STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

25 May 1988

EXAMINER HEARING

IN THE MATTER OF:

Application of Tenneco Oil Company for exceptions to Rule 2(b) of the special rules governing the Blanco Mesaverde Pool, infill well findings, and five unorthodox gas well locations, San Juan County, New Mexico. CASE 9393

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

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I N D E X

I N D E X CONT'D

E X H I B I T S

E X H I B I T S CONT'D

MR. STOGNER: Call next Case Number 9393.

MR. ROYBAL: Case 9393. Application of Tenneco Oil Company for exceptions to Rule 2(b) of the special rules governing the Blanco Mesaverde Pool, infill well findings, and five unorthodox well locations, San Juan County, New Mexico.

MR. STOGNER: Call for appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin from the Santa Fe law firm of Kellahin, Kellahin & Aubrey.

I'm appearing in association with Mr. David Motloch. His name is spelled M-O-T-L-O-C-H. Mr. Motloch and I represent Tenneco Oil Company and we have two witnesses to present.

MR. STOGNER: Are there any other appearances in this matter?

MR. LUND: Mr. Examiner, Kent Lund on behalf of Amoco Production Company and at the appropriate point we'd like to just make a quick statement setting forth the basis for our non-objection to the application.

MR. STOGNER: When will I know

when it's appropriate?

MR. LUND: Whenever it's appropriate for you.

MR. STOGNER: Okay. I take it that it will be a closing statement you would like.

MR. LUND: That would be fine.

MR. BRUCE: Mr. Examiner, I'm Jim Bruce from the Hinkle Law Firm in Santa Fe, representing Kimbark, K-I-M-B-A-R-K, Oil and Gas Company.

I have no witnesses.

MR. STOGNER: Mr. Bruce, may I ask you what Kimbark Oil and Gas is affiliated with this particular case?

MR. BRUCE: I believe they're an offset operator.

MR. STOGNER: Offset operator. To all the well or to one particular well?

MR. BRUCE: Several wells.

MR. STOGNER: To several wells.

Are there any other appearances in this matter?

Will the witnesses please stand and be sworn at this time.

(Witnesses sworn.)

MR. KELLAHIN: Mr. Examiner, I'm presenting two witnesses for you this afternoon.

The first witness is Mr. Tim Hower. It's H-O-W-E-R. Mr. Hower is a reservoir engineer with Tenneco.

The second witness is Mr. Mike Decker. Mr. Decker is a petroleum geologist with Tenneco.

These gentlemen are presenting a request by which they have reached the opinion that the original well drilled in certain selected Blanco Mesaverde spacing units, because they were open hole completions are not effectively and efficiently draining that portion of the spacing unit.

Mr. Hower has developed an engineering presentation to describe for you the nature and extent of the problem, and as part of his proposed solution we are seeking in this application appropriate NGPA findings from the OCD as the jurisdictional agency by which then we can drill what we have described as a second infill well.

So that the vocabulary is clear among us, when we describe the second infill well we are talking about drilling a well in the same 160-acre portion of the 320-acre unit as the original well.

The third well is then adjacent

to the original well in that 160. In each instance the opposite 160 already has an existing infill well in the traditional sense.

The exhibit book that's to be discussed has been prepared by these gentlemen. The geologic exhibit is the last display in the exhibit book and we have put that on the wall of the hearing room.

MR. STOGNER: Mr. Kellahin, before we get started with the -- with your first witness, how many of these wells -- we have -- you have sixteen, is that right?

MR. KELLAHIN: Yes sir.

MR. STOGNER: And how many of these are on Federal acreage?

MR. KELLAHIN: I believe they are all on Federal acreage, Mr. Examiner.

MR. STOGNER: Okay. Now, just to clarify a certain matter, we're the jurisdictional agency as far as the NGPA status on State and fee lands.

How was it -- could you kind of go over why we got involved in this?

MR. KELLAHIN: Yes, sir. My recollection is that we discussed the processing of the application with the Bureau of Land Management. The gentleman's name in Albuquerque escapes me for the moment but I

will find it shortly.

MR. STOGNER: Would that be Allen Buckingham?

MR. KELLAHIN: Yes, sir.

MR. STOGNER: Okay.

MR. KELLAHIN: We've discussed with Mr. Buckingham what his requirements were for drilling a second infill well in the Blanco Mesaverde Pool, and he told us that it was his opinion that he would process the application provided it was a traditional infill well in the typical sense, and we would then attach a copy of the Blanco Mesaverde infill order and -- and submit that application after the well was drilled.

We discussed with him the unusual instance of having to drill a second infill well in the same 160 with the original well. He said that he did not feel comfortable, nor did he have a process available by which he could conduct a hearing or an administrative procedure where he would take the engineering and geologic evidence, then, upon which to make the fundamental determination that this second infill well is a necessary well in order to effectively and efficiently drain that spacing unit, and it was based upon his recommendation to Tenneco that we have filed this application before the Oil Conservation Division. Notwithstanding the fact this is on Federal proper-

ties, they have -- the BLM has requested the assistance of the hearing procedures utilized by the Oil Conservation Division in order to take objections, take testimony, and to make that fundamental finding.

As ancillary issues to that hearing, it is also necessary for us to have either an exemption or specific findings dealing with the fact that this is a third well on a 320-acre spacing unit.

And then, finally we have a problem with the Blanco Mesaverde Pool rules because in each instance it requires that the infill well be on the opposite 160, and that's not the case.

Further, on well locations we have some of these wells that are outside the drilling window for a well in the 320 acres, so they are unorthodox locations, if you will.

As to that, there are four wells that will be closer to the outer boundaries than the current Blanco Mesaverde rules allow with the exception of doing it by notice and hearing or obtaining waivers.

MR. STOGNER: Don't you mean five?

MR. KELLAHIN: No, sir. We perhaps need to check with you on these. It's our witness' opinion that he thinks there are four and at the appropriate

time we need to double check because some of these may or may not be unorthodox.

What we propose to do is -- it may require us to readvertise or schedule a separate hearing to handle the unorthodox location portions of the case, but the real reason we've here is to present to you a case on the NGPA issue of whether these wells are in fact required in order to develop the spacing unit, and the existing well, if it is in fact in each instance not effectively and efficiently draining the spacing unit.

MR. STOGNER: Okay, so to sum it up, the main reason we're here is to get an finding -- an effective and efficient finding to satisfy the FERC rules and regulations so an NGPA application -- determination can be made by the US BLM to send to the FERC in Washington, is that correct?

MR. KELLAHIN: That's true.

MR. STOGNER: All right.

MR. KELLAHIN: The existing administrative procedures dont' handle this problem. We want the finding prior to drilling the second infill well and the BLM, as -- as the manager of the properties is not in a position to give us a hearing by which those findings can be made.

MR. STOGNER: All right, then

please continue, Mr. Kellahin.

MR. ROYBAL: Well, Mr. Kellahin, what the Hearing Examiner and I were discussing, the conclusion, and I think we agree with your presentation that even though this is a BLM determination, that there is a sufficient jurisdictional basis for the State to be conducting this hearing based on the presentation that you made earlier. There are questions that we can hook onto and hold this hearing and help make the determinations you need but there is State -- State question that is sufficient, and I think the hearing officer agrees with me about that.

MR. KELLAHIN: Thank you, Mr. Roybal.

As long as we're having preliminary discussion, let me raise with you the discussions I have had with Amoco and their representatives so that you understand that their -- what their interest is in the case.

It is not our purpose and not our intent to demonstrate to you that there is any need for changing the spacing in the Mesaverde reservoir. We believe that the existing rules are adequate.

The reason we're here is because of the unique problem with certain open hole completions.

The concern of Amoco was that

they did not want to have to complete as an offset operator against three wells, all producing concurrently, and that's not our desire.

We have proposed, then, that in language of the hearing or in the order, we will not produce either the original well or the infill well on that 160 acres within the same month. Now, the reason for doing that is operational so that we want the flexibility of being able to produce the -- some portion of the allowable out of the original well, say, in the month of September.

In the month of October if we decide that we want to produce it out of the new second infill well, we will have the ability to do that. Operationally, Tenneco believes that that will work.

