, I have.

MR. KELLAHIN: Are the witness' qualifications acceptable?

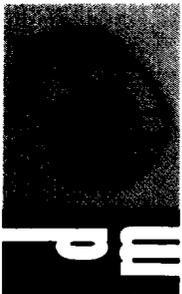
MR. UTZ; They are.

Q (By Mr. Kellahin) Mr. Boylan, you heard Mr. Lyon's testimony in regard to the Eumont-Hardy Unit Agreement; now what is the purpose of this unit?

A This unit is being formed for the purpose of conducting waterflood operations in the unit area.

(Whereupon, Applicant's Exhibit 2 marked for identification.)

Q (By Mr. Kellahin) Now, referring to what has been marked as Exhibit Number 2, would you discuss the information



shown on that Exhibit?

A Exhibit 2 is a plat of the Eumont-Hardy Unit area and an area two miles in each direction from the unit boundary. Lease ownership and location and identification of wells are shown in the usual manner. The formation from which each well is producing is shown by a letter symbol which is explained in the legend.

Q Now, from the Exhibit, it would appear that there are several wells to the south of the unit area which have been plugged and abandoned. Why were these wells not included in the unit?

A These wells had a very poor primary producing history. It is not considered economically justified to re-enter these wells or to drill replacement wells. Because the area would have no value to the unit it was not included in the unit area.

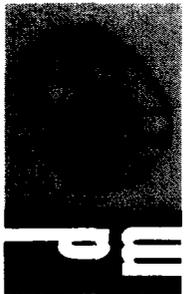
Q Actually, under the formula adopted, they would have no participation anyway if they have no primary production?

A Very little, if any.

(Whereupon, Exhibit 3 marked for identification.)

Q (By Mr. Kellahin) Now, referring to what has been marked Exhibit Number 3, will you describe the information shown on that Exhibit?

A Exhibit Number 3 is the radioactivity log run on



Continental Oil Company's State A-36 Well Number 10. As stated by Victor Lyon, this is the type log identifying the unitized formation. The log shows by a horizontal red line the top of the Yates formation at a depth of 2700 feet. In similar manner the top of the Grayburg, which is also the base of the Queen formation is shown at 3776 feet. The vertical interval between these two depths is the unitized formation.

Q What is the specific interval which is to be flooded in the waterflood project?

A The pay in this area is the Penrose member of the Queen formation. This is the specific interval which is to be flooded in this project.

Q Now, why is it necessary, then Mr. Boylan, to include such a large interval in the section to be flooded when the section to be flooded is so small?

A The Eumont Pool consists of the Yates, Seven Rivers and Queen formations and since there is no other production from the gross interval in this area, we felt it was proper to include the entire pool vertical interval in the unitized formation.

Q You say there's no production from the Seven Rivers and Queen, what about the Grayburg, is there any Grayburg production?

A There is no Grayburg production in the immediate unit



area. It is productive some distance to the north of the unit area.

Q And you say there is no Queen production; what is the character of the formation?

A The character of the Queen formation is relatively tight to the extent of being considered nonproductive.

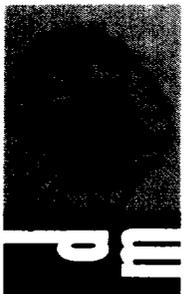
Q So the only productive zone is the Penrose, in your opinion?

A In my opinion, the only productive zone in the unit area is the Penrose member of the Queen formation.

Q Would you give a brief history of the Eumont-Hardy Unit area?

A Referring again to Exhibit 2, the Texaco, Incorporated J. P. Alexander Well Number 1 located 3300 feet from south line and 1980 feet from west line of Section 5, Township 21 South, Range 37 East and designated by a red circle was completed April 24, 1937 as the discovery well in the Eumont-Hardy Unit area. This well was completed for an initial potential of 53 barrels of oil per day flowing, no water, with a gas oil ratio of 704 from the Penrose Sand member of the Queen formation.

A total of 48 oil wells and one gas well have been drilled within the unit area. Initial development took place during the period 1937 to 1941. A second stage development



period occurred during 1956 and 1957. During initial development, the majority of the wells were completed open hole and shot. Wells drilled during the second stage of development were cased to total depth and sand fraced. During 1955 the majority of the old wells were also sand fraced with treatments ranging from 5,000 to 40,000 gallons.

