BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 7, 1962

EXAMINER HEARING

IN THE MATTER OF:

Application of Tenneco Oil Company for an exception to Rule 21-a of Order No. R-1670, Basin-Dakota Gas Pool, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to commingle the gas production from two wells in the Basin-Dakota Gas Pool located on the H. O. Watson Lease in Section 22, Township 27 North, Range 12 West, San Juan County, New Mexico, as an exception to the provisions of Rule 21-a of the Rules for the prorated gas pools of Northwestern New Mexico, Order No. R-1670. Applicant proposes to install one common tank battery and separating facility and to allocate monthly gas production to each well on the basis of deliverability tests and average flowing tubing pressures.

Case 2572

BEFORE: Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

MR. NUTTER: We will call Case 2572.

MR. MORRIS: Application of Tenneco Oil Company for an exception to Rule 21-a of Order No. R-1670, Basin-Dakota Gas Pool, San Juan County, New Mexico.

MR. HINKLE: Clarence Hinkle, Hervey, Dow & Hinkle, Roswell, representing Tenneco Oil Company. We have one witness, Mr. Jerry Lacey.

(Witness sworn.)

MR. HINKLE: We have seven exhibits.

(Whereupon, Tenneco's Exhibits Nos. 1 through 7 were marked for identification.)

JOHN J. LACEY

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q Your name is John Jerry Lacey?

A Yes, it is, Lacey.

Q You are employed by the Tenneco Oil Company?

A Yes, I am.

Q In what capacity?

A I am employed as District Engineer in their Durango District Office, which includes the San Juan Basin, Northwestern New Mexico.

Q Are you familiar with the development in the San Juan Basin?

A Yes, I am.

Q Particularly in connection with the Basin-Dakota Gas Pool?

A Yes, I am.

Q Have you previously testified before the Commission?

A Yes, I have.

Q You are an engineer?

A Yes, I am a graduate engineer from the University of Oklahoma.

Q State briefly to the Commission what the purpose of this particular application is.

A Tenneco Oil Company is requesting an exception to Rule 21-a of Order R-1670, and we are asking that two Basin-Dakota Pool wells, their gas production be commingled through one single separating and metering facility, and that the production from each well be allocated back on the basis of their deliverability tests.

Q Refer to Tenneco's Exhibit No. 1 and explain to the Commission what it shows.

A Exhibit No. 1 is a plat showing the location of the wells and the base lease upon which they are located. It also shows the location of offset wells and the operators and leases of these offset wells.

I might point out that the base lease colored in red is one

common base lease with a common working interest and royalty interest for both wells.

Q What is the character of this land? Is it a fee or federal?

A This is a federal lease, a basic federal lease.

Q Is the ownership common as far as the working interest owners and the royalty owners are concerned?

A Yes, it is. It has a common working interest and royalty interest on the entire Section 22.

Q And it shows the location of the two wells?

A Yes. It shows the location of Tenneco Oil Company's H. O. Watson No. 1 and No. 2. It also shows schematically a diagram of how we propose to commingle this gas and condensate production from the two wells.

Q Are these two wells regularly located?

A Yes, they are. They are both normal with respect to the Basin-Dakota Pool.

Q What is the spacing in the Basin-Dakota?

A 320 acres per well.

Q There's one well on each of the 320 acres?

A Yes.

Q Standard proration units? A Yes.

Q What are the depths of these wells?

A The depth of the two wells, the No. 1 is total depth of 6100 and the depth of the No. 2 well is 6040 feet.

Q Are they both producing from the Basin-Dakota Pool?

A Both wells are completed in the common reservoir and are producing from a sand which exists in both wells.

Q Are these wells essentially the same characteristics as far as their producing formations are concerned?

A Yes, they are. I would say that these two wells are typical in every respect to the Basin-Dakota Pool?

Q Are these top allowable wells, that is, would they be?

A Well, they will be top allowable with respect to what their deliverability will be.

Q In that connection are they on production as yet?