In terms of assigning the allowable, we've talked to Mr. Chavez in the District about how to calculate the allowable for that spacing unit. It is our understanding that we will take deliverability tests, meeting the OCD schedule on deliverability tests. We will then take the highest deliverability of the original well or the second infill well, and that deliverability, then, is used to calculate the allowable for the 320-acre spacing unit, along with the deliverability of the first infill well.

So we're not seeking to in-

crease our allowable based upon three wells, nor do we desire to produce simultaneously the two wells in the same 160, and that was the concern that Amoco expressed to us, and we though operationally we could avoid giving them a concern about either draining their acreage or producing an amount in excess of the unit allowable.

MR. STOGNER: Mr. Kellahin, am I to assume that, say, one month you will be producing the original well and the next month you'll be producing this third well?

MR. KELLAHIN: I'm not sure if that will be the operation.

What we want is the flexibility to do that.

MR. STOGNER: Okay.

TIM HOWER,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Hower, for the record would you please state your name and occupation?

A Yeah. Tim Hower. I'm a reservoir en-

gineer with Tenneco in Denver.

Q Mr. Hower, have you previously testified before the Division as a petroleum engineer?

A Yes, sir.

Q The package of exhibits that we have shown to the Examiner, does that package of exhibits contain your work product on this project?

A Yes.

Q And as an engineer have you reached certain opinions and conclusions with regards to whether or not certain of these Blanco Mesaverde spacing units are being effectively and efficiently drained by the existing original Mesaverde well?

A Yes, I have.

Q Let me, let me ask you, sir, how long have you studied this particular project for your company?

A Off and on for at least a year, over a year, we have looked at this, probably a year and a half.

Q Would you describe for the Examiner what, in fact, is the problem that you've discovered.

A We've identified a certain type of Blanco Mesaverde well that we feel is not effectively and efficiently draining its portion of a proration unit.

Q The wells we're talking about were typically drilled between 1951 and 1955 by El Paso at that time

and were completed open hole using either nitroglycerin or a sand/oil frac on the formation.

The wells that we're bringing to the Examiner's attention today are now operated by Tenneco and it is this open hole completion technique that we feel is the cause for the inefficient and ineffective production.

We feel that cased wells that are fractured, completed with conventional fracture techniques are much more efficient.

MR. KELLAHIN: At this point, Mr. Examiner, we'll tender Mr. Hower as an expert petroleum engineer.

MR. STOGNER: Mr. Hower is so qualified.

Q Mr. Hower, would you summarize for us what you're asking the Division to do for you in this application?

A We're seeking the Commission's finding that a second well, a second infill well as previously defined, is necessary to effectively and efficiently drain the proration unit.

At this point we don't have an order that serves our needs. Without the approval of the Commission we would have to plug and abandon the existing original producing well before drilling this second well we're discus-

sing and that's not acceptable to us at this time.

In addition, we would like the Commission to approve the locations as best we know them because in certain instances the locations are unorthodox and in all instances it is -- the wells are on the same 160 as the original well, not the opposite 160 as is normally the case.

Q Let me direct your attention now, Mr. Hower, to the package of exhibits that we have filed here and ask you if you can give us a specific example that illustrates the problem with these old Mesaverde wells that were drilled as open hole completions.

A Yes. If I could ask you to turn to Exhibit Number Three.

What Exhibit Number Three represents is data taken from 60 long term pressure build-ups from 38 different wells that were conducted between 1956 and 1962 by El Paso.

These build-ups were -- range from anywhere from several weeks to several years and were conducted long enough so that a final, fully built up pressure could be obtained on these wells, so they're much longer than the traditional 7-day build-up that is normally the case.

The data are sorted in ascending order by the delta pressure term, which is the second column from the right, and what I'd like to point out is the -- the comple-

tion type, if you look at completion type, which is the second column from the left, how the data segregate when sorted in this manner. What we feel is the cause here is the open hole wells are -- have a damage zone around the wellbore that is not present in the cased and fraced wells and what's going on is -- is that -- well, first of all, let me explain the delta pressure term.

The delta pressure term represents a difference between the pressure after 7 days, so that would be normally recorded from a 7-day build-up, and the final, fully built up P-star term.

Q The delta pressure term is the second column from the right --

A That's correct.

Q -- of your tabulation?

A That's correct. So those wells with the smallest delta pressure would have, you know, have gotten very close to their final, fully built up pressure, whereas, the wells with the largest delta pressures had quite a long way to go after the 7-day shut-in.

Q All right, do it again slower for me. What is P-star?

A Okay, P-star represents the fully built up reservoir pressure. This is a pressure that was taken, calculated from when these wells were building up they

finally achieved straight line behavior on a Horner plot and from that data a final, fully built-up pressure or P-star could be calculated. This pressure represents the pressure in the reservoir after accounting for the withdrawals of that well itself. So it represents a pressure in the reservoir, a final, fully built-up pressure. If you were able to discount the withdrawals of that well itself, of course, you are accounting then for the withdrawals from all the surrounding wells.

Q Was this information that was utilized by El Paso Natural Gas when they conducted before the Oil Conservation Commission the original hearings that resulted in the infill orders for this reservoir?

A Yes, and the -- the P-stars were calculated by a Mr. vanEverdingen, who gave testimony --

Q In reviewing this information, Mr. Hower, what were the ranges of times that the wells were shut in to obtain what you characterize as a straight line plot of the pressure on the Horner plot?

A They were -- the wells were shut in from a period of several weeks to several years, if need be. There's quite a range.

Q In fact, some of those wells were shut in over 4 years.

A That's correct.

Q Are you satisifed as an engineer in reviewing that information, that you're dealing with accurate pressure data that you're dealing with accurate presssure data that can be relied upon?

A Yes. Yes, I am.

Q All right. You've described for us the P-star. Now, again, what's the delta P value?

A The delta P value, then, represents a difference between P-star and the pressure after your 7-day build-up, which is normally what's required by the State.

Q All right, and what did you see?

A When we sorted these, as I mentioned, in ascending order by delta P, they segregated almost perfectly by completion time, and what I inferred from that is that these open hole wells have a damage zone around the wellbore. You have a large pressure drop in a very close vicinity to the wellbore, and then a correspondingly smaller pressure drop through the reservoir.

The cased wells, on the other hand, have a pressure drop through the reservoir without this damage zone around it and pressure drop due to the damage zone, so when you shut in an open hole well for 7 days, or for a long period, but just so you shut the well in, you get a much quicker build-up because you've got this higher pressure very close to the wellbore and it builds up very quickly to

a pressure not that far away from its P-star, which is why we get the small delta P's. On the other hand, the case of fractured wells, it will take a much longer time for that pressure to build up because it extends throughout the reservoir and it takes a much longer time for the reservoir to recover, giving you a much longer delta P.

Q Let's take a moment and look at Exhibit Number Three. We have the well name. The first entry is the Howell 2D Well, and then it says completion time, OH is open hole?

A That is correct.

Q What is the next?

A SNG represents shot with nitroglycerin and SOF is sand/oil frac.

Q As we read down that table, then, we have open hole completions until we get down to the SJ 28-6 No. 37 Well.

A That's correct.

Q And what does the CSD mean?

A Just -- it means cased and fraced, and if I might add, the fracture there is significantly different from the open hole sand/oil fracture. It's -- it's a sand-water fracture of much greater magnitude; basically a much better completion.

Q If you'll go about 2/3rds of the way down

the table on Exhibit Three and find the Fields No. 1 Well, do you see that in Section 25?

A Yes.

Q As an open hole completion during the test period, what is the corresponding delta pressure?

A Our delta P for the two tests were 160 pounds on the first test and 165 pounds on the second test.

Q Was anything ever done to that well to change the method by which it's being produced from an open hole completion to a cased hole?

A Yes. Subsequent to the second test the well was done, hod the liner run in it and was cased and fraced by El Paso in the early sixties, I believe.

Q And if we count up 9 entries from the bottom of that table are we again looking at the same Fields Well now as a cased hole?

A That's correct. It's the same wellbore except this time the pressure data is being run and the well is cased and has been fraced.

Q And when we look at the delta P, we've gone from 160 up to what number?

A Over 309 pounds.