As of April 1, 1966, 33 of the wells in the unit area were still producing, 14 were shut in, and two were plugged and abandoned.

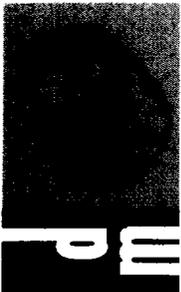
Q What is the current daily average production for the unit area?

A During the month of March, 1966, the unit area averaged 69 barrels of oil per day with 17 barrels of water per day and 1.28 million cubic feet of gas per day, for an average gas oil ratio of 18,550 cubic feet per barrel. This is an average of 2.1 barrels of oil per day per well. Maximum daily oil production from any one well during March, 1966 was 8.9 barrels per day. The above producing rates indicate the reservoir is at or very near the economic limit of production.

Q You would say, in any event, it's at a stripper stage, is it not?

A That is correct.

Q Now, what is the cumulative production for the unit area?



A Cumulative production as of April 1, 1966 for the unit area totaled 2,870,473 barrels of oil.

Q What was the reservoir drive mechanism during the primary production?

A The reservoir drive mechanism for the Eumont-Hardy Unit is a combination of gas cap expansion and solution gas drive. The Eumont-Hardy Unit is located in an isolated section of an oil rim on the Eumont Gas Pool.

(Whereupon, Exhibit 4 marked for identification.)

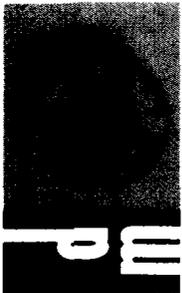
Q (By Mr. Kellahin) Now, referring to what has been marked as Exhibit Number 4, would you identify that Exhibit and discuss what is shown on it?

A Exhibit Number 4 is a tabulation of data in regard to the reservoir rock, fluid characteristics and estimated waterflood performance.

Q In your opinion, is waterflooding feasible in the Eumont-Hardy area?

A Yes. After reviewing the available data in regard to porosity, permeability, oil saturation, oil recovery under primary operations, and calculations by accepted methods as to anticipated performance under waterflooding, my opinion is that the unit area can be successfully and economically waterflooded.

Q Will waterflooding, in your opinion, result in the



production of oil that would not otherwise be recovered?

A Yes. It is estimated that approximately 2,100,000 barrels of oil will be recovered by waterflooding which would not be recovered otherwise. The above amount includes 112,000 barrels of estimated waterflood recovery for the SEMU-Eumont lease, which is proposed to be cooperatively flooded with the Eumont-Hardy Unit.

Q In connection with the SEMU-Eumont lease flood, what do you propose to do there? How many wells will you use for injection in that area?

A Two wells will be used for injection on the SEMU-Eumont lease.

Q In your opinion, in order to protect the owners in the SEMU-Eumont Unit, is it necessary to flood this portion of the unit?

A In my opinion it is. If it were not flooded cooperatively with the unit area, probably oil would be transferred or drained across the lease line.

Q Which would result in a loss to the owners?

A That is correct.

Q Will flooding, in your opinion, protect the correlative rights of the owners in the two units?

A It will.

(Whereupon, Exhibit 5 marked for identification.)

Q (By Mr. Kellahin) Referring to what has been marked as Exhibit Number 5, will you explain what has been shown on that Exhibit?

A Exhibit Number 5 is a tabulation of the wells which are proposed to be converted for water injection. The size and setting depth of each casing string, the amount of cement used and the interval open to the formation is shown for each well. Exhibits 5-1 through 5-28 are schematic diagrams for each well showing the same information as that tabulated on Exhibit Number 5.

(Whereupon, Exhibits 5-1 through 5-28 marked for identification.)

Q (By Mr. Kellahin) As a general proposition, how will your injection wells be completed?

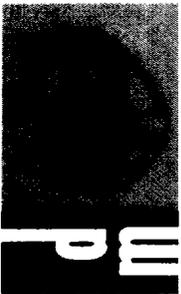
A The injection wells will be completed with tubing and packers, the water being injected through tubing under a packer set in the casing.

Q Will you use a coated tubing, or do you know what will be used at this time?

A There probably will be some measure taken to protect the tubing from corrosion. Some coating will probably be applied.

Q Will you use inhibitors in the water, or do you know?

A I would assume that the injection water will be



inhibited for corrosion.

(Whereupon, Exhibit 6 marked for identification.)

