BEFORE THE
OIL CONSERVATION COMMISSION
HOBBS, NEW MEXICO
August 28, 1957

IN THE MATTER OF
CASE NO. 1300

TRANSCRIPT OF PROCEEDINGS

DEARNLEY - MEIER & ASSOCIATES
INCORPORATED
GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
3-6691 5-9546

C O P Y C O P Y C O P Y

Before Daniel S. Nutter,
Examiner

NEW MEXICO OIL CONSERVATION COMMISSION
OIL CONSERVATION COMMISSION
Hobbs, New Mexico

REGISTER

HEARING DATE AUGUST 28, 1957 TIME: 1:00 P.M.

NAME:	REPRESENTING:	LOCATION:
James I. Wright	State Engineer	Roswell, N. M.
H. Bernard	Sinclair	
Jack M. Campbell	Gen. Am. Oil Co. of Tex.	"
R. F. Miller	" " " " " "	Artesia, N. M.
N. W. Krouskop	" " " " " "	Dallas, Texas
S. B. Christy	Hervey Dow & Hinkle for Humble	Roswell, N. M.
Guy A. Swartz	Gulf Oil Corp.	Roswell, N. M.
W. V. Kastler	Gulf Oil Corporation	Roswell, N. M.
J. Don Walker	Gulf Oil Corporation	Fort Worth, Texas
R. N. Miller	Tidewater Oil Co.	Hobbs, N. M.
H. E. Wanat	Tidewater Oil Co.	Midland, Texas
E. V. Boynton	Continental Oil Co.	Hobbs, N. M.
E. J. Fischer	O C C	Hobbs
J. W. Runyan	O C C	Hobbs
J. A. Moore	Continental Oil Co.	Roswell
Leo S. Cichowicj	Continental Oil Co.	"

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IN THE MATTER OF:

Application of General American Oil Company of Texas for permission to institute a pilot water flood program in the Grayburg-Jackson Pool in Eddy County, New Mexico, and for the establishment of an allowable formula for all wells involved in said project. Applicant, in the above-styled cause, seeks an order authorizing the injection of water into the Grayburg-Jackson Pool through five wells presently producing from said pool in Sections 18 and 19, Township 17, South, Range 30 East, Eddy County, New Mexico, the input volume not to exceed 400 barrels of water per day into each intake well. Applicant further requests the establishment of an allowable formula for all wells involved in the subject water flood project to permit the operation of the project at its maximum efficienty. The area covered by the subject application is presently included in the Grayburg Cooperative and Unit Area gas injection project authorized by Commission Orders No. 659 and No. 802.

CASE NO. 1300

BEFORE:

Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

MR. NUTTER: The hearing will come to order, please. First case on the Docket this afternoon will be Case No. 1300.

MR. COOLEY: Case No. 1300. Application of General American Oil Company of Texas for permission to institute a pilot water flood program in the Grayburg-Jackson Pool in Eddy County, New Mexico, and for the establishment of an allowable formula for all wells involved in said project.

MR. CAMPBELL: Mr. Examiner, I am Jack M. Campbell of Roswell, New Mexico, appearing on behalf of the applicant, General American Oil Company of Texas. I have one witness, Mr. Krouskop, who I would like to be sworn in.

N. W. KROUSKOP

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

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A N. W. Krouskop.

Q Where do you live, Mr. Krouskop?

A Dallas, Texas.

Q By whom are you employed?

A General American Oil Company of Texas.

Q In what capacity? A Secondary Recovery Engineer.

Q Have you testified before the New Mexico Oil Conservation Commission previously in your professional capacity as an engineer?

A As an engineer, yes.

Q Have you previously testified before the Commission in connection with any secondary recovery project? A No, sir.

Q Will you briefly state to the Examiner what experience you have had with your company relative to the engineering work, or operation of secondary recovery projects? Not necessarily in New Mexico, wherever they maybe?

A Well, for the past two years I have been General American Oil Company's Secondary Recovery Engineer, and prior to that time, for about one year, I was their division engineer in Tulsa, and we had some fifteen floods that we took care of up in that area.

Q And you have been responsible for the establishment and operation generally, in the engineering sense, of those secondary recovery projects which you refer?

A Not necessarily the establishment of all of them, but directly responsible for the operation.

Q In your capacity as an engineer in charge of secondary recovery engineering for the company, are you generally acquainted with the application of General American Oil Company of Texas, Case No. 1300, involving proposed pilot water flood project in the Grayburg-Jackson -- in the Grayburg Cooperation and Unit Area in Eddy County, New Mexico? A Yes, I am.

Q Is the proposed pilot water flood situated within the boundaries of the Grayburg Cooperative and Unit Area? A Yes.

Q Who is the operator of that unit at this time?

A The General American Oil Company.

Q Who is the owner of all the leases within the unit area?

A General American Oil Company.

Q I have handed you there a copy of the original application of General American Oil Company of Texas in this case, and ask you to refer to Exhibit one in that application, or to a copy, if you have one there with you, and you will you state, Mr. Krouskop, what

that is?

