BEFORE THE

NEW MEXICO OIL CONSERVATION COMMISSION

Hobbs, New Mexico

April 16, 1969

REGULAR HEARING

IN THE MATTER OF:

Consideration of the adoption of an administrative procedure whereby the Secretary-Director could grant exceptions to Rule 303(a)

Case 4104

BEFORE: A. L. PORTER, JR. Secretary Director

ALEX J. ARJIMO, Land Commissioner

GOVERNOR DAVID F. CARGO, Chairman

GEORGE HATCH, Counsel

TRANSCRIPT OF HEARING

MR. HATCH: Case 4104, in the matter of hearing called by the Oil Conservation Commission upon its own motion to consider the adoption of an administrative procedure whereby the Secretary-Director of the Commission could grant exceptions to Rule 303(a) of the Commission Rules and Regulations, and permit marginal zones in dually completed oil wells to be commingled in the wellbore provided waste would not result thereby, provided dual flow downhole choke assemblies or other acceptable mechanical devices were installed, and provided that the total production from both zones would not exceed top allowable for the uppermost zone. Further, to consider an administrative procedure to permit downhole commingling of low marginal wells approaching their economic limit without the installation of the above-mentioned downhole equipment.

MR. PORTER: The Commission would like to ask for appearances in this case at this time, Case 4104. First, I would like to have the appearance of those who desire to present testimony. Does anyone desire to present testimony in Case 4104?

MR. KELLAHIN: I would like to enter an appearance

for Continental Oil Company. Jason Kellahin of Kellahin & Fox, Santa Fe, appearing for Continental Oil, and we will have one witness.

MR. PORTER: After the testimony has been presented, anyone who wants to may make a statement of position for the record. We may have 3 or 4 written communications also.

We were not able to get the proposed rule, the one that was proposed by the Commission's witness, in the mail prior to the hearing, but I believe there were distributed here at the door this morning. However, the case was advertised, I think, in such a manner that you could reasonably foretell what would be presented in the way of testimony by the Commission staff.

MR. HATCH: If the Commission please, George Hatch appearing on behalf of the Commission, and I have one witness, Mr. Nutter.

(Thereupon, Commission's Exhibits 1, 2, and 3 were marked for identification.)

DAN NUTTER

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

DIRECT EXAMINATION

BY MR. HATCH:

Q State your name and position for the record?

A Dan Nutter, chief engineer for the Oil Conservation Commission.

Q As chief engineer, do you have a duty to make recommendations to the Commission concerning the enactment of rules for the prevention of waste and protection of correlative rates pertaining to the production of crude oil andnatural gas?

A Yes, I do.

Q Are you familiar with Case 4104, and what it proposes?

A Yes, I am.

Q Would you give a little of the background and the necessity for this case?

A This case is being called to consider the adoption of a revision of Rule 303 of the Commission's Rules and Regulations, to permit under some circumstances the commingling in the wellbore of the production from dually completed oil wells.

The history of dual completions in this State

goes back to 1956 when the first oil-oil dual completions were allowed by this Commission. The Commission had steadfastly resisted the dual completion of oil wells until that time, because for the most part, the plan was to complete the wells flowing one zone through thetubing and the other zone through the casing, and the Commission was convinced that this was not a practical method to produce oil wells.

Finally, in 1956, the industry came up with the idea of running parallel strings of tubing, and separating the two zones by packers, and producing each zone through a single string of tubing. At that time, the Commission authorized the first oil wells duals. These first oil-oil duals are now approaching 13 years of age, and there has been an evident decline in production from these oil-oil dual completions, to the point where the zones are now becoming marginal andlow marginal, and there is a distinct advantage to combining the production in the wellbore under some circumstances, and this is essentially the background for this case today.

Q You mentioned the desirability of commingling in the wellbore. Do you have any exhibit that will point that out?

A Yes, Exhibit I, which is mounted on the board here, depicts the advantages of the downhole commingling in just a typical well.

We have a well here which is dually completed. It has Zone A in it which makes 6 barrels of oil per day, and Zone B which makes 10 barrels of oil per day. Both zones have an established decline rate of 10 percent per annum. We have Zone A depicted here, starting of with its 6 barrels of oil per day, and Zone B with its 10 barrels of oil perday. They decline to an economic limit of 2 barrels of oil per day. We see that Zone A will reach its decline limit in 11 1/2 years at this established rate of decline. Zone B, the better zone, will extend its economic life to 2 barrels per day, and we find that it goes 16 1/2 years before it reaches 2 barrels.

Now, if we were to combine these two zones and took out the separation equipment, we would have a combined producing rate of16 barrels per day, and we have shown this 16 barrels per day by a combined line, line C on this graph.