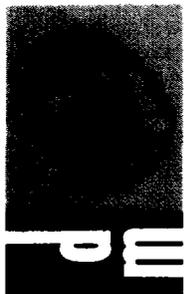
Q (By Mr. Kellahin) Now, referring to what has been marked as Exhibit Number 6, will you discuss what is shown on that Exhibit?

A Exhibit Number 6 is a map showing the structural configuration on the top of the Penrose Sand member of the Queen formation with a contour interval of 25 feet. This particular area was designated the Hardy Oil Pool until the Eumont Pool was established. As shown on Exhibit Number 6, this oil accumulation in the Eumont Pool occurs in a synclinal area near the edge of the Eumont Pool. The oil productive limits are defined to the northwest and south by gas oil contact. The producing limit is determined to the east by permeability pinch-out.

(Whereupon, Exhibit 7 marked for identification.)

Q (By Mr. Kellahin) Referring to what has been marked as Exhibit Number 7, would you identify that Exhibit and discuss it?

A Exhibit Number 7 is a map of the unit area showing the proposed waterflood pattern. The injection wells are designated by their usual triangular symbol. You will note that the westernmost row of wells are all proposed to be



injectors. The reason for this is to create a water barrier to confine oil to the unit area. It is planned to stop or reduce injection rates in this row of wells when a barrier has been created.

The proposed injection wells in the second row from the western boundary will not be placed in service as injectors until water breakthrough has occurred in these wells. The other injection wells shown on Exhibit Number 7 will be used as injection wells on a normal 80 acre five-spot pattern throughout the life of of the flood.

You will note that there are two dry holes located in Lots 1 and 8 in Section 6, Township 21 South, Range 37 East, these wells demonstrated poor producing characteristics during primary producing operations, and it is not proposed to re-enter these wells or drill replacement wells. It is believed that the oil in place can be adequately swept to producing wells by the injection wells in this area.

Exhibit Number 7 also shows the proposed location of the central tank battery and the location of the injection station.

Q Do you seek in this application, approval of the use of a central tank battery for this unit?

A Yes, sir, we do.

Q Now, will this central tank battery have adequate

testing facilities?

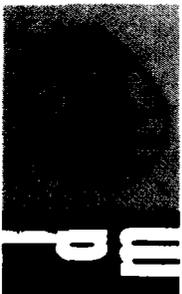
A Yes. A test facility in the central battery will permit at least one test per month on each producing well in the unit area. In addition metering facilities will permit continuous metering of the total water injected, and monitoring meters will provide very accurate estimates of the water injected into each injection well.

Q How much water do you anticipate to be injected in this waterflood project?

A Initially we expect to inject approximately 12,000 barrels of water per day into the 24 injection wells in the first stage of the project. The first stage to which I refer is the period during which full injection rates will be carried on in the westernmost row of wells. During this stage, the second row of wells from the western boundary will consist entirely of producing wells. The second stage of operation will begin at the time that water injection is reduced in the westernmost row of wells when the four injection wells in the second row are in operation.

Q What is the source of the water to be employed in this waterflood project?

A Primarily the water will be obtained from the Cass-Penn Wells, approximately two miles to the north northwest. It may be necessary to supplement this water with water to be



purchased from the E-M-E salt water disposal system. Produced water from the unit area will be injected when the volumes are sufficient to justify its use.

Q Now, an analysis of the water involved has been furnished to the office of the State Engineer, has it not?

A Yes, sir, that is correct.

Q What is the maximum allowable which you anticipate for this unit?

A There are 43 wells which will be in operation during waterflooding, each on a 40 acre tract or lot. This number multiplied by 42 provides a maximum allowable of 1,974 barrels of oil per day.

Q Then, you don't plan to have a pilot project on this unit, is that correct?

A No, sir. The unit area is producing at approximately the economic limit at this time. There appears to be no useful information which can be gained by installing a pilot. In the interest of efficiently flooding the unitized area, we propose to install a full scale flood.

Q Are you familiar with the application for approval of the SEMU-Eumont flood which is a part of this case?

A Yes. The application of Continental Oil Company for authority to install a waterflood on the Southeast Monument Unit Eumont Lease in the area described as the southeast



quarter northwest quarter northeast quarter of southwest quarter, and north half southeast quarter Section 25, Township 20 South, Range 37 East. This waterflood is to be conducted in cooperation with the Eumont-Hardy Unit waterflood. The reasons for its being flooded on a cooperative basis rather than a part of the unit area were discussed by Mr. Lyon in his testimony in Case Number 3428.