A No. These two wells were completed in the summer and fall of 1961, at which time a potential absolute open flow three-hour potential test was taken and they have been shut in since that time and have not produced and are not yet connected to a pipe line.

Q How far is the pipe line company from the wells at the present time, that is the pipe line?

A I'm not sure.

Q It is in the immediate area?

A I believe that there are some wells in the vicinity

that are connected.

Q Where it can be connected and El Paso is the purchaser in that area?

A Yes.

Q El Paso Natural Gas?

A El Paso, and I don't know if Southern Union is connected to some of the wells in that area or not. I guess El Paso is the purchaser in that area.

Q Now, refer to Tenneco's Exhibit No. 2 and explain what that shows.

A Exhibit No. 2 shows the basic data of the potential test on the H. O. Watson No. 1. This test is taken in conformance with the New Mexico Oil Conservation Commission regulations three-hour test with a flow rate measured at the end of three hours through a 3/4" choke, 2.785 million feet per day, and open flow of 3.286, and shut-in pressure of 2,017 psig. Since the wells have not yet been connected to a pipe line, there is no deliverability data available.

Q Let me interrupt you there. Were the tests made in accordance with the Oil Conservation Commission regulations?

A Yes, they were.

Q On both this well and the No. 2 well?

A Yes, sir. Both wells were, potential tests on both

wells taken in accordance with the New Mexico rules of the Oil Conservation Commission.

Q Go ahead.

A Since the wells have not yet been connected to a pipe line, there is no actual deliverability test data available on either of the two wells, and for purposes of this exhibit and the following ones we have estimated what we think might be typical data from these wells when they do have a deliverability test.

We have estimated a flow rate on hypothetical deliverability test of 1078 MCF per day, a flowing tubing pressure P_t of 600 psia, and P_{c_2} 7-day shut-in surface pressure of 1500 psia; the calculated P_{w_2} which would consider the friction losses through the tubing would be 619 psia, as you would calculate it on the New Mexico Conservation Commission Form C-122, and P_d which is --

Q Which is in accordance with the formula?

A Yes. This data would result in a calculated deliverability of 1000 MCF per day.

Q What does this exhibit show?

A Well, essentially this exhibit shows that the potential data on the well indicates that it is below average Dakota wells as far as potential and ability to produce, and the rest of the data has been assumed to show what typically might be expected.

Q Although the well will make its allowable at the

present time, it is a very low normal well in the Basin-Dakota field?

A Yes, it is.

Q Now, refer to Tenneco's Exhibit 3 and explain that.

A Exhibit 3 is a plot of this deliverability data on log log papers with the vertical scale being the P_c^2 minus the P_w^2 and the horizontal scale on the bottom being the flow rate of the well in MCF per day plotted on log log papers. Basically this exhibit shows the relationship between flow rate of the well and its flowing pressure.

Similarly, Exhibit 4 shows the potential test data on the H. O. Watson No. 2, which shows that this well is slightly smaller capacity than the H. O. Watson No. 1. The estimated deliverability test is similar in all respects as the estimated deliverability test --

Q This has all been computed on the same basis as the No. 1 Well, Exhibit No. 2?

A Yes. And Exhibit 5 is a companion graphical representation of this deliverability data on a log log plat.

Q The same explanation of No. 3 applies to No. 5?

A Yes.

Q Now, refer to Exhibit No. 6.

A Exhibit No. 6 shows the relationship of flow rate,

calculated flow rate versus P_w and what the flow rate would be versus the surface flowing tubing pressure, which neglects the friction calculations that are normally incorporated in the P_w.

It shows basically that at low flow rates, neglecting friction calculations through the tubing does not introduce an appreciable error in what is the flow rate, using the surface flowing tubing pressure and what the flow rate would be using the actual P_w.

Q Essentially what does the exhibit show?

A It shows that under the normal flow rates that we would probably encounter from this well, which is the H. O. Watson No. 1, that estimating the well's flow rate, based on its surface flowing tubing pressure, would not be substantially different than what it would be if we considered the friction calculations.