Q And what does that tell you as an engineer?

A Well, again it comes back to this damaged

zone around the wellbore, the damaged zone has been removed and you're getting a much better pressure drawdown through the reservoir, resulting in a much longer time to build up to your final pressure.

Q From that information are you able to conclude as an engineer that the cased hole completions are a more effective and efficient way to develop the reserves in the spacing unit than the open hole completions that were drilled by El Paso during this time period of 1951 through 1955?

A Yes, and if I might add at this point, the primary concern, I believe, or the primary reason is because of the damage around the wellbore. I think there's a secondary factor which is also due to the nature of the Mesaverde layering and lensing, which I believe we'll get into later, but it -- I wanted to just bring it up at this point because a wellbore that is completed in many layers takes a much longer time to get on its straight line part of the build-up and approach P-star, whereas a well completed in one or two layers will get out of that transient period more quickly and I think that is also contributing here. I believe the wells that are cased and fraced are contacting many more of these individual layers than the open hole wells.

Q Let's spend a moment on that, Mr. Hower.

We'll come back to it again in detail but the fact that the open hole completions are not effective and efficient ways to produce this spacing unit has a reservoir explanation in the Blanco Mesaverde reservoir, does it not?

A That's correct.

Q And because of what we see on Mr. Decker's cross section --

A That's correct.

Q -- that within that pool reservoir there is a significant lenticular effect about those producing zones.

A That's right.

Q And that, in fact, was the basis upon which the Commission found a number of years ago that we could go to infill drilling in this 320-acre spaced pool.

A That's correct.

Q When we look at the open hole completions, you have attributed that factor to the fact that these wells are not efficient. What else have you examined to determine that you can exclude any other explanation?

A Could you ask the question again? I'm not --

Q Sure. You have concluded for us the fact that the open hole completions are not effective and efficient?

A That's correct.

Q And you've compared it to the cased holes.

A Yes.

Q Can you, with your analysis or, in fact, have you with your analysis, excluded any other factor that could be used to consistently explain why we see this occurrence in these wells?

A I believe it's due to the random sampling of the wellbores that we have with the sixties test, and the fact that we saw the phenomena in one similar -- one wellbore that this is really the only phenomena that could be causing it. I think that does exclude any random changes in -- for instance, changes in reservoir permeability or spacing, that sort of thing, can also affect the time to build-up, but I think the fact that we've taken a sampling throughout the Mesaverde of 38 wells, 60 tests, that it -- it would -- the way that the data is segregated is the only reason.

Q You, as an engineer, see no other probable explanation other than the fact that these are open hole completions.

A That's correct.

Q Let me ask you a general question and then we'll go into some specifics. Have you satisfied your-

Q When we go from Exhbiit Three, let's turn back to Exhibit Number Two. Explain to us what you have presented on Exhibit Number Two.

A Exhibit Number Two is again data taken from vanEverdingen's testimony in 1974 and what I put it in here to illustrate is the top two curves is what I would like to refer to.

The top one is the average bottom hole pressure of the three strat tests. Now the three strat tests were wells drilled by El Paso in 1957 and 1958. They were cased, fractured, but never produced. They were drilled solely for -- to monitor and take pressures.

The curve below that is the average bottom hole pressure of the long term data that we've just been looking at on Exhibit Three.

You can see that for a 5-year period we had data common between the two sources. The average pressure of the long term build-ups, the P-stars, if you recall, represented the final build-up pressure after accounting for withdrawals from that well itself, and many reservoirs will argue that pressures that high can never exist in the reservoir because to obtain that pressure you're extrapolating out to an infinite shut-in time, which, obviously, you can never have a well shut-in infinitely, so many engineers feel that you can never get pressures as high as those in the re-

servoir, yet here we see for a 5-year period consistent reservoir pressure measurements of 50 to 100 pounds higher than those P-stars, and the explanation for this again comes back to the lenticular lensing nature of the Mesaverde, as you can see up there.

The -- where there's common strata between the two, the producing wells and these strat tests, and there's strata that are not present, what's going on is you're drawing down the pressure in the strat test well and then when you shut in the producer, the strat test partially repressures from strata that are not present in the producers, that have not been drawn down.

That is why you get pressures higher in the strat tests than these long term build-ups and the point I'm trying to make with this is very different from what vanEverdingen tried to make. I'm just trying to use it to show the lenticular lensing nature of the Mesaverde and illustrate that you -- it has this quality.

vanEverdingen used it to show that we needed to down space from 320 to 160. That's not our -- our issue. I think we, as we stated, 160's are adequate, but I wanted to use to show this lensing and lenticular nature of the Mesaverde.

Q You've included as Exhibit Number One to your exhibit book the prepared testimony from Mr.

vanEverdingen?

A That's correct.

Q Going back to the open hole completions, understanding the reservoir and it's lenticular nature, why is the open hole completion not an effective means to produce the spacing unit?

A Well, what we feel has happened is, that the open hole well, in addition to causing damage around the wellbore, is not effectively contacting all of these vertical lenses, and this again is borne out by the delta P. A well contacting all of the vertical lenses takes a much longer time to reach the straight line portion whereas a well producing from only a few of the most permeable lenses, will approach its P-star much quicker, and I think that's borne out in the pressure data, as well.

Q How -- how does the cased completion and the frac treatment give you a wellbore that is in fact effective and efficient for producing these spacing units?

A Well, it just -- the vertical -- the fracture allows you to contact the entire vertical length of the -- the Mesavarde. In many cases you can run ball sealers to seal off the most permeable zones, so you can -- you are fracing the less permeable zones so you're contacting those.

In addition, you don't have this fill

problem that we see with the open hole. In many cases the open hole wells are probably -- the fill is covering up some of the lower formations, as well.

Q Let's go now, Mr. Hower, to the subject of the study you have done based upon Tenneco's sidetracking a number of the open hole Mesaverde completions back in the, oh, late 1985, '86, period.

And directing your attention to Exhibit Number Four, can you orient us as to an area of investigation of these sidetracked wellbores?

A Yes. Exhibit Number Four represents all of section -- Township 29 North, Range 8 West, and the bottom part of Township 30 North, Range 8 West.

It was selected because it is a local area where we had these contrasting wells which provided a good means of comparison, and I might add at this time, it's also the area where the cross section is constructed.

What you see on the exhibit are two types of wells: Wells that El Paso ran liners and cased and fraced in the early 1960's, and wells that Tenneco sidetracked, basically the same thing but did it 25 years later in 1985 and 1986.

The wells were all originally open hole completions, same vintage, 1951/1955, but El Paso remedied six of these wells, changed the completion technique on six

of these wells, those wells in green, in the early sixties and the rest, the ones in red, were not cased and fraced until 1985/1986.

Q Have you prepared for us P/z and production plots for some of the wells that were completed open hole but in which liners were run?

A Yes, (unclear.)

Q In what group of exhibits do we find those?

A Okay, those will be found in Exhibit through Ten. They would represent the six, what I've called, EPNG liner wells.

Q Take any of those that you like as an example of that type of well and describe the data that you have plotted and the conclusions you've reached.

A Okay, we can just look at Number Five, since it's first. There's two things I'd like to bring out. First, if you look at the nature of the P/z plot, it's -- you have this hook or increasing pressure at the tailend, and we saw this in every case. You can page through from Five to Ten and you'll see that. This, as you'll see, is not present in the other wells.

What this indicates, again goes back to the pressure phenomena that we saw on Exhibit Three. Your, prior to this hook, your wellbores were not building up any-

where near the final pressure. They had that large delta P, so 7 days just didn't get you anywhere near the final pressure it would have achieved and you were falling way below what would probably be your correct straight line on the P/z plot.

I think the reason you get this hook at the tailend is we had a lower average rate due to the well's decline and also due to proration and allowables that were in effect in the early 1980's generally dropping the average producing rate of the well and allowing the pressure to slowly, in the wellbore, come up somewhat, relative to the pressure out in the reservoir, so that when you shut it in it had less distance to go to reach its final pressure.

The second thing is the decline curve itself. If I can just draw your attention to the late seventies, you can see there's really not much of a change in the decline from the period prior to that, and again we will see that that's very different from the open hole wells.