Q Now, referring again to Exhibit Number 2, is the SEMU-Eumont Lease and the surrounding area for two miles in each direction shown?

A Yes, it is.

Q And it also shows the injection wells, does it not?

A Yes, sir, it does.

(Whereupon, Exhibits 9 and 10 marked for identification.)

Q (By Mr. Kellahin) Referring to what has been marked as Exhibit Number 9, would you identify that Exhibit, please?

A Exhibit Number 9 is a tabulation of all the injection wells in the Eumont-Hardy Pool Unit.

Q Does it give the well location in each instance?

A Yes, sir, it does. It gives the footage location of each of the wells listed.

Q Now, referring to what has been marked as Exhibit Number 10, would you identify that Exhibit?



A Exhibit Number 10 is the same information for the two proposed injection wells located on the SEMU-Eumont Lease.

Q Also again, it gives the footage location in each case, does it not?

A Yes, sir, it does.

(Whereupon, Exhibit 8 marked for identification.)

Q (By Mr. Kellahin) Now, referring back to what has been marked as Exhibit Number 8, would you identify that Exhibit and discuss it, please?

A Exhibit Number 8 is a tabulation showing the casing pattern in Continental's SEMU Wells Numbers 52, 55, which are proposed to be injection wells.

(Whereupon, Exhibits 8-1 and 8-2 marked for identification)

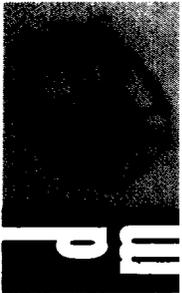
Q (By Mr. Kellahin) Referring to what has been marked as Exhibit 8-1 and 8-2 would you identify those Exhibits?

A Exhibit Numbers 8-1 and 8-2 are schematic representations of the information showing on Exhibit Number 8.

Q And the completion in these injection wells is substantially the same as those in the Hardy Unit, is that correct?

A Yes, sir, that is correct.

Q In your opinion, will the granting of this application both as to the Eumont-Hardy Unit and the SEMU-Eumont Lease result in the prevention of waste and protection of correlative



rights?

A Yes, sir. It is well recognized that secondary recovery operations under a unit will recover oil that would not otherwise be recovered and will protect correlative rights. The cooperative agreement under which the SEMU-Eumont Lease will be flooded in cooperation with the Eumont-Hardy Unit will permit the recovery of secondary oil under this tract in such a manner that correlative rights will be protected.

Q Were Exhibits 2 through 10 prepared by you or under your supervision?

A Yes, sir, they were.

MR. KELLAHIN: I would like to offer at this time Exhibits 2 through 10 exclusively.

(Whereupon, Exhibits 2 through 10 offered in evidence.)

MR. IRBY: I would like to object to the admission of the Exhibits until the identification is straightened out.

MR. KELLAHIN: I don't follow you, Mr. Irby.

MR. IRBY: The Exhibits submitted to the State Engineer, with the exception of two plats, all have two Exhibit numbers on them. The original number, I take it, was typed in and then these numbers have been replaced with red pencil and the numbers on the Exhibits submitted to the State Engineer do not correspond with the numbers put into the

record by the testimony.

MR. LYON: May I straighten that up?

MR. IRBY: If you will, please.

MR. LYON: There are two numbers on the Exhibits, the one in red using Roman numerals. These are the Exhibits referred to in the application. The other number which uses Arabic numbers are the Exhibit numbers which we have referred to in our testimony.

MR. IRBY: What's the purpose of the double numbering system?

MR. LYON: Well, one of the Exhibits, Exhibit 4, was not attached to the application and it may have been a matter of bad planning on my part, but because of the different sequence I used the different system of numbering.

MR. IRBY: Then the typed number is the number used in the testimony?

MR. LYON: Yes, sir.

MR. IRBY: Mr. Lyon, your first plat shows parts of Township 37 and 8 east 20 and 21 south, and the only Exhibit number I can find on it is a red Roman numeral II.

MR. KELLAHIN: That is also Exhibit 2.

MR. IRBY: It is referred to in the testimony as Exhibit 2?

MR. KELLAHIN: Correct.