Q Any further comment on No. 6? If not, refer to Exhibit No. 7 and explain that.

A Exhibit No. 7 is an example of how we propose to allocate production to each well for a month using a hypothetical example.

Q Due to the fact that these wells have not been on production?

A Right. The example shows, assume, for example, that we produce a total of 50 million cubic feet from the two wells

through a common metering facility for the month of June, and that the average flowing tubing pressure on Well No. 1 is 770 psia for the month and that the average flowing tubing pressure on Well No. 2 is 790 psia, average for the month, then, for Well No. 1, using the P_c from the assumed deliverability test data, P_c^2 minus the P_t^2 would result in a value of 1,656,000.

I might point out here that all of these numbers are slide rule accuracy, they haven't been calculated out to the last exact number for simplification.

Then, going to Exhibit No. 3 with this value of 1,656,000 and entering on the vertical scale on the left-hand side, you would come across horizontally until you hit the solid line which has a slope of .75, which is normally used in the Basin-Dakota Pool. And then dropping down vertically to the flow scale you would calculate an average flow rate of say 980 MCF per day for that well during the month.

Similarly, we would go to Well No. 1, and using the P_c from its hypothetical deliverability test squared minus its average flowing tubing pressure for the month squared, we would have a value of 1,197,000.

Going to, I think I've used the wrong exhibits, 3 and 5 were the wrong data, but going to the Exhibit 3, actually, in this case, which is the deliverability test for Well No. 1, and

coming across vertically from the 1,197,000 and hitting the dashed line, and then dropping down to the Q we would have an average Q for this well of 670 MCF per day.

The 50 million cubic feet, which is the production from the two wells for the month, would be allocated on the fraction, in other words, the average flow rate of Q_1, which is 980 times days produced over the denominator of the average flow rate of Well No. 1 times days produced, plus the average Well No. 2 times day produced, times total production from the two wells, which would result in a fraction times 50,000, which would equal 29,700,000 cubic feet allocated to Well No. 1.

The Well No. 2, the production allocated to Well No. 2 would then, the average flow rate from Well No. 2 times days produced over the denominator of average flow rate from Well No. 2, times days produced, plus the average flow rate of Well No. 1, times days produced, times the total production from both wells suring the month, which would be a fraction times the total production from the two wells during the month, which would equal 20,300,000 cubic feet.

Q They, together, would be 50,000?

A Then the sum of the two allocated productions of the two wells would equal the total production from the two wells that would actually be metered.

Q Would this method of allocation give Tenneco advantage as far as allowable is concerned?

A No, it would not, since the total production from the two wells would have to be against the total allowable of the two wells for the month.

Q In your opinion would this method of allocation in any way violate any of the conservation rules or regulations with respect to prevention of waste or protection of correlative rights?

A No, I don't believe it would.

Q Do you have any further comment with respect to any of these exhibits?

A No, these exhibits were prepared primarily to show the method that we propose to use, since there is no actual data available.

Q Were they prepared by you or under your direction?

A Yes, sir, they were.

MR. HINKLE: I would like to offer in evidence Exhibits 1 through 7.

MR. NUTTER: Tenneco's Exhibits 1 through 7 will be admitted in evidence.

Q (By Mr. Hinkle) What additional equipment, if any, would be necessary to use in connection with an allocation of

this kind as far as these two wells are concerned?

A Well, the equipment, additional equipment above and beyond what would normally be used would be two recording pressure gauges measuring the flowing tubing pressure on each well. That would be the only additional equipment.

Q What equipment would be necessary for these two wells to make an allocation of this kind?

A Well, normally Basin-Dakota wells there's a flow line from the well to a line heater and a high pressure three-phase two-stage separator and condensate tanks.

Q That's necessary in connection with any well?

A With any Basin-Dakota well, yes. We propose in this case to set just one high pressure line heater and high pressure separator.

Q So that you would eliminate one set?

A Yes, we would, and like I say, the additional equipment would be two recording pressure gauges for each well.