Q Can you direct us to those series of exhibits that are the P/z and production plots for the -- some open hole completions that were open hole for a period of time and then subsequently sidetracked?

A Yes. Those would be found in Exhibits Eleven through Fifteen.

Q Can you demonstrate for us, Mr. Hower, whether or not sidetracking has resulted in having these wellbores become more effective and efficient?

A Well, you can see, if we just look at Exhibit Eleven, again, you can see the results from sidetracking in the rate increase.

You can also see that, again, when we're looking at the late seventies, early eighty periods, you can see what happened to the wellbore. The open hole wellbore suffered a much bigger drop in rate and what happened there was during the infill period when the number of wells was, in essence doubled, these wells could not compete with their adjacent cased and fraced neighbors, whereas the wells that had liners run in the sixties could, and we didn't see that behavior.

Q When we compare Exhibit Five to Exhibit Eleven on the P/z plot --

A Yes.

Q -- the open hole completion has a hook, if you will, in the form of the curve.

A Not in the open hole completion, no.

Q Okay.

A The open hole -- the open hole wells, now, show, basically, your straight line, traditional P/z behavior and what's going on here is that the wells are

building up. It again just reflects the same phenomena we saw on Exhibit Three. The 7-day shut-in period gets them very close to their final pressure. They build-up much quicker and they are coming back to their straight line behavior.

Q When you go and contrast that to Exhibit Number Five what do you see?

A That's where we get -- the Number Five is where you get that hook and again it shows the larger delta P, where you're not getting anywhere near your final P-star, and this is all -- goes back to the damage zone around the wellbore and the lenticular nature of the Mesaverde.

Q Let's turn to Exhibit Number Sixteen, Mr. Hower. Would you identify and describe the information you've tabulated on that exhibit?

A Exhibit Number Sixteen is as summary of our 14-well sidetrack program in the Mesaverde, end of '85, beginning of 1986. It includes the 5 wells with the P/z and decline curve, as well as 9 other wells which the data was not included for.

It shows, essentially, a pre-sidetrack rate, average rate, and then a stabilized post-sidetrack rate, and if I could, what you see is the pre-sidetrack rate in all of these wells, you have an average rate of 26 MCF per day compared to a post -- stabilized post sidetrack rate

of 635 MCF a day, giving us an average incremental increase of over 600 MCF per day for all 14 wells.

Q If the sidetracking program from 1988 has improved the performance of the wells, why are you not choosing to sidetrack the wellbore on the 16 open hole completions that are the subject of this case?

A Well we've chosen not to do that because of several factors. First there's a mechanical risk involved with sidetracking these wells. Our program was 15 wells but we lost one of them, so we did have some experience with difficulty in sidetracking them, and our incremental cost to re-drill over sidetracking is only $50,000. The mechanical risk, the fact that we get a wellbore with new casing as opposed to 30-year old casing, 35-year old casing, and finally, the last reason gets to this layered, lenticular nature of the Mesaverde. We feel that if we can move away from the original wellbore even a little bit, we stand a chance of picking up a small, several small lenses that were not in contact with the original wellbore and could possibly add a little bit on top of what we hope to get from the recompletion.

Q That fact alone, however, doesn't justify the program.

A No. We feel the bulk of this, most of it is coming due to the improving the completion. If we were

drilling these just to pick up unproductive lenses, it would not justify that at all, which is why we don't feel the Mesaverde needs to be down-spaced. We feel the spacing is perfectly adequate. It's just a little icing on the cake, if you will.

Q You've talked about rate increases, the ability of the sidetracked wellbores to produce at better rates than the original open hole completions.

How have you been able to conclude that you are, in fact, going to be able to recover reserves that would not otherwise be recovered from the original open hole completion?

A Well, we again go back to comparing the P/z charts with the decline curves.

Q Well, let's do that, at least in a specific example, so the Examiner can see how you've attempted to quantify the volume of gas that will be produced or is potentially producable from a more effective and efficient wellbore.

A Okay, if we could look at Exhibit Number Eighteen.

Exhibit Eighteen is one of the wells that we propose to re-drill. It represents a P/z plot and a decline curve for the Mudge LS No. 9.

If we look at the P/z plot, I think if

you eyeball a straight line in there, bring it down to an abandonment pressure of, say, 300 pounds, you're probably looking at an ultimate recovery of in the neighborhood of 7 BCF.

The Mudge has currently a cumulative production of 4.9 BCF from the decline curve, and without getting into an argument of how much more we'd give it, I think if you give it even a shallow decline of 4 or 5 percent, you will only add another couple hundred million or so to that cumulative.

So you're looking at a final EUR from the decline curve of probably just over 5 BCF, so you've got this discrepancy between your P/z and your decline curve reserves.

That, in essence, tells us that these are reserves that are in the reservoir. They're communicating pressurewise. They're being reflected on the P/z plots, but they are not being produced in commercial amounts that is reflected in the decline curve, thus, we need this second infill well to recover those reserves.

Q Have you made a similar P/z plot and production curve for each of the 16 open hole completions in the Mesaverde that are the subject of this application?

A Yes, we have.

Q And where do we find those in the book?

A I guess those would be in Exhibits Seventeen through Thirty-two, inclusive.

Q Mr. Hower, why don't you simply go back and plug the original open hole completion and simply drill a replacement well in this 160-acre portion of the spacing unit?

A Well, what we would like to do is not plug the original wellbore at this time because it's -- one, in most cases they're producing in -- still producing commercial quantities.

We choose to drill the second infill well and we don't want to plug the first well for several reasons. One, it would be, we feel, wasteful to plug that zone. I'm sure we would have a lot of difficulty with our -- our interest owners in plugging a commercial wellbore.

What we would like to do is kind of phase in, drill these wells, have -- attempt to evaluate them, produce them, not plug the second well before we do that, so we have a chance to make sure that the first well is okay, and if we lose the first well for some reason, I mean the new wellbore, we have a chance to -- we always have a fallback position. But we just don't want to be jump the gun; we'd like to be able to just kind of -- as prudent operators, we feel it's -- it's necessary to monitor it and always, you know, retain that fallback just in case, and as we

mentioned in the beginning, then we would allow -- like to have the flexibility to produce these wells within the allowable assigned to the proration unit.

Q When you characterize these 16 wells as producing in commercial quantities, Mr. hower, would that definition include the fact that it's still -- these wells still produce enough gas that they're able to cover the cost of their day-to-day operation?

A Yes.

Q In terms of phasing out the existing open hole completions and phasing in the new infill well for that spacing unit, what is the timing of doing that? What's the drilling program or the plan of development for these wells?

A Well, we plan to -- the drilling program, as it stands right now, is we have 9 locations currently staked and we would like to start drilling those as quickly as possible, and then the remaining 7 just as soon as we can get approval.

Q Have you been in contact with various of the offset operators to any of these 16 wells to determine whether or not they had any objections or concerns about the Tenneco application?

A Yes, I have.

Q Have you had an opportunity to discuss this case with any of the engineers at Kimbark Oil & Gas?

A Yes.

Q What were the concerns that they addressed for you, Mr. Hower?

A Kimbark's concern was similar to Amoco's in that they were concerned that, one, we were asking the Commission to approve spacing less than 160's, or the current spacing, down spacing. And, two, that we were attempting to produce from three wellbores rather than two from the proration unit.

Q What did you advise representatives of both those companies?

A We showed them, Kimbark, that is, we showed them all the data that we're presenting today. We showed them exactly why we wanted and felt it was necessary to drill this third wellbore and convince them that we were doing it to protect our correlative rights and not to gain an advantage over the offset producers.

Q With regards to discussions with Amoco, do you have an understanding and agreement as to how the wells would be operated?

A Yeah. Yes, we do.

Q All right, would you state that as best you understand it?

A The agreement is that we will not produce from the second infill well and the original well within the

same 160 in the same month.

Q Is that within the ability of you as operator to handle on a day-to-day operation? That's physically possible, mechanically possible in the field to do it?

A Yes.

Q To operate that way?

A Yes.

Q In each instance, as to each of the 16 open hole completions that are the subject of this application, in each of those instances, do you have an engineering opinion as to whether the second infill well is necessary in order to effectively and efficiently drain that spacing unit?