MR. IRBY: Then the other plat --

MR. UTZ: As far as your Exhibit Roman numeral II and Exhibit 2 are both Exhibit 2, is that correct?

MR. LYON: Correct.

MR. UTZ: There shouldn't be any confusion there, then.

MR. IRBY: Then down toward the bottom you have another plat that shows apparently the same area, and is marked Exhibit I in Roman numeral red.

MR. KELLAHIN: That's the same as Exhibit Number 2.

MR. LYON: We filed two applications in this case and they were set up in a different manner than we filed them. Our second application covered the cooperative flood of the SEMU Eumont Lease and the plat that was attached to that is the plat that you have marked there as Exhibit 1.

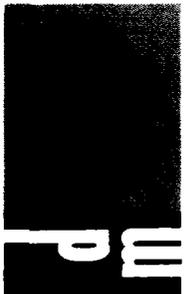
MR. KELLAHIN: They are both the same Exhibit.

MR. IRBY: They are identical?

MR. KELLAHIN: Yes, they were filed in two separate applications.

MR. IRBY: The one that you have filed with State Engineer as Exhibit 1 is referred to as what number in the testimony?

MR. LYON: It has been consolidated and it is the same exhibit, Exhibit 2.



MR. IRBY: It is Exhibit 2?

MR. LYON: Yes, sir.

MR. IRBY: I withdraw my objection to the admission of the Exhibits.

MR. UTZ: The Exhibits will be entered into the record.

(Whereupon, Exhibits 2 through 10 admitted in evidence.)

MR. KELLAHIN: That's all I have on direct examination.

#### CROSS EXAMINATION

BY MR. UTZ:

Q You stated that the source of water, at least some of the water or all that's available from the Cass-Penn Pool would be used for this flooding operation. What type of water is this?

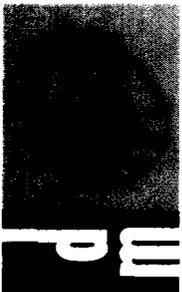
A The Cass-Penn Pool produced water as a brine.

Q What type of water will be used to supplement this?

A In case that there wouldn't be sufficient water, of Cass-Penn Pool water, why, then it's proposed to purchase water from, I believe, the E-M-E -- Is that correct?

MR. KELLAHIN: Yes.

A -- salt water disposal system, which is also a brine.



Q Now, the Exhibits 5 series, I believe if I recall, show injection through tubing and under a packer?

A Yes, sir. That is correct.

Q And you were a little vague as to whether this tubing would be lined or whether you would use coupons in your injection water.

A I feel certain that the brine will be treated for corrosion -- the injection water will be treated for corrosion with an inhibitor and as an additional protection, the injection lines and tubing will be coated with some sort of a protective coating.

Q Then your testimony now is that the tubing will be coated and the injection will be treated?

A Yes, sir, that is correct.

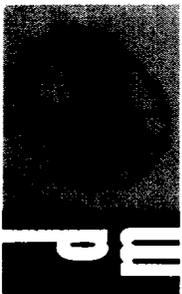
Q I presume you will use coupons as a matter of checking this injection water for corrosion?

A Yes, sir.

Q This little 160 acre unit just to the north of your Eumont-Hardy Unit, what do you choose to call that unit, SEMU Eumont Unit or what? I presume you are, in this application, requesting the approval of this waterflood unit as well as the Eumont-Hardy Unit?

MR. KELLAHIN: Yes, sir.

MR. LYON: It really isn't a unit. It's a part of a



unit. We just call it our SEMU Eumont Lease. I can't see why we can't continue to call it that.

MR. KELLAHIN: It is already unitized.

MR. UTZ: I realize that it is united with a lot of other acreage --

MR. KELLAHIN: Yes.

MR. UTZ: -- but the other acreage is not a waterflood --

MR. KELLAHIN: That's right.

MR. UTZ: -- a waterflood has to have a name for purposes of designation. What should we call it, the SEMU waterflood?

A I propose to call it the SEMU Eumont Lease waterflood.

MR. UTZ: I don't believe I have any further questions. Anyone else have any questions?

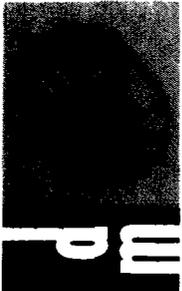
MR. IRBY: Yes. Frank Irby, State Engineer's Office.

