BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
January 27, 1965

EXAMINER HEARING

IN THE MATTER OF:

APPLICATION OF INTERNATIONAL OIL & GAS CORPORATION FOR EXPANSION OF A WATERFLOOD PROJECT, EDDY COUNTY, NEW MEXICO

Case No. 3194

BEFORE:

ELVIS A. UTZ

TRANSCRIPT OF HEARING

MR. UTZ: Case Number 3194.

MR. DURRETT: Application of International Oil & Gas Corporation for expansion of a waterflood project, Eddy County, New Mexico.

MR. LOSEE: Mr. Examiner, A. J. Losee appearing on behalf of International Oil & Gas Corporation. I have one witness, Mr. Appledorn.

MR. UTZ: Are there other appearances in Case Number 3194? ... You may proceed.

MR. DURRETT: Let the record show that Mr. Appledorn was sworn in the previous case.

DIRECT EXAMINATION

BY MR. LOSEE:

Q State your name, please.

A Conrad Appledorn.

Q You are the production superintendent for International Oil & Gas Corporation in Artesia?

A Yes.

Q Have you previously testified before the Oil Conservation Commission?

A Yes, sir.

MR. LOSEE: Are the witness's qualifications acceptable, Mr. Examiner?

MR. UTZ: Yes, sir.

MR. LOSEE: Mr. Appledorn, are you familiar with the present waterflood of International on its McCallister lease and with the proposed plans for expansion?

A Yes.

Q Will you please refer to and explain Exhibit 1.

A Exhibit 1 is the map of the proposed High Lonesome Penrose unit, and shown on the map are the one injection well now in the unit area, the proposed pattern for expansion and the existing injection wells on the adjoining leases.

Q Is it not true that the Commission on March 27, 1963 in its Order Number 2458 in Case Number 2776 approved the conversion of this McCallister Well Number 4 to injection well?

A Yes.

Q And since shortly after that approval you have been injecting water into that well?

A Yes, the well was converted in October 1963.

Q Will you give a brief description of the existing waterflood operation in the area.

A If you would please refer to Exhibit 1, the waterflood operation on General Western's lease, which is to the west of the proposed unit, was first secondary recovery operation in the High Lonesome Penrose pool. It was installed in 1957 as a capacity-type flood after hearing before the Oil Conservation Commission. A total of eight wells have been drilled as inject-

ion wells and that gives a modified dual line drive--actually it's a line of five spots down the center of their leases, extending east and west along the High Lonesome pay development. One of these was Lease Line Well Number 11W on the line between International's McCallister lease and General Western's Davis lease. In 1963 about the same time International converted its Number 4 well, General American converted its Brewster Number 27 offsetting the Number 4 well. International and General American have a cooperative injection agreement providing for a peripheral pattern around the leases. They were converted, the Number 4 and Number 27, to injection in the first phase of the work. General American since converted their Number 21 to injection in the northwestern corner of our Brewer lease and expanded on a peripheral pattern to the east.

Q Have these floods responded to injection?

A All have to some degree. The General American wells have responded well, showing marked production increases--they have had up to 200 barrels a day. General Western's response has been less spectacular but the lease has produced some oil. International Well Number 1 responded to injection in December 1963 and some response has also been shown by our Well Number 2 in the southwest quarter of the northeast quarter. This increase is apparent in Exhibit 2, which is the performance curve for the High Lonesome Penrose unit. The expansion or

the increase is noted in December and January of 1963 and 1964. Our injection rate has been limited in Well Number 4, averaging about 100 barrels of water per day and we expect a greater response when we close the pattern.

Q Are the wells on your McCallister lease that have not responded to injection in their advanced or stripper state of depletion?

A Yes. The wells vary from one-half barrel a day to six barrels a day at the present time.

Q Six is the maximum daily production from any well, then?

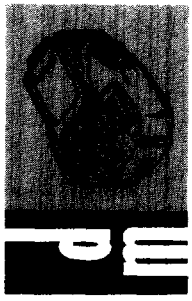
A Yes, at this time.

Q Will you please refer to what has been marked Exhibit 3, and explain it.

A Exhibit 3 is the structure map on top of the Penrose. It shows contours on a 25-foot contour interval. The structure is homoclinal--it has a southeast at about 75 feet per mile.

Q Please refer to what has been marked Exhibit 4 and explain it.

A That is an isopach map of the net pay in the Penrose. It indicates a marked east-west trend of the pay and the stratographic nature of the pay zone. It is a rather narrow, elongated development. With the well spacing we have we feel that a peripheral pattern is desirable because of this type of



pay development.

Q Please refer to Exhibits 5a and 5b, which are logs of two of the injection wells, and explain what those logs reflect, if you will.