A That's a plat of the Grayburg Cooperative and Unit Area. On the plat we have outlined a first phase pilot flood area and also we've shown an outline of the possible boundaries that the flood might be expanded too within the area, and also a possible flood plan that the proposed pilot flood could be expanded on, or pattern that --

Q (Interrupting) I note there some hatch marked lines appearing on the plat outside the boundaries indicated by the red lines, what does that show?

A Well, the boundaries of the Grayburg Cooperative and Unit Area are shown with the hatched lines, the blue hatched lines and the possible limits of the water flood operation are outlined in red, and of course, our pilot phase, initial pilot as proposed, is cross-hatched in blue, the area.

Q Was that plat prepared by you or under your supervision, Mr. Krouskop? A Yes.

MR. CAMPBELL: I would like to offer that as Applicant's Exhibit One.

MR. NUTTER: Exhibit One?

MR. CAMPBELL: It is a part of the application, and I assume maybe already it is a part of the record in the case.

MR. NUTTER: Without objection, the plat submitted by General American Oil Company will be entered as Exhibit One in this case.

Q Mr. Krouskop, has any portion of the area shown on Exhibit

One heretofore been a part of any gas injection?

A Yes, there was a gas injection program carried on here for a period of nine years. From 1944 to 1953.

Q Referring to Exhibit No. One, will you state which wells you would intend to use as input wells in the event this application for a pilot flood program were approved?

A All of the wells are located on the Burch A Lease, and we would propose to use Burch A No. 8, 9, 23, and 24 for input service on a five spot pattern, and also in addition to that, we would like to use Burch No. 14 A as an input well to check for channeling effects during this gas injection program. We noted channeling from Burch 14A to Burch 7A, immediately south of it, and we feel that if we are going to incur any channeling in the flood project, that probably it will show up here. We would like to see what is going to happen and evaluate it before making any plans to expand the flood, that's the reason the Burch 14A conversion.

Q From what formations are these proposed input wells producing at the present time?

A They are now producing from the zone locally called the Grayburg-Jackson zone of the San Andres Formation. This zone occurs throughout an interval of approximately 120 feet below the Lovington Sand marker, known locally there to be from 120 feet to 375 feet below that marker.

Q Do you have logs on all the proposed input wells to which you have referred? A Yes.

Q I refer you again to the application in this case, to which were attached Exhibits 2A, B, C, D, and E, and ask you to state what those are?

A Well, these are the complete well records as submitted to the United States Government on the United States Government Form, just a complete record of each well.

Q Those logs reflect the completion data and the casing record as to each of these proposed input wells?

A Proposed input wells, yes, sir.

Q I would like to offer into evidence Applicant's Exhibit 2A, B, C, D, and E, which the witness has testified are the logs of the five proposed input wells.

MR. NUTTER: Without objection, Exhibits 2A, through 2E, will be received in evidence.

Q (By Mr. Campbell) Mr. Krouskop, with regard to the wells that you have testified are to be the input wells for the pilot program, are there any of those wells on which any special work would be involved in order to render it satisfactory for this program insofar as formation protecting is concerned?

A Yes, there is. We, of course, propose to confine our water to the Grayburg-Jackson zone only, and the wells, the Burch A 23 and 24, proposed input wells, were drilled later in the stage of depletion. This pool pressure was good, and we encountered a few slight shows in the Grayburg Sand immediately overlying the San Andres Formation, and the casing was set high in those wells, so we

recovered all we could out of that, but the wells are in a condition that we can set Formation and Kerr type packers and isolate the lower zones in which we hope to confine our injections at this time.

Q And you do propose to set some sort of formation packer before using these wells as input wells, is that correct?

A That is correct, and we feel that they will be adequate in that we should be able to inject water on a vacuum here, and would not be bothered with any great differential pressure.

Q Referring you again to the application, I'll ask you to notice the diagrammatic sketch attached to that application marked Exhibit No. 3, will you state what that represents?

A That is a diagram of a Formation and Kerr type packer, on the order of which we propose to use to isolate the Grayburg-Jackson from the open hole formation above it. It would be run on the tubing, of course.

Q Would you, after the setting of that packer, consider it will be necessary to conduct any tests to make certain there are no leakages involved?

A We intend to check it, yes.

MR. CAMPBELL: I would like to offer in evidence Applicant's Exhibit No. 3.

MR. NUTTER: Without objection, Applicant's Exhibit No. 3 will be received.

Q (By Mr. Campbell) Mr. Krouskop, what will be the present source of water for the proposed water flood pilot program?

A We've re-entered an old depot formerly known as the Gulf-Grayburg Unit No. 1, located in the Southwest Quarter of the Southwest Quarter of Section 24, Township 17 South, Range 29 East, NMPM. A Pennsylvanian limestone aquifer was perforated from 9265 to 9299, and have tested this zone at the rate of about 1800 barrels a day, and in addition to this supply, we are currently producing about four to five hundred barrels a day from shallower zones in the area which we propose to use, giving us a total of 23 to 24 hundred barrels a day, which will be sufficient to start the flood.