Q In your opinion, by this method of allocation, can you determine within a good degree of accuracy the production from each well and measure it and record it and report it?

A I would say that this method of allocating production back to the two wells on the basis of their deliverability test and flowing tubing pressure will reasonably represent the actual

production from each well, although it's not a hundred percent accurate since there has been some assumptions made.

Q What are the actual advantages to be gained by the use of a method of this kind?

A Where wells exist on a common base lease, where royalty and working interests are the same, it will permit us to lower our capital investment in surface production equipment. Normally a Basin-Dakota well requires the operator to spend a sum of money from eight to ten thousand dollars for this high pressure line heater and separator, and tank battery. In this case we will have just one unit for the two wells, which would result in a saving from four to five thousand dollars per well.

In addition to our saving, it will save the pipe line company a considerable sum of money since normally Basin-Dakota wells require that they set a dehydrator at an approximate cost of forty-five to fifty thousand dollars and a meter run of one hundred to fifteen hundred dollars, plus the laying of lateral lines to each well. So that the total saving represented by both the operator and the pipe line company is considerable.

Q Well, it would be in the neighborhood of $10,000.00?

A Per well.

Q That is four or five thousand to the operator per well and four or five thousand for the purchaser?

A That is correct.

Q That would prevent a duplication of capital investment?

A Yes, it would.

Q And, at the same time, as far as the state is concerned and the Conservation Commission is concerned, they would have substantially as good record of the production as they would before?

A Basically, yes, that the records would be essentially accurate on the production from each well on this basis.

Q Now, is there any alternative method by which this same allocation could be accomplished?

A Yes, sir, there is. There are at least two other methods by which this same thing might be accomplished. One method might be to alternately produce the two wells in this case, since their ability to produce now and for a considerable time in the future is well above their allowable, we could produce one well for say fifteen or sixteen days of the month, shut it in and then produce the other well.

Q When you say produce for fifteen or sixteen days, you mean it would produce at an allowable equal to what both wells would normally have?

A No. I'm saying here that we would just produce each well distinctly and separately from the other.

Q Yes, but at a rate which would be equal --

A Well, at a rate whatever the pipe line is taking. Normally the wells are produced at a rate over their actual daily allowable rate.

Q But that means that whatever rate the pipe line company would normally take from both wells?

A Well, no.

Q Not necessarily?

A No, the wells under this alternate producing method, each well would be produced distinctly and separately without regard to the other well.

Q Just half the time?

A Just half of the time. The other method that might be employed would be to install a wet stream meter run on one of the wells and actually meter the wet stream, which would be both gas and condensate in the gaseous phase, and by simple difference from the pipe line meter run, attribute production to the second one.

Q In other words, the difference would be the runs from the other well?

A Yes.

Q Would that be accurate?

A Yes, that should be a fairly accurate method. This

method is actually permitted in other states with regulatory rules regarding gas production.

Q Could you effect the same saving by that method in capital investment?

A Well, the saving would not be quite as large as the proposed method of allocating production on deliverability test. However, the investment for a meter run would only be twelve or fifteen hundred dollars per well.

Q It would be essentially the same except for the investment and cost of the meter?

A Right.

Q Which would be around twelve or fifteen hundred dollars?

A For a meter. I might add that these wells, although they are not marginal, they are below average and we are talking about saving a considerable amount of money to the operator that he must pay out ultimately from the production of the wells. This method of commingling will permit a lower investment for the operator of five to ten percent, and it will make more attractively, from an economic standpoint, the development of leases that are below average by reducing the investment required.

Q Well, it's in line with the savings that have been effected by somewhat the same method as far as oil production is concerned?

A This is correct. Similar savings, of course, can be obtained in oil production where the Commission has established rules in permitting commingling across leases, and from separate zones by minimizing the duplication of production equipment.

Q So far as you know the only exception that is necessary to permit a setup of this kind is in connection with Rule 21-a of Order R-1670 of the Commission?