A These exhibits, 5a and 5b, are logs of our proposed injection wells Number 3 and 6. We have no log on the Number 5--the pay and completion in Number 5 is similar in all respects to those in the Number 3 and 6. If you will note, casing is set directly above the top of the Penrose, and the injection will be into open hole below the casing into permeable and porous zones in the top of the Penrose sand. This sand is at the base of the Queen formation.

Q In your opinion is channeling possible in the open hole above and below the Penrose?

A I don't believe so. The exposed zones above the pay are tight and no loss of water to thief zones is expected. The wells do not penetrate the entire Penrose section, and the Penrose is also underlain by dense Grayburg dolomite, so water loss, we believe, would be restricted...we have experienced no difficulty in fifteen months of injection.

Q Are there fresh water zones in this area?

A Yes. The fresh water is more brackish than fresh. It is found at intervals of 280 to 320 feet.

Q Will this interval be protected in your injection

wells?

A Yes, in all injection wells surface casing is set below the lowest fresh water sand that has been encountered, and it is cemented.

Q And the cement extends through the fresh water zone?

A Yes.

Q What type of injection well equipment do you propose to use.

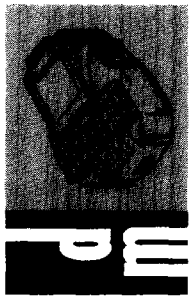
A If you will refer to Exhibits 6A, B and C, we have a diagram of the type of equipment we propose. In wells Number 3 and 5 we propose to inject down the casing. The casing in this case is new; it is $4\frac{1}{2}$-inch OD--$5\frac{1}{2}$-inch OD in the Number 3 well. We expect no difficulty. In the Number 6, however, it has a used casing and a 6-inch OD casing was set, and we propose to inject down the tubing below a packer.

Q Please refer to what has been marked Exhibit 7, and explain what it portrays.

A Exhibit 7 is a description of the casing and cement, the completion date and the total depth of the proposed injection wells.

Q On Wells 3 and 5 that you propose to inject down the casing, will you test the wells before converting them?

A Yes, we propose to test the casing at 2,000 PSI before we convert.



Q On these two wells will you conduct any further tests?

A In the event that we get an indication that our seal has failed, or the casing has failed, we will test the casing at any time.

Q What water sources do you intend to use?

A We are at this time using brackish water furnished by a commercial water company.

Q Are you going to go on using that water?

A Yes, we will continue to use this.

Q Will produced water be re-injected?

A At such time as the volume produced becomes sufficient to support a split system, we will begin to inject produced water. At this time we have analyses indicating we will have some difficulty in commingling our water sources with produced water. We will continue to study, and if we can we will use a single system with produced and fresh water.

Q Earlier you pointed out the flood of General Western. Are they operating to capacity allowable?

A Yes, they are operating under the capacity production rule.

Q Are any of their wells at this time exceeding the allowable specified by Rule 701?

A No producing well under the present allowable.

Q At this time do you feel that International requires a buffer zone treatment.

A No. We are requesting approval under 701e. Our total allowable under that rule will be 308 BPD, which we feel under present conditions will be sufficient. We should like, however, to reserve the right to request a re-hearing before this Commission if changes occur that would make a buffer zone allowable necessary in order to protect correlative rights.

Q What has been the cumulative production of this project area?

A The project area has a cumulative production of 198,000 barrels.

Q As of what date?

A One-one-sixty-five.

Q What ratio do you estimate will be recovered by secondary operation?

A Estimating a 1-1 ratio, based on the history of similar Queen floods in the area, those floods operate up to 1.2, I believe, primary to secondary ratio.

Q Will this waterflood project prevent waste and protect correlative rights?

A Yes. In our opinion we will recover a considerable amount of oil whick would otherwise not be recovered under primary operation.

Q How long do you estimate it will require International to complete this project?

A We are looking at a life in this flood of five years to six years, at this time.

MR. LOSEE: No further questions.

MR. UTZ: What date did you say you put McCallister Number 4 under injection?

A October 1963.

Q You got some response in December 1963?

A Yes.

Q How much water did you inject?

A At that time, about 100 to 110 barrels a day, and a total injection of probably 10,000 barrels.

Q Referring to your exhibits 6A, B and C, are all of these wells cased with the casing set at the top of the Penrose?

A Number 5 is cased to total depth and it is perforated --it is selectively perforated.

Q How old is the casing in these wells?

A The Number 5 and 6 were completed in 1956, March and June respectively. The McCallister Number 3 was completed in October 1959.

Q Was it new casing?

A Yes, in the Numbers 3 and 5. The Number 6 was sec-

ond-hand casing.

Q Have you tested these casings or wells as yet?

A Not yet. We will test at the time we convert to injection.

Q Do you intend to test the casing on the Number 6 well?

A We hadn't intended to, because we intended to run tubing with a tension packer and set the tension packer just above 6.

Q What type of tubing do you intend to use?

A 2-3/8 OD external upset casing, EUE 4.7 JT 55 tubing, sir.