Q Do you have any comments with reference to the amount of water that might be injected into the reservoir as a part of the pilot program?

A Yes, we do. Our pilot area, the five spot pilot area, embraces an area of about 50 acres, and to get any reasonable, to get a fill-up in any reasonable time, why we would like to inject all available water that we have now, and possibly in the future, any additional water that may become available. In other words, the five wells right now would amount to about 500 barrels per day.

Q I note that your application contains a statement that you do not expect the input volume to exceed 400 barrels of water per day into each intake well. Do you feel that may not give you the flexibility that you need?

A I would not want to say. If it is restricted to just 400 barrels a day per well, we may not even be able to get that in some of the wells, but to get a fillup, even in five hundred barrels a day,

theoretically, probably it would take us between a year and a half to two years to get any effect, and to cut it back to 400, why it is just that much longer. We would not like to be limited to that 400 barrels.

MR. CAMPBELL: If the Examiner please, when this application was prepared, I was of the impression that the available water would not exceed that amount, and put that restriction in there. I would like to request that the record show that I have asked to amend the application to delete the clause with reference to the statement "but would not ~~exten~~exceed 400 barrels of water per day into each intake well," if there is no objection.

MR. COOLEY: Mr. Campbell, the case was advertised as the application appears, and you will note that in the body of the ad, it is identical to that appearing on the Docket, the portion there in the middle, that the input volume would not exceed 400 barrels of water per day, do you feel that is a jurisdiction of limitation?

MR. CAMPBELL: I respectfully disagree on the jurisdiction of limitation, I think the notice is ample notice, and that the question of whether it is 400 barrels of water per day is not a judicial matter. It would simply require, in the event that they had that available water and intended to inject it into the well, it would require coming before the Commission again and asking in a formal hearing that it be deleted. If anybody here has any objection to it, I could see your basis for it, but I don't think that affects the validity of the order in any degree.

MR. NUTTER: Is there a possibility that anyone that is not here might have objection to an unlimited amount of water, whereas they didn't have any objection to 400 barrels a day, who are not here?

Q (Interrupting) Well, if that is the Commission's position, we'll just have to make a new application. I didn't prepare the notices I think that was entirely unnecessary to the notice of hearing. The Commission does the preparation of the notice, and publication of the notice is the Commission's responsibility.

MR. COOLEY: Does not that accurately reflect the application.

MR. CAMPBELL: No question about that, but I ask that it be amended in view of the testimony of the witness. There is a lot of things that might not be in the notice of evidentiary matters. It is your position then, that the Commission could not issue an order, Mr. Cooley? It is your position that the Commission could not issue an order based upon the testimony here that they not limit the amount of water that could be injected into the resevoir to 400 barrels per day?

MR. COOLEY: My position is that we would not be authorized to issue an order authorizing more than 400 barrels.

MR. NUTTER: I think that any order of the Commission would have to be limited to the amount that was advertised.

MR. CAMPBELL: If the order is issued, and the amount is available which needs to be injected and the amount is in excess of 400 barrels a day, we'll simply file a request for an amendment of the original order establishing that.

MR. NUTTER: Yes, sir.

Q (By Mr. Campbell) Mr. Krouskop, in your opinion, can this proposed pilot water flood program be effected without waste and with the protection of correlative rights of the owners in the area?

A Yes, it can.

Q Have you notified the owners of the property within one half a mile of the proposed input wells as required by the rules?

A Yes.

Q Do you believe that this proposed pilot program could result in recovery wells which might not otherwise be recovered from this reservoir? A Yes.

Q Mr. Krouskop, what will be the approximate cost of the initial pilot program here?

A The overall cost of the development of the water supply and conditioning the property to flood will fall between sixty and seventy thousand dollars.

Q What do you propose at this time with regard to allowable production insofar as this pilot water flood program is concerned?

A I believe that the existing proration order covering our Cooperative and Unit Area, Order No. 802, could be modified insofar as the Burch A Lease is concerned to allow us to take the restriction as to what any one well could produce, or would give us the flexibility we would need in an operation of this type. I probably haven't put that too clearly.

MR. CAMPBELL: If the Commission, please, if I may make a

statement about this allowable situation in this area. A number of years ago, as a matter of fact, 1948, the Commission, in connection with this particular area, set up **proration units** that contain acreage considerably in excess of the normal proration unit due to the approval and the installation of a five spot program of development of the area, that was Commission Order No. 802. The Commission Order, as I understand it, provided that the operator could produce not in excess of the total number of developed 40-acre tracts in any particular described unit, of which this area was one of those units, and designated as Proration Unit G-1 in the Order, and still carried as such in the proration schedule, and that no well in any of these units could produce in excess of a single top unit allowable. It is our request that for the purpose of this pilot water flood project, which will affect wells within the area referred to as the Unit G-1 under that Order 802, and in the proration schedule for Eddy County, be retained in effect, except that for the purpose of this water flood project, a small well will not be limited to a single top unit allowable, so that the cumulative allowable for the developed units would not be increased, but the limit for a single top unit allowable well for the purpose of the water flood project would be removed.