We have the well starting off here making 16 barrels per day, and decline at the same continuous

rate of 10 percent per annum. Now, we have a tabulation of the figures that we used to derive this curve.

Q Excuse me. Did you mention the number of that Exhibit?

A This is Staff Exhibit I in this case. This would be Staff Exhibit II, which is the supporting figures upon which Exhibit I is based. We will see that the combined total for the first year is 16 barrels per day: that by the end of 11 1/2 years, when the first well or the Zone A has reached its economic limit and would have to be shut in, we will see that the combined production from the two zones is still 5.6 barrels per day. So, rather than losing one zone, we are continuing to produce the well.

Then we can take the combined production clear on out and at the end of 21 years, the combined well reaches its economic limit of 2 barrels per day. What we have done, we have increased the productivity of this well by the blue hatchered area. The blue hatchered area represents at this point 11 1/2 years. Line B is the production that is coming from Zone A plus theproduction that is coming from Zone B. Then

by the time you reach 16 1/2 years, the blue area is the production that is coming from both zones, but which would not have been produced from either zone had they been segregated.

So using this as just a typical example, with a 10 percent actual decline, and a 6 barrel and a 10 barrel zone, we find that the blue hatchered area here represents a total of 6,535 barrels of oil that could be produced by combining the zones, and this oil would not have been produced otherwise. So we feel that under some circumstances you can definitely justify the commingling of the zones in the wellbore, providing no reservoir waste will result.

If the economic limit if raised, if we raised it to 4 barrels, we would shift the red line over to this point, we would shift the blue hatchered area to here, and the blue hatchered area would represent 20,000 or 30,000 barrels by simply raising the economic limit. Now, some of our wells are much deeper than this typical well here, and the economic limit would be much higher than just 2 barrels a day. The higher the economic limit, the more justification there is, providing reservoir conditions justify the commingling. Thisis what we have

to be cautious of, the reservoir conditions.

Q Do you have a recommendation to make to the Commission?

A Yes, I have proposed a suggested Rule 303-c. We have Rule 303(a) of the Commission's Rules and Regulations, which prohibits the commingling of production from oil pools in the wellbore, or on the surface of the ground.

303-A, now 303-B, establishes an administrative procedure whereby production from oil pools can be commingled on the surface of the ground, providing economic waste and other factors are taken into consideration. I would suggest an amendment to Rule 303, to provide 303-C, which would establish an administrative procedure for commingling of production in a wellbore of these dually completed oil wells.

Q Have you prepared a proposed rule?

A Yes, I have. It is printed and has been distributed at this hearing this morning. It is entitled "PROPOSED ADDITION TO COMMISSION RULE 303."

Q Would you go through that Rule, proposed rule,

and explain it, and as you are doing that, point out any changes that you would like to suggest at this time?

A Rule 303-C would read as follows: "The Secretary-Director of the Commission shall have the authority to grant an exception to Rule 303-A, to permit the commingling in the wellbore of dually completed oil wells when the following facts exists and the following conditions are met:

(1) Commingling of fluids from two commonly owned reservoirs in the casing without reservoirs in the casing without downhole separation equipment of any kind. This type of downhole commingling may be approved when the productivity of each zone of the dual completion has declined to 25 percent or less of the currently assigned top unit allowable for each pool, provided that the pressure of the zone with the lowest pressure is at least 90 percent of the pressure of the other zone, and provided further that no fluid compatibility problems exist in the well which

might result in the formation of precipitates which would damage either reservoir.

(2) Commingling of fluids from two commonly owned reservoirs in the tubing, maintaining separation of the zones in the casing by means of a packer and a dual flow downhole choke assembly or other acceptable mechanical device.

This type of downhole commingling may be approved when the productivity of each zone of the dual completion has declined so that the combined productivity of both zones is equal to orless than the currently assigned top unit allowable for the uppermost pool, provided that the pressure of the zone with the lowest pressure is at least 75 percent of the pressure of the other zone, and provided further that there is no serious detrimental effect on the value of the commingled stream as compared to the sum of the values of the individual streams.

(3) To obtain approval for downhole commingling of the production from both zones of a dually completed oil well, the operator of the well shall submit the following in duplicate to the Secretary-Director of the Commission:

(a) Name and address of the operator.

(b) Lease name, well number, well location.

(c) Names of the pools the well is completed in and the Commission order number which authorized the dual completion.

Now, this is a change from the printed proposal, and reads as follows, d would read: a schematic diagram of the well showing all downhole equipment to be installed, if application is being filed pursuant to Section 2 above.

Paragraph e then would provide as our rule, it is shown as d, paragraph e would be: a current (within 30 days) 24-hour productivity test on Form C-116 showing the amount of oil, gas, and water produced from each zone.