Q And this will be uncoated tubing?

A Because of the condition of the water we have to treat for both corrosion and bacteria, and it will be treated to inhibit corrosion.

Q That's the next question I was going to ask--about the brackish water. But you're going to treat it?

A Yes, we're making provisions now.

Q Where are you obtaining the brackish water?

A Caprock Water Company. It's an alluvial water from the East Red Lake area of Eddy County. It's approximately three miles south and about six miles west of the High Lonesome.

Q In the event your casing on the Number 3 and Number 5 doesn't stand the test, what are your intentions at that time?

A To run tubing with a tension packer.

Q Did you state that all surface casing was circulated?

A No, these holes were drilled with cable tools and the--it was cemented with 50 sacks--Number 3 and Number 5 with 75 sacks of cement, with varying returns.

Q What is behind the casing, if anything, above the cement returns or cement tops shown on Exhibits 6A, B and C?

A Mostly sand and shale, with some limestone strata.

Q Is there any fresh water?

A No, none that we know of, above the tops of the cement. There were no fresh water zones indicated at the time the wells were drilled.

Q They were all drilled with cable tools?

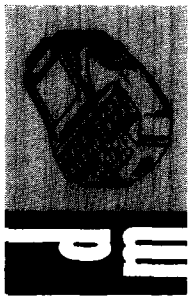
A Yes.

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

MR. IRBY: Frank Irby, State Engineer's Office. Mr. Appledorn, what is going to be your injection pressure?

A We are anticipating injection pressure of 1200 to 1250 pounds. At this time we are limiting our pressure in the Number 4.

Q If this injection pressure approaches your 2,000 pound test do you intend to run a new test to determine that the



casing will withstand the new pressure?

A Yes, if our injection pressure ever did rise that high. However, the nature of the Penrose in this area practically limits us to a maximum of 1500 pounds injection pressure. We chose the 2,000 figure because it's well above any anticipated injection pressure in the future.

Q You have said that your water is being treated or will be treated. Is this water that is being injected into Number 4 treated now?

A We are making provisions now to install treating. The corrosion rate has not been severe up to the present. It's a long-term thing, though, and we are installing within--within the next three weeks we will have corrosion and bacteria inhibition installed.

Q What kind of test do you plan to determine the effectiveness of the water treatment?

A We have coupons, standard corrosion treatment, and also visual inspection of the equipment.

Q The surface equipment?

A Yes.

Q Now, you spoke of the compatibility of the commercial water which is being furnished you, and the produced water which you will be producing eventually. I assume you are possibly producing some water now?

A At the present time our produced water rate is running from 11 to 12 barrels a day.

Q Is this being re-injected?

A No, it isn't enough to support an injection system. In fact, we're putting it to the pit.

Q Will your treatment of the water have to be changed when you start re-injecting produced water?

A Well, if we go separate systems, they would have to have separate treating systems, because the purchased water has oxygen, and that has to be taken into consideration. The produced water will not have any oxygen--we will have to use a different program if we mix the water. That will take special tests, and we will go to the corrosion inhibition program that is called for.

Q When this occurs will you see that the State Engineer and the Oil Commission are both notified?

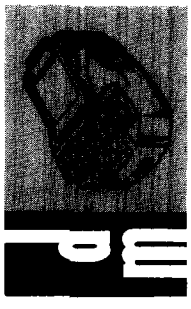
A Yes, sir.

Q How did you determine the tops of the cement on these various strings of casing in the three wells?

A That is calculated, based on experience in the area. We have a temperature survey on one well also--the Number 5 well.

Q A temperature on 5? Is that on both strings?

A No, only on the one string.



Q Which string?

A On the producing string.

Q I think we have most of the information on this casing program, but there's one thing which I don't know whether to say confuses me or amuses me. You referred to the casing as new. Surely you meant when installed--you wouldn't call 1956 casings new today?

A No--certainly not.

MR. UTZ: Are there any other questions?

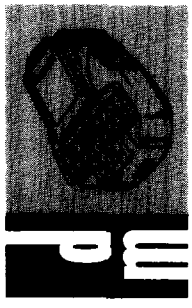
MR. LOSEE: I have one question. Were Exhibits 1 through 7 prepared by you or under your supervision?

A Yes.

MR. LOSEE: We offer Exhibits 1 through 7 in evidence.

MR. UTZ: Exhibits 1 through 7 will be entered into the records of this case. Are there any other statements in this case? ... The case will be taken under advisement.

* * *



STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ELIZABETH K. HALE, Notary Public and Court Reporter, do hereby certify that the foregoing and attached transcript of hearing in Case Number 3194 was reported by me in shorthand 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 of office this 8th day of January, 1965.

Elizabeth K. Hale
Notary Public

My commission expires
May 23, 1968.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3194, heard by me on 1-27, 1965.

New Mexico Oil Conservation Commission, Examiner