Q (By Mr. Campbell) Do you think, Mr. Krouskop, that such a proposition would give the flexibility that you say is required in connection with the investment for this pilot program that you are speaking of? A Yes, I believe so.

MR. CAMPBELL: Have I made myself clear, Mr. Examiner, or what

we're seeking?

MR. NUTTER: I think so.

MR. CAMPBELL: I just have a couple of more questions.

Q (By Mr. Campbell) Mr. Krouskop, is the United States of America the only basic royalty owner in this entire area?

A Yes, sir.

Q Has this plan been presented to the USGS for it's consideration?

A Yes, it has.

Q Referring again to the application, I direct your attention to what is attached thereto and marked Exhibit Four and ask you to state what that is?

A This was a request for approval of the proposed pilot project to the United States Geological Survey Office in Roswell, New Mexico.

Q Mr. Krouskop, I now hand you what has been identified as Applicant's Exhibit No. 5 and ask you to state what that is?

A This supersedes the previous request, Exhibit No. 4, and is a request for approval of the pilot project, and also requesting the USGS -- or the governments attitude as to whether the pattern for the expanded flood would be acceptable to them in case we expanded the flood, and it also goes into a little more detail as to just what our overall plans were.

Q Mr. Krouskop, you are not asking the New Mexico Oil Conservation Commission to take any position with regard to expansion of the program, but only as to the pilot water flood, are you not?

A That is correct, at this time, yes.

Q Have you formally discussed with the United States Geological Survey the proposal as to the pilot water flood program?

A Yes.

Q Have they expressed any objection to the proposed application or the installation of the pilot program? A No.

Q I would like to offer in evidence Applicant's Exhibits Nos. 4 and 5.

MR. NUTTER: Without objection, Exhibits 4 and 5 will be received.

Q Mr. Krouskop, do you have any present estimate as to the approximate length of time involved before any result of this water injection might be observed?

A On our limestone reservoir, such as this, it is a little difficult to predict when we might expect some results. However, based on withdrawls from the area and the rate of water available for injection, why, we might possibly expect some effects from the flood in from one and a half to two years.

Q If satisfactory results are observed insofar as the pilot program is concerned, I assume that you would then come before the Commission again to seek extension of the authority for water injections into the reservoir, is that correct?

A That is correct.

Q Do you have anything further you would like to add before the Commission with regard to this proposal? A No.

MR. CAMPBELL: That's all I have at this time.

MR. NUTTER: Anyone have any questions of the witness?

MR. RUNYAN: I have a question.

MR. NUTTER: Mr. Runyan.

CROSS EXAMINATION

BY MR. RUNYAN:

Q Mr. Krouskop, I believe you mentioned that you will obtain your water from the Pennsylvanian and Shallower Zones. Will you clarify which are the shallower zones?

A By the shallower zones, I meant to say water being produced with oil from smaller zones. We have a zone called the Grayburg-Keely on the west end of this area.

Q It wouldn't be a part of a water zone? In other words, it wouldn't be a pilot water zone.

A No, this are produced zones within the unit area here, the Grayburg-Kelly and Grayburg-Paddock.

MR. NUTTER: Do you have anything further, Mr. Runyan?

MR. RUNYAN: No, that is all.

MR. NUTTER: Anyone else have any questions? Mr. Fischer.

QUESTIONS BY MR. FISCHER:

Q Mr. Krouskop, could you tell us possibly where you intend to set this formation packer in these wells, two of these wells in the Bentonite zone? A What log are you referring to?

Q There is a log here on Well No. 8, and Well No. 9, they both have Bentonite, showing there from 2800 feet.

A We intend to set the packer roughly about 100 feet below the Lovington Sands. I don't know whether your familiar with that general area, but the Lovington Sand comes in about, occurs about, oh, from 100 to 120 feet below the top of the San Andres, and --

Q (Interrupting) Well, I am not familiar with it, but what I want to know is will it be below that Bentonite zone?

A Well No. eight?

Q Or nine.

MR. CAMPBELL: I believe the witness testified that wells No. 23 and 24 were the only ones they intended to use a formation packer on.

MR. FISCHER: That will answer the question then if you have shown to be wells No. 23 and 24.

A I'll tell you, these are old drillers logs, which were drilled back in 1936.

Q (By Mr. Fischer) Do you have cement circulated on the surface pipe?

A No, but I think it is common practice to use a hundred to one hundred fifty sacks.

MR. FISCHER: That's all I have.

QUESTIONS BY MR. NUTTER:

Q Mr. Krouskop, I think you stated that the Lovington Sand occurs 2000 feet below the top of the San Andres or above?

A No, below the top of the San Andres, it's --

Q (Interrupting) I was thinking of the Grayburg-Jackson zone.

How far from the Grayburg-Jackson zone is the zone?

A We figured that our first standing in the Grayburg-Jackson zone is usually picked up about 120 below the Lovington Sand. It has been the practice to drill 120 feet below the Lovington Sand through a few Bentonite streaks, and most of the recent wells have been completed in that manner.

MR. NUTTER: That is all.