(f) A current (within 30 days) sub-surface pressure test on Commission Form C-124

showing the 24 hour shut-in pressure for each zone taken in accordance with Rule 302 of the Commission Rules and Regulations. (Pressures may be calculated from fluid levels in pumping wells.)

(g) Statement that ownership of the two zones is common throughout, including working interest, royalty ownership, and overriding royalty ownership.

(h) A production decline curve for both zones showing that a steady rate of decline has been established for each zone which will permit a reasonable allocation of the commingled production to each zone for statistical purposes.

(i) A description of the fluid characteristics of each zone showing that the fluids will not be incompatible in the wellbore and that the actual commercial value of the commingled production will not be substantially less than the sum of the values of the production from each pool if segregated:

(j) A statement that all offset operators and the royalty owner have been notified of the proposed commingling.

The Secretary-Director of the Commission may approve the proposed downhole commingling in the absence of a valid objection within 30 days after the receipt of the applicationif, in his opinion, waste will not result thereby and correlative rights willnot be violated. The 20-day waiting period may be dispensed with upon receipt of waivers of objections from all parties mention in item (j) above.

That is the proposed amendment to Rule 303.

Q Does your copy have the corrections made on it?

A Yes, sir.

Q Would you mark that up as an exhibit?

A Yes, sir. This has been identified as OCC Staff Exhibit III.

Q Do you have anything else to add to your testimony at this time?

A Not particularly. I would be ready to answer questions, however, if anyone has any.

MR. PORTER: Does anyone have a question of Mr. Nutter? Mr. Kellahin.

MR. KELLAHIN: I would like to ask you a couple of questions.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q In your paragraphs 1 and 2 or your proposed Rules, you have a requirement fora differential of not less than 10 percent. In other words, the lowest pressure in commingling without any equipment, the lower zone must be at least 90 percent of the upper, of the higher pressure zone, and the other is 75 percent if you are using equipment. What is the reason for that?

A Well, Mr. Kellahin, I feel that if you are going to throw the two zones together in the wellbore, the pressures should be the same or nearly the same. Now, we are allowing a 10 percent differential in pressure there. We are talking about, in most cases, marginal production which doesn't have much pressure. But in the event there is a substantial differential, you may have migration from one zone into the other, interzone feed back, and if you keep these pressure differentials practically the same or within a 10

percent maximum, you will have very little interzone feeding. For that reason, I propose that if, in the event of commingling without separation equipment, that the differentials be maintain at 10 percent or less.

Now, in the case of the situation where you would be installing the dual flow downhole choke assemblies, the differential authorized by this proposed rule would be 25 percent there. You could probably go more than 25 percent, but I don't have all that faith in this equipment, and for that reason I have restricted it in my suggested rule to 25 percent.

Q Actually, the Commission --

A Yes, after hearing when they investigated the individual case. We are talking about a situation here where the application is filed by the applicant, and we are not cross examining the well, we are not cross examining the man. We are taking the data provided to the Commission, based on the recent GOR test, and the recent bottomhole or sub-surface pressure test.

Q But in that order there is a provision for administrative approval, is there not?

A Yes, sir.

Q Where there is a greater differential than 25 percent?

A Yes, sir. And also, that is a particular situation where we know the formations in that area. And you will recall there were several hearings before that administrative procedure for that particular area was ever approved. We were well acquainted with the formations, the pressures, and the producing characteristics of both zones.

Q Would there be any migration of fluid if the producing bottom hole pressure of the well is less than the static bottom hole pressure?

A If the producing pressure is less than static?

Q Yes.

A There could be. The differential is what counts. Really, this thing is silent here on saying what types of pressures, and I pondered this very seriously, as to whether this should be a flowing pressure or a shut-in pressure, and I finally came up with the shut-in pressure on this, because I feel that the differential is normally going to be less during a flow period, but you have to contemplate the time when the wells are shut in, too, and for this reason, we felt that there would probably be a

bigger differential at the time the well was shut in, and we ought to measure some of the shut in pressures.

MR. KELLAHIN: Thank you.

MR. PORTER: Does anyone else have a question? The witness may be excused. Mr. Hatch, I believe you haven't offered your exhibits.

MR. HATCH: I would like to offer Exhibits 1, 2, and 3.

MR. PORTER: If there are no objections, Exhibits 1, 2, and 3 of the Commission Staff in Case 4104 will be admitted.

(Whereupon, Commission's Staff Exhibit 1, 2, and 3 were admitted in evidence.)

If there are no further questions, the witnesses may be excused. Mr. Kellahin, would you like to proceed with your testimony at this time?