A Yes, I do.

Q And what is that opinion?

A We feel that in each of these cases that well is necessary to effectively and efficiently drain that proration unit.

A And in each instance have you established to an engineering certainty that the infill well is going to result in the recovery of an additional amount of hydrocarbons that would not otherwise be recovered?

A Yes.

Q And your method of doing that is the -- is what again, the analysis of the P/z curve and the produc-

tion curve, by which you then have plotted what you could expect to recover from an open hole completion?

A Yes, sir.

Q And then you've used other data to extrapolate what you could estimate would be the recoveries with a cased hole completion?

A That's correct.

Q Is that a standard method by which Tenneco and you as a reservoir engineer determine whether or not a well will recover reserves not otherwise recoverable by an existing well?

A We always compare the two, yes. We always compare our reserves from one source to another source.

Q And the method utilized by you is a standard operation or method of analysis to obtain that information?

A Yes, it is.

Q When we look at the rest of the exhibit book after Exhibit Number Thirty-two, the method of identification for the exhibits goes from Exhibit A through Exhibit P?

A That's correct.

Q And what have you and Mr. Decker displayed on each of those exhibits?

A We've displayed the -- the original well,

the first infill well on the opposite 160, and then the staked location or tentative location for the second infill well.

Q Let's take Exhibit A as an example and have you specifically go through with me, first of all identifying the 320-acre spacing unit for the wells in Section 34.

A Okay, the 320 would be the north half of Section 34.

Q And the original well is identified with what type of nomenclature?

A It's the Fields LS No. 7 and it gives a completion date, in this case, 1954.

Q In each of these displays how do I identify the first infill well?

A The first infill well would be designated with an "A".

Q And it will be in the opposite 160 from the original well?

A That's correct.

Q And if we're looking through this tabulation of exhibits and want in an individual case to find the second infill well, how was that identified?

A It would be indicated by either a triangle or an open circle, which -- the triangle indicates

it's a currently staked location. The open circle indicates a location that has not been staked but is tentative.

Q Let's find the display for the Fields Well. That is Exhibit A?

A That's correct.

Q And what have you proposed as the location for that well?

A The Fields 7-B, the proposed -- the staked location is 965 feet from the north line and 2060 feet from the east line.

Q And is that a standard or an unorthodox location in terms of the footage requirements for the pool?

A That's one of the unorthodox -- yeah, that's unorthodox. Okay.

Q When we go to the Neil well, what exhibit is that one?

A That would be the next one, Exhibit B.

Q All right, when we're looking at the location for the Neil B Well, what is that footage location.

A That would be 2,055 feet from the north line and 885 feet from the east.

Q And is that an orthodox or a standard location for drilling wells in this reservoir?

A No, that is an unorthodox location, as well.

Q What is the fourth well you have as a potential unorthodox location? Is that not the Gartner Well?

A The third one?

Q Yes.

A The third well would be the Gartner LS 6B.

Q LA 6B and that's Exhibit C?

A That's correct.

Q And what --

A That well is Exhibit C, I'm sorry. the Gartner 6.

Q All right, we have a the Gartner LS 1, --

A 5 and --

Q -- 5 and 6. 6 is on Exhibit E.

A That's correct.

Q And this is an unorthodox location when you describe the location for Option 2.

A That's correct.

Q Option 2 shows what proposed unorthodox footage location?

A Option 2 is 300 feet from the north line an 1230 feet from the east.

Q What are we doing with Option 1?

A Well, Option 1 is an available location. We -- it is very close to a farm house, however, so we feel

-- our Drilling Department is a lot more comfortable with Option 2.

Q And is there another potential unorthodox location from the field rules for the Blanco Mesaverde Pool?

A Yes. That would be the Mudge LS 9B.

Q And that's Exhibit F?

A That's correct.

Q What's the proposed unorthodox location for that well?

A 2160 from the north line and 395 feet from the east line.

Q Have you and Mr. Decker reviewed the rest of the proposed locations for the second infill well?

A Yes, we have.

Q As best you know, do those four wells you've identified represent the only locations that are unorthodox as to the footage?

A That is correct.

Q Is there an engineering explanation or is it a geologic explanation as to the reason for the unorthodox location?

A In most instances the unorthodox locations are the result of topography, be it existing wellbores, pipelines, or areas that we just can't get a rig to.

We tried to select a location to maximize

our net pay, so there is a geologic reason, but in a lot of cases the unorthodox location is due to topography.

Q I'll let Mr. Decker address the balance of those location issues.

MR. KELLAHIN: Mr. Stogner, that concludes our presentation of the direct case for this witness.

MR. STOGNER: MR. BRUCE, your witness.

CROSS EXAMINATION

BY MR. BRUCE:

Q I just have one question, Mr. Hower. Would you just identify for me again the four unorthodox locations?

A Yes, they would be the Fields No. 7, which would be Exhibit A; the Neil No. 8B, which would be Exhibit B; the Gartner 6B, which I believe is Exhibit E; and then the Mudge LS 9B, which is Exhibit F.

Q Thank you.

CROSS EXAMINATION

BY MR. LUND:

Q Just one question, Mr. Hower, you didn't furnish the information you just presented to the Examiner

to Amoco before today, did you?

A No, I didn't. I did not.

Q Thank you.

MR. LUND: No further questions.

MR. STOGNER: Any other questions of this witness?

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Hower, as I go through your exhibits of the individual proration units, did you determine whether these are all 640-acre plats or some of them, could they be in irregular sections?

A To my knowledge, I believe most of them are the full sections, but there could be some irregularities. I don't know which those would be.

Q Okay.

A I don't believe any of them are the -- the really small sections where they have kind of unique spacings.

Q Do you know what the location of a standard location -- what well location is a standard location in the Blanco Mesaverde Pool?

Well, for the record, it's 790/130.

A Yeah, okay, it's 790 feet and 130 feet.

Q And to your knowledge these are the only five wells that would qualify for a nonstandard proration unit.

A Four.

Q Or these four would be nonstandard. Which is the one in question? I was -- I think maybe I was going through the proration schedule there.

A There's actually two, I guess, now.

Q Okay, which ones are they?

MR. KELLAHIN: Mr. Examiner, there's some question as to whether on the Notice of Hearing --

MR. STOGNER: Uh-huh.

MR. KELLAHIN: -- those listed as 1, 2 and 5.

A That's correct.

MR. KELLAHIN: We are not certain that 1, 2 and 5 are the correct numbers, so we'll need to double check those.

MR. STOGNER: What corresponds to 1?

MR. KELLAHIN: 1 is the Fields Well.

MR. STOGNER: And what exhibit is that under?

A A.

MR. STOGNER: Is that the Fields LS 7B?

A That's correct.

Q Okay, now in looking through here, if you say this is a standard 640 -- well, let's figure it out right quick.

A As we understand it, it would be 790 to 1190 feet or 1450 to 1850 is your legal window.

Q So that would be 350 from the inner boundary. It doesn't look like a nonstandard location to me. I guess the ones I'm really concerned about is those that are listed in here.

MR. KELLAHIN: We'll let Mr. Decker address those, --

MR. STOGNER: Okay.

MR. KELLAHIN: -- Mr. Stogner, and see if we can't work our way through an agreement as to which ones need to be approved as unorthodox locations.

Q Okay, let's further go into the Blanco Mesavrde rules.

I'm concerned about the way that you're going to be producing that original well. In shutting this thing off every once in awhile, is that going to cause premature abandonment of that particular well before it reaches

its economic limit?

A I don't think just producing it in that method it is.

Q Was there any adverse affect out there in shutting a Blanco Mesaverde well in for a certain amount of time and then plugging it -- I mean and then turning it back on?

Do you notice any decrease in the pressure or any such as that?

A Not with the Mesaverde, no. With some of the other productive zones it may have some adverse effect.

Q When you say "other zones" you mean other formations.

A That's correct. You know, there's no water problems or something that we could get in trouble with, so I don't think that would be a problem.

Q Would that be an added expense, going out there and turning that thing off?

A At this point not really. We operate enough wells and have pumpers out there that it wouldn't -- it would be very minimal, if anything.