MR. COOLEY: This maybe more properly answered by Mr. Campbell, since he explained it. Will you please tell me what the cumulative limit would be, as you understand it, as established by Order 802?

MR. CAMPBELL: My understanding is that -- we were unable to obtain a copy of Order 802 from either the office here or from the engineering office, and I didn't have one with me, but it is my understanding that Order 802 actually describes certain proration units within this five spot area by meets and bounds, and that the area encompassed in the blue lines, which is the area affected by the proposed project, it coextensive with proration unit No. G-1, under Order R-802. That proration unit has fifteen developed 40-acre tracts as shown on this months proration schedule in Eddy County. I would refer you -- so that this will be in the record -- to page 16 of the September Eddy County Allowable Schedule, which reflects that proration unit No. G-1, has fifteen forty acre allowables.

Now, the order further provides that will be the maximum oil that can be produced from the unit, and that no well in the unit will produce in excess of a single top unit allowable. The reason

for that, of course, was that there was five spots created in two wells in a 40-acre tract, and that was the formula that was worked out to permit the allocation of the allowables to that particular unit. There are other units in this area described otherwise in the schedule.

This project affects only proration unit G-1, and so far as the present application is concerned, all we seek is not an increase in that unit allowable, but a removal of the restriction on a single well producing in excess of one top unit allowable, because the effected producing well here, from these four water injection wells, obviously cannot operate this project on a limitation of a single top unit allowable, so the order here, if it were issued, would either have to make reference to Order 802 or set out the description of proration Unit G-1 as contained in that order and state the limitation on the allowable insofar as that unit is concerned, and leave the rest of them as they are.

MR. COOLEY: Now then, if I understand your proposal, the No. 4 well would be the producing well in the five spot, and the No. 7 well would be for channeling. Between the two of them, could they produce fifteen allowables?

MR. CAMPBELL: No, sir. Well, I suppose theoretically, if all the rest were shutin, this project will and could very well affect, as shown here, other wells, and these four, and this single well, and it is possibly the water may move in other directions, that is why the program covers the area. The net effect will be that

instead of fifteen producing wells, that will be cut down to nine, by virtue of the -- to ten, by virtue of the five input wells.

MR. NUTTER: Well, Mr. Campbell, as an example, we have a 37 normal unit allowable for the month of September and you have fifteen 40-acre tracts within that area --

MR. CAMPBELL: Developed tracts, yes.

MR. NUTTER: Fifteen times thirty-seven is 555, and you will assign the 555 barrels to the area outlined in blue here to be produced by any well or wells in that tract?

MR. CAMPBELL: Which is exactly what is being done at the present time, except that at the present time, no single well can produce in excess of the top unit allowable. What we want to do is remove that restriction in order that the wells that are affected by this water flood project, if they happened to produce in excess of the top unit allowable, will do so legally, but the total cumulative production from that unit will not be any greater than it is at the present time.

MR. NUTTER: Which will be the gas injection well under the old program?

MR. CAMPBELL: Perhaps the witness can answer that.

A Burch 8A is one, on the Burch lease and has been for years.

MR. NUTTER: Were there any other gas input wells?

A Yes, the Burch 14, of course, was one, and the Burch A and Keely 5-A, but of course, that's outside the pilot area.

MR. CAMPBELL: Mr. Krouskop, are any of these wells, are

there any transfer of allowables now as a result of that gas injection program? A No, no.

MR. CAMPBELL: We will be glad to offer in evidence the original of a letter from Mr. Miller, the District Engineer for General American Oil Company of Texas, with regard to that question which was raised by one of the members of the staff of the Commission, which explains the circumstances surrounding the discontinuance of transfer of allowables on any of these gas injection wells sometime ago. As a matter of fact, when order R-802 was issued, there was no basis for transfer of allowables, that was it, that was the total cumulative allowable of that well, irrespective of injection wells or anything else, and that method was instituted for transfer of allowables insofar as the gas program was concerned. I could see no bearing on this particular situation.

QUESTIONS BY MR. NUTTER:

Q Mr. Krouskop, how many wells is it your expert opinion will be actually influenced by this pilot water flood?

A Well, we certainly expect the five spot take point, and then I would say that any well either directly offsetting it or diagonally offsetting it.

Q What well number?

A 23, 13, 12, 5, and it is not unconceivable that the second row of wells could be affected, that has happened before.

Q How about 16? A 16, yes.

Q Well, now, 13 is shown as a future water input well, will

that be a productive well for the time being?

A Until we expand the flood, yes, it will, yes.

Q Do you believe that every 40-acre tract in G-1 will be affected by the water flood?

A I think it is possible that it would be, yes.

Q How many of the wells in Tract G-1 as outlined in blue, will be producing? A Under the pilot phase?

Q Under the pilot flood?

A Well, let's see, we have 20, about 15 under the pilot phase.

Q Which wells would those be?

A Well, it would be all except Burch 8, 9, 14, 23, and 24.

Q Every well on the plat, in that section in other words, would be producing except the input wells? A Yes.

MR. NUTTER: That is all.