MR. KELLAHIN: I would like to call as our witness, Mr. V. T. Lyon.

VICTOR T. LYON

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would state your name, please?

A Victor T. Lyon.

Q With whom are you employed, and in what position?

A I am employed by Continental Oil Company as Conservation Coordinator for the Hobbs Division.

Q Have you testified before the Oil Conservation Commission, and made your qualification as a Petroleum Engineer a matter of record?

A Yes, sir.

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

MR. PORTER: Yes, sir.

Q Mr. Lyon, have you made any study of the proposal which has been made by the Oil Conservation Commission in Case 4104?

A Yes, I have.

Q And in connection with that, have you prepared some data or proposals to be submitted for information of the Commission later in your testimony?

A Yes, sir.

Q Mr. Lyon, did you recently participate, that is, in December 1968, in an application filed by Continental Oil Company seeking downhole commingling in Case 3995?

A Yes, sir.

Q Were you the witness in that case?

A Yes, I was.

Q For the benefit of the Commission, would you review briefly what was proposed in that application?

A Case 3995 was Continental's application for authority to downhole commingle production from the Maljamar-Abo Baish-Wolfcamp pools in our Baish A Wells No. 12 and 13. Both of these wells had previously been dually completed in the two reservoirs and the completions of both zones had ceased flowing. Hydraulic pumping equipment had been installed for the Wolfcamp completion in Well No. 13. It was proposed therefore to complete both wells with downhole dual flow chokes and lift production from both zones with a single hydraulic pump. The equipment which was proposed was designed so that the production from one formation would not be in contact with the other formation and that the oil would be commingled only in the tubing. The installation called for two packers, one placed between the two zones, and one above the top zone which would permit the gas from both zones to be vented through the casing tubing annulus thereby increasing the efficiency of the pumping equipment.

Q Has Continental Oil Company had experience with this equipment in New Mexico prior to these two installations?

A Our Casper Division office operates Continental's production in the northwest part of the State, and at that time the office was located in Durango, Colorado, which has since been consolidated with the Casper Division office. There was an application filed for the use of the downhole flow choke assembly in the Jicarilla Field. In this particular installation, the two zones involved are high gas-oil ratio flowing zones. Since that area is operated out of a different office, I am not familiar with the details of those installations, but I am told that there were a number of such wells which utilize this equipment. I am also told that the installations had been modified so that the chokes, themselves, have been removed, and the installations involve essentially two check valves which prevent the production from one zone being in contact with the other, so they are commingled just in the tubing, but the equipment has been modified.

The installationsin our Baish 12 and 13 are the first instances, to my knowledge, in New Mexico where the equipment has been used for artificial lift.

Q What was the result of the applicaation in Case 3995?

A Order No. R-3645, dated December 31, 1968, was entered as a result of our hearing in Case No. 3995 approving our application to dual the wells as we requested.

MR. KELLAHIN: If the Commission please, I don't believe Mr. Nutter made any proposals as to testing of the wells which would be completed in accordance with his proposal. We would, of course, anticipate certain tests would be required, and for the purposes of our testimony, we would like to go into that phase of it, too. If you have no objection.

MR. PORTER: The Commission has no objection.

Q (By Mr. Kellahin) Mr. Lyon, at the presentation of the application in Case 3995, how often did you propose to test the zones individually?

A We proposed to test one zone individually, and then test both zones together, so that the zone that was not tested would in effect be tested by the subtraction method, and this was proposed to be done once each year.

Q Now, what are the testing requirements that were actually included in Order R-3645?

A Paragraph 6 of the Order states "that production

tests of the combined zones and of either of the Abo or Wolfcamp zones in each well shall be conducted quarterly, and the productivitiy of each zone thus established."

Paragraph Nine of the Order states "that the Secretary-Director may authorize annual production tests if he determines on the basis of previous tests that a stabilized rate of decline and production has been achieved in each zone, and that quarterly tests are no longer necessary to accurately determine and allocate production from each zone."

Q In presenting your testimony, did you give the Commission an estimate of the cost of performing these tests?

A It was estimated at that time that our cost of testing would be in the range of $400 to $600.

Q Have these wells now been equipped as proposed in Case No. 3995?

A Yes, they have.

Q Was the cost to install the equipment more or less than you had anticipated?

A In one instance, it was about the same; in the other, it was greater. The Baish A no. 13

was estimated to cost $8,400, but actually cost $13,800. The additional cost was the result of additional rate time, due to problems encountered in running the dual flow choke equipment.

Q Is that the same type of equipment that would be required in the proposed Order, paragraph 2?

A Yes, essentially the same equipment.

Q So you would anticipate similar costs if you were proceeding under the proposed Order, would you not?