Q Okay. Are you familiar with the Blanco Mesaverde special pool rules, that premature abandonment is against the rules?

Is that a yes or no? I'm sorry.

A No, I was not familiar with that rule.

Q Well, it is, and that's the reason I'm very concerned about that.

Whenever you had this conversation with Amoco, that they were concerned about producing three at one time, did you tell them that it's a prorated gas pool and that you're going to -- you're going to be cut back as far as your proration unit?

A Well, that was that our understanding, yeah. That's why we feel we'd just like to retain the flexibility of producing that as we please and that the allowables and proration will account for the correlative rights of the offset producers, yes.

Q Uh-huh, and what was the response to that?

A Well, Amoco wanted us to -- they had a -- did not -- I don't think they had the same interpretation of that as we did.

Q Uh-huh.

A They didn't -- I don't think they interpreted the proration allowable, for instance, the way we have.

Q Whenever you had this conversation at Amoco, did you turn the -- did you turn the tables and ask them if they had any proration units that had more than two

wells on it in the Blanco Mesaverde?

Do you know if they are?

A I do not know.

Q And how about this -- the Kimbark Oil & Gas? They -- you said they had the same concern as Amoco did.

A That's correct.

Q And how many -- how many of these wells does Kimbark offset? Looks like I find the Mudge LS No. 9B is an offset, if I'm reading your --

A I believe -- I believe there's three.

Q There's three. Okay. And did they have the same interpretation that Amoco had?

A No, not that they expressed to me, they did not. Their concern was primarily with spacing. They were very concerned that we were here to request a change in spacing of the Mesaverde and that we were going to set that precedent.

MR. STOGNER: I have no further questions of this witness.

Are there any other questions of Mr. Hower?

MR. KELLAHIN: No, sir.

MR. STOGNER: He may be excused. Mr. Kellahin?

MIKE DECKER,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Decker, for the record would you please state your name and occupation?

A Yes. My name is Michael Decker and I am a Project Geological Engineer for Tenneco Oil Company.

Q Mr. Decker, have you previously testified before the Oil Conservation Division?

A Yes, I have.

Q And qualified as an expert in what area, sir?

A As a petroleum geologist.

Q Have you made a geologic study of the area of concern with regard with regards to these open hole completions in the Blanco Mesaverde reservoir?

A Yes, I have.

Q And have you also examined the proposed locations of each of the second infill wells for each of these spacing units?

A Yes, I have.

MR. KELLAHIN: We tender Mr. Decker as an expert petroleum geologist.

MR. STOGNER: Mr. Decker is so qualified.

Q Mr. Decker, is there a geologic explanation as to why we are seeing certain of these open hole completions in the Mesaverde being effective and efficient producers of the hydrocarbons underlying that spacing unit?

A Yes, I believe there is.

Q And what is that explanation?

A If I may go to the cross section?

Q Yes, sir.

A What we have here is a Mesaverde formation stratigraphic cross section titled A/A', with A being towards the north, A' being towards the south.

The cross section has broken the three members of the Mesaverde -- has broken out the three members of the Mesaverde, which are the Cliff House, the Menefee, and the Point Lookout.

The datum for this stratigraphic cross section is a resistivity marker within the Lewis Shale formation.

If you'll notice on here, we have several colors. We have yellow, orange, gray, and a darker gray.

The gray represents shale; the dark gray

represents coal and is in the Menefee member.

The yellow color represents sands which meet a gamma ray cutoff criteria which I have used, and also has porosities better than 10 percent, as determined by a density log.

And I also have resistivities which are better than the resistivity shale base line.

The orange color denotes sands which again meet the gamma ray cutoff and also have resistivities better than the shale base line; however, the difference is within the porosity.

Now orange represents sands which have porosities of 5 to 10 percent.

This cross section covers one section to show the detail that we see within a possible proration unit and how the sands and the character changes.

One thing that I'd like to point out to you that I feel is one of the most important features is that within a given vertical section we have sands of varying quality. You can see that we have good, yellow, porosity sands. We also have good -- or some poor, siltier sands, and with the open hole nitro frac completion, we believe that these poor quality sands are not as well completed and do not contribute as much or as well as they possibly could with a modern fracture completion, which would

go ahead and really open up the permeability of this tighter gas sand.

With the cross section you can also see that within 1000 feet apart you do have some degree of changing sand quality within that 1000 feet and you do pick up a few additional lenses; however, the majority of the sands, say within the same quarter section, are encountered within both wellbores.

Q Can we pretend that one of these is an open hole completion and can you describe geologically why the open hole completion is not an effective means to produce the hydrocarbons in the reservoir?

A The open hole completion and the nitro frac, all they did basically was in most cases drilled to the top of the Mesaverde formation, set casing, drilled out, and then once they drilled out, they left that portion open and completed with nitroglycerin or in some cases sand/oil frac.

With the nitro all you're really going to get to contribute, since you are -- you do not have the advantage of having ball sealers to go into your tighter zones and really putting a frac into those sands, you are depleting poorer quality, poor quality and good quality sands in the same manner, and maybe the poorer quality sands need more sand (unclear) or better type completion to really get

them to contribute to their best potential.

And with the nitro, when you just go in, all you're basically doing is "rubblizing" the zone for a certain width outside the wellbore and you do get the good yellow sands to be the major contributor, because they are the best sands to begin with. We just don't feel that the natural fracing here is giving good stimulation into those poorer quality sands.

Q Mr. Decker, have you worked with the engineers to determine where to locate within the 160-acre portion of the spacing unit where the original well is drilled, have you worked with them to determine where to specifically put the second infill well?

A Yes, I have.

Q In each of the Exhibits A through P, have you been involved, then, with the determination of either the staked location or the approximate location of the well spotted before staking?

A Yes, I have.

Q Do each of those instances have a geologic justification as well as a topographical justification for their pick?

A Yes, they do.

Q Let me have you take a moment and let's start with Exhibit A, which is the plat showing the Fields

LS 7B Well. What is the -- we've identified that well as a well that potentially is unorthodox in the field rules?

A Correct.

Q Is that your testimony, that you believe it is in fact unorthodox?

A At this time the way I understand those field rules, yes, it is unorthodox.

Q What's the geologic justification for picking the location as you've proposed?

A The geologic reasoning is to move towards an area of possible increased net pay due to thickening sand or maybe also pick up a few additional stringers, as we've mentioned before.

Q With regards to this location, your proposed unorthodox location is moving towards Tenneco controlled or operated acreage?

A Correct.

Q And you're moving away from Kimbark?

A That's correct.

Q Okay. Let's turn to Exhibit B. The unorthodox location for the Neil LS 8B Well, in your opinion is that also an unorthodox location?

A Yes, sir.

Q And what is the geologic reason that you've picked this as the second infill location?

A For the same reason as the Fields LS 7B.

Q And the spacing unit for this well is the east half of Section 4?

A Correct.

Q And again you're moving towards Tenneco controlled acreage except for a Kimbark interest off the diagonal offset in the northeast corner?

A That's correct.

Q You could be closer to Kimbark in that spacing unit and still be at a standard location?

A Uh-huh.

Q In what ways, then, is that well unorthodox?

A This well is unorthodox based on the Blanco Mesaverde Pool rules.

Q Because it is too close to an existing well or too close to a quarter quarter line?

A Too close to a quarter quarter line.

Q So you're crowding the interior --

A That is correct.

Q -- boundaries of the spacing unit as opposed to an outer boundary.

A That is correct.

Q If we go then to the third potentially unorthodox location well, it's Exhibit E. It's the Gartner

LS 6B Well?

A Uh-huh.

Q Describe for us in what way is that well unorthodox, Mr. Decker.

A That well again is unorthodox because it does not meet the Blanco Mesaverde Pool rules for standard spacing.

Q In this instance you're too close to an outer boundary?

A That is correct.

Q And the outer boundary towards which you're encroaching is controlled by either Tenneco or Meridian?

A That's correct.

Q Have you received any objection from Meridian Oil & Gas for the proposed unorthodox location?

A No, sir, we have not.

Q Is there a geologic justification for the location?

A Yes, there is.

Q And what is that, sir?

A And that is the same reason as the previous two.