QUESTIONS BY MR. COOLEY:

Q No. 15, we have information from some source that the No. 15 was also formerly a gas input well, is that correct?

A It was for a while, yes.

Q That well is presently producing?

A It presently producing very little. Now, the Burch 5-A is temporarily shut down, it should be excluded from that list of producing wells, it is temporarily shutin.

MR. COOLEY: This raises up another question I wanted to ask you, Mr. Campbell, what is the developed 40-acre proration unit?

MR. CAMPBELL: I don't have the Order in front of me, and I

don't know if it defined that at that time. I am sure it did at that time, at the time it was issued, which was November 19, 1948.

MR. NUTTER: Do you remove that from the shutin status?

A Your well No. 24 is the same as the 5.

QUESTIONS BY MR. COOLEY:

Q It will be an injection well?

A It is a developed 40.

Q I asked Mr. Campbell, and now I want to ask you, what is the definition of a developed 40-acre unit?

A Under water flood conditions, whether it has ever been defined in New Mexico or not, I don't know, but certainly an injection well will constitute a 40, for water purposes, I think.

MR. COOLEY: That is all.

MR. NUTTER: Anyone else have any questions of the witness. Mr. Runyan?

QUESTIONS BY MR. RUNYAN:

Q Do you happen to have the water analysis on the water which you intended to use?

A I do not have them with me. We've tested them there in Dallas, and apparently it is compatible, but I don't have them here, no. Incidentally, with respect to this Lovington Sand, I think that the Shaly zone -- we intended to radioactivity log it, and be sure that our pipe is below all that shale and sand.

MR. RUNYAN: That is all.

MR. FISCHER: May I ask a question?

MR. NUTTER: Mr. Fischer.

QUESTIONS BY MR. FISCHER:

Q You said that if you could not get enough water for injection from this one well from the Pennsylvanian zone, then you would go to some other source to add to that source, the first primarily source of water, Pennsylvanian water? A Yes.

Q Well, have you already tested this secondary source of water to see if it is compatible with the Pennsylvanian water?

A Yes.

Q You commingled them?

A From all the testing that we have done today, yes. We have one source of water, produced water here that we may have a little trouble with. However, I think we can adequately treat it.

Q The system, or the source of your injection water to the injection well, will that be a closed system? A Yes.

Q One other thing, is the oil from this oil zone, the Grayburg-Jackson, it is sweet or sour?

A I believe it is less than one per cent sulpher, I don't know where you draw the line.

Q I consider anything above three grains --

A This is sour, the gas is sour.

Q The holes where you put your formation packer you will not load or attempt to load?

A Not to start out with, we are going to have to feel our way along to get started.

Q Maybe I misunderstand this system of prorationing according to Order 802. Would it be correct to assume then, that if-- or would you ask that if Well No. 3 were affected by this water flood, if you noticed that it would be necessary to increase the allowable of your No. 3 say, then your No. 5 well, that would surely or most probably be affected by this water injection? A Yes.

Q Would you attempt to ask for more than a forty-acre allowable on that?

MR. CAMPBELL: I might be able to explain that better. I will go over it again, and this is my understanding, and I might say that applicant is willing to work out any feasible program which will give them the flexibility required to make investment of this program, but this is the simplist way, it seems to me, at the present time. Under the five spot drilling program that was approved a number of years ago, where there were more than one well on several developed 40s or several proration units, the Commission approved, in effect, a larger proration unit that the normal unit, and said that the operator would be permitted to produce cumulative amount of oil not in excess of say 15 times the 40-acre top unit allowable assuming 15 --

MR. FISCHER: Well, let me ask you one thing in that connection, then would you consider, just for simplicity, would you consider this area, this supposed 15 time 40-acres say, would you consider that, then, as one unit? I mean, would you consider it as one unit for allowable purposes?

MR. CAMPBELL: That is the way it has been considered for 15 years, almost. It is still carried that way in the proration schedule. Now, the only limitation in it is that no well under the present order will be permitted to produce in excess of a single top unit allowable. The fact is, of course, as the schedule shows, all these wells are marginal wells now, but that limitation in a water flood situation -- and it should certainly be limited to that situation -- would make it impossible for production of any output well in excess of one 40-acre top unit allowable, which would restrict the flexibility for water flood.

My reaction to it was that the simplist way, at least during the stages of this water flood project, or pilot project, would be to go right ahead with the same allocation method that they have used, except elimation of that restriction on the one top unit allowable. If that doesn't prove adequate, then we will have to take a look at something else by way of maximum production or whatever it may be, but this way it will not increase the cumulative allowable for that particular unit.

MR. FISCHER: All right. Then possibly I am right in saying that you would possibly ask for five allowables for the No. 4?

MR. CAMPBELL: If the water flood project made that much oil available, it would be permitted, under this proposal, to produce it, so long as cumulative production from that G-1 unit did not exceed the number of units times the top unit allocation in one well.

MR. FISCHER: All right, if No. 3, if it would be necessary,

due to your engineering appraisal of this project, if it should be necessary that the No. 3 well should be allowed to produce more oil, would it be taken from the No. 4?