A Yes, sir.

Q Have you made the tests that were required by the Order?

A We are in the process of conducting the test.

Q And what experience have you had in connection with the cost of conducting these tests?

A Well, we believe that our original estimates were considerably optimistic. It appears now, based on our experience in testing the wells that the cost to test the well will be approximately $1,000.

Q Just what do you have to do in order to conduct this test?

A Well, it is quite an involved process, and I would like to go through it just to make sure that the

Commission is familiar with what all is involved.

First, since this is a hydraulic pumping installation, the pump must be surfaced by reversing the flow.

Then the standing valve is removed by a wire line. Then you go in with a wire line again, and remove the blanking plug, and then you go in again with a wire line, and remove the dual orifice head. When you do this you take out the top part of the dual. The check valve still stays in place, so the zones are not commingled.

Then you change the orifice head so that one of the flow tubes is blanked on it, and you run it back with a wire line. Then you run in with a wire line again and replace the blanking plug; and then you run in again with a wire line again, and replace the standing valve.

Then you pump the pump back to the bottom and being your production test. When you have stabilized your production, and have a reasonably accurate test, you surface the pump again by reversing the flow. Then you go in with a wire line, pull out the standing valve,

go in with a wire line and remove the blanking plug.

Then you go in with a wire line again, remove the head, change the flow tube so that they are both open and run in with a wire line, replace the orifice head, then run in with a wire line again, replace the standing valve -- I mean the blanking plug and then you run in again with a wire line and replace the standing valve, and you pump the well back down, and conduct your test with both zones together.

Now, we could do it the other way. We could test both zones first, and then test the one zone individually but the result is the same. It requires two round trips of this equipment, which involves 12 runs with a wire line.

MR. PORTER: In other words, you better have pretty good wire?

(Laughter)

Q Does this type of operation on your well involved any risk, loss of one or both zones, at least temporarily?

A Well, it sounds relatively simple when I tell you that you run in with a wire line andpick up

this equipment. It doesn't always come, so then you have to make another run, or if there is something else that happens, you may have to pull the tubing. It sounds real simple, but it doesn't work quite that easy.

Q Is it your recommendation to this Commission that such tests be held to a minimum?

A Yes, it certainly is.

Q What do you anticipate the cost will be to conduct these tests that you described?

A Well, as I said, I believe that the cost to conduct this test in the absence of more than usual difficulty, to be about $1,000.

Q Have you found that this type of equipmenthas resulted in a saving to Continental Oil Company?

A Yes, the equipment has certainly resulted in less investment than would be involved in installing two parallel completely separate hydraulic pumping systems. But, really, the test on a quarterly basis considerably offsets the savings in investment.

Q Is it your testimony then that the downhole dual flow choke assembly does not have any application in your operation?

A No, it is not my intent to give this impression. I think the equipment does have application. I think these applications should be limited to reasonably high producing rates, and in those situations where there could be waste or loss of oil as a result of putting the two zones together.

Q Now, you heard Mr. Nutter testify in regard to this type of completion, and 25 percent differential of pressure across the two zones. Do you have any comment on that?

A Well, we have discussed this at length in our office, a good many of engineers, and it is true there are times when the well will not be producing, but in most cases these times will be quite short in duration. Really, if your bottom hole producing pressure is less than the staticpressure of those zones, then I can't see any possibility of thiefing from one zone to another.

Q In the event there was some limited amount of thiefing from one zone to another, would it, in your opinion, cause any waste or damage to any of the reservoirs?

A If both zones are oil producing zones, and in the absence of some characteristic of the fluids which would make them incompatible, any thiefing on a temporary basis would be recovered shortly after the well was replaced on production.

Q Do you have any recommendation as to an alternate courseof action?

A Yes, sir.

Q What would those recommendations be?

A I believe that it is generally conceded that dual completions are requested and approved on the basis that they permit development of zones which under normal circumstances would not be developed by individual wells. This is not always the case, since certainly there are savings in dually completing wells. Where you can anticipate a minimum of difficulty in producing them, then certainly an operator's profit can be increased by dual completions. But when producing rates decline to the point that the profit is small, the operator must look for some way in which he can continue to operate the well at a profit.

Any operator who looks at his operating costs

must be aware of the cost of maintaining additional equipment, the cost of conductingproduction tests, the cost of conducting packer leakage tests, and the cost of performing repair work when communication is found to exist between zones.

By commingling downhole, an operator can salvage a tubing string, and in many instances can salvage surplus equipment such as separators, heater treaters, and so forth. Therefore, from an operator's viewpoint there are many advantages to commingling production downhole.