#### CROSS EXAMINATION

BY MR. IRBY:

Q On your Exhibit Number 3, Mr. Boylan, the log has numbers preceded by a plus and minus starting at the top and going down the right-hand side, what do these numbers mean?

A These numbers are the subsea elevation which corresponds to the number written on the left side.



Q On your Exhibit -- I believe it's Number 5, the schematic drawings of the individual injection wells --

A Yes, sir.

Q -- your Well State "F" 1 Number 3, which is 5-11 --

A Yes.

Q -- on your surface casing it is set at 1318 feet with ten sacks of cement and you calculate the top to be at 1250. What prevents the water in the Ogallala from wasting into the lower formations?

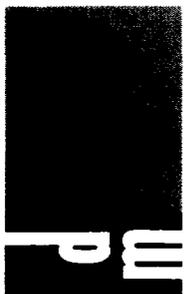
A What depth is the Ogallala at that point?

Q The base of it is variable. I would say from 250 to 350. It might possibly go to 400.

Q Well, the first restriction would be the ten sacks of cement around the base of the casing, and the second restriction would be that the pressure at the surface will be less than it would be at depth and so therefore, the water would not travel down the well bore against a pressure gradient.

Q What is the pressure at the bottom at that setting of that cement and what creates that pressure?

A I would estimate that the pressure at that point would be roughly the normal pressure gradient in the earth, or a generally accepted pressure gradient which is .43 pounds per square inch per foot of depth, which would, in this case,



be roughly 600 pounds pressure. The pressure in the Ogallala at 350 feet of depth would be estimated at roughly one-half of 350, or 175 pounds per square inch.

Q What is causing this pressure at 1250, just the natural --

A It's the normal hydrostatic gradient encountered in the formations as you penetrate the formations.

Q Is there any fluid or gas between the bottom of the Ogallala and the cement to hold this water up?

A I can't state for a fact but I would imagine that the casing was run by fluid in the hole and I would assume that there is some sort of fluid behind the casing. Probably mud that was in the hole when the casing was run.

Q Well, I would assume the same thing but I can't accept assumption. I can't accept your conclusion that there is hydrostatic pressure between the bottom of the Ogallala and 1250 feet on this well. I firmly believe that the Ogallala water is wasting through.

MR. KELLAHIN: I object to this, there's nothing in the record in the first place to even show there's any Ogallala water here, and Mr. Irby wants to testify, well, let's put him under oath and have him testify, but to assume and make a conclusion that Ogallalais being wasted in a well that was drilled some 30 years ago in conformance with the rules, then,

in effect, I think is objectionable. I object to it.

MR. IRBY: Very well. Then I will state an objection for the State Engineer, that we object to the casing program that now exists with respect to the surface casing on State "F" 1 Number 3, State "F" Number 4 and State "KM" 36 Number 1. I have no further questions.

MR. KELLAHIN: With reference to the objection that has been stated by the State Engineer --

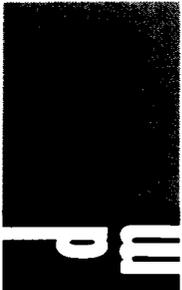
MR. UTZ: What Exhibit are you looking at?

MR. KELLAHIN: I'm not looking at an Exhibit.

MR. UTZ: You are looking at this brochure?

MR. KELLAHIN: Yes, which will show that the wells involved in the objection were drilled and have been producing since 1938 to 1940. No objections ever have been stated by the State Engineer heretofore, the objection does not go to the conversion of these wells to water injection at this time. It goes to a condition that existed and has existed throughout the life of the well, and to ask us to go in and recomplete these wells at this time without any evidence whatever that any leakage is occurring, or even that there is any Ogallala water present in this area, I think, is an unreasonable demand on the part of the State Engineer.

MR. IRBY: I might say, Mr. Kellahin, that these wells are within the Lea County Underground Water Basin



designated by the State Engineer, and the records in the office show that Ogallala water does exist in this area, and the law concerning waste of water has existed since long before these wells were drilled.

MR. KELLAHIN: I believe that the engineer is in error in saying this is within the Lea County Basin. The State "F" Wells, I am informed, are not within the area of the Lea County Underground Basin, which would certainly indicate that in the State Engineer's opinion, no Ogallala water is present.

MR. IRBY: What is the location of the "F" Wells? It doesn't indicate on the Exhibit 2 that I have anything except the numbers of the wells.