MR. CAMPBELL: It would be permitted, under that formula, to produce as much as it could, so long as the total production does not exceed the top unit allowable times the developed unit. Under the present order, you may have several wells producing in excess of the single top unit allowable; under the water flood project, that wouldn't be known for a year or two years, but it is possible it could be a year, depending on the effectiveness of the program.

I felt that was a simpler method of approach at this stage, rather than to change the method of transfer of allowables, or the maximum allowables in the pilot stage, that's the reason for this proposal.

MR. NUTTER: Mr. Campbell, in the event the Commission did not see fit to grant unrestricted allowables to any particular well within the limitation of the 15 times the normal unit allowable, would General American be willing to any sort of limitations on the wells?

MR. CAMPBELL: I think you should ask the witness that question.

A I think that depends on what your limitation is. We certainly need to put the thing in to see how the reservoir responds to water injection, we might want to test it at various rates or cut it back, we want a little flexibility in operation here to see what we can do.

QUESTIONS BY MR. NUTTER:

Q I appreciate that, but it is rather hard to conceive that some of these units that are far removed from the pilot project will be affected.

A I have seen them half a mile off, by golley, kick, with two wells in between. I have seen them affected. That might be an exception rather than the rule, but it could happen, especially in this type of reservoir. You have some very erratic permability distribution, and porosity varies quite suddenly from one lease to the other and from one well to the other. Anything can happen in this thing.

Q Would a limitation of five times the normal unit allowable be too restrictive to the operation of the flood?

A Well, not to start out with, but we would like to be able to see how it is going to respond, and do some work in checking to see what the most effective producing rate would be, we would like a little flexibility.

Q Actually, you don't expect any results until fillup?

A Fifty to sixty per cent of fillup should take about a year and a half with no more water than we have available now. Of course, you can do all the figuring you want, but if we have irregular distribution in permability and porosity, as we might have, we might get a response much quicker, you might have a thin stringer flood out right away, and you might have some effects within two or three months, but theoretically, it ought to be about a year and a half

injecting say between four and five hundred barrels per day per injection well.

MR. CAMPBELL: I might make a statement in that regard. I don't think the Commission expects, or should expect any operator of a proposed secondary recovery project, water flood project, to make the investment that is required without some reasonable assurance of flexibility in production, which will justify the investment. We are perfectly willing, within the realm of reasonable limitation, to approach this thing with caution insofar as unrestricted allowables are concerned, but that has to be done in the light of the obvious fact that a 60 or 70 thousand dollars investment, coupled with the cost of lifting the oil, cannot be made without -- on the assumption that a year and a half or two years from now maybe they will get some allowable relief, I think it would be a serious restriction on water flood programs to take that fixed position. If there is a somewhere, an in between that can be reasonably worked out in gradual steps, we are certainly willing to consider that.

QUESTIONS BY MR. NUTTER:

Q Mr. Krouskop, do you feel that a water flood project like this will be very sensative? That is, could the allowable rate be changed in the middle of the flood program?

A That's quite a question. Of course, we don't know, that's what we are trying to find out, but I think -- lot of boys that are a lot smarter than I am have not been able to answer that and they are still trying to figure that out.

Q Do you think that this 400 barrels per day injection into each well would be considered a high rate of injection, low rate of injection, or medium rate of injection?

A I think for the area that we are trying to fill up, it is a rather low rate. In other words, we have a 50-acre pilot area, and that has produced cumulatively to date around 75 hundred, that particular area, and the No. 4 well has produced cumulatively 475,000 barrels, and you are looking at 10 or 12 thousand barrels per acre that has been voided already, and it is a low rate. A year and a half to two years, its quite a slow fillup period. Most of them try to inject at a rate sufficient to get a fillup. Most floods get a fillup within six to seven months on ten acre spaces, ten-acre five spot, instead of your 40-acre five spot as you have here. Actually it measures 15.

Q Do you think that the No. 4 well, once you have obtained fillup and obvious effective results of the water flood, that the rate of production on that No. 4 well could be changed in any well without affecting the ultimate recovery?

A That I can't say for this reservoir. I can show you examples where the ultimate recovery has been hurt by cutting back the rate, and I can also show you some where it hasn't. I think it depends on the individual reservoir, but on this one, I can't say, I don't know.

MR. NUTTER: That is all.

QUESTIONS BY MR. COOLEY:

Q If this flood is successful, what would you expect the production from No. 4 to be, do you have any idea?

A In the one zone you have very good permability in this immediate area, the well came in four, six hundred barrels a day naturally, and that well could conceivably, with water put in, could make 3 to 5 hundred barrels a day, and it wouldn't surprise me if it did, because you do have the best part of this reservoir right through the middle of that Burch A Lease. Of course, our intention was to try it out in the best part, and if it works, we will expand the thing, as the water is available. We don't want to jump out and develop the whole thing. We're going to have to fillup our well on it because you do run into some very tight zones down in the flanks.

MR. COOLEY: That is all.

QUESTIONS BY MR. NUTTER:

Q Do you have an estimate as to what the original recovery reserves on that 50-acre pilot area were?