The expenses that I have mentioned are eliminated, and in many cases the lower zone is producing more efficiently when it is not restricted by producing below a packer. The ability to vent the gas just naturally improves pumping efficiency.

Q Are there any disadvantages to this type of completion.

A Well, of course, there are disadvantages to down hole commingling, or we would have been doing it before this. First, there is the reluctance to commingle downhole, because of the possibility of causing waste.

Primarily, such waste could result from, say, the drowning of one zone when it is produced together with another zone that has an active water drive.

Another possibility of waste would be where a gas zone is commingled with an oil zone, and the gas reservoir becomes saturated with oil from the oil zone, and this oil will be forever lost.

Another possibility of loss, at least of a temporary nature, would be where one zone had a considerably lower producing pressure than the other. For instance, if one zone was pumping and had a very low bottomhole pressure, and the other was flowing so that its producing pressure is greater thanthe shut in pressure of the zone, then oil from thehigher pressure zone would enter the lower pressure zone, and the production from the well would be reduced rather than increased.

I say this would cause a temporary loss, because as the pressure of the higher pressure zone declines, it would ultimately reach a point where the lower pressure zone would begin to feed into the well, and any oil that was lost by migration would ultimately be recovered, and the zone would give up the oil which

is indigenous to that formation.

Then, also, there is a question of data. It is desirable to have as accurate data as possible on production from each lease, and each well, and each reservoir on each lease. The accuracy of this data varies considerably according to the number of wells, the number of producing zones, the quality of the testing equipment, and the quality of supervision which isgiven to the well. Those who gather data in New Mexico are certainly appreciative of the fact our data is reported by wells, and by zones. This data is generally pretty good, but one must understand when evaluating this data that each well's production is not individually measured. Consequently, the data is not 100 percent accurate.

By commingling production in the wellbore, we are not able to measure the production from each zone in that well. Consequently, we have a further loss of accuracy in our data when such commingling is permitted. Wemust then consider what this greater accuracy must cost us. Therefore, there can be no doubt that many reservoirs in Southeast New Mexico can be commingled

without creating waste, and that such wells can be operated to a lower producing rate so that the oil is actually conserved. We must find a balancing point where we maintain production for accuracy of data, until the accuracy of that data is down to the point that it is no longer worth the extra oil that it will cost us, which could be saved ifthe two zones were produced together.

After giving due consideration to the factors I have just discussed, it is Continental Oil Company's position that downhole commingling without separation equipment could be permitted by administrative procedure under the following conditions.

Q Mr. Lyon, before you read that, do you have a copy which you can make available to the Commission of your recommendations that you are about to --

A I can supply them later. I don't have them available with me right now.

Q Will you supply a copy to the Commission?

A I would be happy to.

Q What recommendations do you make with regards to downhole commingling without any downhole

separation?

A No. 1, both zones should be classified as oil well completions.

No. 2, neither zone should produce more than 15 barrels of water per day.

No. 3, both zones have a combined producing capacity of not more than half of the top allowable of the zone having the lower allowable, and gas production below the lower of the two daily gas limits.

It is recommended tht the production from C-115 for the last six months be used to determine whether a well can qualify under these requirements.

No. 4, if either zone is produced by artificial lift prior to downhole commingling, the commingled zones must be artificially lifted. This is in order to prevent the thiefing from a high pressure zone to a low pressure zone. It is believed that there would be no loss of oil, provided that the well is pumped off to the point that the producing bottom hole pressure is less than the static reservoir pressure of both zones.

No. 5, the unit value of the crude oil should not be reduced as a result of the commingling. This

refers primarily to the commingling of the sweet and the sour crude. There could be a loss of revenue if the producer is receiving a sweet crude price for one crude, and a sour crude price for the other, and the commingling of the two would result in the commingled stream being sold as sour crude. If the sweet crude is being sold at a sour price before the commingling, then there would not be any reduction in revenue.

We further recommend that the following restrictions be imposed. If a well qualifies under the above conditions, it may receive an allowable of not more than 50 percent of the top allowable of the zone having the smaller allowable, and shall be penalized for excessive gas-oil ratio, based on the lower of the daily gas limits which apply to the reservoirs; and production from the well during downhole commingling shall be allocated between the two zones on the basis of extrapolated decline curves of the zones prior to the downhole commingling, or on such other basis which is satisfactory to the District supervisor. Now, it's positively been my observation that there are some wells that just don't

have decline curves which you can readily extrapolate very accurately. And, too, the wells shall be tested on a commingled basis each year during the normal testing period for the lowermost zones, except that a well penalized for a gas-oil ratio shall be tested semi-annually, at 6 month intervals.

Q Does that complete your recommendations?

A Yes, sir.

MR. KELLAHIN: That completes the direct examination of the witness.