Q Okay. Let's go to Exhibit F. In your opinion is this also an unorthodox location?

A Yes, it is.

Q This is for the Mudge LS 9 Well, 9B?

A 9B, that's correct.

Q All right, and how is it unorthodox?

A Again it does not meet the Blanco Mesaverde Pool rules for a standard location.

Q Is it too close to an outer boundary or an interior boundary?

A It's -- it's too close both to an interior and to an outer boundary.

Q And the outer boundary operator to whom you're encroaching is also Tenneco operated properties?

A That is correct.

Q Have you been able to identify, as best you know, Mr. Decker, any other wells, the second infill location for which is unorthodox in terms of a footage requirement for the Blanco Mesaverde Pool?

A No, I have not.

Q You don't find any others?

A No, sir.

Q The proposed locations that you propose for the infill wells are the ones described in the exhibit book with this footage location?

A That's correct.

Q And if there is a different number float-

ing around somewhere it needs to conform with this number?

A That's correct.

Q Was the geologic cross section prepared by you?

MR. KELLAHIN: That concludes my examination of Mr. Decker.

MR. STOGNER: Mr. Bruce?

MR. BRUCE: I have no questions.

MR. STOGNER: Mr. Lund?

MR. LUND: No questions, Mr. Examiner.

MR. STOGNER: I have no further questions of Mr. Decker.

MR. ROYBAL: Mr. Stogner, I have one or two for clarification.

MR. DECKER: Yes, sir.

CROSS EXAMINATION

BY MR. ROYBAL:

Q On the notice of this case it says that locations 1, 2 and 5 are -- probably are not unorthodox locations.

A That is my -- yes, that is my understanding.

Q Okay, and Number 3 corresponds to Exhibit Number E, is that correct?

A Yes, sir, that is correct.

Q And Number Four corresponds to Exhibit Number Four, is that correct?

A That is correct.

Q So Exhibit -- so the unorthodox locations shown on Exhibits A and B are not on the notice.

A That is correct.

Q All right. Thank you.

MR. STOGNER: Are there any other questions of this witness?

MR. KELLAHIN: No, sir.

MR. STOGNER: Mr. Kellahin, do you have any further witnesses you'd like to call?

MR. KELLAHIN: No, sir, we would like to introduce at this time the Certificate of Mailing of Notice to the offset affected operators. I have -- I have marked Mr. Decker's cross section using a letter exhibit following the last in the exhibit book using "R", if that's all right, and I have marked as Exhibit S the Notice Certificate showing that we have sent copies of the application certified mail, return receipt, to the offset operators prior to the 20-day requirements, and that is set forth on the exhibits.

MR. STOGNER: Thank you, Mr. Kellahin.

So which ones do I need to accept at this time?

MR. KELLAHIN: One through Thirty-two, Mr. Examiner, and A through S, with the exclusion of Q.

MR. STOGNER: Exhibits One through Thirty-two and Exhibits A through S, excluding Q, will be admitted into evidence at this time if there are no objections.

Are we ready for closing remarks at this time?

MR. LUND: Mr. Examiner, with your permission, given the testimony, may I swear Mr. Wood for five minutes of testimony now?

MR. STOGNER: Are there any objections?

MR. KELLAHIN: No objection.

(Mr. C. Alan Wood sworn.)

C. ALAN WOOD,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. LUND:

Q Mr. Wood, would you please state your name and by whom you're employed and in what capacity?

A My name is C. Alan Wood. I'm employed by Amoco Production Company in Denver, Colorado as the Region Proration Unitization Manager.

Q And you have testified as an expert in petroleum engineering and unitization matters before this Division before, haven't you?

A Yes, I have.

Q And your qualifications have been accepted?

A Yes, they have.

MR. LUND: Are they still acceptable?

MR. STOGNER: Yes, they are, if there are no objections.

MR. KELLAHIN: No objection.

Q Very quickly, Mr. Wood, let's hit a few

points.

First of all, would you discuss Amoco's concern over points of withdrawal?

A Yeah. That was a question asked by the Examiner concerning a reliance upon an allowable for protection of correlative rights regardless of the number of wells within the proration unit.

Within the four prorated fields within northwest New Mexico, we've got a little bit of a problem inasmuch as we've got what's referred to as a marginal well classification.

Now, under the application of the prorated gas field rules, a marginal proration unit is assigned an allowable based upon its last reported monthly production. If you have three points of withdrawal within a proration unit as opposed to an offsetting 320 that only had two, I would anticipate that your withdrawal would be higher; therefor your allowable would be higher for this well.

We also have a very basic concern even with nonmarginal proration units that you do have three pressure sinks within that proration unit, where the offset operators may not have the same completion problems that Tenneco has attested to today, nor have the same economic situation that Tenneco has.

It's a fact of reservoir engineering that hydrocarbons in a reservoir will migrate towards the reservoir sink, or the pressure sink in this case, and that is our concern, that you will have three pressure sinks if these wells are allowed to produce concurrently at any point in time.

Q I believe there was a question earlier from Mr. Stogner about calculation or assignment of allowables. What is your understanding on how that should work in this situation?

A Based on discussions that Tenneco has advised me they had with the Aztec District Office, I could very well see that they could test for deliverability purposes all three wells and utilize what they thought to be the best deliverability test or, in fact, the highest deliverability test, and that number would be used in the proration formula for the AD component (not clearly understood.)

Q In units operated by Amoco, do you have an understanding as to whether Amoco has more than two wells in any of those units?

A I'm not aware of any proration units that Amoco operates within the Blanco Mesaverde that have more than two wells, that being the parent well and the permitted infill well.

Q Would you briefly summarize Amoco's position?

A Our position is very simple. We are concerned that a precedent may be set by the granting of the Tenneco application. We have what we believe is a very legitimate concern over potential violation of correlative rights, if in fact these three wells area allowed to produce concurrently, both within a nonmarginal proration status, proration unit status, or a marginal gas proration unit status.

We believe that what Tenneco has requested for the relief, that being that concurrent production from the two wells within the same quarter not be permitted, is appropriate, and we believe that it should be adopted by this Division.

MR. LUND: Nothing further.

MR. STOGNER: Mr. Kellahin, your witness.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Wood, do you see any operational difficulty from your perspective should Amoco be operating a property where you have an original open hole completion and on the same 160 a cased hole completion and you are handling

the performance of those wells where you shut in the open hole for one month and during that month you produce the cased hole, and vice versa? Do you see any operational difficulty with that?

A Provided the operating company has sufficient personnel within the field to effectuate that, I see no operational problems with it

Q Do you see any potential reservoir damage occurring if operations occur in that fashion?

A I am not aware of anything within the Blanco Mesaverde that would indicate that potential reservoir damage could occur.

Q Do you see whether or not -- do you know whether or not the open hole completion operated in that fashion where it's produced for a month and shut-in for a month, that kind of cycle would cause that wellbore to be damaged result in the reduced ability of that open hole completion to perform?

A I'm not aware of anything.

Q Do you have any objection or disagreement with Tenneco's proposal to have effective and efficient FERC findings made by the OCD in order to make the appropriate filing for the Section 103 pricing on these wells?

A Mr. Kellahin, our concern dealt with points of withdrawal that might be allowed under the relief

requested by Tenneco on a given 320-acre proration unit.

We did not attempt to evaluate the merits of Tenneco's request for the justification under FERC or the NGPA rules.

Q If the Examiner approves the agreement Tenneco and Amoco have discussed in terms of field operations for the open hole completion, whereby that well and the second infill well are not produced concurrently in the same month, then you have no objection to the application.

A That's correct.

MR. STOGNER: Mr. Bruce?

MR. BRUCE: I have no questions.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Wood, you just got through testifying that you don't know of any Blanco Mesaverde proration units that Amoco operates that has three wells. How about in the past history since prorationing has begun in the Blanco Mesaverde, has that been a -- has Amoco ever had that kind of proration unit where there was more than two wells?

A Not that I'm aware of, Mr. Examiner.

Q Do you know if this is occurring out there presently, where there's three wells on a Blanco Mesa

verde Pool?

A No, I am not aware of it.

Q If it does exist out there, would you all consider coming in and making them produce their wells like Tenneco is doing?