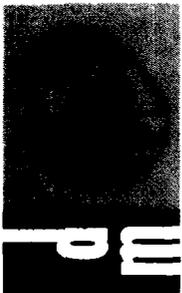
MR. KELLAHIN: Well, they're in a different range and it's outside the Township.

MR. IRBY: The diagramatic sketches do not give descriptions of the wells, they give these numbers that I quoted to you, and they don't correspond with the numbers on your Exhibit 2.

MR. UTZ: What were the numbers and names of the wells again?

MR. KELLAHIN: Here's a description of the well locations, all of them.

MR. IRBY: Well, thank you.



MR. KELLAHIN: I gave you one once.

MR. UTZ: What are the names and numbers of the wells again, Mr. Irby?

MR. IRBY: State "F" 1 Number 3 --

MR. UTZ: Number 3 and Number 4, and the other one was what?

MR. IRBY: "KM" 36 Number 1.

MR. UTZ: All right, we have the locations of those wells.

MR. IRBY: Admittedly.

MR. UTZ: In Section 31.

MR. IRBY: Now that I have the description, the "F" Wells are outside the Lea County Basin. The "KM" 36 Number 1 is inside the Lea County Basin.

MR. UTZ: Will this fact have any bearing on your objection?

MR. IRBY: I withdraw my objection to "F" 1 Number 3 and 4.

MR. KELLAHIN: That leaves us then only with the State "KM" 36.

MR. IRBY: Yes.

MR. KELLAHIN: I again submit there is no evidence in the record to show that either Ogallala water is present in this area or that leakage is occurring.



REXCROSS EXAMINATION

BY MR. UTZ:

Q Mr. Boylan, referring to Exhibit 5-15 where your eight and five-eighths casing is used as a surface casing set at 1733, and you calculate the top of the cement at 900 with 200 sacks, now, is that your calculation or was that taken from previous records, or did Continental drill this well to begin with?

A I can't answer for certain whether Continental drilled this well. John Kelly drilled the well. I can't answer whether this is a current calculation or whether it was calculated by the company which drilled the well. We will obtain this information and submit it to the Commission.

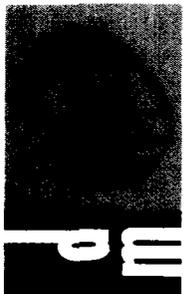
Q I presume that you also don't have any information as to whether the well was drilled with mud or not. We can assume that it was drilled with mud, that when they set the casing there would be mud behind the casing.

A I don't have that detailed information at this time.

Q Would you furnish the Commission with that information, too?

A Yes.

Q If the well was drilled with mud, since you are an engineer, can you state what the condition behind the pipe



would be under those circumstances?

A In my opinion the pipe was set in a hole filled with mud and was cemented around the bottom with 200 sacks of cement, and the annular surface between the surface casing and the formation is at the present time filled with mud.

Q The reason being that there would be no place else for the mud to go?

A That is correct.

Q And when they circulated the cement, the mud would flow out the surface and come back into the pits?

A That is correct. The mud would be displaced from the top of the hole.

Q So it's pretty safe to assume that the annulus, or outside the casing is mudded up above the cement drilling mud?

A Yes, sir, in my opinion.

Q Do you know whether there's any Ogallala water? Do your records show any Ogallala water in any quantities in this area?

A I do not have that information at this time.

MR. PORTER: You don't know whether there is any fresh water at all?

A No, sir.

Q (By Mr. Utz) Could you examine your company records and make a determination of whether you have had any water



problem in your drilling in this area?

A Yes, sir, I will.

Q If remedial work should be deemed necessary in this well, would the procedure be to perforate and squeeze the surface casing?

A No, sir. I would propose that if remedial work is necessary that they remove the well head and run a string of one inch pipe on the outside of the surface casing until they tag cement, and at that point inject cement until it's circulated to the surface.

Q If your annulus is full of mud, how are you going to get the one inch down?

A I assume that the one inch would penetrate the mud and tag the cement.

Q If you force the cement down there, what would happen to the mud?

A The mud would be forced out the top of the hole.

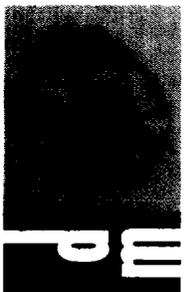
Q Probably pretty dry by now?

A It could very well be.