MR. PORTER: Do you have any Exhibits that you would like to offer, Mr. Kellahin?

MR. KELLAHIN: We do not have an Exhibit. I can leave a copy of the recommendations that were made, if you would like it.

MR. PORTER: We would like to have a copy.

Does anyone have any question of Mr. Lyon? Mr. Nutter, do you have any question?

MR. NUTTER: No.

MR. SELINGER: George W. Selinger, with Skelly Oil Company. I would like to ask Mr. Lyon a clarification question. As I understand it, Mr. Lyon,

the Staffs' recommendation is for a one time current productivity and pressure test, whereas your recommendations indicate an annual testing, is that correct?

THE WITNESS: Yes,sir.

MR. SELINGER: Thank you.

MR. NUTTER: Mr. Porter, I don't think I would recommend that these wells, particularly the wells that you are going to put the downhole dual flow choke assemblies on, would never be tested again. Maybe I should have gone into that in a little further detail, but I think that periodic tests of some nature should be conducted. I envision that the orders which would authorize the downhole commingling would make provisions for some sort of a test.

MR. SELINGER: Under paragraph 2 of the proposal?

MR. NUTTER: On paragraph 2 only, yes.

MR. PORTER: I believe that concludes the testimony in the case. Now, do we have statements, is there anyone who would like to make a statement referring for Case 4104?

MR. SIMEX: I am Brad Simex with Amarado

Petroleum. Amarado Petroleum Corporation supports the adoption of administrative procedure to allow dually completed wells to be commingled in the wellbore, where the combined production of the commingled zones, either gas or oil, is less than one allowable, and Amarado supports the approval of the wellbore commingling even without downhole chokes.

MR. WHIGHAM: I am Carl Whigham, employed by Texaco, Inc., at Midland, as proration division engineer. I would like to make a statement. Texaco is a proponent of wellbore commingling and partially completed multi-pay oil and gas pools producing from reservoirs which are compatible, where mineral interests ownership will not be adversely affected. Such wellbore commingling is recognized as an effective conservation measure due to increased utlimate recovery of hyddrocarbon reserves resulting from more economic operation. Texaco recommends the adoption of administrative procedures whereby the Secretary-Director of the Commission can administratively grant exceptions to Rule 303-A of the Commission's Rules and Regulations permitting marginal zones and dually completed wells to be commingled in the wellbore, providing waste will not result thereby, and provided that

the total production from both zones will not exceed the top allowable for the uppermost zone.

MR. TERRY: My name is George Terry, with Phillips Petroleum Company in Midland, Texas. I would like to read the following statement for Phillips. Phillips Petroleum Company wishes to commend the Commission for its foresightedness in bringing this matter on for hearing, and Phillips believes that the reduced operating and investment expenditures permissible under downhoole commingling in marginal zones will yield an increased economic recovery of oil, which otherwise would be lost, and supports the proposed rule.

MR. SIMMONS: I am W. B. Simmons, proration engineer with Mobil Oil Corporation, from Midland, Texas, and I would to read this statement into the record.

Mobil Oil Corporation welcomes the opportunity to express its views on the adoption of a statewide administrative procedure to authorize the Secretary-Director of the New Mexico Oil Conservation Commission to grant exceptions to Rule 303 (a) of the Commission Rules and Regulations and permit downhole commingling of marginal zones under conditions established by the Commission.

Mobil has reviewed the testimony and exhibits presented at past downhole commingling hearings. It appears that while the administrative work incurred by both the Commission and the oil operators has been within manageable limits in the past, it can be expected to become time consuming and expensive as the hearing loads increase in the future.

It is for this reason that Mobil supports the establishment of administrative procedure whereby the application for downhole commingling could be simplified and expedited by the Commission. The advantages of downhole commingling have been recognized by the Commission as evidenced by the approvals granted in the past.

Mobil would like to take this opportunity to state its views on downhole commingling. Avoiding the economics of specific cases, Mobil believes that the increased cost of maintaining a multiple completed well over the cost of producing a downhole commingled well will cause premature abandonment and waste of recoverable hydrocarbons. Whereas, the amount of hydrocarbons recovered from any one commingled well would be relatively small, the combined amounts would become significant as more wells were commingled in an aging reservoir.

Other favorable aspects of commingling multiple wells would be the savings inherent in the utilization of

salvaged equipment on other wells and minimizing the administrative and operational procedures that multiple completed wells require. These savings can be better spent on development and exploratory drilling opportunities.