A As far as I'm aware, this is the only regulation.

Q And that rule simply requires the measurement of each well separately?

A That the gas from each well should be metered separately, that's correct.

MR. HINKLE: I believe that's all that we have.

MR. NUTTER: Are there any questions of Mr. Lacey?

MR. UTZ: Yes, sir, I have some.

MR. NUTTER: Mr. Utz.

CROSS EXAMINATION

BY MR. UTZ:

Q Referring to your Exhibits 2 and 4, this potential test data is a three-hour test?

A Yes.

Q How did you estimate your deliverability data on the basis of that three-hour test, or did you use some other method?

A Well, normally our experience has indicated that an initial deliverability test will be approximately fifteen to thirty percent of the open flow.

Q So you have made an adjustment from your three-hour test?

A Well, we've approximated our deliverability on that basis. However, it could be either more or less. There are exceptions to this.

Q Now, the method, as I understand it, that you intend to use is to use this curve which is shown on your Exhibits 3 and 5 which establishes the characteristic slope for the well, based on a deliverability test?

A Well, the deliverability test as taken under the Commission rules does not establish a slope, as I understand it, but the value has been arbitrarily used.

Q So that you would reposition that slope each year?

A Yes, with each deliverability test, I might point out here that the deliverability test will necessarily require that one well is shut in while the test is taken on the other.

Q Yes, sir.

A With each new deliverability test we would have a new data and a new plot on which to allocate production.

Q And you would estimate the flow from each well based

on the difference of squares, using your flowing tubing pressure?

A Yes.

Q Rather than your P_w?

A Rather than your P_w, yes, that is correct.

Q Apply it to the characteristic slope which would be revised each year?

A Yes, sir, that is correct. That's how we propose to do it.

Q Then additional adjustment would be made on the basis of days produced?

A Yes, sir.

Q What type of a meter is a wet stream meter?

A Well, I'm not too familiar with wet stream metering, although I do know it is done. Normally I think wet stream metering can be just a conventional orifice meter with a meter run. However, there are mass flow meters which are available, which I understand are rather expensive, that probably could be applicable.

Q Then, by your term of wet stream metering, simply means you use a conventional meter to measure the wet gas rather than separate it prior to metering?

A Yes, sir, that's my definition of the term wet stream metering.

Q That would run what, around $1200.00?

A Normally I would say the meter run with all the equipment necessary to go with it would be approximately twelve to fifteen hundred dollars.

Q Then the only innacuracy that would be involved in that type of metering, would that be due to the liquids in the gas?

A Yes, sir. Like I say, I'm not too familiar with wet stream metering, but if two-phase flow liquid and gaseous flow exist simultaneously, there would be some air introduced to it.

Q Yes. With your first alternate or second alternate, I believe it was, where you produce the wells alternately during the month. In other words, you would produce the allowable from No. 1 and shut it in and produce the allowable from No. 2, that would be satisfactory until the wells declined or until the allowable increased, at which time you would have to, in order to produce your allowable, you would have to produce two of them at one time, wouldn't you?

A Yes, sir. That first alternate method would only be applicable during the period while the wells had producing ca at least twice their allowable. However, based on the curre trend of allowables, the number of additional wells that ar being drilled and completed in that Basin-Dakota Pool, we think a substantial part of the reserves might be produced that method before they would have decreased to the point

A Normally I would say the meter run with all the equipment necessary to go with it would be approximately twelve to fifteen hundred dollars.

Q Then the only innacuracy that would be involved in that type of metering, would that be due to the liquids in the gas?

A Yes, sir. Like I say, I'm not too familiar with wet stream metering, but if two-phase flow liquid and gaseous flow exist simultaneously, there would be some air introduced to it.

Q Yes. With your first alternate or second alternate, I believe it was, where you produce the wells alternately during the month. In other words, you would produce the allowable from No. 1 and shut it in and produce the allowable from No. 2, that would be satisfactory until the wells declined or until the allowable increased, at which time you would have to, in order to produce your allowable, you would have to produce two of them at one time, wouldn't you?