A In that 50-acres, it's close to 12,000 barrels per acre, probably in that --

Q And what percentage of that has been produced?

A Well, it is probably 98 per cent depleted now, I imagine. I am just picking a figure out of the air. It is certainly in the latter stages of depletion.

MR. NUTTER: Anyone else have a question? Mr. Fischer.

QUESTIONS BY MR. FISCHER:

Q Are you going to inject in tubing? A Yes.

Q Swinging in the hole?

A Swinging in the hole. I'll tell, we will have this formation type packer.

Q This is just on two wells?

A On the two wells and we are going to run radioactive logs on the other two to decide that. Eventually, we will have packers in them. See, they have old pipe in them, and we will start out and see what kind of pressure we are going to have, we are going to feel our way along, and probably just inject down the casing until we see what we run into. We expect to run into a little pressure on the two north wells.

Q You are going to inject down the casing? A To start.

Q On all wells? A No.

Q Or just the ones that don't have formation packers?

A That's right.

Q Well, do you possibly know or have an idea what your injection rate might be at first?

A I think that at first those four wells in the pilot, the five spot area, will take about everything you can give it on a vacuum, we know that from going in an acidizing these holes. I almost be you that for time it would take water on a vacuum. We do expect the two north wells to pressure up, and I think that the two south wells will probably take everything you can give them on a vacuum.

Q Do you think the pipe in the hole now will hold up?

A On the newer wells, the two south wells, yes, there is good pipe in it. It has been drilled within the last eight or ten years, of course, that remains to be seen. We eventually expect to have to run packers in all of them, in some of the wells, at least just to protect the piping.

MR. FISCHER: Thank you.

QUESTIONS BY MR. NUTTER:

Q Mr. Krouskop, what method would you use for testing the formation packers upon setting them in the two wells that you will use them?

A Those are the two wells that we expect the water to go in on a vacuum. Actually there is nothing above the pipe that we are afraid of, just very tight streaks, and I don't imagine you could inject into them but several hundred pounds pressure. It is going to be a little difficult, unless we measure, to determine whether the packer is leaking, and it will be of no concern if we are on a vacuum, and if it does pressure up, we will be able to run an echometer and watch the fluid in the annulus, if it builds up. If you run in too much pressure, it will circulate, come to the surface, and we will watch it very close.

Q Not only upon the initial setting, but later on to determine if the packer is leaking?

A Yes. As I say, if we run into any pressure at all, you get your water in the annulus in the surface. We will know right

away if it starts leaking, I imagine.

MR. NUTTER: Are there any other questions? If there are no other questions, and no statements, we will take the case under advisement.

MR. CHRISTY: Mr. Examiner, there is a statement.I am Sim Christy with Hervey, Dow and Hinkle representing Humble Oil Company. We have a statement in connection with this application.

Humble is not interested in acreage involved in case 1300, and is not opposed to the granting of an application to General American for permission to institute a pilot water flood program in the Grayburg-Jackson Pool, but we are opposed, as a matter of principle, to the Oil Conservation Commission establishing an allowable formula in this particular case, or in any case, based upon operation of the project at maximum efficiency, or increased allowables per well, and which will be a precedent for all other water flood or similar secondary recovery projects. Humble believes that any allowable formula which is a deviation from the State Wide allowable Rule should only be made upon proper motion for the promulgation of rules to be adopted by the Commission, which would only be adopted after a state wide hearing in which all operators are given an opportunity to express their views and submit evidence with respect thereto.

MR. NUTTER: Any other statements?

MR. COOLEY: Mr. Christy, you stand opposed to the allowable formula proposed by the applicant?

MR. CHRISTY: We are opposed, as a matter of principal, to adopting any allowable factors as a deviation from your State Rules without a full Commission hearing on a state wide basis, whether it be this case, this program, or other program in an isolated instance. We feel that your basic allowable, state wide rule should apply, unless you have a full Commission hearing and adopt rules for secondary recovery or for proration unit allowables.

MR. COOLEY: That would be, as well then, that you would be opposed to any unitization for the purpose of secondary recovery?

MR. CHRISTY: No.

MR. COOLEY: Doesn't this amount to the same thing?

MR. CHRISTY: The applicant seeks a change of the state wide allowable and that is the objection. It is not the secondary recovery project, as such, but the change in allowable from the state wide rules, that is the objection.

MR. COOLEY: Thank you Mr. Christy.

MR. NUTTER: Anything further in this case? If not, we will take Case No. 1300 under advisement, and proceed to Case No. 1301.

C E R T I F I C A T E

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILL)

I, J. A. TRUJILLO, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing was reported by me in Stenotype at the time and place hereinbefore set forth; that same was thereafter transcribed into typewritten transcript by me; and that same is a true and correct record to the best of my knowledge, skill, and ability.

WITNESS my Hand and Seal this, the 8th day of September, 1957, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

J. A. Trujillo
NOTARY PUBLIC

My Commission Expires:

October 5, 1960.

I do Hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1300 heard by me on 8-28, 1957.

New Mexico Oil Conservation Commission, Examiner