The following limitations for downhole commingling applications are proposed by Mobil for consideration as guidelines by the Commission:

1. All zones to be commingled are or need to be artificially lifted.
2 Total daily average production from all zones to be commingled shall not exceed top unit allowable for highest allowable zone commingled.
3. Evidence be presented supporting the compatibility of the zones to be commingled.
4. There is common ownership of all zones to be commingled.
5. Commingling does not jeopardize secondary recovery operations.

Mobil Oil Corporation reiterates its support of the proposed administrative procedures and believes

that its implementation will simplify downhole commingling applications while preventing waste and protecting correlative rights. Thank you.

MR. PORTER: Does anyone else have a statement?

MR. MOTTER: Gene Motter of Cities Service. I would also like to commend to the Commission,and to recommend that you proceed with the adoption of the administrative procedure for wellbore commingling. I believe the case has had some relationship to two different cases, one describing low marginal well. I would suggest that the Commission might consider, in lieu oflow marginal wells, that they consider the barrel situation along with thecurrent depth record. This might ease the situation in determining a low marginal well.

MR. PORTER: You would suggest that rather than just the terminology of a low marginal well, that we might use a definite number of barrels?

MR. MOTTER: Yes, and correlate it to the present depth record.

MR. PORTER: Does anyone else have a statment?

MR. KELLAHIN: Jason Kellahin of Kellahin & Fox, Santa Fe. I would like to make a statement. If

the Commission please, we feel that the Oil Conservation Commission is to be commended for bringing this matter on to a hearing. If we left any doubt in the Commission's mind, I would like to remove it. Continental Oil Company is in favor of the adoption of the rule as proposed by Mr. Nutter, with the modifications that we have suggested. We do feel it is quite important, however, that the Commission adopt a rule for administrative procedure for commingling of production in the wellbore as one of the next steps, which the Commission must take in order that the oil and the gas operations of our State continue in many of the pools which are now reaching economic limit. We did attempt to putout a few matters which we feel are important. As you recall, I believe Continental Oil Company introduced the use of downhole assembly as the first operator in the State to use that. It was up in Northwest New Mexico, and has proved quite satisfactory. There are certain problems, as were outlined by Mr. Lyon, in connection with the use of this equipment, and I think those problems must be borne in mind by the Commission when it adopts any order.

We are really dealing with an economic problem. As was pointed out by Mr. Nutter, what we are talking about is the conservation of oil in our State, and production of the greatest ultimate recovery, which is shown by his cross hatched area in his Exhibit. This is of importance to the States, and it will avoid premature abandonment of our wells.

Now, we do feel, however, that if the order is unduly restrictive, it will lose its purpose. In that connection, in particular, we would propose that rather than saying if you are commingling between two common reservoirs without downhole separation that one zone be at least 90 percent of the pressure of the other, just leave that percentage out, and consider the matter solely on the information that is submitted to the Commission, which would deal with the type of reservoir we are in, and the nature of fluids. As Mr. Lyons testified, the presence of water would cause a problem. These are far more important, actually, than 10 percent differential, in our opinion. Since these are marginal wells, they are going to be producing most of the time, and the producing pressures are going

to be less than those in the zones involved. Normally, in depleted reservoirs, your pressures are going to be low, anyway. This becomes more important when we consider it in the use of dual downhole choke assemblies. Actually, here again, as a normal thing, thepressures are going to be low. It is the number of pounds that will be important, and there again, I think the pressure information submitted to the Commission should govern, rather than saying a 25 percent differential, because we don't feel that 25 percent is significant in this.

We do urge the Commission the adoption of administrative procedure for downhole commingling, both with separation of the two zones or without separation, as may be indicated, and in compliance with the Commission's Rules.

MR. PORTER: Does anyone else have any statement?

MR. SELINGER: George W. Selinger, representing Skelly Oil Company. We concur in the principle of administrative approval of commingling. We are

inclined to believe that the percentage figures indicated in Class I and Class II, as to types should be equal, should be the same. We think there should be some measure of standards made applicable so that all operators will be given notice as to what the administrative procedures will be. I think that should include the eligibility for administrative approval. I believe that the single initial testing of the low wells, and the periodic tests not earlier or sooner than annual, would be adequate.

The only other comment I wish to make is with respect to paragraph J on Page 2 regarding a statement that all the offset operators and royalty owners have been notified in writing. We believe that since it is an operating problem, we don't believe that the royalty owner is interested as such, and it is an additional burden on the operator to attempt to notify all the royalty owners. The protection is already secured in Section 10 or paragraph G of the Order, in which a statement is made that all interests are common. The additional burden of notification is

becoming quite burdensome on all administrative procedures before the State Regulatory Agency, and we would like to start cutting down on some of the paper work.

MR. PORTER: Does anyone else have any statement?

If there is nothing further to be offered in this case, the Commission will take it under advisement.

I N D E X

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

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