Q At any rate, due to the condition of the mud at the present time, it might be a pretty sorry cement job?

A That we would have to evaluate in the field.

MR. PORTER: Mr. Irby -- Excuse me, Mr. Examiner -- what would it take in the way of information to satisfy the



State Engineer that there's no leakage occurring or no danger of leakage? What information could they supply you with that would remove your objection?

MR. IRBY: I don't know how it could be supplied, Mr. Porter, without going down that annulus because it's my honest opinion that there is no hydrostatic pressure below the Ogallala formation until you pass through the red beds and the red beds have permeability in various sections, and it is also my opinion that the water in the Ogallala can penetrate this mud in the bore if it is there.

MR. PORTER: Your objection would still remain if it could be proven that the mud was behind the pipe?

MR. IRBY: Yes, sir. I would have to maintain my objection.

MR. PORTER: What if there is no water in there in the immediate area?

MR. IRBY: No water in the Ogallala at that particular point?

MR. PORTER: Right.

MR. IRBY: I would withdraw my objection, but this, admittedly, is on the fringe of the basin. Township 38 is only two or three miles wide, isn't it, this far south?

A I can't say.

MR. LYON: No, it's farther west than that. It's

a full township.

MR. IRBY: 38 is?

MR. LYON: Yes.

MR. IRBY: This is where we have the correction line?

MR. LYON: Yes.

MR. PORTER: Township 38, I think, is full that far south. Up north, I think it does have some partial sections along the State line. Township --

MR. IRBY: Off the record.

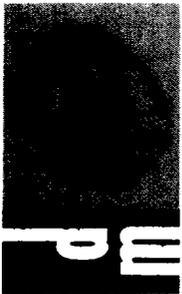
(Whereupon, a discussion was held off the record.)

MR. IRBY: I will do this, to help out on reconciling this problem; I will check any data we have on the wells in the northwest quarter of Section 36, 20 South, 37 East, I believe that's the location of that well, is it not?

MR. KELLAHIN: I believe it is.

MR. IRBY: And if we have any information on the base of the Ogallala or the geology underneath it, or the water contained in these formations, I will transmit to the Commission and to Mr. Kellahin. It's not my object to get my hand in Continental's pocket, but I want to be assured that this water isn't being wasted and there are things that clearly indicate to me that it might be.

MR. LYON: Mr. Irby, I would like to point out that this Exhibit 2 does designate the leases and has the well



numbers. I don't think that there's any information withheld on this Exhibit.

MR. IRBY: How do you mean? I think you will find out they are identified --

MR. UTZ: Just a minute. There's some discussion that can be handled outside the Hearing. We have a lot of cases and I am anxious to get through today. Unless you have something for the record, I would request that you carry on with your conversation at some other time and place.

Is there anything else in this case?

MR. IRBY: I have nothing more.

MR. KELLAHIN: Nothing.

MR. UTZ: The case will be taken under advisement and we will take a ten minute recess.

(Whereupon, the Hearing was recessed for ten minutes.)

dearnley-meier

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I N D E X

## WITNESSES

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J. P. BOYLAN

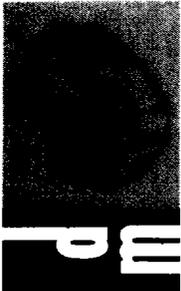
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E X H I B I T S

| EXHIBIT                  | MARKED FOR<br>IDENTIFICATION | OFFERED | ADMITTED |
|--------------------------|------------------------------|---------|----------|
| No. 1                    | 4                            | 9       | 10       |
| No. 1-1                  | 6                            | 9       | 10       |
| No. 1-2                  | 6                            | 9       | 10       |
| No. 2                    | 12                           | 26      | 29       |
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| No. 7                    | 20                           | 26      | 29       |
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| Nos. 8-1 & 8-2           | 25                           | 26      | 29       |
| No. 9                    | 24                           | 26      | 29       |
| No. 10                   | 24                           | 26      | 29       |

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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 said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand and Seal this 27th day of July, 1966.

*Ada Dearnley*  
NOTARY PUBLIC

My Commission Expires:

June 19, 1967.

I do hereby certify that the foregoing is a complete record of the proceedings in the Executive hearing of Case No. 3428 & 29 heard by me on July 19, 1966.

*[Signature]*  
Chairman  
New Mexico Oil Conservation Commission