A Mr. Examiner, regreffully, I don't think Amoco can be a watchdog of the industry. We monitor Commission activity and review the applications that have an adverse or even a positive effect upon the Amoco acreage. That's why we're here. We identified that this particular application did, in fact, have a number of proration units that were directly offsetting Amoco acreage.

Q Okay, let me see if I got your testimony straight.

A You're not offering any testimony straight.

You're not offering any testimony today whether to -- to help me make a determination of whether producing the third well and the first well on a proration unit on an off and on basis will cause waste? You don't have any testimony today on that?

A No, sir, my testimony today is to address our concern --

Q Okay, all right, you answered my question now -- okay.

A -- about potential violation of correlative rights.

Q Okay, and as far as producing three wells and this being a prorated pool, you feel that it would violate correlative rights, is that correct?

A I think there's a potential violation of correlative rights and definitely a stronger potential of the violation of correlative rights when you have a marginal classification for your gas proration unit.

Q So you see a potential of violation of correlative rights but at the same time you see that there may not be a violation of correlative rights, but you have no testimony today to present to me one way or the other.

A If it pleases the Examiner, I believe my testimony would reflect that it's my opinion that when you have a marginal gas proration unit, that there is a very strong possibility or likelihood of a violation of correlative rights, just given the fact that you have got three wells producing.

Q That's why we have prorationing, is it not, Mr. Wood?

A Mr. Examiner, it's my understanding the reason the State has adopted proration is to ratably allocate the available market to the pools that are capable of producing into that market.

Q Do we prorate wells or proration unit?

A You prorate proration units but you have within New Mexico, the northwest portion of New Mexico, Mr. Examiner, a basic proration order that classifies wells in two different manners; those being the nonmarginal wells and also the marginal wells.

The nonmarginal wells are allocated an allowable, if you would, based upon an allocation of a proration formula in which you have considered market demands and the assignment of that market demand back to an individual pool.

That does not hold, however, when you start dealing with the marginal wells because the marginal wells are assigned an allowable based on the last reported monthly production. There is no consideration given to market factors. It's strictly, let's produce these wells for as long as we can, and if you can't make your allowable we're going to call you a marginal well, and we're going to give you an allowable equal to your last month's production, reported production.

My concern is when you have three wells within a 320-acre proration unit that is competing for reserves with offsetting 2-well 320-acre proration units, the allowable under the marginal classification will be higher. It will promote the migration of reserves from the

2-well proration units to the 3-well proration unit.

Q Okay. And with what you're telling me, regardless if the first well is capable of producing what it's capable of doing, or if there's some sort of inhibiting factor, such as in this case the way the completion is, and it's producing very marginal, anyway, whether they come in and plug that back and redrill it and drill a sidetrack from it and case it and get better response from it, do you see any difference there?

A Well, I certainly do, Mr. Examiner. The difference is you've got three physical penetrations within the Mesaverde, those being the three individual wells. If they wanted to effectuate a higher deliverability by virtue of a sidetrack, you'd still only have one point of withdrawal.

The other concern I have, as I attempted to state earlier, is that when you have three pressure sinks competing for reserves, and that we know that the reserves are going to migrate towards those pressure sinks, I think even under the nonmarginal classification there is a potential for a violation of correlative rights.

In order to quantify that, you would have to make an engineering study on specific proration units, those actually developed with three wells compared to the offset proration units developed with only two wells.

We do not have any of that information with regard to the Tenneco acreage because they're asking for approval from this Division prior to the drilling of these wells.

Q Do you see a potential of offsetting acreage, let's say these offsetting acreages are completed as such where they're withdrawing their capacity, and one particular well has not yet reached its capacity, would you consider that that could -- that acreage could be -- could be draining?

A I'm afraid I don't understand the question.

Q Well, all right, you've got a well here that's not producing its capacity because of some sort of completion technique which is inhibiting it from getting its maximum efficient rate of flow, and it's surrounded on three sides, do you see a possibility of correlative rights of those good wells draining off of this one particular portion of the proration unit that can't, or won't?

A No, I don't, Mr. Examiner. I think Tenneco is exercising their correlative rights by requesting your approval to exercise an opportunity to produce what they think they're entitled to under that 160, or under that 320.

MR. STOGNER: I have no further

questions.

Are there any other questions of Mr. Wood? He may be excused.

Any other witnesses, Mr. Kellahin?

MR. KELLAHIN: No, sir.

MR. STOGNER: Okay, are we ready for closing remarks now?

Mr. Bruce, you may go first.

MR. BRUCE: Very briefly, Mr. Examiner.

The interest in this case of Kimbark is somewhat like that of Amoco; they want to maintain current spacing rules and they are also interested in having no more than two producing wells per unit, and that's already been addressed, I think (not clearly understood). Thank you.

MR. STOGNER: Thank you, Mr. Bruce.

Mr. Lund?

MR. LUND: We also concur with Mr. Bruce there is no desire to change the spacing. All the witnesses agree, and Amoco agrees, that two properly completed wells will effectively and efficiently drain the spaced area.

And the evidence before you today, Mr. Examiner, was competent evidence by Tenneco that they have problems with 16 open hole completions and the Amoco situation is different, but we acknowledge that the Tenneco evidence is competent.

We do not oppose the application of Tenneco to drill these new infill wells because of two basic reasons. Number one, Tenneco will produce only two wells at any one time in a month period. That means that only the parent well or the new infill well, not both which are in the same quarter section, and the first infill well would be produced in any one month, and there would never be any production of both wells in the same quarter section in the same month without the prior approval by you.

And then the second thing is that if Tenneco wants to produce all three wells in the proration unit in any one month, or if it wanted to produce both wells in the same quarter section, which would be the parent and the new infill well, Tenneco would be required to first get permission from the OCD after notice and hearing.

So that is our position and we appreciate the opportunity to be here.

MR. STOGNER: Thank you, Mr. Lund.

Mr. Kellahin?

MR. KELLAHIN: Mr. Stogner, we appreciate the fact that you've addressed this question for us this afternoon.

We are trying to work out a system where we can phase in new wells on the 160 and phase out the old well without prematurely abandoning the reserves that might yet be produced by the original well; notwithstanding the fact that Mr. Hower was not specifically informed about the requirements of the Blanco Mesaverde rules about avoiding the premature abandonment of that property, that, in fact, is not our case and that's not the way we propose to operate.

The rule says that the infill well and the original well are to be produced so long as economically feasible, and that's our desire.

To accommodate the concerns that Amoco has expressed, we examined with our engineers whether or not it is reasonable to sequence the production so that we would have no more than one well producing in a given month on that 160. We believe we can do it. We believe it can be done without waste, and would afford us the opportunity, then, not to have to plug and abandon the original well before we drill what is called the replacement well.

I think we have an accommoda-

tion between the parties that satisfies the Amoco concerns. It is something that can be addressed with notice of hearing and a subsequent hearing before the Commission should be desire or feel the need to adjust the producing operations for the well, but prior to drilling the wells we simply don't know, and it's too big an investment to make and not know what we'll do about the FERC findings.

And that's really the impetus to be before you, is to establish, as I think we conclusively have, is that the infill findings are necessary for these wells so that we can, in fact, get efficient wellbores in that spacing unit that replace these open hole completions that are no longer efficient, but rather than simply arbitrarily terminating commercial production in these wells. We'd like to phase them in and phase them out and we believe the method discussed before you today is the one that most effectively and efficiently accomplishes that task.

MR. STOGNER: Thank you, Mr. Kellahin.

Is there anything further in Case Number 9393 today?

Mr. Lund, Mr. Kellahin, I'd like to get a rough draft order from each of you. If you care to work together, that's fine. Say within seven days, is that good enough or would you like ten?

MR. KELLAHIN: Seven is fine. I'll be happy to circulate one to Mr. Lund and let him forward it on to you with his comments and suggestions.

MR. LUND: That's acceptable.

MR. STOGNER: Mr. Bruce, you can jump right in and submit me one, too, if you'd like.

MR. BRUCE: Oh, that's okay, I'll trust them.

MR. STOGNER: Okay, in that case, this case will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9393, heard by me on 25 May 1988.

Examiner
Oil Conservation Division