A Yes, sir. That first alternate method would only be applicable during the period while the wells had producing capacity at least twice their allowable. However, based on the current trend of allowables, the number of additional wells that are being drilled and completed in that Basin-Dakota Pool, we feel that a substantial part of the reserves might be produced under that method before they would have decreased to the point where

they could no longer produce their allowable in half a month.

Q At least for three or four years?

A Yes, sir.

MR. UTZ: I don't believe I have any more questions.

BY MR. NUTTER:

Q Mr. Lacy, in saying that P_t is the equivalent of P_w, you are making that assumption based on your calculations here on Exhibit No. 6, is that correct?

A Yes, sir. The nomenclature or the symbol there should indicate approximately equal to and where the flow rates are low. In other words, where the factors used in calculating the friction losses are such and the flow rate is low, it represents just a small difference.

Q These wells are producing through 2-3/8" tubing?

A Yes, they are.

Q So your friction loss is relatively low at a low Q?

A Yes, that is correct.

Q Would the computation of this allocation of allowable be changed at all? I notice in your example both wells produced thirty days. If one well produced a fraction of a month and the other well produced a fraction, would that change the computation?

A Well, in determining the fraction on which to multiply the total production from the two wells, that fraction would

include the days produced, that each well produced in it, so that we would consider the number of days, in other words, if both wells produce the same number of days, the ratio is strictly a function of their flow rates. However, if the one well produced fifteen days and the other well thirty days, that would go into the fraction that I've illustrated here on the example.

Q Without running through it, I wondered if the numerator would change in the same proportion as the denominator if you changed the number of producing days of a well.

A Well, I don't know without actually doing it to see what it would do.

MR. NUTTER: Any further questions of Mr. Lacey? I have one more.

BY MR. NUTTER:

Q This method of making this computation each month would be rather time-consuming, would it not? Have you estimated how much time it would take?

A Well, if the figures were drawn similar to Exhibits 3 and 5 for each well, I think, and the average flowing tubing pressure was used, I think that the computation wouldn't be too long.

Q You think an actual cost to your company would be cheaper to do it by this calculating method rather than use a wet stream

meter?

A Well, I believe that a qualified person doing something routine and over a period of time, that he could do it rather rapidly. That we might not be talking about more than five or ten minutes to perform this calculation, and we would propose to submit to the Commission with our C-115 something similar to our Exhibit 7, showing the basis by which we allocated the production.

MR. HINKLE: In other words, you would do the calculation rather than the Commission?

A Yes, we would.

MR. HINKLE: And submit it with your reports?

A Yes, sir.

Q (By Mr. Nutter) And each well would have a pressure recorder?

A Yes, sir.

Q And you would have a chart for the pressure for the month for each well?

A Yes, sir, we would.

Q Would that also be submitted?

A Well, depending on what the Commission might require, we would submit all or any data that the Commission sees fit to have filed.

MR. NUTTER: That's all I have. Any further questions

of Mr. Lacey? He may be excused. Do you have anything further, Mr. Hinkle?

MR. HINKLE: That's all.

MR. NUTTER: Does anyone have anything to offer in Case 2572?

MR. RAINEY: D. H. Rainey, El Paso Natural Gas Company. El Paso is, of course, always interested in saving money, both for themselves and for operators. It appears that the proposal made hereby Tenneco is both feasible and would result in such a saving. We estimate it would result in a saving of several thousand dollars for El Paso facilities in connection with these wells.

The proposal made as to means of allocation as to production to each of the wells after the metering of the combined stream appears to be feasible and reasonably accurate. Therefore, El Paso urges that the application be granted.

MR. NUTTER: Thank you. Anything else? We'll take the case under advisement and call Case 2573.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 21st day of June, 1962.

Ada Dearnley
Notary Public-Court Reporter

My commission expires:

June 19, 1963.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2572, heard by me on June 7, 1962.

....., Examiner
New Mexico Oil Conservation Commission